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The challenge of measuring children's attitudes toward wildlife in rural India

Gabby Salazar[a], Ishika Ramakrishna[b], Nitya Satheesh[b], Morena Mills[c], Martha C. Monroe[a] and Krithi K. Karanth[b,d]

[a]School of Forest, Fisheries, and Geomatics Sciences, University of Florida, Gainesville, Florida, USA; [b]Centre for Wildlife Studies, Bengaluru, India; [c]Centre for Environmental Policy, Imperial College London, London, UK; [d]Nicholas School of the Environment, Duke University, Durham, North Carolina, USA

ABSTRACT

People's attitudes influence the nature of their interactions with wildlife and support for conservation. Globally, many environmental education programs seek to influence children's attitudes toward wildlife and the environment. Understanding these attitudes requires assessment tools that are appropriate to the context and culture. However, most tools have been developed and used in Western developed countries, making their effectiveness elsewhere questionable. The Wild Shaale environmental education program was launched in 2018 in rural India with the goal of enhancing children's positive attitudes toward wildlife. To design an evaluation for Wild Shaale, we tested five tools to assess children's attitudes toward wildlife with 1772 students in 56 rural schools. Here, we discuss the challenges encountered while testing these tools and report which tools are likely to be valid measures of variation in children's attitudes and which may be useful for program evaluation. We provide recommendations for assessing children's attitudes in similar contexts.

KEYWORDS

program evaluation; India; attitudes toward wildlife; international environmental education; human-wildlife conflict

Introduction

As wildlife extinctions accelerate across the globe, there is a critical need to understand human attitudes toward and perceptions of wildlife (Ceballos et al., 2015). Environmental attitudes are often linked to behaviors (Gifford & Sussman, 2012) and may influence support for species protection and people's interactions with wildlife. Understanding and influencing attitudes may be particularly important in areas where people come into frequent contact with wildlife and face decisions about how to behave (Karanth & Kudalkar, 2017).

To help reduce biodiversity loss and human-wildlife conflict, many environmental education (EE) programs around the world seek to enhance children's positive

CONTACT Gabby Salazar gabriellesalazar@ufl.edu School of Forest, Fisheries, and Geomatics Sciences, University of Florida, PO Box 110410, 1745 McCarty Drive, Gainesville, FL 32611, USA

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attitudes toward wildlife (Dettmann-Easler & Pease, 1999; Genc, Genc, & Rasgele, 2018). Broadly, attitudes are "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1993, p. 1). In social psychology, attitudes have been called "an evaluative disposition that is based upon cognitions, affective reactions, behavioral intentions, and past behaviors … [that] can itself influence cognitions, affective responses, and future intentions and behavior" (Zimbardo & Leippe, 1991, p. 32). To understand whether and how EE programs influence children's attitudes toward wildlife, tools are needed that can assess both cognitions (beliefs) and affect (emotions or feelings) (Pooley & O'Connor, 2000). In particular, it is important to understand children's naturalistic attitudes (expressions of interest in and affection for wildlife) and negativistic attitudes (expressions of indifference, dislike or fear of wildlife) (Kellert, 1985).

Tools that measure children's attitudes toward wildlife and the environment have mostly been developed and validated in English and in Western countries, far from the areas where most biodiversity is concentrated (e.g., Johnson & Manoli, 2010; Kellert, 1985). Different cultures may have distinct social norms regarding the experience and expression of emotions (Mesquita & Frijda, 1992). Human-animal relationships and the language used to describe them also varies across cultures, which may influence how people interpret and respond to questions (Cho, Kim, & Stoltman, 2020). Therefore, it is likely that some of the assumptions underlying these tools will not hold true in other cultures (Thomas, Teel, Bruyere, & Laurence, 2019). Translation may also result in non-equivalent meanings (Van de Vijver & Tanzer, 2004).

These issues are further amplified when working with children. Literacy and comprehension may pose a challenge, resulting in measurement error or in responses that lack the detail or depth needed to assess attitudes (Kuhar, Bettinger, Lehnhardt, Townsend, & Cox, 2007). Norms for teaching and learning may also differ (Stoicovy, 2002) and students may be unfamiliar with certain question types (Browne-Nuñez & Jonker, 2008). Social desirability bias, or the desire to please others, may also influence children's responses (Browne-Nuñez & Jonker, 2008). To evaluate the impact of EE programs on children's attitudes toward wildlife, we need measurement tools that have been tested and validated in local contexts and cultures (Carleton-Hug & Hug, 2010).

With these challenges in mind, we tested five different approaches to measuring children's attitudes toward wildlife while designing and developing an evaluation for a new EE program in rural India. The program, Wild Shaale ("shaale" means school in Kannada, the state language of Karnataka), was designed for children living near national parks and wildlife sanctuaries in India. It is offered by the Centre for Wildlife Studies (CWS) in Bengaluru, India (https://cwsindia.org). The program works with 5th–7th grade students (10–13-year-old children) in public government schools located within ten kilometers of national parks and wildlife sanctuaries. These areas were selected because they support globally important populations of tigers, leopards, and elephants, which are threatened with range contractions and local extinctions (IUCN, 2020; Karanth, Gopalaswamy, Prasad, & Dasgupta, 2013). They also have high rates of reported human-wildlife conflict (HWC) involving tigers,

elephants, leopards, and wild pigs (Karanth & Kudalkar, 2017). These interactions may put children and their families at risk and may lead children to develop negativistic attitudes toward these species.

The development of more positive attitudes toward wildlife and empathic concern for wildlife could lead children to change their behavior toward wildlife or to support conservation efforts (Hungerford & Volk, 1990; Young, Khalil, & Wharton, 2018). With this in mind, the primary objectives of the Wild Shaale program are to increase children's environmental literacy, to foster positive attitudes toward wildlife, to foster empathy toward wildlife, and to make children aware of resources and strategies that could help their families more safely coexist with wildlife.

The goals of the program include enhancing positive wildlife attitudes and empathy; therefore, it was essential that our evaluation assess both. While developing the evaluation, we piloted and tested five tools for measuring children's attitudes and empathy toward wildlife. This paper chronicles what we learned from each tool.

Materials and methods

Site description

We collected data from students at government schools in rural villages near Bandipur and Nagarahole National Parks in Karnataka, India. These reserves support important populations of endangered megafauna and are surrounded by densely populated human settlements and agricultural fields. Over the course of 48 months, 13,808 instances of HWC were recorded around these parks (Karanth & Vanamamalai, 2020). Many (> 80%) households are categorized as rural, earning less than US $1,600 annually (Karanth & Vanamamalai, 2020).

Rural government schools, including those in Karnataka, vary considerably in the quality of the education they provide (Giridhar, 2019). Instruction is primarily delivered through rote learning and memorization (Giridhar, 2019). We surveyed 17 teachers in 17 government schools (5th–7th grade) in the study region between July and September 2018 to understand the resources provided to students. These schools ranged in size from 41 to 444 students ($M = 134.76$, $SD = 87.80$). All schools provided mid-day meals, uniforms, and schoolbooks to students. Access to paper and desks varied, and only two schools had a functional computer. Some schools lost electricity throughout the day, particularly during the rainy season. The reading and writing abilities of students also varied; we observed students struggle to read quickly and write coherently in Kannada.

Data collection

Students participated in the Wild Shaale program four times as part of their normal school day. Pretests and posttests were implemented. We present data from 1772 students in 56 schools who provided both parent consent and student assent (Table 1). Local evaluators, trained by CWS and the research team, collected data during three phases of program development using a shared script and prompts. The program was implemented between July to September 2018 (Phase 1), November to December

Table 1. Five tools used across the three phases of the wild shaale program in rural India.

Tool	Version	Program development phase	Students and schools participating in program	Students with useable data[a] from pretest (*n*)
Summative Empathy and Attitudes Scale (adapted from MECAP Measurement Tools, 2019)	10 items, 5- point balanced scale	1	983 students 17 schools	666
	12 items, 3- point balanced scale	2	730 students 16 schools	474
Rising attitude scale	8 items, 7- point rising scale	3	907 students 23 schools	632
Inclusion of Nature in Self Scale (adapted from Schultz, 2002)	3 questions: Self and nature, self and wild animals, self and family	2	730 students 16 schools	474
Open-ended attitude questions	3 questions: Are there any animals that you like/dislike/are afraid of from the forests near your school? If YES, which ones?	1	983 students 17 schools	666
	2 questions: Do you like leopards/elephants? Why or why not?	2	730 students 16 schools	474
Embedded assessment activity	8 questions: Which three words come to mind when you see a picture of an _____? (elephant, tiger, leopard, snake, peacock, goat, panda, slug)	1	983 students 17 schools	666

[a]Useable data means that the student provided both assent and parent consent.

2018 (Phase 2) and July 2019 to March 2020 (Phase 3). The study's protocol was approved by University of Florida (IRB201901271) and Imperial College London (18IC4649). In India, we received permission from Block Education Officers of Hunsur, H D Kote, Gundlupet and Nanjangud Taluks (subdistricts) prior to implementation.

Tools

We used five tools to measure children's attitudes toward wildlife during three phases (initial test with two revisions and expansions) of the Wild Shaale Program (Table 1). The development of the open-ended attitude questions and the rising scale were informed by the definitions of attitudes developed by Zimbardo and Leippe (1991) and Kellert (1985). The Inclusion of Nature in Self scale (INS) and the empathy and attitudes scales were adapted from existing tools that were developed and validated in the United States (MECAP Measurement Tools, 2019; Schultz, 2002). These adaptations were informed by research on the development of empathic concern (Schultz,

2000) and attitudes toward wildlife (Kellert, 1985). When developing the tools, we worked closely with CWS staff who were from the region and familiar with the culture of local schools (Chouinard & Cram, 2019; Jacobson & McDuff, 1997). Tools were tested in different phases to limit the number of questions students had to complete and two tools were revised across phases (Table 1). Tools were evaluated based on whether they: (1) *appeared to be a valid measure of children's attitudes toward wildlife,* (2) *captured variation in children's attitudes toward wildlife*, and (3) *had the potential to capture fine-scale change in individual attitudes*. We assessed the tools' face and construct validity by reviewing them with researchers, evaluation experts, and local collaborators in India. We also interviewed students to assess their understanding of the tools, and we embedded validity checks within two tools. Finally, we used triangulation, comparing results from the tools to see if they captured similar themes and patterns (Mathison, 1988).

All tools were translated to Kannada and then back to English by a different translator. The translators and research team worked together to match the Kannada version to the English version (Brislin, 1970).

Pilot testing

All tools were piloted and revised before full implementation. One author (GS) spent 15 days observing pilot tests that took place before each of the three phrases (July 2018, Nov. 2018, and July 2019). Another author (IR) made observation notes over 18 days during Phases 2 (Feb. 2019) and 3 (Aug. – Oct. 2019). Their observations were supplemented by those from CWS staff and informed the following two main changes to our data collection process.

First, to increase student comprehension of the survey items, we read each item aloud and gave students 30 seconds to answer (Larson, Green, & Castleberry, 2011). Second, to show that we were interested in their opinions, we added a practice question at the beginning of each scale using ice cream as an example.

In Phase 3 (July 2019), we conducted think-aloud cognitive interviews with four students to check their comprehension of the rising scale (Willis, 2004). Students were presented with three response options for the scale and were asked which was easier to understand: (1) a series of seven equally sized circles labeled "not at all" (leftmost circle) and "very much" (rightmost circle), (2) a series of seven equally sized circles with partial shading that increased from left to right, and (3) a series of fully shaded circles that increased in size from left to right. Two students preferred option 2 and two students preferred option 3. We used option 3 because the fully shaded circles do not require any conceptual knowledge of fractions and will not fail when duplicated with poor copying equipment.

Summative empathy and attitudes scale

In Phase 1, we used a 10-item Likert-style scale to measure children's empathy and attitudes toward wildlife (supplemental material). Seven items were adapted from the Measuring Empathy project (MECAP Measurement Tools, 2019). Three items were

created by the authors to assess respect and love for wild animals and the utilitarian value of wild animals. Children were asked to respond to statements on a 5-point balanced scale ranging from Strongly Disagree to Strongly Agree. Four items were reverse scored. The internal consistency of the scale was examined using Cronbach's alpha.

To increase internal consistency in Phase 2, we revised the scale by (1) using a 3-point balanced scale ranging from Disagree to Agree, (2) simplifying the language used in the items, (3) adding two items from the MECAP survey (MECAP Measurement Tools, 2019), and (4) removing reverse-scored items from the scale, which appeared to confuse participants (Swain, Weathers, & Niedrich, 2008) (supplemental material).

Before Phase 2 (November 2018), the revised scale was piloted at one school with 59 students to test its reliability; its internal consistency was examined using Cronbach's alpha.

Inclusion of nature in self scale

In Phase 2, we tested the INS scale, which measures the degree to which individuals perceive their closeness to nature (Schultz, 2002). The original tool is a single pictorial question with seven pairs of circles, which are labeled "Self" and "Nature," and overlap to varying degrees, from (1) complete separation to (7) complete overlap. Participants are prompted to select a pair of circles: *Think about your relationship with nature and focus on your positive feelings. How connected do you feel to nature? Please circle the picture below that best describes your relationship with the natural environment.* We condensed the INS from seven sets of circles to five sets following Larson et al. (2019). We expanded the INS with two parallel questions, comparing "Self" and "Wild Animals" and comparing "Self" and "Family." These served as an embedded validity check; we hypothesized that children would feel more interconnected to their family than to wild animals or nature. We computed a sample mean and standard deviation for each question.

Attitude questions with rising scale

In Phase 3, we tested eight attitude questions (e.g., *How important is it to you that wild animals are protected?*) using a rising scale from 1 to 7, with 1 representing "not at all" to 7 representing "very much." We embedded a validity check within the scale by including two questions to which students would likely respond differently: (1) *How afraid are you of leopards?* and (2) *How afraid are you of spotted deer?*

Short open-ended attitude questions

In Phase 1, we asked students three open-ended questions about their feelings toward different animals: *Are there any wild animals that you like/dislike/are afraid of from the forest near your school? YES or NO, If YES, which ones?* We counted responses for frequency of occurrence. If students selected no in response to the first question and wrote responses,

we excluded those responses from our analysis. We classified species by taxa and by whether they are local wild animals, non-Indian wild animals, or domestic animals.

In Phase 2, we asked students whether they liked elephants and leopards with the option to circle *like* or *dislike* for each question. This was followed by *Why or Why Not?* Responses were coded for content and counted for frequency of occurrence.

Embedded assessment activity

In Phase 1, we showed students eight animal photos in a digital slideshow (tiger, elephant, leopard, goat, slug, snake, peacock, and panda) and asked them to write the first three words that came to mind when viewing each photo. All photos showed animals facing forward with neutral expressions. We analyzed student responses ($N = 639$) to the tiger, elephant, goat, and peacock because a scan of 100 randomly selected responses for each animal illustrated that there was the most variation in responses to these species.

Responses were coded as being emotive/affective (e.g., scary, love) or descriptive (e.g., large, striped). Emotive/affective words were then coded as having a positive, negative, or neutral valence. Ten percent of responses were randomly selected and were coded by a second coder. We compared our coding and found an overall inter-coder reliability of 88% (Campbell, Quincy, Osserman, & Pedersen, 2013). We worked together to refine the codebook and to recode the 12% that were different.

Results

Pilot test observations

We observed that children were eager to answer fact-based questions, hesitant to express their opinions, frequently copied from their neighbors, looked to peers for guidance, and often struggled to read and write quickly.

Q1: Which tools appear to provide valid measures of children's attitudes toward wildlife?

The INS scale, rising scale questions, open-ended attitude questions, and embedded assessment activity all appeared to provide valid measures of children's attitudes toward wildlife (Figure 1). The INS scale demonstrated that students feel a stronger connection between self and family ($M = 4.53$, $SD = 1.05$; $N = 444$) than between self and nature ($M = 4.26$, $SD = 1.15$; $N = 437$) or self and wildlife ($M = 3.36$, $SD = 1.48$; $N = 445$).

We confirmed the validity of attitudes questions with a rising scale via responses from think-aloud cognitive interviews ($N = 4$) and by comparing the extent to which they were *afraid of leopards* ($M = 5.97$, $SD = 1.85$) to *spotted deer* ($M = 2.17$, $SD = 2.03$) ($N = 632$) (Table 2).

The open-ended questions in Phases 1 and 2 and the embedded assessment activity captured similar and expected patterns in children's attitudes toward wildlife. Responses show that children tended to have more positive attitudes toward harmless

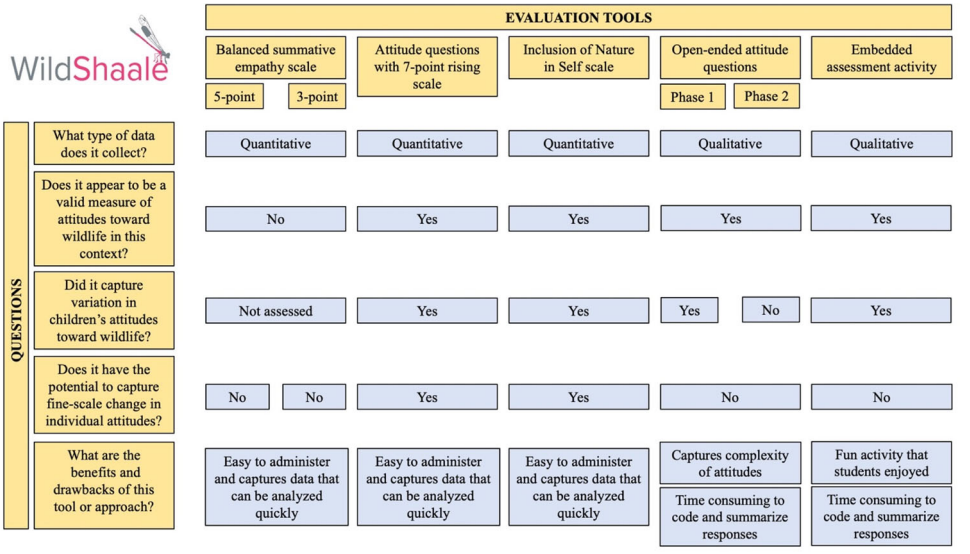

Figure 1. The five tools and approaches that were used to evaluate children's attitudes toward wildlife in rural India corresponding to how each tool was evaluated.

Table 2. Children's attitudes toward wildlife in rural India assessed with questions using a rising 7-point scale.

Questions	*M*	*SD*	Responses *(N)*
How interested are you in learning about wildlife?	6.50	1.32	624
How much do you value tigers?	5.69	1.88	626
How afraid are you of leopards?	5.97	1.85	625
How afraid are you of spotted deer?	2.17	2.03	628
How happy are you that your village is close to the forest?	6.64	1.13	627
How important is it to you that wild animals are protected?	6.54	1.18	631
In the future, do you hope there will be more tigers in the forest?	5.15	2.27	620
How important is it for people in your village to learn to live with wild animals like tigers, peacocks, and gaur nearby?	6.12	1.58	629

species, such as peacocks, and more negative attitudes toward species that are prone to having negative interactions with people, including leopards, tigers, and elephants. Attitudes toward elephants were generally more positive than attitudes toward leopards and tigers.

In response to the open-ended questions in Phase 1 (*local wild animals that you like/dislike/are afraid of*), children most frequently reported liking elephant, deer, and tiger, disliking tiger, sloth bear, elephant, and leopard and being afraid of tiger, leopard, and lion (Figure 2). Children listed 71 species across the three questions, of which 63.38% were mammals. Of the 71 species, 53.52% were local wild animals, 12.67% were non-Indian species and 18.30% were domestic animals.

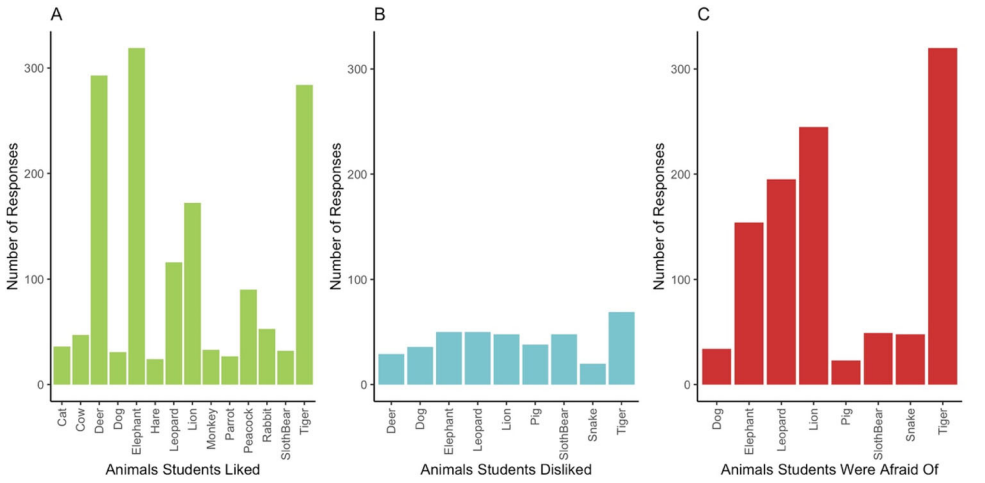

Figure 2. Wild animals that children most frequently liked (A), disliked (B), and were afraid of (C) from the forests near their schools; only animals mentioned by more than 15 students are reported.

Table 3. Words and phrases used to describe goats, tigers, peacocks, and elephants coded by type ($n = 639$ children).

Animal	Descriptive (% of responses)	Emotive/affective (% of responses)	Ambiguous (% of responses)	No answer (% of responses)	Responses coded (*N*)
Goat	31.30	39.28	14.92	14.50	1917
Tiger	32.24	39.33	13.30	15.13	1917
Peacock	25.25	46.64	13.09	15.02	1917
Elephant	37.40	36.15	12.47	13.98	1917

In Phase 2, in response to the question, *Do you like elephants?*, 72.36% of students said they did, 21.94% said they did not, and 5.70% did not answer ($N = 474$). In response to the question, *Do you like leopards?*, 33.54% of students said they did, 57.81% said they did not, and 8.65% did not answer ($N = 474$). Results from the embedded assessment activity demonstrate that the tool worked, with more than one-third of responses for each animal providing an indication of student's attitudes (e.g., emotive/affective words) (Table 3). These emotive/affective words show that students tended to have more positive attitudes toward peacocks than other animals and more positive attitudes toward elephants than tigers (Table 4; Figure 3).

Neither of the balanced empathy and attitudes scales were reliable nor valid measures of children's empathy and attitudes toward wildlife in this context (Figure 1). In Phase 1, the 10-item scale demonstrated low internal consistency (Cronbach's alpha = 0.228; $N = 607$). Removing the four reverse-scored items increased the internal consistency (Cronbach's alpha = 0.551, $N = 607$). In Phase 2, a pilot test of the revised 12-item scale at one school demonstrated that the scale had high internal consistency (Cronbach's alpha = 0.793; $N = 34$). However, internal consistency decreased in broader program implementation (Cronbach's alpha = 0.632; $N = 423$).

Table 4. The valence of emotive/affective words that students used to describe different wild animals.

Animal	Positive valence (%)	Negative valence (%)	Neutral valence (%)	Responses coded (*n*)
Goat	84.86	13.01	2.13	753
Tiger	47.21	52.25	0.53	754
Peacock	95.08	2.91	2.01	894
Elephant	67.68	31.46	0.87	693

Figure 3. Word clouds showing the different emotive or affective words used in descriptions of peacocks and elephants. The size of the word reflects the relative frequency with which the word was used; only words used five times or more are included (837 words are included in the peacock word cloud and 662 words in the elephant word cloud[a]). Peacock by Venkat Mangudi; elephant by Yathin S Krishnappa.

[a]12 responses that referred to human-wildlife conflict were coded as conflict.

Q2: Which tools capture variation in children's attitudes toward wildlife?

The INS scale, the rising scale, the open-ended attitude questions used in Phase 1, and the embedded assessment activity were able to capture variation in children's attitudes toward wildlife (Figure 1).

The standard deviations for responses to the INS question for self and wildlife ($M = 3.36$, $SD = 1.48$; $N = 445$) and for the rising scale questions (Table 2) indicate that both tools captured variation in children's attitudes.

Both the open-ended attitude questions used in Phase 1 and the embedded assessment activity captured the variation in and complexity of children's emotions toward wildlife by demonstrating that students can like, dislike and be afraid of a species at the same time. In response to the Phase 1 open-ended attitude questions, 147 both liked and were afraid tigers, 89 students both liked and were afraid of elephants, and

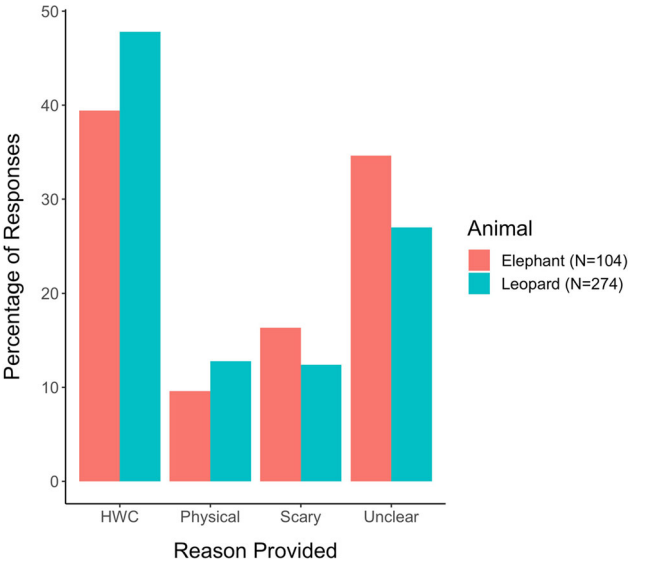

Figure 4. The reasons 274 children in rural India provided for disliking leopards and 104 children provided for disliking elephants, coded by theme. HWC refers to human-wildlife conflict.

73 students both liked and were afraid of leopards. The results of the embedded assessment activity show similar patterns, with many students using both positive and negative emotive/affective words to describe the same animal. Of the 639 children who participated in the activity, 135 children had a mixed response to tigers, 93 to elephants, 52 to goats, and 19 to peacocks.

The open-ended attitude questions used in Phase 2 did not capture the complexity of children's attitudes toward wildlife because of the forced binary response (like or dislike); 274 students disliked leopards and 104 students disliked elephants. The follow-up question (*Why or why not?*) captured variation in the underlying reasons for children's attitudes. Children most frequently noted issues related to HWC as their reasons for disliking leopards (47.81%, $N = 131$) and elephants (39.42%, $N = 41$) (Figure 4). Of the 343 students who liked elephants, 31.20% noted physical characteristics and 22.16% noted ways elephants benefit humans.

Q3: Which tools have the potential to capture fine-scale changes in individual attitudes?

Only the rising scale and the INS scale have the potential to capture fine-scale changes in individual attitudes (Figure 1).

To assess the rising scale, we examined the change between the pretest and posttest scores for 621 students who participated in the program in Phase 3 and who answered the rising scale question, *How important is it for people in your village to learn to live with wild animals like tigers, peacocks, and gaur nearby?* A dependent t-test shows that participation in the program resulted in a change in scores from the pretest ($M = 6.12$, $SD = 1.58$) to the posttest ($M = 6.36$, $SD = 1.35$) for this question and that this change was significant, $t(620) = 3.48$, $p = 0.001$.

To assess the INS scale, we examined the change between the pretest and posttest scores for the self and wildlife question for 251 students who participated in the program (in Phase 2, other students who completed the pretest were part of a control group and were not included in this analysis). A dependent t-test shows that participation in the program resulted in a significant increase in scores from the pretest ($M = 3.31$, $SD = 1.53$) to the posttest ($M = 3.64$, $SD = 1.46$) and that this change was significant, $t(250) = 3.01$, $p = 0.003$.

While the open-ended questions and the embedded assessment tool provide a snapshot of children's baseline attitudes toward different wildlife species, these tools are not able to provide a robust measure of changes in individual attitudes over time. If students list different animals in a posttest, it is difficult to know whether this reflects a change in their attitudes or whether it is simply an artifact of memory or due to recent exposure to a particular species.

Discussion

We found a wide variation in how effective different tools were in capturing and evaluating children's attitudes toward wildlife in rural India. The INS scale, the rising scale questions, the open-ended attitudes in Phase 1 and the embedded assessment activity were able to capture the direction of and variation in the attitudes of children. However, only the INS scale and rising scale questions are likely to be useful in program evaluations that seek to measure fine-scale changes in individual attitudes.

The open-ended tools, while less useful for measuring subtle shifts in attitudes, were able to capture deeper insights into the variation in children's attitudes. As expected, children had more negative attitudes toward species that may be involved in negative interactions with humans, such as a leopards and tigers. However, students tended to fear these animals more than dislike them. Tools that only capture a binary response (e.g., like/dislike) would miss this distinction (DeSteno, Petty, Wegener, & Rucker, 2000). While fear is a negative emotion, it may be helpful to experience in response to potentially dangerous animals (Kaltenborn, Bjerke, & Nyahongo, 2006). Programs like Wild Shaale may be able to transform impairing aspects of fear, which can instigate dangerous behaviors, to respect for animals, as children learn how to act more safely and to avoid potential conflict situations.

There is a need for tools that can reliably assess changes in children's feelings of empathy toward wildlife due to participation in a program. Empathy can influence children's attitudes toward and levels of concern about wildlife (Young et al., 2018). Activities that promote perspective-taking may increase children's ethical attentiveness and lead to changes in their behavior (Harrison, 2017; Young et al., 2018). However, given the diverse relationships that people have with animals across the world, it may be difficult to find a single tool that applies across cultures.

Although a number of our tools effectively captured children's attitudes, we encountered three challenges that may have influenced our results. First, educators observed that children were often hesitant to express their opinions. Since rote learning, which is the norm in these schools, focuses on repeating facts, students may have been less familiar with or less comfortable with questions about their attitudes

and perceptions. Although there have been recent reforms (Syeed, 2018), curriculum in India tends to test knowledge of facts, not critical thinking skills (Kumar, 1988). This may explain the lack of internal consistency in the balanced scales we tested, which asked students to "agree or disagree" with statements. We attempted to overcome this limitation by practicing with obvious likes and dislikes, such as ice cream flavors. Additional practice questions might help, as could the use of questions that are more straightforward, like those used in the rising scale.

Second, children tended to mimic their peers. We observed many students copying other students' work and looking at peers for cues during group activities. Although there are broad intra-societal differences, national cultures tend to lean toward individualism or collectivism (Minkov et al., 2017). When Minkov et al. (2017) characterized 56 countries along the dimension of individualism versus collectivism, India leaned toward collectivism, while the countries where many measurement tools are developed leaned toward individualism. It may be more challenging to measure individual attitudes in collectivist cultures.

Third, we faced challenges involving the reading comprehension and writing skills of students. Observations from program staff suggest that literacy varied between schools, which likely added noise to our results. Many students struggled with written expression, which meant that their answers to open-ended questions lacked detail and depth and were sometimes unreadable (Kuhar et al., 2007). In contexts where literacy and reading comprehension are limited, individual oral interviews might be more appropriate for students and more insightful for researchers.

While we were able to assess the validity of our tools through embedded validity checks and triangulation, we were not able to look at correlations between tools because the tools were used with different groups of students (Table 1). The evaluation process took around 30 minutes and we wanted to limit the number of questions each student had to answer. In the future, we hope to examine correlations between responses to the INS and the rising attitude scale to further examine the validity of these tools. It is also important to note that all of these tools may function differently in other languages and contexts (Bettinger, Kuhar, Lehnhardt, Cox, & Cress, 2010).

Conclusion

Around the world, we need to create culturally appropriate EE programs and to evaluate those programs using culturally appropriate mechanisms. Without valid and reliable evaluation tools that are adapted to local cultures and contexts, we risk making decisions about the design and delivery of programs based on inaccurate results. In reflecting on our experience in rural India, we reached four conclusions, presented here as recommendations, that may help researchers interested in assessing children's attitudes toward wildlife in rural India or in similar contexts.

Use rising scales instead of balanced agree-disagree scales

We found the rising scale questions to be more valid and useful measures of children's attitudes toward wildlife. The 7-point spread of the rising scale questions has

the potential to capture subtle shifts in attitudes over time, making it more useful for program evaluation. Our experience with rising scales complements Powell, Stern, Frensley, and Moore (2019) who found that an 11-point rising scale yielded greater variability than a balanced 5-point agree-disagree balanced scale when used with adolescents in the United States. They also found that rising scales were easier for youth to understand.

Try a mixed methods approach

We recommend using a combination of rising scale questions and open-ended attitude questions to capture variation in children's attitudes, complexity of attitudes, and change in attitudes over time. While less useful for robust program evaluations, open-ended questions can provide deeper insights into the complexity of emotions toward wildlife than fixed choice questions and can also capture mixed feelings (Browne-Nuñez & Jonker, 2008). When assessing children's attitudes toward forests in Uganda, Kuhar et al. (2007) also found that multiple choice questions with a single answer did not effectively measure the complexity of children's attitudes, which can involve both positive and negative emotions.

Think critically about how local culture and the pedagogy in schools might influence the evaluation

If the tool was not developed in the culture or context where you plan to assess attitudes, it is essential to engage local collaborators to develop culturally appropriate approaches (Chouinard & Cram, 2019). The pedagogy and culture in schools may influence the types of questions asked, the results of assessments, and the broader impact of EE programs (Cheung, Chow, & So, 2018; Jacobson & McDuff, 1997). It is important to understand whether students are accustomed to answering questions about their opinions and feelings and to communicate to children that they are free to provide a dissenting opinion.

Pilot test tools and questions using a think-aloud cognitive interview process

Pilot testing data collection methods and tools is critical (Ernst, Monroe, & Simmons, 2012) and should be undertaken in multiple schools because student abilities may vary between schools. We recommend using a think-aloud cognitive interview process in pilot tests, particularly when assessing complex constructs, such as attitudes (Willis, 2004).

Our research demonstrates the need for evaluation tools that are appropriate for all of the different cultural contexts where we conduct EE. We have reported on both successes and failures in the hope that our experience can help other researchers and practitioners improve and adapt evaluation tools. Appropriate tools can help us improve the design and delivery of programs that seek to enhance positive attitudes toward wildlife, which is a critical step in addressing the global biodiversity crisis caused by human behavior.

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ORCID

Gabby Salazar http://orcid.org/0000-0003-3350-593X
Morena Mills http://orcid.org/0000-0001-9865-0770
Martha C. Monroe http://orcid.org/0000-0003-3080-5101
Krithi K. Karanth http://orcid.org/0000-0003-4614-2648

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