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Research article

Assessing the immediate and longitudinal effects on conservation caring and behaviour intent of a human-dolphin interactive programme

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Abstract

Conservation awareness and behaviour change are some of the main objectives of progressive zoos and aquariums. Among the wide range of visitor experiences these places offer, many also promote animal-visitor interactions as emotional experiences that allegedly promote increased knowledge and attitudes towards conservation. The present study aimed to measure immediate and longitudinal effects on conservation caring and behaviour change of a human-dolphin intervention using the Conservation Caring scale (Skibins and Powell 2013). This scale was originally designed to measure the zoo-goer's connection to a specific species and to relate this to pro-conservation behavioural intentions following the zoo visit. A total of 291 adult zoo visitors participated in this study. Participants were randomly selected and 124 interventions were assessed. Participants were asked to answer the survey before (pre-intervention) or after (post-intervention) the programme. Twelve weeks after the intervention, a follow-up survey was emailed to all participants who stated willingness to participate in the follow-up assessment. A total of 148 pre-intervention, 143 post-intervention and 32 follow-up surveys were collected. Results show a post-intervention increase in some of the variables under study, notably 'existing connection to wildlife' and both 'species-' and 'biodiversity-oriented behaviours'. A longitudinal analysis showed a significant return to baseline values for the 'existing connection to wildlife' and 'conservation caring' variables. Both 'species-' and 'biodiversity-oriented behaviours' remained stable three months after the intervention although with a decreasing trend. Future considerations on improving the acceptance of conservation-focused behaviour changes are suggested.

Introduction

First developed by Wilson (1984), the theory of biophilia, which literally translates to 'love of life', proposes that human beings have an intrinsic need to bond with nature and its constituents, such as animals and plants. This communion stems from an innate, biologically driven need to interact with other forms of life to ensure full functioning and well-being. Following this assumption, Kellert (1997) argued that humans yearn for a specific connection with animals as integral elements of nature, which is a fundamental component of well-being. Kellert added that possible emotional connections with animals can help to overcome feelings of isolation and loneliness. Today, numerous studies prove animals have a positive effect on human mental health and well-being (e.g. Brown and Nanding 2019; Hediger and Beetz 2021; Wells 2019). However, not all animals have the same emotional impact on humans. There are animals with which humans identify more and experience more positive emotions and others with which humans experience negative emotions (Castillo-Huitrón et al. 2020). The closer to the human evolutionary line the animal is, the more the animal is able to generate feelings of closeness such as empathy and compassion, which are also fundamental to their future conservation (Miralles et al. 2019). Deeply related to these feelings are some of the intrinsic characteristics of each animal, such as charisma (e.g. Albert et al. 2018), phylogenetic

proximity (e.g. Miralles et al. 2019) and neotenic characteristics (Estren 2012), which influence the degree to which humans will connect to each animal.

Fostering connections

One of the main objectives of progressive zoos and aquariums is, invariably, to change the behaviour of their visitors to a more pro-conservation context. This is a considerable challenge, especially for long-term behaviours, since aiming for a lasting impact through short, albeit emotionally intense, experiences is particularly difficult. However, some studies show that this long-term change is possible (Hughes et al. 2011; Kemmerly and Macfarlane 2009; MacDonald 2015), although these changes are usually based on the supposition that increased knowledge or attitudes towards conservation will result in behavioural changes which, in turn, are difficult to assess in the long run. Zoos and aquariums also seek to promote pro-conservation behaviours in their visitors by exploring their emotional bond with the animals. It is this 'connection' that allows the creation of a feeling of 'uniqueness' with the 'other', generating an empathic concern for animals which, in turn, will relate to the desire to help and support conservation (e.g. Clayton et al. 2011; Miralles et al. 2019). The existence of this emotional connection was confirmed by Bruni et al. (2008) through studying implicit and explicit connections with nature in participants visiting three different zoos. The results showed that, although visitors leaving zoos did not report changes in their explicit connection (conscious perception), significantly greater implicit connection (unconscious perception) was found in exiting visitors when compared to entering visitors.

Conservation Caring

Emotional attachments by zoo visitors may be indicative of this important connection, which is an important step towards much needed conservation behaviours, especially when targeting a specific species. To measure the individual level of connection to a specific species, Skibins and Powell (2013) adapted the Conservation Caring scale first developed by Rabb and Saunders (2005). Through this scale, Skibins and Powell (2013) proved that direct encounters with wildlife have the potential to increase visitor empathy for wildlife species and these encounters promote pro-conservation behaviours.

Conservation Caring allows understanding of visitors' emotional attachment to wildlife in three sub-dimensions: 'care that', 'care about' and 'care for' (Rabb and Saunders 2005). The 'care that' sub-dimension captures the cognitive axis and orders the values of nature. The 'care about' sub-dimension explores the affective axis associated with experiences in nature. Finally, the 'care for' sub-dimension explores expressions of caring behaviour, offering opportunities for direct and indirect action for nature conservation. Skibins and Powell (2013) built on this, showing the influence of previously existing connections to wildlife (focused on wildlife in general, i.e. no specific species), and proving conservation caring to be a significant predictor of pro-conservation behaviours. This scale allows understanding of how visitors think, feel and act in favour of a particular species (Skibins and Powell 2013). By incorporating the cognitive and affective dimensions, this scale also allows estimation of awareness, rather than measuring knowledge about the species. Furthermore, it aligns awareness with empathy, which has been shown to be a predictive measure of helping behaviour in the context of conservation (Miralles et al. 2019).

The Conservation Caring scale is composed of four main subscales: existing connection to wildlife (ECW), conservation caring (CC), behaviour – species oriented (BSO) and behaviour – biodiversity oriented (BBO). ECW aims at capturing the cognitive and emotional components of an individual's relationship to wildlife in general. CC is designed to capture how visitors connect to specific species (as opposed to wildlife in general) and to reflect how individuals think, feel and act for that specific species. BSO and BBO are designed to evaluate the visitors' behavioural intentions toward the conservation of individual species (BSO) and biodiversity as a whole (BBO).

The case of human-dolphin connection

Dolphins have long been associated with positive feelings and enjoy a markedly positive perception, and historical records show a connection of cooperation, communication and empathy between dolphins and numerous cultures (Mazzoldi et al. 2019). Dolphins are also part of the common imagery with regard to the symbolism of nature and the environment (Servais 2020) and are commonly associated with human characteristics such as wisdom, grace and intelligence (e.g. Neves et al. 2021). This leads to a more intense bond that is prone to fostering feelings of protection (Naylor and Parsons 2018). In this regard, dolphins fulfil many of the previously mentioned requirements to be considered good objects of conservation engagement (e.g. Barney et al. 2005; Barua et al. 2011). Recent research shows that close contact with dolphins has the ability to elevate emotional states (e.g. Curtin 2006; Milstein 2008), reduce stress and anxiety (e.g. Webb and Drummond 2001), improve connection with nature (e.g. Wiener 2015) and foster conservation behaviours (e.g. Zeppel and Muloin 2008).

Human-animal interaction and animal-visitor interaction

Of particular importance to this study, and as defined by Thayer and Stevens (2019), human-animal interaction (HAI) captures mutual and dynamic exchanges between humans and other animals and their psychophysiological effects on humans. The study of HAI is now a relatively robust field both in animal welfare and human-centred outcomes. Animal-visitor interactions (AVIs) are a particular type of HAI with concrete application in the context of zoos. AVIs are now relatively common programmes in zoological institutions and are often a major component of a zoo's appeal to visitors. Studies have sought to understand how these interactions between animals and humans influence each other. A particularly important model for zoos is the Chew-Hemsworth model (Learmonth 2019), which gives attention to the emotional effect and implications for both the animal's well-being and the visitor's emotional and behavioural aspects. With regard to the latter, recent research has mostly focused on psychological theories such as planned action and planned behaviour (e.g. Davey et al. 2020; Jhamvar-Shingote and Schuett 2013; Windschnurer et al. 2022). Such theories aid the understanding and prediction of behavioural intentions as a consequence of, for example, AVIs. The BSO and BBO subscales of the Conservation Caring scale work as a complement to this growing knowledge associated with the conservation outcomes of a visit to the zoo.

The current study was designed following calls from Learmonth et al. (2021) for research to "better understand how visitors 'connect' with animals, and whether this caring increases practical support" that "would be greatly beneficial to both scientific understanding as well as to zoo operations" (p. 640). To the authors' knowledge, no study has yet used the Conservation Caring scale as a short- and long-term tool to test how visitors connect with dolphins and how this affects behavioural intent following an AVI. The main purposes of this study were to: (1) measure the extent to which visitors connect to dolphins after participation in a human-dolphin interactive programme through the use of the Conservation Caring scale and (2) investigate the programme's immediate and longitudinal effect on visitors' pro-conservation behaviour intentions.

Methods

Study site and intervention

Data were collected at Zoomarine Algarve, a marine mammal park located in Southern Portugal, between 15 June and 31 August 2022, in a total of 78 days. The programme under study, henceforth called intervention, is a human-dolphin education-focused interaction programme. A total of 124 interventions were assessed throughout the study. Each intervention lasts for about 60 minutes. Each starts with a 15-minute talk given by one educator, addressing general dolphin conservation facts, followed by norms and behaviours when in contact with the dolphins *Tursiops truncatus*. Participants then enter the dolphin habitat and spend about 15 minutes in a shallow water experience, where, under the supervision of a trainer and the educator, they experience close contact with two dolphins. Following the intervention, participants are directed to the changing room and lounge area. The programme has a maximum of eight participants per session, with a minimum age for participation of 6 years old. The education (pre-contact) content is based on general biological information about the bottlenose dolphin, overall conservation status, umbrella species role, ecological importance and easily adoptable daily eco-friendly behaviours (e.g. environmentally conscious shopping, litter literacy), followed by the correct norms and behaviours for participants in the water. In-water (contact) content is mostly based on anatomical, biological and ecological adaptations of the bottlenose dolphin. Post-contact content is based on an informal conservation debriefing, highlighting the behaviours mentioned in the pre-contact approach.

Sampling methodology

Participants were asked to answer the survey before (pre-intervention) or after (post-intervention) the programme. Participants were randomly selected based on multiples of three within each intervention. An average of 3.73 surveys were obtained per day throughout the study period. Pre- and post-intervention response rate was almost 100%; of 292 participants asked to respond to the survey, only one refused.

Twelve weeks after the intervention, a follow-up survey was emailed to all participants who stated willingness to participate in this assessment. No survey incentives were offered. No photos of animals accompanying the survey were shown in any stage of the study. A total of 181 participants agreed to answer a follow-up survey within a period of three months after the intervention. Of these, a response rate of 18% was obtained, accounting for 32 completed follow-up surveys.

The survey (available in the local language and in English) was adapted directly from the Conservation Caring Scale (Skibins and Powell 2013), designed to measure zoo-goers' connection to a species and to relate this to pro-conservation behaviours following a zoo visit (Table 1). No changes to this previously validated scale were made, and predictive relationships between variables were not analysed.

All subscales (ECW, CC, BSO and BBO) were measured using a nine-point scale (1=strongly disagree to 9=strongly agree). For general analysis, each subscale was considered a distinct variable, composed of the different group items. The different items in each behavioural subscale were aggregated to give a general idea of visitors' overall intention to change behaviour. Behavioural intentions were also subject to individual item analysis.

Table 1. List of questions used to measure each subscale (adapted from Skibins and Powell 2013).

Topic	Questions
Existing connection to wildlife	'I actively seek opportunities to view wildlife'
	'I feel a deep connection to wildlife'
	'I am highly motivated by the need to interact with wildlife'
	'I spend a lot of time learning about wildlife'.
Conservation caring	'Ensuring this species' survival is my highest priority'
	'My emotional sense of well-being will be severely diminished by the extinction of this species'
	'I need to learn everything I can about this species'
	'I would protest this site if I learned of the mistreatment of this animal'
	'I will alter my lifestyle to help protect this species'
	'My connection to this animal has increased my connection to the species as a whole'
	'Wildlife protection must be society's highest priority'
Behaviour: species-oriented	'I will donate up to 50€ to 'adopt' this animal at this site'
	'I will volunteer at an event designed to help the conservation of this species, within the next 6 months'
	'I will become a member of an organization committed to protecting this species, within the next 6 months'
	'Before my visit is over, I will sign up for a mailing/email to receive updates about the care and conservation of this animal'
Behaviour: biodiversity-oriented	'Even if I never return, I will provide ongoing financial support to this site'
	'If asked, I would donate as much as 50€ to help protect a species I've never heard of'
	'I will endorse public policy that severely restricts future growth & development in order to protect wildlife'
	'Elected officials' views on wildlife will be a major factor in my voting'
	'Even when they are more expensive or harder to find, I will buy groceries & products that support wildlife conservation'

The study followed a non-repeated measures design, where different participants completed pre and post surveys. This strategy aims at avoiding the 'priming' effect (Chalmin-Pui and Perkins 2017) where participants' scores can be inflated by the second survey. It also helps to minimise social desirability bias associated with the presence of the researcher, as well as to avoid order effects, such as fatigue or boredom. Follow-up surveys were treated as non-paired since there was no direct relationship with the original answers. A response rate log was maintained throughout the study.

Participation followed the ethical standards toward research on humans as required by the host institution. All subjects were informed about their rights regarding participation and the possibility to stop participation at any moment with no penalty. An informed consent form was signed by all participants, stating their voluntary and anonymous participation. Participants were also informed that the ethical principles of confidentiality and anonymity would be respected. All procedures in this study were in accordance with the American Psychological Association's (APA) ethical principles and national regulations for data protection.

Results

Survey sample description

A total sample of 291 adult zoo visitors participated in the study, answering pre and post surveys. Females accounted for 67% (n=195) of the total participants. The most represented age group was 35–44 years old (n=148), representing 50.9% of the total sample, followed by the 25–34 years cohort with 21.6% (Table 2). Participants' education ranged from primary education to university graduate, where 62.2% (n=181) of the total participants were university graduates (Table 2).

Normality testing for each variable showed that the data differed significantly from normality across all variables (ECW: W=0.95, P<0.001; CC: W=0.89, P<0.001; BSO: W=0.96, P<0.001; BBO: W=0.98, P=0.005). Similar results were obtained when testing normality for each individual item in the BSO and BBO subscales. Based on this outcome, non-parametric tests were used to test for differences between sampling times for each variable (Kruskal-Wallis H tests). There were 10 outliers in the data (five in the ECW variable and five in the CC variable), as assessed by boxplots (Figure 1). However, these did not significantly affect the results, as determined by comparing the result of a Kruskal-Wallis H test with and without the outliers. All variables used displayed good internal reliability (Table 3). No statistical differences were found in any of the measured variables between the participants' sex, age and education for pre or post surveys.

Pre- and post-intervention surveys

Significant differences (Kruskal Wallis H test, P<0.05) were found for three variables (ECW, BSO, BBO; Figure 1). No statistical difference was found between measures regarding the CC variable.

Species- and biodiversity-oriented behaviours

When considering reported individual behaviour intentions per se, only the first two items from the BSO subscale showed significant increases from pre- to post-intervention. Intention to donate to adopt an animal and becoming a member of a conservation organisation were found significant ($H_{(1)}$=5.01, P=0.025; $H_{(1)}$=9.68, P=0.002, respectively), although all behaviours increased after the intervention. Similar to species-oriented behaviours, biodiversity-oriented behaviour items scored slightly higher post-intervention, although not significantly for any of the individual behaviours (Kruskal Wallis H test, P>0.05).

Table 2. Participants' demographics.

	Pre-intervention		Post-intervention		Total	
	N	%	N	%	N	%
Sex						
Male	45	30.4	51	35.7	96	33.0
Female	103	69.6	92	64.3	195	67.0
Age group (y-o)						
18-24	12	8.1	11	7.7	23	7.9
25-34	29	19.6	34	23.8	63	21.6
35-44	84	56.8	64	44.8	148	50.9
45-54	20	13.5	27	18.9	47	16.2
55-64	3	2.0	6	4.2	9	3.1
65+	-	-	1	.7	1	.3
Education						
Primary school	3	2.0	2	1.4	5	1.7
College	14	9.5	21	14.7	35	12.0
Highschool	37	25.0	32	22.4	69	23.7
Graduate	94	63.5	87	60.8	181	62.2
Not reported	-	-	1	.7	1	.3

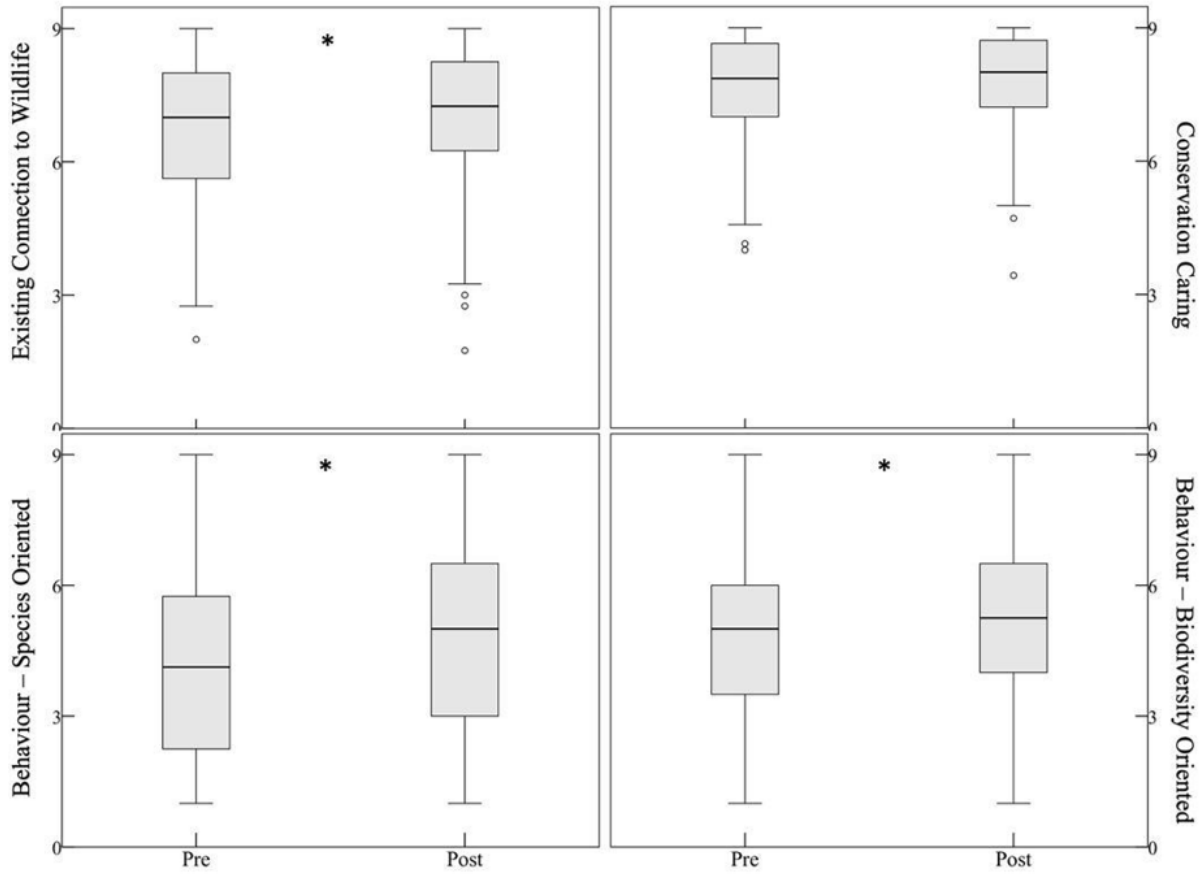

Figure 1. Boxplots of each of the four variables under study according to pre-intervention survey and post-intervention survey, with median and IQR values. *denotes significant differences P<0.05 (ECW: $H_{(1)}$=3.92, P=0.048; CC: $H_{(1)}$=0.92, P=0.34; BSO: $H_{(1)}$=5.34, P=0.021; and BBO: $H_{(1)}$=4.09, P=0.043).

Table 3. Mean values, Standard Deviation and Internal Reliability values for each variable and item under study in the pre- and post-intervention.

	Pre			Post		
	M	SD	α	M	SD	α
Existing Connection to Wildlife	6.74	1.60	0.90	7.10	1.57	0.90
Conservation Caring	7.66	1.25	0.91	7.81	1.10	0.90
Behaviour – Species Oriented	4.10	2.22	0.85	4.75	2.35	0.88
I will donate up to 50€ to 'adopt' this animal at this site	3.70	2.60		4.42	2.78	
I will become a member of an organization committed to protecting this species, within the next 6 months	3.85	2.61		4.84	2.74	
I will volunteer at an event designed to help the conservation of this species, within the next 6 months	3.97	2.58		4.47	2.57	
Before my visit is over, I will sign up for a mailing/email to receive updates about the care and conservation of this animal	4.90	2.86		5.28	2.87	
Behaviour – Biodiversity Oriented	4.80	1.94	0.75	5.27	1.94	0.76
Even if I never return, I will provide ongoing financial support to this site	3.81	2.63		4.34	2.52	
If asked, I would donate as much as 50€ to help protect a species I've never heard of	3.60	2.65		4.08	2.70	
I will endorse public policy that severely restricts future growth & development in order to protect wildlife	5.77	2.59		6.20	2.53	
Elected officials' views on wildlife will be a major factor in my voting	6.02	2.39		6.45	2.42	
Even when they are more expensive or harder to find, I will buy groceries & products that support wildlife conservation	6.63	2.18		6.72	2.22	

Table 4. Mean values, standard deviation and internal reliability values for each variable and item under study in the follow-up survey.

	Follow-up		
	M	SD	α
Existing Connection to Wildlife	6.32	1.74	0.93
Conservation Caring	7.11	1.47	0.88
Behaviour – Species Oriented	4.30	2.48	0.93
I will donate up to 50€ to 'adopt' this animal at this site	4.13	3.00	
I will become a member of an organization committed to protecting this species, within the next 6 months	4.06	2.61	
I will volunteer at an event designed to help the conservation of this species, within the next 6 months	4.00	2.51	
Before my visit is over, I will sign up for a mailing/email to receive updates about the care and conservation of this animal	5.00	2.76	
Behaviour – Biodiversity Oriented	4.85	2.05	0.79
Even if I never return, I will provide ongoing financial support to this site	3.72	2.68	
If asked, I would donate as much as 50€ to help protect a species I've never heard of	3.86	2.67	
I will endorse public policy that severely restricts future growth & development in order to protect wildlife	5.90	2.53	
Elected officials' views on wildlife will be a major factor in my voting	5.91	2.54	
Even when they are more expensive or harder to find, I will buy groceries & products that support wildlife conservation	6.34	1.99	

Follow-up survey

A total of 32 follow-up surveys were collected. Normality testing for all variables showed only the BSO variable not complying with normal distribution (ECW: W=0.95, P=0.15; CC: W=0.94, P=0.10; BSO: W=0.91, P=0.02; BBO: W=0.98, P=0.83) With such a small sample, skewness and kurtosis were also checked. All values were below the threshold of ±2 for both skewness and kurtosis, thus normality assumptions were met (George and Mallery 2010). Even though this was not a sound representative sample of the population (124 participants needed for 95% confidence limits), these results were included as a needed approach to better address the aim of this study. Since the follow-up data were compared with the non-normal values of the post-intervention survey, a Kruskal-Wallis H test was conducted to check for differences in each variable. All scales showed good internal reliability (Table 4).

Table 4 shows the average values of all measured scales. Results were compared with the post-intervention results in order to check if there were any longitudinal effects. The follow-up survey found a significant decrease in participants' ECW and CC scores, whereas BSO and BBO scores did not significantly alter (Figure 2).

Species- and biodiversity-oriented behaviours

When comparing individual behaviour intentions, both species-oriented and biodiversity-oriented follow-up scores showed no significant differences from post-intervention (Kruskal Wallis H test, P>0.05).

Discussion

Among the wide range of visitor experiences that zoos and aquariums offer, AVIs are usually promoted as emotional experiences that encourage positive attitudes towards conservation which will, presumably, reflect on behaviour change. This assumption is based on evidence that learning and emotion are interrelated (Tyng et al. 2017) so forming emotional bonds with animals can be seen as the first step in the cascade of behaviour change. Nevertheless, there is very limited research on AVIs and visitor behaviour change. To date, only a few studies have focused on the relationship between human-dolphin interactions and how the experience affects visitors' emotional connection and behavioural intentions (e.g. Webb and Drummond 2001; Welsh and Ward 2021; Yerbury and Boyd 2018). To the authors' knowledge, none have yet applied the Conservation Caring scale as a means to explore how these AVIs influence the visitor's connection with the contact species and how this affects pro-conservation behavioural intentions.

Existing connection to wildlife and conservation caring

The results show that, although the CC variable did not increase immediately after the intervention, ECW did significantly increase in the post-intervention assessment (Figure 1). Both CC and ECW pre-intervention scores were particularly high, averaging 7.66 (SD=1.25) for CC and 6.74 (SD=1.60) for ECW, showing a possible ceiling effect influencing post-intervention results. This should not be surprising as zoos are known to be self-selected places for visitors with higher environmental motivations and attitudes (Adelman et al. 2000; Falk et al. 2007), which suggests pre-existing knowledge and empathy for conservation. This is coherent with the results of the current study through the particularly high pre-intervention scores of both ECW and CC. According to the Conservation Caring scale (Skibins and Powell 2013), the CC variable aims at measuring how visitors connect to a specific species, specifically how individuals think, feel and act toward that species. The results show the intervention to be influential in the connection with the bottlenose dolphin, even though visitors were highly motivated beforehand.

Behavioural intentions toward species and biodiversity

The Conservation Caring scale postulates that high CC scores will influence pro-conservation species-oriented behavioural intentions. The results confirm this influence although only partially when looking at the individual behavioural intentions.

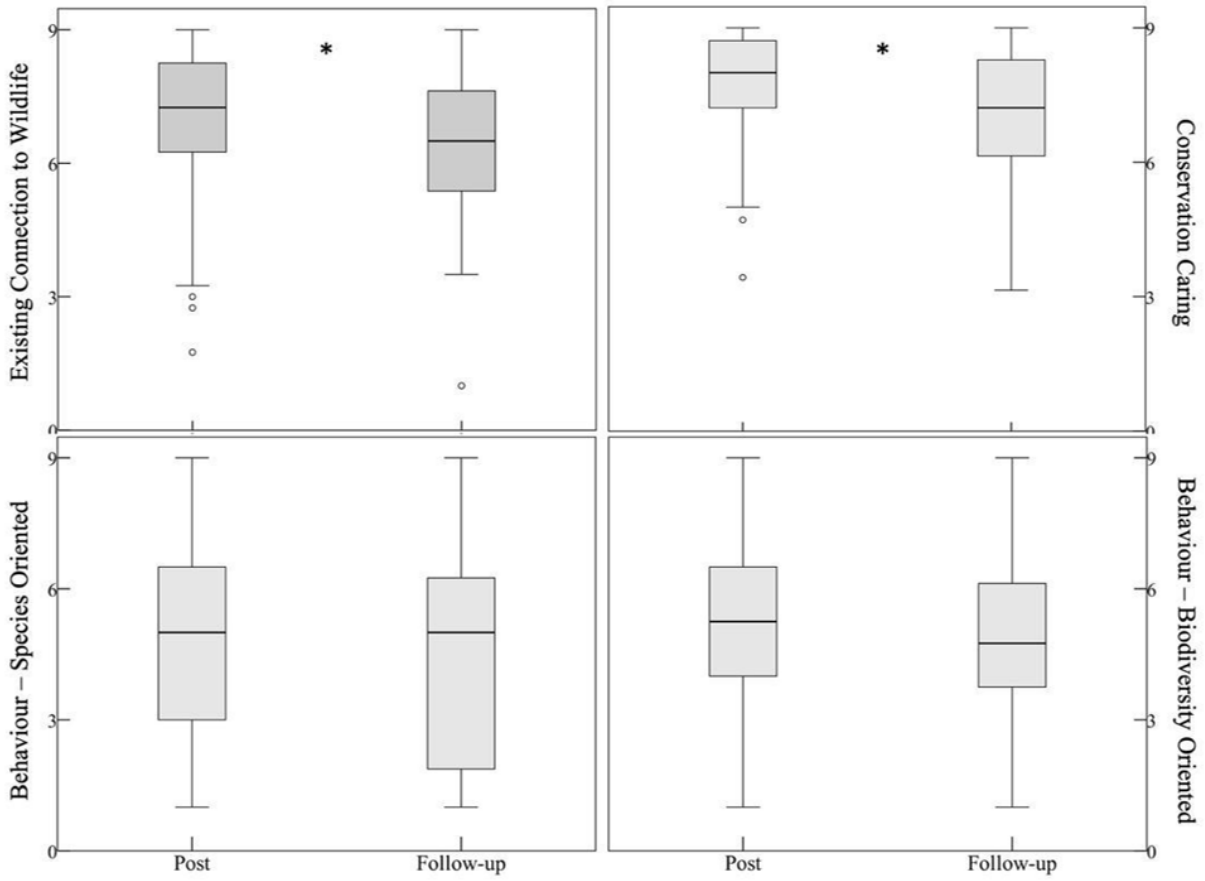

Figure 2. Boxplots of each of the four variables under study according to (2) post-intervention survey and (3) Follow-up survey, with median and IQR values. * denotes significant differences P<0.05 (ECW: $H_{(1)}$=4.72, P=0.030; CC: $H_{(1)}$=7.86, P=0.005; BSO: $H_{(1)}$=0.38, P=0.54; and BBO: $H_{(1)}$=0.61, P=0.34).

This was shown by the increased post-intervention scores of some species-oriented behavioural intentions, namely, on the intention of donating to 'adopt' an animal and becoming a member of a conservation organisation for that specific species. These two pro-conservation behaviours are commonly described intentions of zoo visitors (e.g. Collins et al. 2020; Ojalammi and Nygren 2018; Skibins and Powell 2013). These are indirect actions which are easier to adopt, as opposed to more direct involvement such as, for example, volunteering or changing daily consumer behaviours. This is coherent with the information summarised by Learmonth et al. (2021), where two of the largest reported barriers to the adoption of pro-conservation behaviours are uncertainty of how to get involved by more than simply donating money and feelings of insecurity due to lack of expertise or education, or perceived irrelevance of an individual to appropriate solutions supporting conservation.

Looking at the general behavioural intentions, the results partially confirm what the Conservation Caring scale predicts, as shown by increased post-intervention scores of the BSO variable. Nevertheless, the findings do show an increase in the BBO variable, which may be explained by the fact that the interventions ended with examples of general rather than species-specific conservation actions, thus pointing to a possible recency effect.

Longitudinal effects

The follow-up scores show maintenance of the behavioural intentions variables. Looking closely at the average values, scores decrease in the follow-up assessment but no statistical significance was found (Figure 2). Conservation caring and connection to wildlife significantly decreased from post-intervention scores (Figure 2), reaching pre-intervention levels. Since the follow-up sample was relatively small, these results should be analysed with some caution; sample size may have influenced the outputs. Nevertheless, a return to baseline is predictable and perfectly acceptable, as emotional connections are known to be short-lived and may not strongly influence behaviour in the long term (e.g. Ballantyne et al. 2011; Dierking et al. 2004).

Flagship versus endangered species

The bottlenose dolphin, the species of this AVI, is a non-threatened charismatic species. In the particular context of this study, the message was mainly focused on the dolphin's ecological importance or as a representative of other similar but threatened species. The lack of focus on the particular, i.e. on the need for protection of the specific species, raises the question whether this non-threatened and charismatic species would be a better vehicle for a message focused on biodiversity (BBO). However, short-term

results show that proximity to the animal was more relevant to conservation intentions than the biodiversity-focused message. In fact, the absence of differences in individual biodiversity-oriented behaviours is consistent with what the Conservation Caring scale postulates, as the emotional influence of the species may overshadow general concern (Skibins and Powell 2013).

Conclusion

Evidence shows that AVIs can be influential in the development of positive emotional experiences, as well as enabling behaviour changes towards conservation of species with which visitors have interacted. Therefore, it is crucial to find ways to correctly evaluate the emotional impact of such visitors' experiences, especially in the long term.

The results demonstrate a post-intervention increase in important factors such as wildlife bonding, as well as, and perhaps more importantly, a predisposition to change behaviours, an effect that was stable even after a few months.

Aside from other studies focused on acquired knowledge and changing attitudes, this study shows that the Conservation Caring scale can also be important to assess the immediate and longitudinal effect of emotional connections and conservation-focused behavioural intentions from participating in a human-dolphin intervention. Although general pro-conservation behavioural intent increased after the intervention and did not decrease significantly even after three months, individual species-oriented behaviours did significantly increase after the intervention. The results show that concrete actions toward the focal species should be favoured rather than more general biodiversity-oriented behaviours when outlining content for such AVIs. Identifying the details that lead to successful adoption of specific pro-conservation behaviours is essential for the future of zoos and aquariums.

Nudging conservation behaviours

It is important to tailor conservation messages, since a key objective of AVIs is to engage participants in conservation issues (whether through knowledge acquisition or the adoption of conservation behaviours). In the selection of conservation behaviours for a specific programme, zoo staff often use their own perceptions of what seems most relevant and feasible for visitors to adopt. These behaviours are often selected from the staff's perspective of what will work or what is most salient at the time (Smith et al. 2010). Other teams use internal consulting strategies for behaviour selection; however, few choose to acknowledge visitor motivations as the first step towards behaviour change (Smith et al. 2012). As stated by Smith et al. (2010), the behaviours most likely to be adopted are those that meet certain conditions. The first condition is that the asked behaviours can be carried out on-site, i.e. in the zoo itself. The second condition relates to how easy the behaviours are to perform; they should not require any kind of prior knowledge or expertise. The third condition relates to the possible fatigue of habitual behaviours. Smith et al. (2010) recommend an appeal to new behaviours or a new understanding of existing behaviours. In this context, according to Bamberg et al. (2003), in order to break the behaviour cycle associated with habitual choices, it may be necessary to provide visitors with new and personally relevant information about the impacts of these same choices, or else reinforce the benefits of alternatives. Finally, the proposed behaviours must have a high response efficacy, i.e. the behaviour will directly help the focal animals. Bamberg et al. (2003) also highlight the pros and cons of 'one fits all' messages. It is important to understand that some messages will resonate best with a large percentage of visitors, while others will echo only in a more restricted group of visitors (Smith et al. 2010).

Limitations and future directions

Some limitations have likely affected the outcomes of this study. One weakness of the present study is the absence of a question asking if visitors had previously experienced the same or a similar AVI experience. This would help better understand a possible prolonged exposure effect, as repeat zoo visitors are more likely to engage in conservation action (e.g. Clayton et al. 2017; Godinez and Fernandez 2019). Access to this information would also help to filter the pre-intervention attitudes in more detail, depending on sample composition. To further interpret the longitudinal effect, there is a need to increase follow-up response rate. One possible solution is the use of survey incentives, although this strategy can affect sample composition, response bias and response quality. Since the data do not show a normal distribution, future studies should aim for a larger sample size to seek normal distribution of response variables. Although not the aim of this study, a normally distributed dataset would have allowed exploration of the intrinsic relationship of the Conservation Caring scale and pro-conservation behaviours, as in the original study (Skibins and Powell 2013).

Future research should explore the use of this scale in other AVIs, including for less charismatic species, as well as study the relationship between conservation caring and knowledge acquisition in the short and long term, as these two variables are known to predict pro-conservation behaviours. Equally important for progressive zoos and aquariums is to understand whether their conservation messages are effective and how the presence of animals can potentiate these messages, in the sense of knowledge acquisition, attitude shift or behaviour change. Future studies should also explore different ways of communicating pro-conservation behaviours, seeking to involve different groups of visitors.

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