Exploring the Relationship Between Empathy for Animals and Environmental Self-Efficacy in Zoo and Aquarium Visitors

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Abstract

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The interconnected crises of climate change and biodiversity loss necessitate widespread behavior change on the individual and collective levels, and zoos and aquariums are uniquely positioned to galvanize this change. Understanding the factors that influence visitors' behavioral intentions is vital to interpretation that inspires pro-environmental action. The purpose of this study was to explore the relationship between empathy for animals and environmental self-efficacy, and the ways in which they affect zoo and aquarium visitors' intent to take conservation action. Quantitative survey data were collected from 264 visitors to four AZA-accredited zoos and aquariums using the Conservation Learning Instrument developed by Mast et al. (2018). Environmental self-efficacy was found to be significantly correlated with all measures of empathy for animals, and both constructs were significantly related to intent to take conservation action. Empathy for animals, environmental self-efficacy, and intent to take conservation action were significantly different between women and men and between guests who did and did not report an extra-special experience during their visit. These findings affirm and build upon those of existing literature and have implications for the roles of environmental self-efficacy and empathy for animals in zoo and aquarium research and practice.

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Chapter One: Introduction

According to the 2018 report by the Intergovernmental Panel on Climate Change, global carbon emissions must be halved by 2030 if the world is to avoid breaching an average global temperature of 1.5ºC over pre-industrial levels. Above 1.5ºC, human and non-human animals alike will suffer from irreparable ecosystem collapse, which will disproportionately affect the half of the world's population living in poverty (IPCC, 2018; Global Goals, 2020). To halve emissions within the coming decade, widespread behavior change – both individual and collective – must take place in high carbon-emitting nations, especially the United States (Rare, 2019, IPCC, 2018). Individual behavior changes, such as taking public transit and reducing consumption of animal products and single-use plastics, lessen one's own contribution to high-emitting sectors such as transportation, electricity, and agriculture (EPA, 2020, IPCC, 2018). Collective behavior changes, such as voting, getting involved with community activism, signing petitions, and contributing to nonprofits, are needed to drive systemic change toward an equitable, sustainable, carbon-free economy (IPCC, 2018).

Informal education institutions, such as museums, zoos, aquariums, and gardens, are exploring ways that they can play a role in this global effort to slow climate change and mitigate its effects (Cameron, 2011). Many organizations are shifting from the more traditional, passive approach of simply transmitting knowledge about environmental issues (with the hope that visitors will learn to take action on their own time) to a more active approach that seeks to inspire and facilitate behavior change. As institutions that focus specifically on the world's biodiversity, much of which is threatened by climate change and habitat loss, zoos and aquariums (henceforth, zoos) are uniquely positioned to influence the environmental behaviors of large, diverse audiences (Falk et al., 2007)—and many are taking on the challenge.

Institutions accredited by the Association of Zoos and Aquariums (AZA) – which, together, welcome over 200 million guests annually in the United States – pursue missions that include conservation education (AZA, 2019). Zoos' encouragement of conservation action is not only rooted in the AZA accreditation standards and the passion of zoo staff, but it is also in demand; evidence shows that visitors are supportive of zoos promoting conservation messages and tend to perceive zoos as important sources of conservation education (Ballantyne and Packer, 2016; Falk et al. 2007). However, the question of how zoo experiences translate into tangible behavior change has no simple answer. As a result, researchers and practitioners across the field have dedicated considerable research, evaluation, and innovation to exploring the factors of zoo experiences that inspire people to adopt new behaviors on behalf of the rest of the natural world.

In order for an individual to intentionally adopt a new behavior, they must first have self-efficacy for that behavior. The term self-efficacy was first coined by Bandura (1977) as "the conviction that one can successfully execute the behavior required to produce [certain] outcomes" (p. 193). Therefore, in order to change one's behavior in ways that benefit the earth, one must have a sense of *environmental self-efficacy*. For the purpose of this study, I will employ the following definition of environmental self-efficacy, which I have adapted from Bandura's (1977, p. 193) definition: *Environmental self-efficacy is the conviction that one can successfully carry out meaningful action, individually or collectively, on behalf of humans, animals, or other living beings affected by threats to the natural world.* Considerable evidence demonstrates that environmental self-efficacy is predictive of pro-environmental behavior (Bamberg & Möser, 2007; Clayton et al., 2017; Hines, 1987). Therefore, it is vital that zoos intentionally cultivate a sense of environmental self-efficacy in their visitors so that they feel capable of turning any

knowledge, sentiments, or skills they gain at the zoo into concrete conservation actions. In order for zoos to implement interpretive strategies that effectively build guests' environmental self-efficacy, it is important that they understand how this construct interacts with the manifold cognitive, affective, and behavioral factors at play during a visit to the zoo.

One such factor that been the focus of intensive study is empathy for animals—particularly how this experience can be harnessed to promote action for conservation. For the purpose of this study, I will employ Young et al.'s (2018) definition of empathy: *Empathy is a stimulated emotional state that relies upon the ability to perceive, understand, and care about the experiences or perspectives of another person or animal* (p. 329). As a result of work conducted throughout the Advancing Conservation through Empathy (ACE) for Wildlife network, empathy best practices have been established and put into practice at zoos throughout the country. Prior work has investigated the relationships between empathy for animals and environmental attitudes (Berenguer, 2007), moral reasoning (Berenguer, 2010), concern (Schultz, 2000; 2011), and behavioral motivation (Chawla, 2009; Grajal et al., 2016; Kals et al., 1999; Tam, 2013). Yet no published research to date has specifically investigated the relationship between environmental self-efficacy and empathy for animals in zoos.

However, recent evaluative work has begun to shed light upon the relationship between empathy for animals and environmental self-efficacy, thanks to the Conservation Learning Instrument developed at the Shedd Aquarium by Mast et al. (2018) (Appendix I). The Conservation Learning Instrument seeks to build a holistic understanding of how zoo and aquarium experiences impact guests' conservation learning by measuring the following factors: visitors' predispositions for empathy and environmental engagement; the types of experiences they have at the zoo; their affective and cognitive reactions; their curiosity to learn more; and

their intent to take conservation action (Mast et al. 2018). As part of the validation process for the Conservation Learning Instrument, Luebke et al. (2017, 2018) homed in on the relationship between empathy for animals and environmental self-efficacy and found that empathic concern was significantly predictive of environmental self-efficacy (Luebke et al. 2017, 2018).

Purpose and Research Questions

The purpose of this study was to explore the relationship between empathy for animals and environmental self-efficacy in zoo and aquarium visitors and the ways in which these constructs interact with visitors' intent to take conservation action. I addressed the following research questions:

1. How and to what extent does environmental self-efficacy relate to visitors' predispositions for empathy for animals and to their empathic reactions to animals at the zoo?
2. How and to what extent do environmental self-efficacy and empathy for animals, individually, relate to visitors' intentions to take conservation action?
3. What patterns emerge when we examine environmental self-efficacy, empathy for animals, and intent to take conservation action across demographic characteristics and zoo experiences?

Significance

The present research contributes valuable insights both for practitioners working to galvanize environmental behavior change and for researchers seeking to understand how manifold cognitive, affective, and behavioral factors interact to catalyze conservation action. In a literature review of the psychology of environmental decision-making, Newell et al. (2014)

highlight the importance of studies such as this one that focus in on the relationships between specific factors, writing,

> One issue that becomes apparent in reviewing this literature is the difficulty of pinpointing or isolating which of these factors (or combinations thereof) has the greatest impact on willingness to take action…What is clear, however, is that careful experimentation and testing of various combinations of these factors are crucial for improving our understanding of what works and why. (p. 460)

In honing our collective knowledge about the complex pathway from zoo experiences to behavioral change, my findings inform numerous new directions for future research. By indicating the value of integrating empathy best practices with self-efficacy-building strategies, this study may also guide zoo practitioners' efforts to empower visitors. Additionally, this study significantly contributes to the continued validation of the Conservation Learning Instrument by applying it in new geographical contexts. On an even broader scale, this exploration of the relationship between empathy for animals and environmental self-efficacy is valuable to communicators across sectors working to construct narratives that will effectively inspire action for climate justice and biodiversity conservation.

Chapter Two: Literature Review

This study did not seek to identify empathy for animals and environmental self-efficacy as the most important factors influencing behavior change in zoo and aquarium visitors. Rather, this research was undertaken with appreciation of the fact that these are just two of many social and psychological factors that shape one another and influence the meaning-making pathway through which visitors go from having experiences at the zoo to taking action on environmental issues. A diagram (Figure 1) featured in the Measuring Empathy: Collaborative Assessment Project Briefing (Owens & Khalil, 2015) encapsulates the relationship between some of these factors by portraying them as gears. As one gear turns, it influences how the others move, and together, they generate beneficial action for animals and climate. The present research is an effort to zoom in on two gears – empathy for animals and environmental self-efficacy – to closely examine how and to what extent they turn one another and power behavior change.

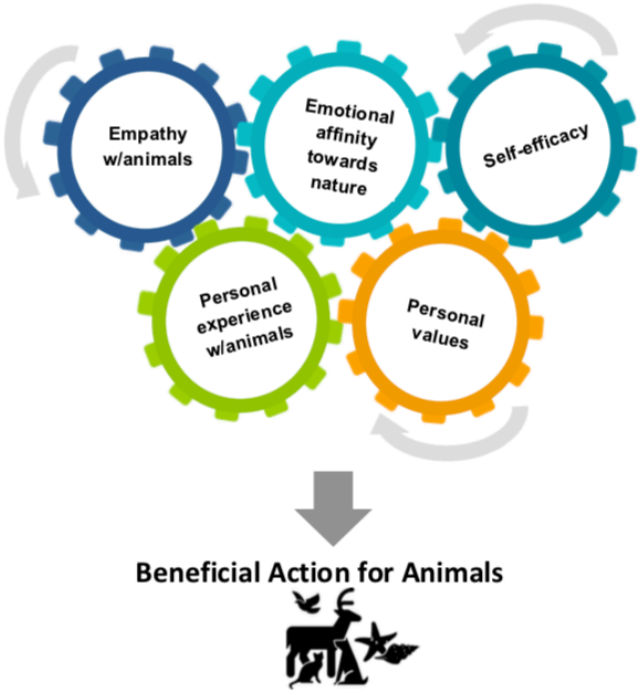

Figure 1. Diagram of factors contributing to environmental behavior change from the Measuring Empathy: Collaborative Assessment Project (MECAP) Project Briefing (Owens & Khalil, 2015).

This literature review presents our collective knowledge to date on empathy for animals and environmental self-efficacy in terms of their relationships to each other and to pro-environmental behavior change.

Empathy for Animals

Understanding Empathy for Animals

Empathy has been defined in numerous ways, with no single definition employed consistently across fields. In the present study, I employ the following definition from Young et al. (2018): *Empathy is a stimulated emotional state that relies upon the ability to perceive, understand, and care about the experiences or perspectives of another person or animal* (p. 329). I have selected this definition because it accounts for non-human animals, includes cognitive, affective, and behavioral dimensions, and is employed by many zoos engaged in empathy research and interpretation (Young et al., 2018).

As a construct, empathy is comprised of three separate but interrelated components: affective empathy, cognitive empathy, and empathic concern (Cuff et al., 2014). While the three phenomena take place in different parts of the brain, they all facilitate perspective-taking (Eres et al., 2015). Affective empathy is defined as the ability to sense or physically experience the perceived emotions of another (Cuff et al., 2014; Eisenberg and Miller, 1987; Mehrabian and Epstein, 1972). The experience is evoked when mirror neurons stimulate the brain to respond to the emotions of others by reflecting them (Gerdes et al., 2011; Goldman, 2014). Preliminary findings suggest that the experience of viewing animal emotions triggers mirror neurons in the same way as the experience of viewing human emotions (Myers, 2007).

Cognitive empathy refers to one's ability to understand others' experiences by recognizing and imagining their reality (Cuff et al., 2014; Davis et al., 1996; Young et al., 2018).

Through cognitive empathy, one can gain the ability to express through language how one's own lived experiences compare and contrast to those of others (Myers, 2007). Additionally, the more one knows about another's experience, the more accurate their cognitive empathy will be (Young et al., 2018). In the case of zoo and aquarium visitors, cognitive empathy can sometimes be at odds with the emotions stirred by affective empathy. Young et al. (2018) provide the following example:

> Visitors to an aquarium will often express sadness for an octopus housed in a small exhibit alone. As social beings that require and enjoy space, we struggle to accurately empathize with the needs of an octopus who, when given the choice, prefers to live alone and in small confined locations within the vast ocean. (p. 330)

In order to prevent such misperceptions, it is essential that institutions with living collections foster cognitive empathy with accuracy by making emotional appeals alongside information about species' behavior, cognition, and perspectives (Young et al., 2018).

Empathic concern, often used interchangeably with compassion, is the dimension of empathy that seeks to reduce the suffering of others (Eisenberg and Miller, 1987; Mehrabian and Epstein, 1972; Pfattheicher et al., 2016). This phenomenon builds upon what is felt through affective empathy and what is understood through cognitive empathy to determine what action can be taken to relieve another being's physical or emotional pain (Young et al., 2018). Empathic concern can encourage pro-social activities such as volunteering, making donations, and other deeds that help "vulnerable others" (Pfattheicher et al., 2016, p. 931). One might display empathic concern for *individual* wild animals by, for instance, taking an injured bird to a wildlife rehabilitation center or helping an overturned turtle right itself. However, zoos have the unique challenge of inspiring empathic concern for *entire species* via experiences with individual

animals that are not in need of help themselves (Young et al., 2018). Please see Appendix II for a brief review of the barriers and promoters of empathy for animals and for a summary of established empathy best practices for zoos and aquariums.

Empathy for Animals and Pro-Environmental Behavior Change

Researchers have identified multiple pathways from the affective and cognitive experiences of empathy for animals and the environment to the result of pro-environmental behavior change. This paper employs the following definition of pro-environmental behavior, which I have adapted from a definition by Stern (2000): *Pro-environmental behaviors are those that positively impact the availability of resources for life on earth or that maintain the dynamics of ecosystems and the biosphere* (p. 408). Dispositional Empathy with Nature (DEN), defined by Tam (2013) as the "dispositional tendency to understand and share the emotional experience of the natural world" (p. 92) has been found to robustly predict reported conservation behavior. Understanding the extent to which visitors are predisposed toward empathy for animals is important to our interpretation of their reactions to experiences at the zoo. Empathic feelings have also been found to mediate environmental moral reasoning, indicated in a study by Berenguer (2010) in which individuals with higher empathy levels provided higher numbers of moral arguments for pro-environmental behaviors. This same study discovered that imagery can impact the types of moral reasons expressed; seeing animals can encourage more eco-centric reasoning, whereas images of humans can inspire more anthropocentric reasoning (Berenguer, 2010). Animals are not the only stimuli that prompt empathic action for the environment; people's compassion for other human beings is positively related to pro-environmental intentions, donations, and values (Pfattheicher et al., 2016).

The relationship between empathy for animals and pro-environmental behavior change is a new but rich frontier in zoo and aquarium research that has implications for societal responses to climate change. Grajal et al. (2016) discovered a significant, directional relationship between connectedness to animals and pro-environmental behavior. Since connectedness to and empathy for animals are separate but related concepts, the relationship between empathy for animals and pro-environmental behavior may be similarly strong. Perspective-taking – a process that spans cognitive and affective empathy as well as empathic concern – has been found to correspond with biospheric concern (concern reflecting value for all living things); Schultz (2000) found that individuals who take the perspective of an animal being harmed by pollution express significantly higher biospheric concern than individuals who remain "objective."

Zoos seek to promote behavior change for *entire* species and ecosystems through experiences with *individual* animals. Evidence suggests that empathy for the environment may be a key factor in expanding concern for individual animals to the rest of the natural world. Berenguer (2007) found that when induced to feel empathy toward an animal or plant, people express more favorable attitudes and stronger intentions to perform helping behaviors—not only toward the natural entity before them, but also toward nature as a whole. This finding indicates the real potential for zoos to employ empathic concern to inspire behavioral intentions that extend beyond their exhibits and into ecosystems around the world. At the same time, it is important for zoos to avoid stimulating empathic over-arousal, the state in which an individual's distress reaches a degree that they must turn their attention away from the subject of their empathy and toward their own well-being (Hoffman, 2008). In order to solidify visitors' affective and cognitive reactions into behavioral intentions, zoos must also strive to ensure that

visitors feel competent in their abilities to carry out those behaviors. This is where environmental self-efficacy enters the picture.

Environmental Self-Efficacy

Understanding Environmental Self-Efficacy

The concept of self-efficacy was first developed by Bandura (1977), who defined it as "the conviction that one can successfully execute the behavior required to produce [certain] outcomes" (p. 193). Efficacy plays an essential role in human behavior, strongly influencing goals, aspirations, and persistence (Bandura, 2004). Individuals with stronger self-efficacy for a particular effort tend to set higher goals for themselves and commit more firmly to those goals than those with weaker efficacy; furthermore, they tend to expect more favorable outcomes and view obstacles as surmountable through perseverance and self-management skills (Bandura, 2004).

Bandura (1977) established the four types of experiences that can develop self-efficacy: mastery experiences, social modeling, verbal persuasion, and one's physical and emotional state. Mastery experiences, especially when repeated, increase an individual's expectations of future success and reduce their fear of the negative impacts of occasional failures. Social modeling builds self-efficacy by providing a vicarious experience of mastery; according to Bandura (1977), "Seeing others perform threatening activities without adverse consequences can generate expectations in observers that they too will improve if they intensify and persist in their efforts" (p. 197). Verbal persuasion by others can strengthen a person's self-efficacy by influencing them to believe that they can successfully cope with situations that have thwarted them in the past (Bandura, 1977). Finally, physiological and emotional responses to challenging situations can inform one's own perceived self-efficacy.

It is important to note that since Bandura's (1977) initial work, researchers have characterized multiple types of efficacy. As Crosman et al. (2019) point out, these types have been applied inconsistently in environmental literature, with some studies distinguishing between different forms of efficacy and other studies consolidating them under a single term. On the one hand, some environmental research (Crosman et al., 2019; Doherty, 2019; Truelove, 2009) separates self-efficacy (how easy a person believes it will be to engage in pro-environmental action) from response efficacy (how effective they believe their behaviors will be in mitigating harm to the environment). On the other hand, much of the literature (Heath-Gifford, 2006; Kellstadt et al., 2006; Mead et al., 2012; Milfont et al., 2012; Morton et al., 2011; van Zomeren et al., 2010) employs "self-efficacy" or simply "efficacy" as an umbrella term for both constructs. The present research follows the latter group of literature in its application of the term "environmental self-efficacy" to refer to both the ease and effectiveness of action, employing the following definition, which I adapted from Bandura (1977, p. 193): *Environmental self-efficacy is the conviction that one can successfully carry out meaningful actions, individually or collectively, on behalf of humans, animals, or other living beings affected by threats to the natural world.* I apply this "umbrella" approach to efficacy terminology in keeping with prior work conducted by Luebke et al. (2017, 2018) with the Conservation Learning Instrument (Mast et al., 2018).

Self-Efficacy and Pro-Environmental Behavior Change

A variety of studies have uncovered the extent to which environmental self-efficacy affects various facets of the process of individual behavior change. By giving rise to intrinsic motivation, environmental self-efficacy has been shown to promote low-effort environmental activities, such as recycling (Tabernero & Hernandez, 2011). Environmental self-efficacy has

also been found to facilitate "spillover" from easy pro-environmental behaviors to more difficult pro-environmental behaviors, indicating the continued importance of the phenomenon as one adopts more challenging practices (Lauren et al., 2016). Schutte and Bhullar's (2017) experimental study established a causal relationship between environmental self-efficacy and intent to adopt sustainability behaviors by engaging the experimental group in an intervention intended to enhance self-efficacy and the control group in an intervention that did not. Their successful environmental self-efficacy intervention first provided participants with a written explanation of environmental self-efficacy and its role in changing purchasing habits, then asked them to engage in two reflective writing activities: one about an area of their life in which they would like to increase their environmental self-efficacy, and another specifically about building environmental self-efficacy for green buying habits. However, in one study conducted with adolescents, environmental self-efficacy was *not* found to have a significant moderating effect between environmental attitudes and behaviors—indicating the need for further research into environmental self-efficacy in this important age group (Meinhold and Malkus, 2005).

Environmental self-efficacy has also been found to play an important role in responses to climate change. Milfont (2012) found that perceived environmental self-efficacy for action on climate change is positively associated with concern and knowledge about the crisis. He proposed the following pathway to illustrate the relationship between knowledge, concern, self-efficacy and responsibility: first, knowledge about climate change increases concern about the resulting risks; second, this concern engenders greater environmental self-efficacy; finally, environmental self-efficacy increases one's sense of responsibility to take action on climate change (Milfont, 2012). Thus, building environmental self-efficacy is critical to the process of encouraging people to adopt behaviors that mitigate the effects of climate change.

Few studies have examined environmental self-efficacy specifically in zoos, but initial findings suggest that zoos *can* increase visitors' environmental self-efficacy and that it is critical to zoos' promotion of conservation behavior. Clayton et al. (2017) discovered that a zoo visit significantly increases perceived self-efficacy to protect biodiversity, observing that visitors *exiting* the zoo were found to have significantly higher environmental self-efficacy than visitors *entering* the zoo. Among the exit surveys, the researchers also found environmental self-efficacy to be significantly correlated with environmental concern, behavioral intentions, and reported behavior (Clayton et al., 2017). Clayton et al. (2017) concluded that "a zoo visit does have a positive impact on knowledge and concern, and by affecting self-efficacy, it has the potential to influence future behavior" (p. 87). Given the promising nature of the existing research on environmental self-efficacy, it is clear that there is much to be gained through the continued exploration of this construct.

Empathy for Animals and Environmental Self-Efficacy

Both empathy for animals and environmental self-efficacy have been shown to impact pro-environmental behavior, yet we know little about how and to what extent they affect one another. In one non-environmental context – schoolteachers – emotional self-efficacy (the judgment of one's own ability to process emotional information accurately and effectively) was found to predict teachers' empathy (Goroshit & Hen, 2014). This was the sole study I uncovered in which empathy and self-efficacy were the primary variables. Given the lack of published research exploring this intersection as it relates to conservation behavior in zoos and aquariums, it is evident that this is a gap in the literature that needs to be addressed.

However, unpublished tests of the Conservation Learning Instrument (Mast et al., 2018) found empathic concern to be highly predictive of environmental self-efficacy. As part of the

validation process, an earlier iteration of the instrument was tested at the Shedd Aquarium, the Chicago Zoological Society-Brookfield Zoo, and four other U.S. zoos and aquariums in the summer of 2016 (Mast et al., 2018). Luebke et al. (2018) reported the following analyses and results in the AZA Conservation Education Committee newsletter.

The researchers analyzed data from the Conservation Learning Instrument to assess the relationship between empathy for animals and environmental self-efficacy. Perceived environmental self-efficacy was represented by the questionnaire item, "I feel more like my actions can make a difference in helping to protect these animals in the wild" (Luebke et al., 2018). To create an empathic concern composite score, they took the average ratings for two items on the questionnaire: "I became concerned about these animals in the wild" and "I have a greater sense of connection with animals and the natural world" (Luebke et al., 2018). The former question measured empathic concern, or compassion, for wild animals, whereas the latter question measured connectedness to animals. The researchers chose to include this item on connectedness in the empathic concern composite score because connectedness between humans has been found to facilitate empathic responses which result in increased willingness to help (Cialdini et al., 1997), and because connectedness to nature has been found to be a strong basis for empathy and motivation to take pro-environmental action (Tam, 2013).

Luebke et al. (2018) discovered that empathic concern was highly predictive of respondents' ratings of perceived environmental self-efficacy. Cognitive reactions (increased understanding of how individual actions can impact the environment and wildlife) were also highly predictive of environmental self-efficacy. Luebke et al. (2018) state that these preliminary results indicate that "zoos and aquariums can build confidence in visitors' capabilities to take action by providing action-related knowledge as to how people can help and by triggering the

motivational dimension of visitors' empathic concern for wildlife" (p. 10). These findings are the first to draw a direct link between empathy for animals and environmental self-efficacy in zoo and aquarium visitors.

Identity and Experience Factors Affecting Empathy, Self-Efficacy, and Intent to Act

Research has uncovered differences in the constructs of empathy for animals, environmental self-efficacy, and pro-environmental behavior between demographic variables and between types of experiences at the zoo. For example, in terms of gender identity, Tam (2013) observed that women had stronger environmental movement support, frequency of sustainable behaviors, and DEN than men. Research into the gender dimensions of sustainable consumption has established cognitive links between "greenness" and femininity, and that men are more likely to purchase sustainable alternatives after being exposed to messages affirming their masculinity (Brough et al., 2016). Caprara & Steca (2007) found that women tended to demonstrate more pro-social behaviors and express greater perceived efficacy to empathically respond to others' needs, and Riechard and Petersen (1998) observed greater perception of environmental risks among women. However, Riechard and Petersen (1998) found no significant difference in risk perception between age groups. Clayton et al. (2017) found no significant difference in environmental self-efficacy between zoo visitors of different genders and education levels.

Types of experiences during a zoo visit have been found to interact with the constructs of interest in various ways. Myers (2007) established that making eye contact with an animal, spending more time with them, and observing them demonstrate agency are all factors that increase humans' empathy levels toward animals. Narrative, language choice (especially the use of pronouns to describe animals), and cultural portrayals have also been found to foster empathy

for animals (Chawla, 2009; Young et al., 2018). Ridgway (2005) observed that when animals are active, zoo visitors' observation time tends to double. However, Clayton et al. (2017) observed that zoo visit frequency was not significantly related to environmental self-efficacy. The variability of these findings indicates the value of further exploring the demographic and experiential dimensions of empathy for animals, environmental self-efficacy, and intent to take conservation action.

Empathy, Self-Efficacy, and Intent to Act are part of a Conservation Learning Meaning-Making Pathway

Although this study focused on empathy for animals and environmental self-efficacy, these are just two of the factors that affect the process of conservation learning. In the process of developing and validating the Conservation Learning Instrument, Mast et al. (2018) employed Ballantyne and Packer's (2005) definition of conservation learning, which will also be applied in the present research because it addresses cognition, affect, and behavior, the three primary domains of learning:

> [Conservation learning is] a meaning-making process that incorporates the deepening and expansion of personal knowledge of sustainability issues; changes in awareness, appreciation, and concern for wildlife; development of intentions to take or refrain from specific personal actions that have an impact on the environment; and enactment of lifestyle changes designed to support environmental sustainability (p. 287).

This definition describes conservation learning as a meaning-making process. Mast et al. (2018) hypothesize a meaning-making process, or "pathway," for conservation learning, represented in Figure 2. This pathway includes the major factors known to affect visitors' meaning making in zoos, each of which is reflected in the Conservation Learning Instrument. The topics in this

literature review – empathy for animals, environmental self-efficacy, and intent to take conservation action – are encompassed by the following factors in the pathway: has focused upon three of the factors: visitor predispositions, affective/empathic reactions, and intent to act. Please see Appendix III for background and literature on the factors not emphasized in this study—environmental predispositions, exhibit characteristics, affective reactions other than empathy, cognitive reactions, and curiosity to learn more.

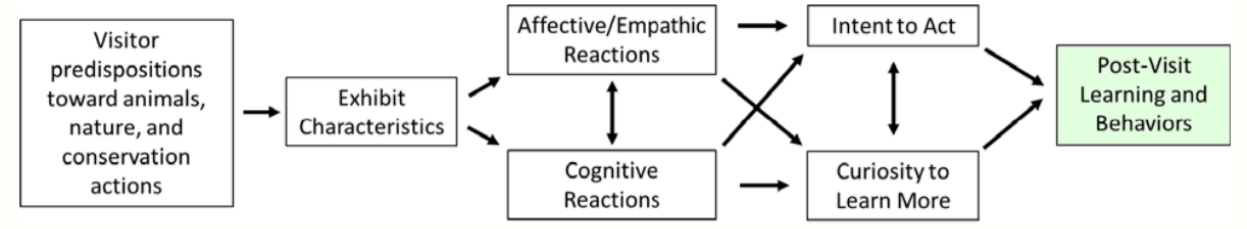

Figure 2. Meaning-making pathway for conservation learning, from zoo visit to behavior change, presented by Mast et al. (2018) based upon the definition by Ballantyne & Packer (2005).

Glossary of Key Terms from Literature Review

Conservation Learning: "A meaning-making process that incorporates the deepening and expansion of personal knowledge of sustainability issues; changes in awareness, appreciation, and concern for wildlife; development of intentions to take or refrain from specific personal actions that have an impact on the environment; and enactment of lifestyle changes designed to support environmental sustainability" (Ballantyne & Packer, 2005, p. 287).

Empathy: "Empathy is a stimulated emotional state that relies upon the ability to perceive, understand, and care about the experiences or perspectives of another person or animal" (Young et al., 2018, p. 329).

Environmental Self-Efficacy: Environmental self-efficacy is the conviction that one can successfully carry out meaningful actions, individually or collectively, on behalf of humans, animals, or other living beings affected by threats to the natural world. Definition adapted from Bandura (1977, p. 193).

Pro-environmental behavior: Pro-environmental behaviors are those that positively impact the availability of resources for life on earth or that maintain the dynamics of ecosystems and the biosphere. Definition adapted from Stern (2000, p. 408).

Chapter Three: Methods

The purpose of this study was to explore the relationship between environmental self-efficacy and empathy for animals in zoo and aquarium visitors. The following section details the methods and procedures through which this study addressed my three research questions, as well as a description of the research sample in terms of demographics, group composition, relationships to the zoo, and overall experience measures.

Research Approach

Study Design

I employed a survey design in this study in order to gain a quantitative description of trends present in the population of interest (zoo and aquarium visitors) by gathering data from a representative sample of visitors. A survey design was the most fitting approach to address my research questions because it enabled me to draw inferences about zoo visitors as a whole by examining the responses of a subset of individuals. The survey approach was cost-effective, allowed the study to cover a geographically diverse array of perspectives, and enabled me to gain a large sample within the allotted timeline.

Instrumentation

This study is an extension of work by Mast et al. (2018) to develop and validate a tool to holistically measure conservation learning in zoo and aquarium visitors. The Conservation Learning Instrument was created at the Shedd Aquarium in response to growing calls from the visitor studies field for more reliable, generalizable tools that accurately assess the phenomena they seek to measure. The need for such tools has been especially salient in the zoo and aquarium field, which currently lacks a comprehensive, streamlined instrument that can address the cognitive, affective, and behavioral dimensions of conservation learning across institutions (Mast

et al., 2018). The instrument was built and improved upon through a rigorous validation process, including multiple stages of pilot testing, item analysis, and test refinement (Mast et al., 2018). The current iteration of the instrument has been applied consistently since 2018 in both exhibit-specific and exit contexts at the Shedd Aquarium.

I selected the Conservation Learning Instrument for this study because it addresses the key constructs of my research question – empathy for animals and environmental self-efficacy – while connecting these phenomena to the other components of the meaning-making process hypothesized to lead to behavior change. Because empathy and self-efficacy do not exist in a vacuum, and are instead inextricably connected to predispositions, zoo experiences, and additional affective and cognitive factors, it was important that I employed an instrument that addresses these constructs in context. As Weiler and Smith (2009) point out, much research into interpretive and experiential outcomes only examines one or two domains; therefore, the Conservation Learning Instrument is unique because it addresses all the known factors of conservation learning. Furthermore, employing the Conservation Learning Instrument increased the potential impact of this work. As the first study to apply the most current iteration of the instrument across a geographic range of institutions, this research is beneficial to the Shedd Aquarium – and to the visitor studies field as a whole – because it demonstrates how the results of this important tool differ across sites.

The Conservation Learning Instrument (Appendix I) includes 46 items, including 37 questions on five-point ordinal scales, one written question, and eight demographic questions. Each scaled question specifically addresses one of the following factors of conservation learning: environmental predisposition, empathy predisposition, zoo/exhibit experience, cognitive reactions, affective/empathic reactions, curiosity to learn more, and intent to take action/self-

efficacy (Mast et al., 2018). The single written response is where visitors can report anything extra special that took place during their visit.

In consultation with Fran Mast, Research & Evaluation Associate at the Shedd Aquarium, I made some minor alterations to the current version of the instrument for the purpose of this study. First, because three out of four of my sites are zoos, I changed the word "aquarium" to "zoo" or "institution" wherever it appeared. Second, I made slight changes to the language of the "Your Racial/Ethnic Identity" question to further increase gender and geographic inclusivity. Third, in order to gain as precise a snapshot of the respondent's experience as possible, I added question twelve, "At what point are you in your visit today?" This study did not focus on specific exhibits, but also was not strictly an exit survey. Therefore, even though sampling locations were selected to maximize the number of participants who were toward the middle or end of their visit, I anticipated variability in terms of when the survey would fall in a guest's day at the zoo and wanted to consider this factor in my analysis.

Data Collection

Sampling

The target audience for this study included adult (18+) zoo and aquarium visitors who were not volunteers or staff at that institution. Following Mast et al. (2018), participants were selected through simple random sampling. At medium- to high-traffic times at the zoo, every third individual adult who crossed over an imaginary line was invited to participate in the survey. If that individual refused, the next person who crossed the line was invited to complete the questionnaire. On low-traffic days, every first person to cross the line was asked to participate. See Appendix V for the data collection protocol shared with research sites.

Sampling locations within the research sites were selected based upon two criteria. First, because this study was a general zoo visit survey, rather than an entry or exit survey, the locations needed to be toward the inside or middle of the zoo so that the participants had experienced at least part of their visit when the interaction occurred. Second, research locations were either indoors or in semi-enclosed spaces, to ensure that visitors were sheltered from the cold, rain, or sun, and to prevent young children from running off while their parents or guardians filled out the questionnaire.

Research Sites

In order to build the generalizability of this study to zoos and aquariums throughout the country, data were gathered from four organizations throughout the United States: Denver Zoo in Denver, CO; Living Desert Zoo and Gardens in Palm Desert, CA; Shedd Aquarium in Chicago, IL; and Woodland Park Zoo in Seattle, WA. Sites were selected based on three criteria. First, I only considered sites accredited by the Association of Zoos and Aquariums (AZA) in order to ensure that they exceeded standards for animal welfare, education, and conservation action. Second, each organization required the staff capacity to either collect data on my behalf or to welcome a visiting researcher for two to three days. Third, I intentionally sought out zoos that represented a variety of geographic regions of the country, including the Pacific Northwest, Southwest, Rocky Mountains, and Midwest. The Bronx Zoo in New York City, NY (the flagship zoo of the Wildlife Conservation Society) would have been the fifth site in this study, representing the Northeast region, but data collection at this site had to be cancelled due to the COVID-19 pandemic of 2020. For each research site, I will present the location, mission, visitation level, current geographic range of conservation activities, and how the data from this site was acquired for this study.

Denver Zoo. The Denver Zoo (DZ) in Denver, Colorado works with the mission of "Inspiring communities to save wildlife for future generations" and pursues the vision of "A world where wildlife thrives" ("A Movement", 2020). As of 2018, the 84-acre zoo cared for over 3,500 individual animals of over 550 species and welcomed approximately 1.8 million visitors annually (*Annual Report*, 2018). DZ currently has field conservation efforts taking place in Vietnam, Peru, Botswana, Mongolia, and the Rocky Mountains, and the organization's strategic framework notes its intentions to "ensure that the exhibits and educational programs here on campus reflect our Field Conservation efforts around the world—providing not just information, but clear avenues of action" ("A Movement," 2020). Data from DZ was generously collected by zoo staff on my behalf, in person via paper surveys in February and early March of 2020.

Living Desert Zoo and Gardens. The Living Desert Zoo and Gardens (LDZG) in Palm Desert, California holds the mission of "Desert conservation through preservation, education, and appreciation." The organization manages over 1,200 acres of desert, 80 of which include exhibits and 1,120 of which hold pristine Sonoran Desert scrubland. LDZG cares for 450 individual animals of 143 species, as well as 1,475 species of plants. According to the most recent Annual Report, LDZG welcomed 514,283 visitors in 2018, continuing a six-year trend of record attendance. The institution leads or supports field conservation efforts in Mexico, India, South Africa, Tanzania, and the Southwestern United States. I collected data from LDZG in person via paper surveys on February 29 and March 1, 2020.

Shedd Aquarium. The Shedd Aquarium (the Shedd) in Chicago, Illinois works toward the vision of "A world thriving with aquatic life, sustained by people who love, understand, and protect it" by acting upon its mission of "Sparking compassion, curiosity, and conservation for the natural world" ("Vision and Mission," 2020). Welcoming over 2 million visitors annually,

the Shedd cares for freshwater and saltwater aquatic species, as well as some terrestrial animals, from around the world. The aquarium leads field conservation projects focusing on corals, groupers, sharks, conchs, and iguanas in the Bahamas, tortoises in Madagascar, and turtles, amphibians, and suckers in the Great Lakes and surrounding rivers (*Annual Report*, 2018). The aquarium also leads public campaigns for sustainable seafood and the reduction of single-use plastics (*Annual Report*, 2018). The Shedd provided randomly selected data from an existing set of exit surveys, which were collected in person via SurveyMonkey on a tablet between January 7 and February 14, 2019.

Woodland Park Zoo. The mission of the Woodland Park Zoo (WPZ) in Seattle, Washington is to "Save wildlife and inspire everyone to make conservation a priority in their lives." The zoo strives toward its vision of "a world where everyone lives sustainably with wildlife and their habitats" (*Strategic Plan,* 2018). In 2018, WPZ welcomed 1.39 million guests to engage with over 1,000 individual animals of 298 species (*Impact Report*, 2018). WPZ works with 35 conservation partners in over twenty nations, protecting species such as tree kangaroos in Papua New Guinea (the zoo's signature program), orangutans in Indonesia, cranes in Russia, and various carnivores in the Pacific Northwest region of the United States. I collected data from WPZ in person via paper surveys on January 31 and February 1 and 2, 2020.

Analysis

Much of this study's analysis followed the approaches taken by Mast et al. (2018) and Luebke et al. (2017, 2018), with guidance from the first authors thereof. I sought to gain insights into the relationships between the constructs of interest – empathy for animals, environmental self-efficacy, and intent to take conservation action – while also seeking out trends across and within demographic categories and types of zoo experiences. Data from each organization were

entered separately then compiled into a complete database, and each questionnaire was given a unique tag. Before conducting any inferential statistics, I established the response frequencies and means for every question on the instrument.

Item-Level and Factor-Level Scores

The phrase "item-level score" refers to the mean rating of any scaled item on the Conservation Learning Instrument. Although means typically are not calculated when using ordinal scales, I chose to do so in keeping with the analysis employed by the Shedd in their internal evaluative work (F. Mast, Personal communication, April 14, 2020). A "factor-level score" or "composite score" refers to the mean response of all of the items comprising a factor of interest, such as empathy predispositions, affective/empathic reactions, and intent to take action (Table 1). Environmental self-efficacy was represented by a single item (Table 1). I also calculated an empathic concern composite score from two items in the affective/empathic reactions factor, in order to extend prior analyses conducted by Luebke et al. (2017, 2018) with the Conservation Learning Instrument. To calculate factor-level scores, I found each visitor's average response to the four to six questions within a factor, then found the mean of all the visitors' average scores combined.

Table 1. Primary factors and items from the Conservation Learning Instrument used in this analysis. *Indicates the two items that comprise the empathic concern composite score, a factor-level score applied by Luebke et al. (2017) that is more empathy-specific than the total affective reactions composite score.

Item: Environmental Self-Efficacy
I have a greater sense of my connection with animals and the natural world.
Factor: Predispositions toward Empathy for Animals
When I see injured animals, I feel very upset.
When I see stories of animals in need, I imagine how things look from their perspective.
When I see animals well taken care of, I feel at peace.
When I see stories of animals being mistreated, I feel protective toward them.
Factor: Affective Reactions
*I have a greater sense of my connection with animals and the natural world. **

*I became more concerned about the well-being of these animals in the wild. **
I felt awed by the animals.
I saw how amazing the world is.
I was moved by my experience.
Factor: Intent to Take Action
I want to help support the care of these animals (volunteer my time, make a donation, etc.).
I want to share what I learned about these animals with others.
I want to do something new at home to help animals around the world (recycle, reduce energy use, etc.).
I want to do something new to support a conservation organization (make a donation, sign a petition, etc.).

Correlation

My first research question sought to address the *relationship* between empathy for animals and environmental self-efficacy, and my second called for an examination of how these two constructs, individually, *relate* to visitors' intent to take conservation action. Therefore, in order to explore these relationships, I conducted correlative analyses between a variety of item-level and factor-level scores. Because this was not an experimental study, none of my findings imply causation between variables. Although nonparametric tests are typically applied to ordinal data, I used Pearson's Correlation Coefficient (r), a parametric test, in order to extend prior evaluative analyses performed with Conservation Learning Instrument data at the Shedd (Fran Mast, Personal Communication, March 2, 2020). In my written descriptions of correlation strength, I applied the language detailed in Table 2, based upon the relative *r* values of the relationships in this study. A relationship was considered significant if it had a p-value below 0.05.

Table 2. Strength descriptors used in this study to describe various Pearson's Correlation Coefficients (r).

Strength Descriptor	Pearson's Correlation Coefficient (r)
Weak	$r < 0.35$
Moderate	$0.35 \geq r \leq 0.55$
Strong	$r > 0.55$

Demographic and Research Site Comparisons

My third research question called for exploration of patterns that emerge when environmental self-efficacy, empathy for animals, and intent to take conservation action are compared between demographic characteristics and zoo experiences. I began this investigation by conducting crosstabs and compiling the mean responses to all of the factor- and item-level scores listed in Table 1 by the following categorizations: membership, time since last visit, age, gender, race/ethnicity, education, presence of people under 18, and point in visit. After closely examining these means and noting any marked differences within categories, I selected categories to investigate further. Although, again, nonparametric tests are typically applied to ordinal data, I compared means between categories using independent samples t-tests in order to extend the Shedd's evaluative analyses. Differences were considered significant when they resulted in p-values below 0.05.

Limitations

There are certain limitations to this study that are important to describe in defining its scope. First, the present research is exploratory and correlational, not experimental and causative. Therefore, I was able to draw conclusions about the *relationships* between factors, but not about *causal pathways* between them. Any statements suggesting such a pathway are speculative and grounded in existing knowledge about these constructs from the literature. Second, this study measures behavioral intentions, not actual behavior, and which cannot be equated. Actual behavior is challenging to assess, due to the continued contact required post-visit and the potential effects of positive response bias. I join Mast et al. (2018) in encouraging further research into the predictive nature of intentions for actual action. Third, in keeping with much of the environmental efficacy literature, I refer to two types of environmental efficacy – self-

efficacy (the perceived ease of a behavior) and response efficacy (the perceived effectiveness of the behavior) – under one umbrella of self-efficacy. Measuring these types of efficacy separately could lead to an even more rich analysis of visitors' meaning making.

Description of the Sample

In total, 264 individual zoo and aquarium visitors participated in this study with 19% of responses from the WPZ, 20% from the LDZG, 33% from the DZ, and 28% from the Shedd (Table 3). Non-members were in the majority, representing 64% of the sample (Table 3). Forty-one percent of participants were frequent visitors, meaning that they had visited within the past 12 months, whereas nearly one third were visiting the zoo for the first time (Table 3).

Table 3. Composition of the sample by research site, membership, and time since last visit.

Question	Response	Frequency	Valid Percent (rounded to nearest whole number)	N
Research Site	Denver Zoo	86	33%	264
	Living Desert Zoo and Gardens	52	20%	
	Shedd Aquarium	75	28%	
	Woodland Park Zoo	51	19%	
Are you a member of this institution?	Yes	74	28%	262
	No	167	64%	
	Did not respond	21	8%	
When was the last time you visited before today?	First time!	85	32%	262
	12 months or less	107	41%	
	1+ to 2 years ago	17	7%	
	2+ to 5 years ago	13	5%	
	5+ to 10 years ago	14	5%	
	More than 10 years ago	15	6%	
	Did not respond	11	4%	

Women comprised 56% of the sample, and approximately two thirds of the sample were people between the ages of 18 and 39 (Table 4). Sixty eight percent of visitors responded that they identified as white and 38% identified as people of color; because visitors were welcome to check all racial identities that applied to them, the number of responses to this question was

greater than the number of participants (Table 4). Overall, the respondents were highly educated, with 30% having achieved graduate degrees or higher, 33% having completed a college degree, and 23% having attended some college (Table 4).

Table 4. Demographic information of study participants, including gender identity, age, racial/ethnic identity, and highest education level attained.

Question	Response	Frequency	Valid Percent (rounded to nearest whole number)	N
Gender Identity	Men	100	38%	264
	Women	148	56%	
	Nonbinary	1	0%	
	Did not respond	15	6%	
Age	18-24	42	16%	262
	25-29	50	19%	
	30s	81	31%	
	40s	33	13%	
	50s	13	5%	
	60s	19	7%	
	70+	9	3%	
	Did not respond	15	6%	
Racial/Ethnic Identity	American Indian or Alaska Native	6	2%	249 (multiply coded)
	Arab or Middle Eastern	3	1%	
	Asian or South Asian	28	11%	
	Black/African American	11	4%	
	Hispanic or Latina/o/x	29	12%	
	Multiracial	11	4%	
	Native Hawaiian or Pacific Islander	2	1%	
	White (non-Hispanic)	169	68%	
	Other	6	2%	
Highest education, so far	Some school	2	1%	259
	High school graduate	21	8%	
	Some college	59	23%	
	College graduate	85	33%	
	Graduate degree or higher	78	30%	
	Did not respond	14	5%	

In order gain a snapshot of each participant's day at the zoo at the time of the interaction, I asked three experience-related questions. Fifty-two percent visited in adult-only groups, whereas 43% participants visited with family groups that included at least one person under the

age of 18 (Table 5). Half of the respondents visiting with young people were in their thirties. Of the visitors to WPZ, LDZG, and DZ who responded to, “At what point are you in your visit today?” 70% of the visitors were either “somewhere in the middle” or “near the end” (Table 5). Because data from the Shedd were collected as an exit survey, all data are assumed to have been collected near the end of each participant’s visit. In response to the question “Sometimes when you visit places like the zoo or aquarium, something happens that really sticks in your mind. Did anything extra special happen during your visit today?” 36% said yes (Table 3). 123 individuals elaborated upon their yes or no response, with largest proportion of these answers describing a moment in which they interacted with an animal, observed an animal engaged in a specific behavior, or saw a favorite animal in general (Appendix IV).

Table 5. Snapshot of visitors’ days at the zoo or aquarium—including the presence of people under the age of 18, whether or not the participant had an extra-special moment during their visit, and point in the visit at which the survey took place.

Question	Response	Frequency	Valid Percent (rounded to nearest whole number)	N
Do you have people under 18 in your group?	Yes, family group	114	43%	264
	No, adult only group	138	52%	
	Did not respond	12	5%	
Did anything extra special happen to you during your visit today?	Yes	95	36%	262
	No	142	54%	
	Did not respond	25	10%	
At what point are you in our visit today?	At the beginning	42	22%	189 (does not include Shedd Aquarium)
	Somewhere in the middle	38	20%	
	Near the end	108	57%	
	Did not respond	1	>1%	

Chapter Four: Results and Discussion

The purpose of this study was to explore the relationship between empathy for animals and environmental self-efficacy in zoo and aquarium visitors and the ways in which these constructs interact with visitors' intent to take conservation action. Through my analysis, I addressed three research questions:

1. How and to what extent does environmental self-efficacy relate to visitors' predispositions toward empathy for animals and to their empathic reactions to animals at the zoo?
2. How and to what extent do environmental self-efficacy and empathy for animals, individually, relate to visitors' intentions to take conservation action?
3. What patterns emerge when we examine environmental self-efficacy, empathy for animals, and intent to take conservation action across demographic characteristics and zoo experiences?

I will first present overall descriptive results, followed by the results in order of my three research questions.

Descriptive Results

Mean responses to all of the focal items in this study were above 3.60 on a five-point scale. Overall, empathy predisposition items had the highest average ratings, followed by empathic concern items (Table 6). Environmental self-efficacy and intent to take conservation action items had the lowest average ratings (Table 6). The highest mean score was for positive empathy ("When I see animals well taken care of, I feel at peace"), whereas the lowest was for intent to further support animals at the zoo ("I want to help support the care of these animals

[volunteer my time, make a donation, etc.]"). Table 6 shows the mean responses to each item-level and factor-level score considered in this study.

Table 6. Mean responses, standard errors, and sample sizes for each item-level and factor-level score considered in this study. Rows are organized by factor (empathy predisposition, affective reactions, environmental self-efficacy, and intent to act), with the items within each factor presented in order from highest to lowest mean. *Denotes items comprising the empathic concern composite score.

	Mean	Standard Error	N
Empathy Predispositions Toward Animals Factor	**4.41**	**0.71**	**264**
When I see animals well taken care of, I feel at peace.	4.58	0.70	263
When I see stories of animals being mistreated, I feel protective toward them.	4.55	0.73	263
When I see injured animals, I feel very upset.	4.40	0.87	262
When I see stories of animals in need, I imagine how things look from their perspective.	4.12	0.99	261
Affective/Empathic Reactions to Animals Factor	**4.14**	**0.76**	**264**
I felt awed by the animals.	4.41	0.83	261
I saw how amazing the world is.	4.37	0.87	262
*I became more concerned about the well-being of these animals in the wild. *****	3.99	1.02	260
*I have a greater sense of my connection with animals and the natural world. *****	3.98	0.97	260
I was moved by my experience.	3.92	0.95	262
Environmental Self-Efficacy: *I feel more like my actions can make a difference in helping to protect these animals in the wild.*	**3.90**	**1.04**	**260**
Intent to Act Factor	**3.79**	**0.96**	**262**
I want to do something new to help animals around the world (recycle, reduce energy use, etc.).	3.98	1.07	262
I want to share what I learned about these animals with others.	3.91	1.04	261
I want to do something new to support a conservation organization (make a donation, sign a petition, etc.).	3.64	1.16	256
I want to help support the care of these animals (volunteer my time, make a donation, etc.).	3.61	1.14	261

Research Question 1: How and to what extent does environmental self-efficacy relate to visitors' empathy predispositions and empathic reactions?

To address my first research question, I ran correlations between environmental self-efficacy – represented by the item "I feel more like my actions can make a difference in helping to protect these animals in the wild" – and two facets of empathy for animals: empathic predispositions toward animals, which visitors bring with them to the zoo, and empathic reactions to animals, which visitors experience in response to the experiences at the zoo. I found a significant correlation between self-efficacy and every factor-level and item-level score across both empathy predispositions toward and empathic reactions to animals. Correlation strength with environmental self-efficacy varied between items.

Empathy Predispositions Toward Animals

My analysis indicated a positive relationship between respondents' empathy predispositions toward animals and environmental self-efficacy, with a moderately strong correlation between environmental self-efficacy and the empathy predisposition toward animals composite score ($r = 0.452$, $p = 0.000$, $N = 260$). Each individual question within the empathy predisposition factor was also found to be significantly correlated with environmental self-efficacy, with moderate strength across the board ($0.35 \geq r \leq 0.55$). Of the four predispositions toward empathy for animals items, the one most strongly correlated with environmental self-efficacy was that which indicates perspective-taking: "When I see stories about animals in need, I imagine how things look from their perspective" ($r = 0.449$, $p = 0.000$, $N = 258$). Thus, there appears to be an association between visitors' perceived predispositions to take the perspectives of animals – a key component in cognitive and affective empathy as well as empathic concern – and the degree to which they feel their actions can make a difference in helping animals in the wild.

The next most strongly correlated item was "When I see animals well-taken care of, I feel at peace" ($r = 0.415$, $p = 0.000$, $N = 259$), a measure of positive empathy with animals. This finding suggests association between environmental self-efficacy and positive empathy, defined by Morelli et al. (2015) as "the ability to share, celebrate, and enjoy others' positive emotions." Two more items, though significantly correlated with environmental self-efficacy, had weaker correlations with the construct—one reflecting predispositions for personal distress at the sight of injured animals ($r = 0.364$, $p = 0.000$, $N = 260$) and another representing predispositions for protective emotions toward mistreated animals ($r = 0.354$, $p = 0.000$, $N = 259$).

Empathic Reactions

Each of the measured affective reactions to experiences at the zoo – including connectedness, concern, awe, amazement, and feeling moved – were found to be significantly associated with environmental self-efficacy. I observed a correlation of moderate strength between environmental self-efficacy and the empathic concern composite score, which is comprised of two items reflecting connectedness and concern: "I have a greater sense of my connection with animals and the natural world" and "I became more concerned about the well-being of these animals in the wild" ($r = 0.535$, $p = 0.000$, $N = 258$). Of these two items, the one most strongly correlated with environmental self-efficacy was the one representing concern ($r = 0.575$, $p = 0.000$, $N = 258$), affirming Clayton et al.'s (2017) finding of a significant relationship between environmental self-efficacy and environmental concern in zoo visitors. The item reflecting connectedness to nature was moderately strong ($r = 0.488$, $p = 0.000$, $N = 257$). Therefore, there is a stronger association between visitors' self-efficacy and their reactions of concern for the well-being of animals in the wild than there is with their feelings of connectedness to animals and nature. The difference between the strengths of these comparisons

makes intuitive sense, given that the items on environmental self-efficacy and concern both refer to animals *in the wild*, evoking a link between zoo experiences and biodiversity as a whole, whereas the item on connection does not.

The correlation between environmental self-efficacy and the *affective* reactions composite score – which includes the two items in the empathic concern score as well as three items reflecting awe, amazement, and feeling moved – was even stronger than the correlation with the empathic concern score alone ($r = 0.626$, $p = 0.000$, $N = 260$). This observation suggests that reactions such as awe, amazement, and/or feeling moved may play a mediating role between empathic concern for animals and environmental self-efficacy. The three items representing these other types of affective reactions were also significantly associated with environmental self-efficacy with moderate to strong correlations, including awe of the animals ($r = 0.519$, $p = 0.000$, $N = 259$), amazement at the world ($r = 0.465$, $p = 0.000$, $N = 260$), and being moved by the experience ($r = 0.498$, $p = 0.000$, $N = 260$). However, it is important to note that of all the affective reaction items and composite scores, the one with the strongest correlation with self-efficacy was concern for animals in the wild.

Research Question 2: How and to what extent do environmental self-efficacy and empathy for animals, individually, relate to visitors' intentions to take action for animals and the natural world?

I found significant correlations across factor- and item-level scores between intent to act and both environmental self-efficacy and empathy for animals. Overall, measures of environmental self-efficacy had the strongest correlation with intent to act, followed by empathic reactions to zoo experiences and empathy predispositions toward animals.

Environmental Self-Efficacy and Intent to Take Conservation Action

Environmental self-efficacy, represented by the question "After visiting this zoo/aquarium, I feel more like my actions can make a difference in helping to protect these animals in the wild," was strongly correlated with the intent to take conservation action composite score ($r = 0.677$, $p = 0.000$, $N = 258$). This link between environmental self-efficacy and intent to take pro-environmental actions supports the findings of prior literature (Schutte & Bhullar, 2017; Lauren et al., 2016; Tabernero & Hernandez, 2011; Clayton et al., 2017).

I found markedly strong correlations between environmental self-efficacy and the item-level scores in the intent to act factor, indicating that the visitors whose environmental self-efficacy increased as a result of the zoo visit also tended to be those who intended to take a variety of collective and individual actions after their visit to help animals in the wild. The strongest correlation I observed between any two individual items *throughout this study* was between environmental self-efficacy and the item "I want to do something new to support a conservation organization (make a donation, sign a petition, etc.)" ($r = 0.724$, $p = 0.000$, $N = 255$). Such a strong correspondence between these two items suggests the requisite nature of environmental self-efficacy to engaging in organization-based pro-environmental behaviors, especially relatively high-barrier actions such as making donations. The correlation between environmental self-efficacy and "I want to support the care of these animals (volunteer my time, make a donation, etc.) was also high, though slightly less so than for supporting conservation organizations ($r = 0.616$, $p = 0.000$, $N = 259$). This slight difference in correlations suggests that environmental self-efficacy is preconditional to zoo support to a lesser extent than it is for involvement with other conservation organizations.

Visitors' intentions to take individual conservation actions were significantly and strongly correlated with environmental self-efficacy. "I want to share what I learned about these

animals with others" showed a very strong correlation with environmental self-efficacy (r = 0.701, p = 0.000, N = 259); one interpretation of this finding is that confidence in one's knowledge, or one's ability to share that knowledge, is key to guests' intentions to share what they learned at the zoo with others. Additionally, "I want to do something new at home to help animals around the world (recycle, reduce energy use, etc.) was strongly correlated with self-efficacy (r = 0.65, p = 0.000, N = 260), suggesting that efficacy is also necessary for the adoption of household actions.

Empathic Reactions and Intent to Act

Factor-level and item-level scores representing empathic/affective reactions were significantly correlated with various measures of intent to act, mostly with moderate strength. The empathic concern composite score (comprised of the two items measuring concern for animals in the wild and the connectedness to nature) showed a moderate-to-high correlation with the intent to act composite score (r = 0.565, p = 0.000, N = 262). The affective reactions composite score, which also includes measures of awe, amazement, and feeling moved, showed an even stronger correlation (r = 0.574, p = 0.000, N = 262); this slight difference indicates that these other emotional experiences had a positive effect on visitors' intent to change their behavior.

Affective reactions as a whole were moderately-to-highly correlated with items reflecting visitors' intentions to take individual and collective actions. Correlation strength was similar between the affective reactions composite and both intent to take new actions at home (r = 0.575, p = 0.000, N = 262) and intent to support a conservation organization (r = 0.566, p = 0.000, N = 256). This finding suggests that there is an association between emotional reactions to

experiences at the zoo and intentions to take concrete actions—and that this association is only slightly stronger for household actions than for organizational support.

Empathy Predispositions and Intent to Act

Although factor-level and item-level scores for empathy predispositions towards animals were significantly correlated with intent to act, these correlations were weaker than the those with environmental self-efficacy and empathic reactions. I observed a moderately strong correlation between the composite scores for empathy predisposition and for intent to act ($r = 0.481$, $p = 0.000$, $N = 262$). Of the items within the empathy predisposition factor, the one most correlated with the intent to act composite was "When I see stories about animals in need, I imagine how things look from their perspective" ($r = 0.489$, $p = 0.000$, $N = 259$). This finding suggests that those visitors with a predisposition for perspective-taking are moderately more likely to adopt pro-environmental behaviors. The correlation between intent to act and positive empathy predispositions ("When I see animals well-taken care of, I feel at peace") was also moderately strong, though less so than the correlation with perspective taking ($r = 0.417$, $p = 0.000$, $N = 263$).

Visitors' predispositions for personal distress ("When I see injured animals, I feel very upset") and protective emotions ("When I see stories of animals being mistreated, I feel protective toward them") were weakly correlated with intent to act ($r = 0.368$, $p = 0.000$, $N = 260$; $r = 0.383$, $p = 0.000$, $N = 261$). The fact that the correlations between intent to act and various empathy predisposition measures are relatively low is unsurprising, given that the average empathy predisposition responses were among the highest in this study (empathy predisposition composite mean = 4.41), whereas the intent to act means were among the lowest (intent to act composite mean = 3.81). My finding here reflects the disparity between the large

proportion of visitors who enter the zoo with empathetic emotions toward animals and the far lower proportion who leave the zoo intending to take action to help those animals—a major gap which zoos seek to bridge in order to achieve their missions.

Research Question 3: What patterns emerge when we compare empathy, self-efficacy, and intent to act across demographic characteristics, research sites, and zoo experiences?

Gender Identity

I examined the mean factor-level scores and item responses for empathy for animals, environmental self-efficacy, and intent to take conservation action across all demographic data collected. On the whole, gender identity was the only demographic characteristic for which I observed consistent differences across all factors and items tested.

I observed marked differences between the average responses of men (N = 98) and women (N = 136) across measures of empathy for animals, environmental self-efficacy, and intent to act. Because only one respondent identified as nonbinary and 12 did not respond, these participants were not included in the gender-based analyses. Women's average item-level responses and composite scores in the factors of interest were between 0.34 and 0.61 points higher them men's average responses on a five-point scale. The differences between men's and women's responses were most pronounced in measures of intent to act. There were significant differences between men's and women's average responses to items regarding household behavior changes ($t = -3.48$, $df = 246$, $p < 0.001$) and supporting conservation organizations ($t = -4.036$, $df = 240$, $p = 0.000$), where women's average responses were 0.61-points higher than men's average responses. Mean environmental self-efficacy responses were also significantly different between these gender identities ($t = -3.42$, $df = 244$, $p < 0.001$). Women's and men's responses also differed significantly across numerous empathy for animals items; for example,

women's average responses to the item on predispositions for perspective-taking with animals were significantly higher than men's average responses ($t = -4.631$, $df = 243$, $p = 0.000$).

Special Zoo Experiences

I found marked differences across factors between the average responses of visitors who expressed "yes" and "no" in response to "Did anything extra special happen during your visit today?" The average responses of visitors who said "yes" were consistently between 0.25 and 0.5 points higher (on a five-point scale) than the average responses of those who said "no." The difference was greatest in the intent to take conservation action items; in response to the items on household behavior changes ($t = 3.142$, $df = 235$, $p = 0.002$) and supporting conservation organizations ($t = 3.443$, $df = 230$, $p = 0.001$), there were significant differences of 0.5 and 0.46, respectively, between the "yeses" and "nos." Similarly, there was a significant difference of 0.5 in environmental self-efficacy scores between the two groups ($t = 3.799$, $df = 233$ $p = 0.00$). The fact that visitors who had special moments reported significantly greater environmental self-efficacy and intent to take both collective and individual conservation actions suggests that memorable, unique experiences may be key to zoos' promotion of behavior change and merits further investigation.

Chapter 5: Conclusions and Implications

The purpose of this study was to explore the relationship between empathy for animals and environmental self-efficacy in zoo and aquarium visitors and the ways in which these constructs interact with visitors' intent to take conservation action. In keeping with this purpose, I addressed three questions. First, how and to what extent does environmental self-efficacy relate to visitors' predispositions toward empathy for animals and to their empathic reactions to animals at the zoo? Second, how and to what extent do environmental self-efficacy and empathy for animals, individually, relate to visitors' intentions to take conservation action? And third, what patterns emerge when we examine environmental self-efficacy, empathy for animals, and intent to take conservation action across demographic characteristics and zoo experiences? In this chapter, I will present the major conclusions of this research in the context of the literature, recommend directions for further research and areas of exploration by practitioners, and discuss the broader implications of this work for the zoo, aquarium, and environmental communication fields.

Conclusions and New Directions Research and Practice

Empathy for Animals and Environmental Self-Efficacy

My results indicate an unambiguous relationship between environmental self-efficacy evoked during a zoo visit and both empathy predispositions towards animals and empathic reactions to zoo experiences. Although prior research has investigated the relationship between empathy predispositions and pro-environmental behavior, this study is among the first to specifically explore how empathy predispositions towards animals correspond with induced environmental self-efficacy. This discovery that environmental self-efficacy is significantly related to empathy predispositions towards animals responds to Tam's (2013) call to test whether

Dispositional Empathy with Nature (DEN) (the construct upon which Mast et al. (2018) based the empathy predisposition items) "predicts conservation behavior only among individuals who possess a strong sense of self-efficacy" (p. 100). Future research may explore the extent to which self-efficacy plays a mediating role between empathy predispositions towards animals and pro-environmental intentions and actions.

Environmental self-efficacy was found to be significantly related to specific predispositions, including perspective-taking, positive empathy, and personal distress and protectiveness toward suffering beings. My observation of a moderately strong correlation between perspective-taking and environmental self-efficacy suggests the interpretive value of combining efficacy-building strategies, such as social modeling (Bandura, 1977) with activities that tap into visitors' existing abilities to "walk a mile in others' shoes." This finding points to the great potential of programming that helps caregivers foster empathy in their children while engaging them with content that increases their sense of capability to take action.

I also found a moderate correlation between self-efficacy and positive empathy. Based on this promising initial observation, I join Morelli et al. (2015) in calling for further research into the effects of positive empathy on self-efficacy and other factors contributing to prosocial behavior. In the zoo and aquarium context, one could establish a causal relationship (or lack thereof) through an experimental study in which visitors' environmental self-efficacy and behavioral intentions are compared between research subjects presented with language that induces positive empathy versus empathic language focused on animals' suffering. I predict that the positive empathy language would evoke greater environmental self-efficacy and behavioral intentions, based upon my own finding that environmental self-efficacy is more strongly correlated to positive empathy than to personal distress. The weaker relationship between

environmental self-efficacy and the predisposition toward personal distress at the sight of injured animals reflects Hoffman's (2008) findings that empathetic over-arousal becomes a barrier to behavior change, especially when an individual feels incapable of helping the subject of their empathy. In summary, these results suggest that positive stories of animals thriving in the wild may have a more empowering impact on visitors than devastating stories of biodiversity loss.

This study also found a significant relationship between environmental self-efficacy and the empathic concern that visitors experience during their zoo visit, in keeping with Luebke et al.'s (2017, 2018) discovery that empathic concern for animals in the wild is highly predictive of visitors' perceived environmental self-efficacy. After making this observation on a broad geographical scale, I affirm Luebke et al.'s (2017, 2018) assertion that zoos can increase visitors' confidence in their capabilities to take action by "triggering the motivational dimension of visitors' empathic concern for wildlife and nature" (p. 10). It is important to note that Luebke et al. (2018) also found that cognitive reactions (an increased understanding of how individual actions can impact the environment and wildlife) were also predictive of environmental self-efficacy. Although it is well-established that knowledge alone is not enough to prompt behavior change, this observation affirms that affect works in concert with cognition to empower visitors with a sense of their own ability to make a difference.

Self-Efficacy and Intent to Act

I found significant relationships between visitors' perceived environmental self-efficacy and intent to take conservation action, congruent with existing work in which efficacy was found to be significantly related to or predictive of behavior change (Bamburg & Moser, 2007; Clayton et al., 2017; Hines, 1987; Lauren et al., 2016; Milfont, 2012; Schutte and Bhullar, 2017; Tabernero and Hernandez, 2011). My observation that environmental self-efficacy is strongly

correlated with each intent to take conservation action item (supporting a conservation organization, adopting new household actions, supporting the care of the animals, and sharing knowledge with others) indicates the requisite nature of environmental self-efficacy to a variety of pro-environmental behaviors. The strong relationship between environmental self-efficacy and intent to adopt new household actions reflects existing findings in the environmental efficacy literature focused upon individual actions such as water conservation (Lauren et al., 2016), recycling (Tabernero and Hernandez, 2011), and green consumerism (Schutte and Bhullar, 2017).

The correlations between environmental self-efficacy and intent to support a conservation organization, as well as with intent to share knowledge gained at the zoo with others, were even stronger than the correlation between environmental self-efficacy and individual actions. These findings indicate that self-efficacy is more necessary for participation in civic action, donation of time or resources, or knowledge-sharing than it is for the adoption of new household behaviors. Therefore, I highly encourage further research into the role of environmental self-efficacy in collective and civic action. Schutte and Bhullar's (2017) experimental study, which established a causal relationship between environmental self-efficacy and intent to adopt individual sustainability behaviors, may serve as an effective model for further investigation of the relationship between efficacy and collective or civic action.

Empathy and Intent to Act

The significant relationships observed between empathy for animals and intent to take conservation action indicate that individuals who have higher empathy predispositions towards animals and experience more intense empathic reactions to animals at the zoo tend to be those who are more inspired to take pro-environmental action after their visit. These findings are

reflective of prior research showing empathy or connectedness to animals as significant predictors of intentions and behaviors (Berenguer, 2007; Grajal et al., 2016; Schultz, 2000). My observation that visitors' predispositions for perspective taking were the most strongly correlated with intent to take conservation action out of all the empathy predisposition items advances Schultz's (2000) discovery that perspective-taking with animals increases biospheric concerns. Given Grajal et al.'s (2016) finding that connectedness to animals at the zoo is significantly related to self-reported pro-environmental behaviors – a relationship the authors found was remarkably unaffected by political ideology – these findings connecting empathic reactions to behavioral intentions show the potential for empathy for animals to drive actual behavior change across a broad range of visitors.

It is important to note that intent to take conservation action was more strongly correlated to empathic reactions than to empathy predispositions towards animals. In other words, empathic feelings evoked by experiences at the zoo are more strongly related to behavioral intentions than visitors' preexisting empathy towards animals. Future research may seek to establish a causal relationship between experiences of empathy at the zoo and pro-environmental intentions. One possible approach to such an experiment would be to have a treatment group of visitors attend an ambassador animal program that employs empathetic language and have a control group attend a program with traditional, informational language, and compare the two groups' reported intentions to adopt new behaviors. Although a causal relationship has not been established, I encourage zoo practitioners to continue implementing empathy best practices throughout their exhibits, programs, and marketing, as part of the overall effort to inspire action for conservation.

Motivation has been proposed to serve as a mediating factor, or bridge between self-efficacy and actual behavior (Schutte and Bhullar, 2017). Empathic concern has been described

as the *motivational* dimension of empathy—specifically, the motivation to alleviate others' suffering (and in the case of positive empathy, the motivation to continue others' comfort) (Luebke et al., 2018; Pfattheicher et al., 2016). Therefore, exploring the motivational effect of empathic concern may be a fruitful direction for future research. One possible approach to address this question would be to compare the mediatory effects of empathic concern and of motivation on the causal path between environmental self-efficacy and pro-environmental behavior.

Noteworthy Patterns: Gender Identity and Special Experiences

Gender Identity

The consistently significant differences between men's and women's average scores across empathy for animals, environmental self-efficacy, and intent to take conservation action are reflective of similar gender gaps previously observed in the literature (Brough et al., 2016; Caprara & Steca, 2007; Riechard and Peterson, 1998; Tam, 2013). I encourage future research to explore the role of environmental self-efficacy in mitigating social fears resulting from the perceived threats to masculinity associated with pro-environmental behavior. Zoo and aquarium practitioners may also explore interpretive and programmatic opportunities to cultivate empathy for animals and environmental self-efficacy in men, especially during father-child interactions and activities.

Special Experiences

I observed significant differences in average empathy for animals, environmental self-efficacy, and intent to take conservation action scores between individuals who did and did not report having an extra special experience during their day. The finding that empathy was greater for people who had these special experiences corresponds with evidence in the empathy

literature. According to Myers (2007), a person's empathy for an animal is likely to increase when they observe the animal demonstrating agency (engaging in behaviors by choice). Therefore, it follows logically that participants who witnessed animals engaging in natural, active behaviors were more likely to also experience empathic reactions.

Given our knowledge that viewing time is significantly higher when animals are active than when they are not (Ridgway, 2005) and that continuity, or time spent with an individual animal, tends to increase empathy (Myers, 2007), it is unsurprising that participants in my study who encountered active animals experienced significantly greater empathic reactions. Further research could investigate the effects of various visitor experiences, such as talking with a staff member or volunteer or making eye contact with an animal on environmental self-efficacy and intent to take conservation action. One could address these questions by applying the Conservation Learning Instrument in another study similar to this one, with a focus on the relationship between items in the exhibit experience and intent to take conservation action factors.

Implications

The findings of this study contribute to our collective understanding of two factors that contribute to zoo visitors' intent to take action to conserve biodiversity and the natural world: empathy for animals and environmental self-efficacy. With the knowledge that visitors' empathy for animals and environmental self-efficacy are significantly related to one another and to their behavioral intentions, researchers can confidently move forward with lines of inquiry involving these two constructs. Practitioners can explore ways of strategically employing these two factors such that they build upon each other toward the ultimate goal of pro-environmental action.

On a broader scale, this study adds to the burgeoning body of work illuminating how and to what extent the cognitive, affective, and behavioral components of zoo visits contribute to visitors' pro-environmental actions. As organizations that facilitate many individuals' only interactions with wild animals – and that have conservation education at the core of their missions – AZA-accredited zoos and aquariums are uniquely positioned to encourage audiences to reflect upon how their actions can harm or help a rapidly changing world. By strategically applying the findings of studies such as this one in their exhibits, programs, and marketing, zoos and aquariums can become more effective change agents—building a better future for human and non-human animals alike.

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Appendix I: Conservation Learning Instrument (Mast et al., 2018)

1. Please tell us a little about yourself. Rate how well each statement describes you.	Does not describe me at all	Describes me only slightly	Describes me somewhat	Describes me for the most part	Describes me perfectly
a) I am ordinarily interested in animals.	0	1	2	3	4
b) I often feel a sense of connection with nature.	0	1	2	3	4
c) I have a good understanding of wildlife conservation issues.	0	1	2	3	4
d) I pay attention to news about environmental issues.	0	1	2	3	4
e) I usually try to help protect and preserve local wildlife habitats.	0	1	2	3	4
f) I tend to support conservation organizations (volunteer my time, make a donation, sign a petition, etc.).	0	1	2	3	4
g) I typically engage in conservation efforts during my daily activities (recycling, reducing energy usage, buying earth-friendly products).	0	1	2	3	4
h) I spend as much time as I can in natural settings such as woods, prairies, mountains or lakes.	0	1	2	3	4
i) When I see injured animals, I feel very upset.	0	1	2	3	4
j) When I see stories about animals in need, I imagine how things look from their perspective.	0	1	2	3	4
k) When I see animals well taken care of, I feel at peace.	0	1	2	3	4
l) When I see stories of animals being mistreated, I feel protective toward them.	0	1	2	3	4

2. Based on your visit today, to what extent do you agree with the following statements?

	Not at all	Only slightly	Somewhat	For the most part	Very much so
a) I was able to see some of my favorite animals today.	0	1	2	3	4
b) I talked with my family or companions about the things we saw and heard during our visit.	0	1	2	3	4
c) I made eye contact or had an up-close encounter with one or more animals.	0	1	2	3	4
d) The animals were very active today.	0	1	2	3	4
e) I heard a staff member or volunteer talk about animals or their natural habitats.	0	1	2	3	4
f) I have a greater sense of my connection with animals and the natural world.	0	1	2	3	4
g) I have a better understanding of what kinds of resources animals depend on to survive.	0	1	2	3	4
h) I became more concerned about the well-being of these animals in the wild.	0	1	2	3	4
i) I felt awed by the animals.	0	1	2	3	4
j) I saw how amazing the world is.	0	1	2	3	4
k) I have a better understanding of the connection between animals and people.	0	1	2	3	4

Please continue on back…

	Not at all	Only slightly	Somewhat	For the most part	Very much so
l) I was moved by my experience.	0	1	2	3	4
m) I have a better understanding of what kinds of resources animals depend on to survive.	0	1	2	3	4
n) I want to learn more about the connections between animals and people.	0	1	2	3	4
o) I have a better understanding of how my actions can impact the environment and animals.	0	1	2	3	4
p) I learned something new about the connections between animals, people and environment during my visit.	0	1	2	3	4
q) I have a better understanding of how environmental issues impact animals around the world.	0	1	2	3	4
r) I want to learn what else I can do to help protect and preserve these animals in the wild.	0	1	2	3	4
s) I am interested in seeking out more information about the animals I saw during my visit.	0	1	2	3	4
t) I am interested in seeking out more information about these animals in the wild.	0	1	2	3	4
u) I want to help support the care of these animals (volunteer my time, make a donation, etc.).	0	1	2	3	4
v) I want to do something new at home to help animals around the world (recycle, reduce energy use, etc.).	0	1	2	3	4
w) I want to share what I learned about these animals with others.	0	1	2	3	4
x) I feel more like my actions can make a difference in helping to protect these animals in the wild.	0	1	2	3	4
y) I want to do something new to support a conservation organization (make a donation, sign a petition, etc.).	0	1	2	3	4

3. Sometimes when you visit places like the zoo or aquarium, something happens that really sticks in your mind. Did anything <u>extra</u> <u>special</u> happen to you during your visit today? ❑ No ❑ Yes

If yes, please tell us what it was and how you felt about it.

_____

_____

4. May we have your home Zip Code (or country if outside the U.S.)? _____

5. Are you currently a member of this institution? ❑ No ❑ Yes

6. When was the last time you visited before today? ❑ This is my first time! ❑ 12 months or less since last visit ❑ 1+ to 2 years ago ❑ 2+ to 5 years ago ❑ 5+ to 10 years ago ❑ More than 10 years ago

7. Your gender: _____

8. Your age: _____

11. Do you have people under 18 in your group?

❑ No ❑ Yes

12. At what point are you in your visit today?

❑ At the beginning ❑ Near the end

❑ Somewhere in the middle

9. Your Racial/Ethnic Identity:

___ American Indian or Alaskan Native
___ Arab or Middle Eastern
___ Asian or South Asian
___ Black/African American
___ Hispanic or Latin o/a/x
___ Multiracial
___ Native Hawaiian or other Pacific Islander
___ White (Non-Hispanic)
___ Other: _____

10. Highest Education, so far:

___ Some school
___ High school graduate
___ Some college
___ College graduate
___ Graduate school

Appendix II: Barriers, Promoters, and Best Practices for Empathy for Animals

Barriers and promoters of empathy for animals

Empathy for non-human animals has been the subject of extensive research in recent decades, due to its potential to motivate environmental behavior change and due to heightened interest in the societal benefits of an empathetic public. Like with any human phenomenon, empathy exists within a complex psychosocial context. Empathy, when isolated from other factors, is not enough to cause behavior change on its own (Schultz, 2011). Research has established numerous barriers that prevent individuals either from experiencing empathy in the first place or from taking action upon their empathy. However, we also know that certain factors promote empathy and thus encourage subsequent action.

Narrative and language choice can strongly influence the likelihood of a visitor to feel empathy (Chawla, 2009). For example, referring to an animal using pronouns (she, he, they) gives the animal individuality, as opposed to using "it," which implies that the animal is an object (Young et al., 2018). Cultural messages can shape humans' perceptions of certain species as good and others as bad, even evil; for example, the portrayal of sharks and spiders as malicious creatures in popular culture can interfere with one's ability to empathize with them (Myers, 2007). Conflicting messages abound in our society about which animals are to be loved, feared, exterminated, and eaten (Chawla, 2009; Myers, 2007). In order to promote accurate, meaningful empathy in their visitors, zoos must take sociocultural factors into account each time they develop interpretive narratives.

It is also important to recognize that "empathy overload" can present a barrier to meaningful understanding and action. When people, especially children, are confronted with too many emotionally triggering experiences (such as devastating stories of extinction), they may

protect themselves by disengaging entirely (Dewar, 2013). Humans tend to express this emotional distancing through justification, blame-shifting, dehumanizing the victims of their actions or inaction, or stating that the consequences are out of their control, all of which are evident in various current climate change narratives (Myers, 2007; Dewar, 2013). Because zoos and aquariums seek to inspire empathy and action, not disengagement, it is important for them to avoid overwhelming visitors with stories of animals in peril. Therefore, an emerging area of research is on positive empathy, or empathic joy. In contrast to empathic concern, which seeks to relieve another's suffering, positive empathy seeks to sustain another's positive state and results in shared joy, playfulness, social connection, or satiation (Morelli et al., 2015). Especially given that zoos and aquariums are places where people come to enjoy time with friends and family, explore, learn, and renew (Falk et al., 2007), it is to zoos' advantage to promote empathy that contributes to visitors' positive experiences.

Empathy best practices in zoos and aquariums

As a result of the research exploring empathy for animals in zoos and aquariums in recent years, there are now established best practices for integrating empathy into interpretation. Three organizations in Washington state – Point Defiance Zoo & Aquarium, Seattle Aquarium, and Woodland Park Zoo – collaborated on the MECAP (Measuring Empathy Collaborative Assessment Project) and present the following best practices in their project briefing (Owens & Khalil, 2018). The first approach to building empathy is constructing narratives that bring to light animals' individuality, agency, and perspectives, while emphasizing accurate points of similarity with humans (Ornaghi et al., 2013; Myers, 2007; Chawla, 2009). Second, there is evidence that the more time one spends observing or interacting with an animal (building continuity), the greater one's empathy becomes (Blizard and Schuster, 2007; Myers, 2007; Chawla, 2009);

therefore, zoos can promote empathy by prolonging the amounts of time that visitors spend in the presence of individual animals. Role models that demonstrate empathy are important in the development of empathy in children and are most effective when there is a long-standing relationship between the role model and the observer (Arluke, 2013; Chawla, 2009). Zoos can employ this finding by offering empathy-developing experiences or activities for adults and children to engage with together. Finally, activating imagination in visitors is key to evoking empathy because it facilitates perspective-taking, which can, in turn, increase affective empathy, cognitive empathy, and empathic concern (Ornaghi et al., 2019; Myers, 2007; Blizard and Schuster, 2007; Young et al. 2018).

Appendix III: Background Literature on Additional Factors of Conservation Learning

This appendix provides background literature the factors of the Conservation Learning Instrument not directly addressed in this study: environmental predispositions, affective reactions (other than empathy), cognitive reactions, and curiosity to learn more/reflective responses.

Environmental predispositions

Luebke & Matiasek (2013) explored the relationship between visitors' predispositions and their affective and cognitive reactions to zoo exhibits using their own Zoo Predisposition Scale. They found personal predispositions about animals and the environment to be significantly related to visitors' overall reactions to zoo experiences and found that exhibit experiences serve as mediating variables in the relationship between visitors' predispositions and reactions (Luebke & Matiasek; 2013). Mast et al. (2018) added eight items from the Zoo Predisposition Scale to the Conservation Learning Instrument to assess visitors' existing engagement with animals, nature, and conservation issues.

In addition to Luebke & Matiasek (2013), numerous findings developed our collective understanding of the roles of environmental predispositions in zoo experiences. Powell and Bullock (2014) found a significant correlation between visitors' predispositions toward nature and their emotional responses at the zoo. Existing characteristics such as emotional sensitivity, feelings toward animals, empathy have been found to correlate significantly with emotional reactions to animals at the zoo (Myers et al., 2004). Ballantyne et al. (2011) discovered that visitors' pre-visit motivation to learn and their involvement with environmental advocacy were the best predictors of the long-term impacts of a zoo visit. Furthermore, predispositions can play an important role in effective evaluation; grouping visitors based on their preexisting attitudes and knowledge has been found to result in more accurate assessments of changes in conservation

learning and behavior than grouping by demographics (Falk & Adelman, 2003). As Ballantyne (2007) states, the key requirement for successful conservation interpretation in zoos is "to combine facts into meaningful messages the enable visitors to make connections between their previous experiences and the issues being interpreted" (p. 375).

Affective Reactions

Affective, or emotional, reactions to zoo animals and experiences have been studied extensively, with a variety of results largely pointing to the importance of cultivating and harnessing positive emotions to achieve conservation learning goals. For example, Clayton et al. (2014) found that feeling an affective connection to zoo animals is significantly related to both cognitive and emotional responses to climate change. Additionally, much research has explored the factors of a zoo experience that elicit affective reactions; for instance, there is evidence that the type of animal being viewed, an individual's emotional predispositions, and the experiences of making eye contact with animals and seeing them engaged in enrichment activities are all variables that increase positive emotional experiences, sometimes leading to reports of stronger conservation-mindedness (Myers, 2004; Luebke & Matiasek, 2013; Powell & Bullock, 2014; Luebke et al., 2016).

Cognitive Reactions

In the context of the conservation learning meaning-making pathway, the component "cognitive reactions" describes visitors' understanding of concepts presented at the zoo, such as the resources animals depend upon to survive and the ways that one's actions can impact the environment (Mast et al., 2018). The educational benefits of viewing animals have been recognized for decades (Churchman, 1985). Although visitors may not intend to learn or consciously recognize that they are doing so, learning is inherently part of the social interaction

which take place at the zoo (Luebke and Matiasek, 2013). Clayton & Myers (2009) note that zoo exhibits prompt conversations that encourage cognitive engagement, allowing visitors to process the concepts presented, pose questions about the animals to others, and make inferences. Furthermore, Briseño-Garzón et al. (2007) found that the action of interpreting zoo experiences to children helps adults retain more facts and concepts, recall memories of their visits, and express emotions related to what they saw.

At the same time, it is well-established that knowledge *alone* is not enough to predict behavior change in zoo visitors (Hungerford and Volk, 1990). For example, Moss et al. (2016) found that understanding the concept of biodiversity is a real but only very minor aspect of visitors' reported proconservation actions and knowledge of actions to help protect biodiversity. However, cognitive understanding of content remains a vital part of the conservation learning meaning-making process, when in concert with the other components of the pathway.

Curiosity to learn more and reflective responses

The component "curiosity to learn more" reflects the degree to which an individual becomes interested in asking questions or seeking out information about animals and the natural world as a result of their zoo experience (Mast et al., 2018). Curiosity is a component of the reflective response that can take place both during and after the zoo visit. According to Luebke and Matiasek (2013), reflection comprises of cognitive, affective, and behavioral elements. Cognitive reflection can involve "reflecting on new ideas, the recollection of episodic memories, and the perceived compatibility of [one's] own interests and the exhibit features," while affective reflection may involve "feelings of spirituality and relaxation" (Luebke and Matiasek, 2013, p. 413). Hughes et al. (2011) found that reflective responses often affirm the role of zoos as mental "anchor points," providing people with concrete reasons to care about conservation. Ballantyne

et al. (2011) identified that the reflective response is an essential link between visitors' zoo experiences and their subsequent engagement in conservation action (p. 325). Additionally, Ballantyne et al. (2011) revealed a key link between affective responses, curiosity, reflection, and behavior; emotional experiences at the zoo are more likely spark introspection, leading to increased involvement in both short- and long-term conservation learning outcomes.

Appendix IV: Coding Rubric and Response Frequencies for Written Question

Sometimes, when you visit places like the zoo or aquarium, something happens that really sticks in your mind. Did anything extra special happen during your visit today?

Code	**Title**	**Description**	**Example**	**Frequency** (N = 95; responses multiply coded)
1	Interaction with animal	Visitor interacted directly with animal, i.e. feeding, holding, petting, eye contact, interaction through glass	*I was able to get up close to a hyena because he came right up to the glass.*	24
2.1	Animal activity, general	Visitor notes that all animals or at least one type of animal were active, with no mention of a specific activity	*Animals very active today. Talked with employee about random things.*	5
2.2	Animal activity, specific	Visitor recalls the specific activity performed by an animal	*Sloth bear eating bugs*	17
2.3	Animal, general	Visitor notes seeing an animal/animals but does not mention a specific interaction or behavior.	*First time we saw the porcupine*	19
3	Learning content	Visitor recalls a fact learned, or that they learned about an animal/ecosystem in general	*Learning about tongue pigments and tongue height ratio was super interesting!*	9
4	Zoo, general	Visitor comments on the exhibits, or the zoo as a whole	*Just being able to be up close to the animals and see how well taken care of, is very special.*	5
5	Facilitation moment	Visitor refers to a special moment that happened for someone else in their group	*My son fed a giraffe. That was a great connection for him.*	6
6	Interpretation	Special moment involved an interpretive interaction or program	*I was awed by the sea lions in the dolphin show. Super cool.*	11
7	Conservation or other important messages	Visitor mentions that they learned about conservation or makes a statement about it.	*Conservation should be prioritized as a society*	11
0	Reason why “no”	Visitor explains or qualifies why they answered "no"	*I was babysitting my nephew, so it was difficult to enjoy the animals as much as I wanted.*	12
88	Other	Answers that do not fit any of these categories	*I should do it often*	4

Appendix V: Data Collection Protocol

Data Collection Protocol

Based on Ong, A. (2019). Visitor Interview Protocol. Retrieved from University of Washington: https://canvas.uw.edu/courses/1274338/pages/project-materials.

A message from Linnea to participating zoos and aquariums:
Thank YOU for welcoming me, a University of Washington graduate student in Museology, to your organization to collect data. Your site is part of a multi-zoo research endeavor that will build our collective understanding of the factors that influence visitors' conservation learning, caring, and behavior.

My responsibilities will be to…

- Intercept visitors at your site
- Inform them of the study
- Invite them to participate in the study
- Answer any questions they may have as they complete the questionnaire
- Thank participants and safely stow all questionnaires

Materials

I will supply my own…

- Clipboard(s)
- Writing utensils
- 50-75 copies of the questionnaire
- Folder(s) for questionnaires

If it is your organization's practice to provide stickers, postcards, or other small thank-you items for study participants I will be happy to distribute them. However, this is by no means necessary or required.

Selecting Visitors to Survey

Where?

- I will collect my data in a location where I am likely to intercept visitors who have completed half or more of their visit, such as an exhibit in the middle or back of the zoo.
- If possible, I will seek out indoor exhibits for data collection, not only for the visitors' comfort, but also because they are spaces where children are less likely to stray while their parents/guardians complete the questionnaire.

Who?

- I will be collecting data from adults only. It is ok if there are children in the group, or if they "help" with the questionnaire, but ultimately, the adult will be the one answering the questions.
- The responses will reflect the thoughts of one adult; friends or couples should not answer the questions collaboratively. Therefore, I will make clear from the start that I am asking for just one participant.
- I will not intercept adults that are clearly part of a larger organized group or tour. It is ok if they came with a group, but they should be exploring the zoo independently when I engage with them (i.e. not with a guided tour).

Selecting your subjects

- I will select participants as randomly as possible. Randomness will need to vary based on zoo attendance and traffic flow in the area.
    - **If there is a consistent flow of visitors**, I will employ the following approach: I will draw an imaginary line near my position and approach every third family group that crosses that line.
    - **If attendance is limited or traffic is sparse**, I will employ the following approach: I will draw an imaginary line near your position and approach every family group that crosses that line. After finishing a survey or returning from a break, I'll approach the next family group to cross the imaginary line.
- When I encounter large groups including multiple adults, I will only ask for ONE participant.
    - If there is more than one adult in the group you approach, choose one individual from that group to ask.
    - If the individual you approached volunteers or suggests a different person from that same group, it is ok to accommodate that suggestion as long as that other person is an adult.
- If a visitor approaches with interest in participating in the study, I may welcome them to do so. However, if multiple people from the same group volunteer, I will thank them but express that I can only survey one person per group.
- I will be mindful not to select participants based on "approachability" (i.e. how friendly they seem or how likely you think they will be to participate). This adds bias to the data. Following the "imaginary line" approach above will help avoid this problem.

How many visitors?

- I aim to collect between 50 and 75 completed instruments per site.

Inviting Visitors to Participate

I will smile and be cheerful while approaching visitors, using an introduction such as this one:

> *Hello! Are you enjoying your time at the zoo today?* (Basic icebreaker)

My name is _____ and I am a [volunteer, researcher, etc.] *working with* [name of zoo] *to listen to feedback from visitors. Would you have a moment to share your thoughts?*

If they hesitate or ask how long it will take:

The questionnaire should take five to ten minutes, and your answers will be valuable in helping [name of zoo] *to better serve visitors like you.*

If the person/group declines:

Stay friendly and cheerful and say something like *"I completely understand. Thank you for your time and enjoy the rest of your visit!"*

The Instrument

Once the visitor has agreed to participate in the survey, I will hand them the clipboard. Many visitors will dive right in, but if they await instruction, I'll give them an overview of the questionnaire like this:

Most of this questionnaire consists of statements, and for each statement, you can circle the number that matches the degree to which you agree. Toward the end, there will be one open-ended question where you can write about your experience, followed by some quick questions about yourself. Your participation is completely anonymous, and we appreciate your honesty. Feel free to ask me any questions you have.

Depending on the location, I may invite them to sit down or walk around with their group while filling out the questionnaire.

Concluding the Interview

Once the participant has completed the questionnaire, I will take a quick look over the page to make sure it's complete. If there are blanks or if something is not clear, I'll ask the visitor to clarify while they are still present.

I will conclude the interaction by saying something to the effect of the following:

Thank you again for your participation. It's so important that zoos learn from visitors like you and we really appreciate your time. Have a fantastic day.

Before you tuck the instrument away, I will look it over to make sure that all parts are complete and that writing is legible. All instruments will be stored in the folder in which they arrived.