



Pathways between contrasting ecotourism experiences and conservation engagement

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Abstract

It is commonly believed that nature experiences lead to increased concern for nature, and ultimately, the expression of conservation behaviours. Captive and non-captive ecotourism experiences with charismatic megafauna have been associated with conservation support. However, there is little research examining experiences with non-mammalian wildlife, or familiar species in domestic settings. We conducted interviews (N=427) at two ecotourism destinations in Australia (a conservation-focused zoological park and a rainforest national park), to determine whether these experiences are associated with conservation engagement and if so, the pathways through which these might operate. Interviews identified the elements of experience (site, duration, animal encounter, educational shows, and interpretive signs), the subjective aspects of their experience (positive and negative emotions, learning, connection, reflection), and engagement in conservation (environmental intentions, policy support and signing a conservation-focused pledge). Regression analyses examined the relationship between elements of experience and conservation engagement, while controlling for demographics and nature-relatedness. Participating in non-captive bird feeding at the rainforest site was associated with greater support for conservation policies, whereas visiting the zoological park was associated with greater intention to seek and share conservation information. Mediation analysis demonstrated that both of these relationships were mediated by feeling upset about environmental problems, indicating a role for negative emotions alongside ecotourism experiences in prompting conservation engagement. No element of the experience was associated with signing the pledge, highlighting the challenges of eliciting behaviour change. Overall, these findings suggest that different types of ecotourism experiences may generate different types of conservation engagement, and that that associated negative emotions about the plight of species can foster stronger engagement in conservation issues.

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Introduction

Human activity has disrupted and degraded the planet's ecosystems. More than half of the world's surface has been turned over to human land uses (Hooke and Martín-Duque 2012), causing a major extinction crisis (Grandcolas and Roseli 2016). As human activity has driven this crisis, so too are humans critical to arresting and reversing losses in biodiversity. A global conservation movement aims to halt the declines in biodiversity, culminating in calls to set aside half the planet for nature (Wilson 2016). However, evidence on how to generate meaningful conservation actions remains weak (Amel et al. 2017; Reddy et al. 2017). A disconnection from nature is posited as a fundamental driver of low conservation concern, a notion encapsulated by the idea of 'extinction of experience' (Nisbet et al. 2008; Pyle 1978). This theory suggests that habitat degradation and increasing urbanization lead to reduced opportunity to experience nature, the loss of connection with nature, reduced concern, and ultimately, reduced support for conservation policies or actions (Miller 2005). There are many ways to experience nature, involving diverse activities, from citizen science or hiking in national parks, through to gardening or relaxing in urban parklands (Clayton et al. 2017; Prévot et al. 2018a). Clayton and colleagues describe different dimensions of nature experiences, informed by not only the characteristics of nature experienced, but also the social context of the experience, such whether a special effort is made to experience nature, or whether nature activities are part of a regular routine (Clayton et al. 2017). The importance of direct nature experiences is widely accepted as important for promoting conservation engagement (encompassing knowledge, concern, behaviours, policy support) (Clayton et al. 2017; Dean et al. 2016; Duerden and Witt 2010; Prévot et al. 2018a; Stevenson et al. 2014). Experience of nature may also foster environmental identity, which can elicit longer term engagement (Prévot et al. 2018b). However, there are few studies which examine how contrasting types of nature experiences differentially influence the pathways by which experience leads to engagement. Here we examine two terrestrial ecotourism experiences, one in situ (rainforest resort), and one ex situ (zoological park), to explore how different types of nature experiences influence support for conservation policies and likelihood of performing conservation actions.

Most research on nature experiences and conservation support has focused on ecotourism experiences and, in particular, wildlife encounters in zoos. Findings indicate that zoo experiences may foster increased conservation awareness and concern (Ardoin et al. 2015; Ballantyne et al. 2007, 2011a) and strengthen environmental identity (Clayton et al. 2011). There is a wide variety of different 'elements' of these experiences, comprising time in nature, animal encounters, and specific educational experiences such as guided walks, shows and exposure to interpretative material. Some studies suggest that touching animals or interactive demonstrations can foster for visitor enjoyment and learning (O'Neill et al. 2004; Rowe and Kisiel 2012; Swanagan 2000) but little research has assessed the influence of animal encounters on conservation outcomes relative to other aspects of the experience. There is also little investigation into the comparative role of in situ ecotourism experiences, such as visiting national parks. These provide opportunities for encountering wildlife and educational experiences, but may generate greater perceptions of authenticity (Moscardo and Saltzer 2004; Zeppel and Muloin

2007). As such, in situ ecotourism experiences may generate different outcomes compared to captive ecotourism experiences. One study examined how experiences of charismatic megafauna influenced conservation concern and willingness to engage in conservation behaviours in visitors to two contrasting settings: U.S. zoos and aquariums, and Tanzanian national parks (Skibins et al. 2013a). Indicators of connection with wildlife were associated with conservation concern in both settings. Other aspects of the experience (such as quality of interpretation) were associated with conservation concern in captive settings only (Skibins et al. 2013a). While such findings highlight the potential role of charismatic megafauna as ‘flagship’ species in both in situ and ex situ settings (Skibins and Powell 2013), a number of questions remain unanswered. Given that charisma of the animal may exert this influence on conservation support (Colléony et al. 2017a), it is unclear whether experiences with less charismatic wildlife (e.g. non-mammalian species or familiar species in domestic settings) are also able to elicit conservation support (Veríssimo et al. 2009). It is also unclear whether touching wildlife offers a unique contribution to the experience. In this study, we explore two nature-based ecotourism sites in a single region, both of which offer wildlife encounters. We examine how elements of these experiences influence conservation engagement.

There are many potential pathways by which experience might increase conservation engagement (Chawla 2006). A number of theoretical perspectives describe how experiences can lead to change. Kolb’s Experiential Learning Theory posits that experiential learning has a number of stages that are important for learning and change, including both specific concrete experiences and subsequent reflection or processing of these experiences (Kolb and Kolb 2009). Studies suggest that reflecting on new ideas about nature or feeling a connection to the observed wildlife are associated with stronger concern (Ballantyne et al. 2011a; Clayton et al. 2011). Transformative Learning Theory identifies a range of additional psychological processes that may enable experiences to elicit change. For example, within nature settings, it has been argued that experiencing psychological benefits of being in nature, such as wellbeing or feeling connected to nature, are important for transformative learning (D’Amato and Krasny 2011). Emotions arising from experiences may also be important for transformative learning, including both positive emotions, such as feeling awe (D’Amato and Krasny 2011), and negative emotions related to seeing environmental degradation (Diduck et al. 2012). For example, zoo visitors who felt positive emotions after viewing animals were likely to express a desire to save the animal (Myers et al. 2004). Negative emotions (e.g. anger, sadness) may also influence outcomes, with research indicating that negative emotions associated with experiencing environmental degradation are associated with taking action in both citizen scientists (Dean et al. 2018; Haywood 2016) and environmental activists (Chawla 1999). In this study we examine both concrete aspects of an experience (e.g. touching, seeing, doing) and subjective processing of this experience (reflecting, connecting, feeling, learning).

One of the challenges in understanding processes that lead to conservation engagement is identifying which engagement outcomes are most important. Although some studies focus on conservation concern as an outcome, it is important to recognise that concern or awareness about an issue may not translate to action (Ballantyne et al. 2011a; Chawla 2006; Dierking et al. 2004). Most behavioural research focuses adoption of household behaviours, such as recycling (Osbaldiston and Schott 2012; Steg and Vlek 2009). However, it is likely that achieving better conservation outcomes will also require communities to adopt social and civic behaviours such as sharing information with others, seeking out conservation information, and demonstrating support for policies via behaviours such as petitioning (Amel et al. 2017; Stern 2000).

Here we explore which elements of ecotourism experiences are associated with an increase in conservation engagement. We compare the impact of two fundamentally different terrestrial experiences (zoological park and rainforest resort) on three measures: support for conservation policies, intentions to seek and share information, and pledging to address personal carbon footprint. First, we determine which elements of the experiences are most strongly associated with subsequent engagement. We examine whether touching an animal, attending educational shows, reading educational signage, visit duration, and site are associated with policy support, intentions, and actions. Second, we investigate the potential psychological pathways linking experience with outcomes, including (i) learning about conservation actions, (ii) positive and negative emotions, (ii) personal well-being, (iv) a sense of connection, and (v) reflecting on the experience.

Methods

Recruitment and procedure

We recruited participants at two contrasting nature tourism destinations in South East Queensland, Australia. The first site was a zoological park (Lone Pine Koala Sanctuary, 27°32'S, 152°58'E) which showcases iconic Australian animals in a natural bush setting in Brisbane, Australia. The main hands-on experiences offered are feeding kangaroos in a large fenced area (Fig. 1a), or holding a koala for a photo while supervised by staff (Fig. 1b). The park features ample conservation-focused interpretation, including various and frequent educational shows. The site's educational focus is designed to be accessible to a wide range of visitors, including children and families, and domestic and



Fig. 1 Typical wildlife encounters at the zoological park include kangaroo feeding (a), koala holding (b). Typical bird encounters at the rainforest resort include Regent Bowerbirds (*Sericulus chrysocephalus*) (c) and Australian King-Parrots (*Alisterus scapularis*) (d). Photo credits: Lone Pine Koala Sanctuary (a, b), Paul Gabbert (c), Courtney Morgans (d)

international visitors. The second study site was a rainforest resort situated on private land adjacent to a national park dominated by subtropical rainforest (O'Reilly's Rainforest Retreat, 28°14'S, 153°8'E). The rainforest resort offers picnic areas, a 4-wheel driving pit stop, a café, information centre, accommodation, bushwalks, wildlife viewing, a 'birds of prey' show, and bird feeding. Bird feeding experiences involve attracting wild birds from the rainforest to a designated area where visitors engage in hands-on feeding (hereafter referred to as non-captive bird feeding). This enables close interactions with a range of bird species including Regent Bowerbirds (*Sericulus chrysocephalus*) (Fig. 1c), Australian King-Parrots (*Alisterus scapularis*) (Fig. 1d), and Crimson Rosellas (*Platycercus elegans*). Despite their differences, the two sites share some similarities, both offering opportunities to see and touch animals, read educational signs and interpretation, and attend educational shows.

During Spring–Summer of 2016, we approached adults at each site and invited them to participate in a brief face-to-face survey about their visit. Within each site, set areas were identified from which to recruit participants (animal interaction areas, café, entry/exit areas, and central thoroughfare). During survey periods, all visitors walking via these areas were invited to participate. The survey took approximately 5 min. Participants did not receive any compensation for their participation. Informed consent was provided by all participants. Ethical clearance was provided by the institutional human research ethics committee.

Dependent (outcome) variables—indicators of conservation engagement

Three domains of conservation engagement were assessed:

- *Policy support* three items assessed degree of support for three conservation policies: (i) limiting urban development in specific areas of South East Queensland that are important for koalas, (ii) restricting land-clearing in areas important for Australian wildlife, and (iii) stronger enforcement of speed limits in wildlife zones. These were rated on a 5-point scale (1 = very unlikely, 5 = very likely). The mean of these items formed a 'policy support' score (Cronbach's $\alpha = 0.87$).
- *Intentions to seek and share information* two items to assess how likely respondents were to (i) discuss wildlife conservation with people they know and (ii) seek out information on wildlife conservation within the next month. We rated these two items on a 5-point scale (1 = very unlikely, 5 = very likely). The mean formed an 'information intentions' score ($r = 0.62$).
- *Signing a pledge* we invited participants to sign a conservation pledge, as a means of measuring a conservation action. Research shows that signing a pledge increases the likelihood of performing the pledged behaviour (Lokhorst et al. 2013; Osbaldiston and Schott 2012). Asking participants to sign a pledge also provided an opportunity to perform a 'conservation behaviour' within the brief survey period. We offered a small paper card to respondents with a sentence explaining the impact of our carbon footprint on Australian wildlife, followed by a pledge to 'calculate my carbon footprint and consider ways to reduce it'. The card requested the participant's signature, and directed them to a user-friendly website where they could briefly calculate their carbon footprint. We assured respondents that their choice had no impact on the interviewer (response coded 1 = signed pledge, 0 = did not sign).

Independent variables—elements of experience

Five items captured elements of the type of experience:

- Study site (coded as 0 = rainforest, 1 = zoological park).
- Duration of experience: we asked participants how long they had been at the study site, as an indicator of ‘dose’ of experience. The data related to duration of visit was heavily positively skewed; to address this, we created a binary variable, using a median split (coded for analysis as 1 = two hours or more; 0 = less than two hours).⁷
- Whether they touched an animal (1 = yes, 0 = no).
- Whether they read any interpretation/signage (1 = yes, 0 = no).
- Whether they attended a show (1 = yes, 0 = no).

Mediators—subjective aspects of the experience

Five groups of variables examined subjective aspects of the experience, as potential mediators between experience and outcome. All were rated on a 5-point scale (1 = Strongly disagree, 5 = strongly agree) and adapted from previous research (Ballantyne et al. 2011a; Tennant et al. 2007):

- *Wellbeing* three items measured whether participants felt (i) energised and full of life, (ii) relaxed and restored, and (iii) good about life.
- *Positive emotions (two items)* “I felt a sense of wonder and awe” and “It was exciting to see live animals”.
- *Negative emotions (single item)* “Something I came across made me feel upset about environmental problems”.
- *Reflection (single item)* “I found myself reflecting on new ideas about nature and the environment”.
- *Connection (single item)* “I felt an emotional connection with the animal/s I saw”. This item captured a sense of connection felt with the wildlife during the visit.
- *Learning (single item)* “I learnt about things I can do to protect wildlife”.

To assess whether these items should be considered separately or combined into scales for mediation analysis, we undertook a factor analysis (see “[Statistical analysis](#)”).

Participant characteristics

To account for the potential influence of participant characteristics we also assessed the following:

- *Nature relatedness* three items from brief The Nature Relatedness Scale (NR-6) were used to control for connection to nature (Nisbet and Zelenski 2013). Because of the necessary brevity of the survey, we included only three items. These comprised two (of the four) items that consider self-identification/connection with nature (‘I always think about how my actions affect the environment’ and ‘My relationship to nature is an important part of who I am’), and one (of the two) items that reflect individual differences in the need for/awareness of nature (‘I take notice of wildlife wherever I am’). Each item was rated on a 5-point scale (1 = strongly disagree, 5 = strongly agree) and

the mean formed a ‘nature relatedness’ score (Cronbach’s $\alpha=0.72$). We note that, in contrast to the ‘Connection’ mediator (described above) that assesses a potentially transient sense of connection felt in the moment, these NR-6 items reflect a stable trait characteristic that may underpin an individual’s choice to visit an ecotourism site.

- *Sociodemographic factors* participant age (four response options), gender, and currently residing in Australia (yes/no).

Statistical analysis

We used regression analyses to examine direct relationships between independent variables (elements of experience) and dependent variables (Hayes 2013). Policy support and Information intentions were both calculated by taking the mean of multiple Likert-style items, and as such are considered suitable for use in linear regression as continuous variables (Tabachnick and Fidell 2013). We used linear regressions for continuous dependent variables (policy support and information intentions), and logistic regressions for dichotomous dependent variables (signing pledge). We inspected all regression models to ensure that they met the assumptions related to normality and multicollinearity. We utilised a step-up modelling approach, as recommended by Cohen (Cohen 1978) and used in other research (e.g. Clapp et al. 2008). Each regression model contained two steps:

- *Step 1* included five independent variables (site, duration, touched an animal, engaged with interpretation, attended show), and four covariates (age, gender, Australian resident, and nature relatedness).
- *Step 2* added interaction terms between study site and other independent variables. As recommended by Aiken and West (Aiken et al. 1991), we only including hypothesised interactions in the model (i.e. between independent variables and site, and not interactions with covariates).

To examine pathways between elements of experience and outcome, we then explored significant relationships identified in Stage 1 of the analysis using mediation analysis with the PROCESS macro in SPSS (Hayes 2013). This estimates total, direct and indirect effects of an independent variable on a dependent variable via a mediator. We used bootstrapping (10,000 bootstrapped samples) to assess the significance of the indirect effects by recurrently resampling the data to create bias-corrected confidence intervals (Hayes 2013). Significant mediation is indicated by a bootstrapped confidence interval for the coefficient which does not cross zero.

To assess whether the nine mediator items should be combined into subscales or treated as separate mediators, we conducted factor analysis, using principal axis factoring with varimax rotation (Bartlett’s test of sphericity $\chi^2=789.22$, $p<0.001$). We identified two factors with Eigenvalues exceeding 1 (Table S1). Five items loading onto Factor 1 comprised the three wellbeing items and two positive emotion items. We combined these into a single ‘positive emotions’ scale, whereby higher scores reflected stronger positive emotions ($M=4.27$, $SD=0.49$, $\alpha=0.77$). The two items loading onto Factor 2 were ‘reflecting on new ideas’ and ‘feeling an emotional connection’. These were combined into a single scale ‘reflection/connection’ ($M=3.58$, $SD=0.80$, $r=0.38$). Two items failed to load onto a scale and we treated these as separate single items: negative emotions ($M=2.88$, $SD=1.17$) and learning ($M=2.51$, $SD=0.87$).

Results

Participant characteristics

In total, 427 adults consented to participate: 222 individuals were recruited at the zoological park (87% response rate) and 205 at the rainforest site (76% response rate). There were a number of differences for each site: participants at the zoological park were more likely to be younger, female, live outside Australia, and report lower nature relatedness (Table 1). The types of activities reported during visits also varied across the two sites: one-third of visitors to the zoological park reported attending a show, compared to less than 5% of visitors to the rainforest site, and more visitors to the zoological park reported touching an animal, and engaging with interpretative signs (Table 1). Correlations between variables are highlighted in Table S2.

Factors associated with policy support

Step 1 of the regression indicated that individuals who had touched an animal reported greater policy support ($B=0.16$ $p < 0.001$) (Table 2). Step 2 indicated that this relationship was significantly moderated by site ($B=-0.16$, $p < 0.001$). Inspection of the regression co-efficient at each level of the moderator revealed that at the rainforest site, touching an animal was a positively associated with policy support; there was no direct effect of touching an animal on policy support at the zoological park. The relationship between touching an animal and policy support was further examined using mediation analysis with PROCESS Model 5; this examines the mediation of the main effect observed in Step 1, while controlling for the moderated effect observed in Step 2. Mediation analysis indicated that the effect of touching an animal on policy support was partially explained by the experience of negative emotions, whereby those participants that touched an animal reported feeling more upset about environmental problems, which was associated with higher levels of policy support (Indirect Effect=0.021; 95% CI 0.003, 0.056; Table S3, Fig. 2a). There

Table 1 Descriptive statistics for participants at each study site (N, %, or mean, SD)

	Site 1 rainforest resort	Site 2 zoological park	Statistic
Participants	205 (100.0%)	222 (100.0%)	
Gender (female)	109 (53.2%)	150 (67.6%)	$\chi^2=9.26$, $p < 0.01$
Age			$\chi^2=8.34$, $p < 0.05$
18 to 30 years	75 (36.6%)	107 (48.2%)	
31 to 45 years	49 (23.9%)	46 (20.7%)	
46 to 60 years	38 (18.5%)	41 (18.5%)	
61 and over	43 (21.0%)	28 (12.6%)	
Australian resident	161 (78.5%)	75 (33.8%)	$\chi^2=9.26$, $p < 0.001$
Nature relatedness	4.37 (0.56)	4.14 (0.64)	$t=-0.38$, $p < 0.001$
Touched an animal	77 (37.6%)	129 (58.1%)	$\chi^2=18.02$, $p < 0.001$
Interpretation	101 (49.3%)	159 (71.6%)	$\chi^2=22.36$, $p < 0.001$
Attended shows	6 (2.9%)	63 (28.4%)	$\chi^2=50.96$, $p < 0.001$
Duration (≥ 2 h)	124 (60.5%)	90 (40.5%)	$\chi^2=16.96$, $p < 0.001$

Table 2 Moderated multiple regression analyses predicting policy support, information intentions, and sign a pledge

	Policy support						Information intentions						Sign pledge		
	Step 1			Step 2			Step 1			Step 2			Step 1		
	B±SE	95% CI	p	B±SE	95% CI	p	B±SE	95% CI	p	B±SE	95% CI	p	OR	95% CI	p
Site	-0.05±0.05	-0.14, 0.05	0.34	-0.08±0.05	-0.18, 0.01	0.09	0.14±0.06	0.04, 0.25	0.009	0.13±0.06	0.01, 0.25	0.030	1.37	0.84, 2.23	0.21
Duration	-0.04±0.04	-0.12, 0.04	0.36	-0.04±0.04	-0.12, 0.04	0.36	0.02±0.05	-0.08, 0.11	0.75	0.00±0.05	-0.10, 0.09	0.96	1.06	0.86, 1.30	0.61
Touched animal	0.16±0.04	0.08, 0.24	0.000	0.16±0.04	0.08, 0.24	0.000	0.05±0.05	-0.04, 0.14	0.31	0.06±0.05	-0.04, 0.15	0.24	0.85	0.56, 1.29	0.45
Signs	0.03±0.04	-0.04, 0.11	0.39	0.01±0.04	-0.06, 0.09	0.74	0.04±0.05	-0.05, 0.13	0.40	0.03±0.05	-0.06, 0.12	0.52	1.06	0.70, 1.60	0.79
Show	-0.02±0.04	-0.10, 0.07	0.68	0.09±0.06	-0.03, 0.21	0.15	-0.02±0.05	-0.12, 0.07	0.64	0.03±0.07	-0.12, 0.17	0.71	0.93	0.51, 1.70	0.83
Touched animal × site				-0.16±0.04	-0.24, -0.08	0.000				0.06±0.05	-0.04, 0.15	0.24			
Signs × site				-0.02±0.04	-0.10, 0.06	0.66				-0.08±0.05	-0.17, 0.01	0.09			
Show × site				-0.07±0.06	-0.20, 0.05	0.25				-0.07±0.08	-0.22, 0.08	0.38			
Duration × site				-0.06±0.04	-0.14, 0.02	0.13				-0.06±0.05	-0.15, 0.03	0.22			
Age	0.06±0.04	-0.02, 0.14	0.16	0.03±0.04	-0.05, 0.11	0.44	0.09±0.05	-0.01, 0.18	0.066	0.09±0.05	-0.01, 0.18	0.068	0.85	0.70, 1.05	0.14
Sex	-0.03±0.04	-0.10, 0.05	0.52	-0.02±0.04	-0.10, 0.05	0.58	0.01±0.05	-0.08, 0.10	0.85	0.01±0.05	-0.08, 0.10	0.86	0.92	0.61, 1.38	0.69
Australian resident	0.02±0.04	-0.07, 0.10	0.66	0.02±0.04	-0.06, 0.11	0.61	-0.08±0.05	-0.18, 0.02	0.11	-0.07±0.05	-0.17, 0.03	0.15	1.26	0.81, 1.97	0.31

Table 2 (continued)

	Policy support			Information intentions						Sign pledge					
	Step 2			Step 1			Step 2			Step 1					
	B ± SE	95% CI	p	B ± SE	95% CI	p	B ± SE	95% CI	p	B ± SE	95% CI	p			
Nature relatedness	0.27 ± 0.04	0.19, 0.35	0.000	0.28 ± 0.04	0.20, 0.36	0.000	0.51 ± 0.05	0.41, 0.60	0.000	0.51 ± 0.05	0.42, 0.60	0.000	1.44	1.17, 1.78	0.001
	F = 8.60, R ² _{adj} = 0.14, p < 0.001			F = 8.02, R ² _{adj} = 0.18, p < 0.001			F = 16.71, R ² _{adj} = 0.25, p < 0.001			F = 12.17, R ² _{adj} = 0.25, p < 0.001			Cox and Snell R ² = 0.04; Nagelkerke R ² = 0.50; p = 0.063		

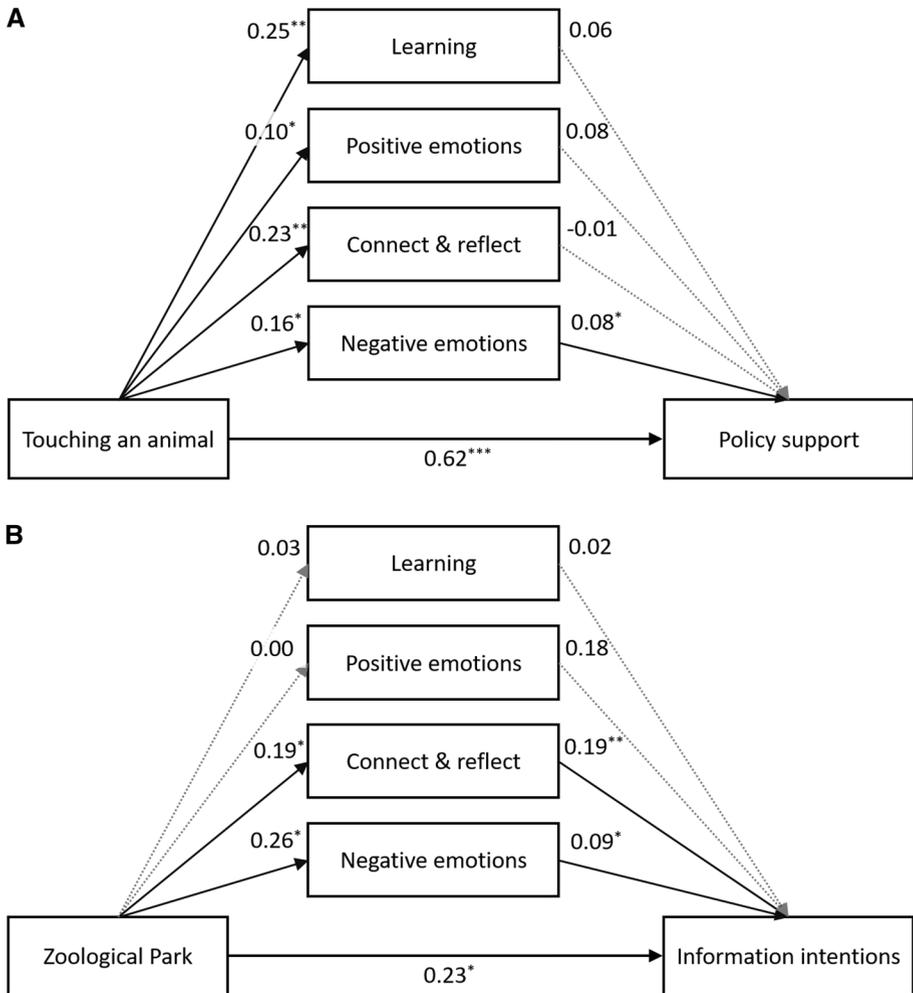


Fig. 2 Mediation analysis showing that **a** the relationship between touching an animal and policy support is mediated by negative emotions, and **b** that the relationship between visiting the zoological park and information intentions is mediated by both negative emotions and connection/reflection. Values are regression coefficients. Full lines indicate significant pathways; dotted lined indicate non-significant pathways (* $p < .05$; ** $p < .01$)

was no significant effect of other mediators (i.e., learning, positive emotions, connect/reflect).

Factors associated with information intentions

Regression analysis indicated that participants were more willing to share or seek further information at the zoological park, compared with the rainforest site ($B=0.14, p < 0.01$; Table 2). There were no significant interactions observed in Step 2. The relationship between site and information intentions were further assessed using mediation analysis

(PROCESS Model 4, Table S4). Mediation analysis revealed that site was positively associated with information intentions, and that this relationship was partially explained by both negative emotions (Indirect Effect=0.024; 95% CI 0.003, 0.068) and connection/reflection (Indirect Effect=0.037; 95% CI 0.005, 0.096), whereby zoological park visitors were more likely to report both negative emotions and higher levels of reflection/connection, which were both associated with stronger information intentions (Table S4, Fig. 2b).

Factors associated with signing the pledge

At the first step of logistic regression analysis, the only factor associated with signing the pledge was nature relatedness (Table 2). No independent variables were associated with signing the pledge and overall, this model was weak, only reaching marginal significance ($p=0.063$). The model did not reach iterative termination in Step 2, and thus only Step 1 findings were reported (Table 2).

Discussion

Our study examined how captive and non-captive ecotourism experiences in terrestrial settings influenced conservation engagement. We showed that two of the three measured indicators of conservation engagement were influenced by aspects of the experience, and that non-captive and captive settings generated different patterns of effects. Direct physical contact with an animal was associated with policy support, and this association operated via feeling upset about environmental problems. This finding was strongest in rainforest visitors, where the main animal interaction was feeding rainforest birds. The second primary finding was that attending the zoological park was associated with greater intentions to discuss and seek out conservation information; this interaction was mediated by negative emotions and feeling a sense of connection and reflection. Interestingly, no characteristics of the experience influenced whether participants signed the pledge.

Touching an animal at the rainforest site was associated with stronger ratings of policy support. A number of studies have indicated links between touching animals and environmental engagement (Ballantyne et al. 2007, 2011a; O'Neill et al. 2004), where proximity to an animal may indicate intensity of a wildlife experience (DeMares 2000; Muloin 1998). Most of these studies have focused on charismatic megafauna in captive settings or marine-based activities such as dolphin encounters. Most research on avitourism focuses on birders (e.g. (Steven et al. 2016) which may not represent broader types of nature tourism (Hausmann et al. 2018). Our finding—that bird interactions in rainforest settings were associated with greater policy support—extend this research by demonstrating an association between feeding non-captive birds in broader tourist groups and conservation engagement. It is not clear why the effect of animal encounter varied with study site. Feeding non-captive birds may evoke a sense of helping the animals, and visitors might have felt a sense of privilege and emotional affinity due to the non-captive birds willingly approaching them (Ballantyne et al. 2011b). Indeed, investigations into the motivations for garden bird feeding reveal a central desire to protect and care for animals (Goddard et al. 2013; Jones 2011; Schriber 2010). This was not observed at the zoological park, where most animal encounters involved holding a koala or patting a kangaroo. Anecdotally, some visitors commented on how the animals appeared disinterested, or questioned whether the animals enjoyed being

held. This lack of perceived spontaneity of captive animal experiences may have limited the influence of these experience.

Our second key finding was that visiting the zoological park was associated with increased intentions to discuss and seek out conservation information. This could have been due to a number of features that were unique to the zoological park. For example, the zoological park had a strong educational focus, offering more educational signage and shows than the rainforest site. Secondly, the variety of animals presented was much greater at the zoological park, including a range of rare and cryptic species. This feature of the park may have engendered more curiosity and questioning, which may have contributed to visitor's increased intentions to discuss and seek out conservation information. It would be interesting for future research to examine the type of information shared or sought after an ecotourism experience, and whether the type of information influenced longer-term engagement.

These two relationships discussed above (touching an animal-policy support, and the zoological site-information intentions) were both mediated by negative emotions, indicating that feeling upset about environmental problems was important in fostering information intentions and policy support. Chawla suggests that negative emotions in response to environmental degradation or loss are associated with conservation concern or behaviour (Chawla 1999). Negative emotions may stimulate action via a range of pathways. For example, concern about environmental threats may be associated with reduced life satisfaction, but adoption of pro-environmental behaviours may mitigate this effect (Schmitt et al. 2018). Negative emotions may prompt people to seek more information (Baron et al. 1994), increase awareness of risks (Leiserowitz 2006), and motivate action (Dean et al. 2018; Thomas et al. 2009).

The second mediation finding was that connecting and reflecting mediated the relationship between visiting the zoological park and information intentions. This finding is congruent with a range of studies, which indicate the importance of reflecting on one's experience or feeling connected to wildlife in eliciting engagement (Ardoin et al. 2015; Ballantyne et al. 2011b; Clayton et al. 2009; Grajal et al. 2017; Hughes et al. 2011; Skibins et al. 2013b). In this way, our findings indicate that feeling a connection to the animals encountered and reflecting on new ideas about wildlife may be important steps on the pathway from experience to intentions. Despite the potential importance of positive emotions, positive emotions did not mediate either of our key findings. This might be due to a ceiling effect, since our data indicated high levels of wellbeing and positive emotions amongst visitors to both sites. It is also possible that the important mediating role of negative emotions occurs in the context of high co-occurring positive emotions, where positive emotions are necessary but not sufficient for change.

None of our measured elements of the experience was found to be associated with signing the pledge. Nature relatedness was the only factor that was associated with this behaviour. Consistent with prior research, nature relatedness was associated with all three outcomes (Nisbet et al. 2008). The fact that our behavioural outcome was influenced by individual characteristics rather than a brief experience reinforces the complexity of changing behaviour, even a simple behaviour such as signing a pledge. Aligned with this, longitudinal studies and one review report that although wildlife experiences increase conservation concern and intentions to adopt behaviours, there are limited effects of such experiences on long-term behaviours (Ardoin et al. 2015; Ballantyne et al. 2011a; Hughes 2013). Collectively, these findings suggest that brief experiences may enhance support for policies and motivations to adopt behaviours, but translating this into adoption of behaviours is more challenging (Steg and Vlek 2009). Nature tourism provides an opportunity

to provide information promoting target behaviours, but single experiences or information alone will typically be insufficient to elicit change. Changing behaviours requires more intensive intervention approaches. For example, one approach to behaviour change—‘community-based social marketing’—highlights four steps for behaviour change: (i) selecting a target behaviour and identifying related barriers and benefits, (ii) developing interventions, (iii) testing the intervention, and (iv) implementation (McKenzie-Mohr and Schultz 2014; Schultz 2014). Within this framework, effective interventions may involve a combination strategies such as prompts, feedback, making the target behaviour easier, and social modelling (activating positive social norms) (McKenzie-Mohr and Schultz 2014; Osbaldiston and Schott 2012; Schultz 2014). Ecotourism sites may provide an opportunity to raise awareness about specific behaviours that support biodiversity, which may be a first step for subsequent behaviour change (Moss et al. 2015). Some behaviour change techniques may be applied within nature tourism settings. For example, nature tourism sites may provide opportunities to sponsor animals or habitat, or use display design to promote selection of wildlife-friendly products within retail outlets (Smith et al. 2012).

Implications for practice

Our findings suggest that different types of ecotourism experiences may influence conservation engagement in different ways. Tactile animal encounters are beneficial in fostering conservation policy support, particularly in non-captive wildlife experiences. In practice, such close encounters are seldom feasible in non-captive settings, where wildlife interactions need to be well managed to reduce negative impacts on wildlife (Acevedo-Gutiérrez et al. 2011; Klein et al. 1995). In captive environments, ‘natural’ and ‘authentic’ enclosures and encounters may enhance the influence of the experience on a broader range of engagement outcomes. The lack of findings related to pledge signing reinforce the importance of being realistic about the types of change that brief experiences can confer: changing behaviour is challenging. It would be useful for future research to examine how increased support or curiosity indicated by information intentions can translate into longer term change. Our findings echo research on household environmental behaviours, suggesting that there is no single intervention for cultivating conservation engagement, and that interventions need to be targeted to the specific behavioural outcome and the audience (Osbaldiston and Schott 2012; Steg and Vlek 2009). This requires research to identify which behavioural targets should be prioritised, how such behaviours can be influenced, and which groups should be targeted for change. The importance of negative emotions may pose a challenge for practitioners, where there is an emphasis on providing enjoyable experiences. One study describes a zoo-based educational program that incorporated ‘disturbing’ messages (Esson and Moss 2013). Evaluation indicated that while some visitors found the content inappropriate, others exhibited signs of reflection and appreciation, suggesting that it can be possible to promote more challenging content in a zoo setting (Esson and Moss 2013). One study reports that experience of threats only elicited pro-environmental behaviours in certain contexts, highlighting the need for caution when using negative messages or fear appeals (Fritsche et al. 2010). Our findings indicate that negative emotions about conservation issues may arise in the context of positive experiences such as holding animals, suggesting that carefully curated experiences may be sufficient to elicit these emotions, rather than requiring gloomy messages. Research suggests that integrating information about environmental problems with information about how to take action may minimise the risk of denial or apathy (Dean et al. 2018; Kollmuss and Agyeman 2002).

These findings were generated in individuals choosing to participate in an ecotourism experience, and may not generalise to individuals who do not seek out such experiences. It would be useful for future research to explore the role of ecotourism or nature experiences in individuals less likely to choose these experiences. According to Clayton and colleagues (Clayton et al. 2017), these opportunities may arise during incidental exposure to nature or wildlife during daily routines, or being exposed to nature while engaging in ‘other-directed’ activities, such as employment or school programs. Individuals with weaker connection to nature or environmental issues may exhibit a number of barriers to engagement in conservation actions, suggesting that these groups may require more intensive approaches to interventions to elicit change (Dean et al. 2016). Our survey was intentionally brief, to optimise feasibility for all types of participants, reducing risk of selection bias. Many of our measures were assessed using binary variables (e.g. reading signage). Scale-based items may have generated richer data. There may be other aspects of the experience that we did not assess; for example, one study describes how some zoo experiences make visitors more aware of common birds present in the natural setting (Colléony et al. 2017b). The use of a cross-sectional design means that conclusions cannot be drawn about causality; however our use of conditional processes aims to provide greater insight into the intricacies of the interactions between variables (Hayes 2013). It would be useful for future research to investigate a wider range of measurable, onsite behaviours and examine the necessary ingredients for long-term change.

We have shown that certain types of ecotourism experiences are associated with conservation behavioural intentions and policy support, and that different types of experience may differentially influence conservation engagement. Furthermore, our findings indicate that feeling upset about environmental problems is a key pathway from experience to engagement. Programs likely to foster conservation concern and behaviour are perhaps those that move well beyond a focus on simply providing an experience, to considering carefully the dimensions of that experience, integrating elements that provoke negative emotions about the state of biodiversity with potential solutions.

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