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Understanding human attitudes towards sharks to promote sustainable coexistence

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ABSTRACT

Better understanding of human attitudes towards sharks is essential to foster support for shark conservation. Here, a quantitative multivariate approach was used to analyse data from questionnaire-based surveys of public attitudes towards sharks in the Galapagos Marine Reserve to identify some of the most influential socio-economic factors, emotions and beliefs that shape those attitudes. The aesthetic value of sharks, their environmental role, and their perceived dangerousness had the greatest influence on attitudes. However, attitudes also varied according to the gender, occupation, and residency status of respondents. Knowledge and experience with sharks had a moderate influence on attitudes, while behavioural responses, such as tolerance and support for the protection of sharks, showed strong correlations with attitudes. Therefore, it is recommended that efforts to promote positive attitudes and behaviours towards sharks should use strategies that encourage support for shark conservation policies by targeting the most influential emotions and beliefs held by the public.

1. Introduction

Public support for environmental issues can lead to important shifts in conservation policies [1]. Conversely, negative attitudes towards wildlife can reduce support for conservation efforts and allow detrimental activities such as illegal hunting [2]. Therefore, communication strategies aimed at inducing positive changes in attitudes and behaviours are essential tools in nature conservation. Yet, an estimated 50% of these initiatives fail [3], likely due to poor understanding of the drivers of public attitudes towards conservation issues and how these might affect behaviour [4,5].

The concept of'attitude' is central to behavioural science [6]. An attitude is broadly defined as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" [7, p.1]. It is generally accepted that attitudes comprise a cognitive component (i.e., beliefs) and an affective component (i.e., emotions and feelings; Fig. 1) [8,9]. Attitudes are thought to be strongly influenced by experiences of the particular entity and highly predictive of future behaviours towards that entity (Fig. 1; see also Fazio & Zanna [10], Kraus [11]).

Studies of public attitudes towards conservation initiatives have led to some important insights [12]. In particular, attitudes influence important behavioural responses such as 'tolerance' of a species (i.e., the degree of acceptance of living in coexistence with a wild population [13]), support for protection, and willingness to increase knowledge about a species (Fig. 1) [14]. Public tolerance of and attitudes towards sharks are particularly contentious [15]. Large animals that can physically harm humans generally suffer from negative attitudes and low tolerance [16], though these may be offset by perceived economic benefits derived from wild populations [13]. Indeed, negative attitudes towards sharks are thought to be driven primarily by fear, negatively impacting management policies around the world [17], but they persist despite the potential of sharks to provide considerable economic benefits via ecotourism [18]. Given the critical status of many shark populations worldwide [19], a better understanding of public attitudes and behaviours towards sharks is urgently required to foster support for conservation initiatives.

Questionnaire-based surveys are a key tool in the study of attitudes but they pose some important methodological challenges. Attitudes expressed directly by respondents are context-dependent, varying

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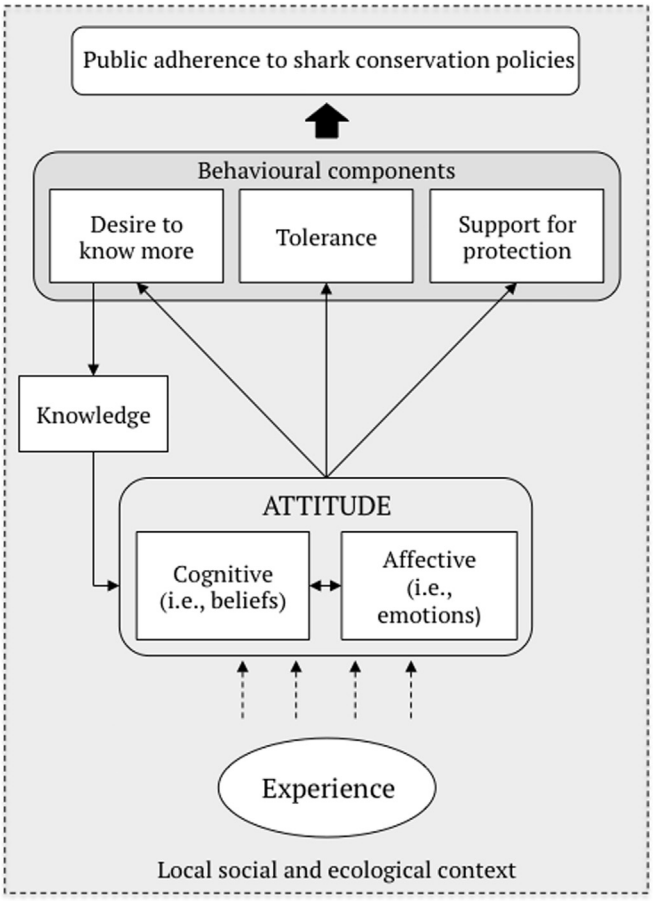

Fig. 1. Diagram showing the conceptual framework used in this study relating attitudes (produced after an evaluating process involving beliefs and emotions) and behaviours (reflected in the tolerance to coexistence situations with wildlife, support for its protection and willingness to increase knowledge about it). Lighter-gray area delimited by dashed line refers to the local social and ecological context.

according to the circumstances of the survey and the format or wording of the questions [20]. Instead, a deeper understanding of attitudes can be achieved through questions that target the various judgmental processes—the cognitive and emotional variables—that comprise attitudes [21]. The few questionnaire-based studies of humans' attitudes towards sharks are limited to relating responses to direct questions about attitudes to differences in demography, knowledge and experience [1,22,23]. Remarkably, in only one study [1] was the test of attitude assessed for its reliability (e.g., using the standard method developed by Cronbach [24]), and a poor reliability coefficient score resulted in attitude being excluded from the analysis. In addition, to date, there has been no study of the underlying cognitive and affective components that comprise attitudes towards sharks, or attempt to identify relationships between attitudes and their willingness to tolerate coexisting with sharks.

This study introduces a new methodological approach to understanding and quantifying public attitudes towards sharks. Following literature on attitudes [8–10], we used a conceptual framework where attitudes comprise cognitive and emotional components, are able to predict behavioural responses and can be influenced by previous experiences (Fig. 1). Using the Galapagos Islands as a case study, questionnaire-based interviews were used to collect data on the cognitive and affective variables, and behavioural responses associated with attitudes, which were then analysed using a multivariate statistical approach. This study aimed, firstly, to quantify the relative contributions of a set of proposed variables in the formation of overall attitudes. Negative emotional variables (e.g., the fear of sharks) were expected to have a strong negative influence on attitudes, whereas some cognitive components (e.g., perceptions of ecological and economic benefits, and endangered populations) were expected to be positively associated with attitudes. Secondly, differences were tested in the construction of attitudes among various demographic groups, such as males *vs* females and residents *vs* visitors to the islands. Thirdly, it was examined how attitudes influenced behavioural responses, such as tolerance of living near sharks, willingness to increase knowledge of sharks, and support for conservation measures. Finally, it was discussed how these results may be used constructively in the design of more effective communication strategies to foster support for shark conservation policies.

2. Material and methods

2.1. Study population and survey design

The Galapagos Archipelago (Ecuador) is a UNESCO Natural World Heritage Site located on the equator ca. 1000 km west of continental South America. The archipelago harbours a resident population of ca. 25,000 and receives over 200,000 visitors per year [25]. The Galapagos Marine Reserve (GMR) provides full protection to sharks, and is one of the few places in the world where abundant populations of these top predators can still be found [26,27]. Sharks are an important attraction for a growing nature-focused tourism industry, which is the base of the local economy [28]. Artisanal fishing, research, maritime transport and tourism are all permitted in the GMR under a co-management system [29].

The study population comprised adult (> 15 yrs) residents and visitors to the Galapagos Islands in October-November 2015. Residents were approached in a haphazard manner at Puerto Ayora (Santa Cruz Island), the most populated town of the Archipelago [25], while visitors were approached at the Charles Darwin Research Station, which is visited by most tourists. After conducting a pilot study to ensure the comprehension of questions by respondents and to evaluate the most appropriate method of administration (i.e., self-administered *vs* interview-based), the questionnaire was filled out by researchers during an interview with each respondent. Questionnaires contained close-ended questions structured into sections: demography, previous experience, affective and cognitive variables, knowledge and behavioural responses to sharks (questionnaire provided in Supplementary material). Within the demographic section, the occupation of the respondent was classified into the sectors of Tourism, Science-Conservation, Fishing, Other, Retired, or Student and also whether they had a relation in the Tourism or Fishing sectors. It was expected that people connected with fishing *vs* tourism sectors would have opposing attitudes and economic interests, as these sectors correspond to extractive *vs* non-extractive uses, respectively.

Rather than asking direct questions about attitudes, this survey was designed to quantify separately affective and cognitive responses towards sharks. This allowed examination of the underlying construction of attitude on the basis of these separate components, using a multivariate approach. Each respondent provided scores for each of 14 variables considered to be associated with either the affective (including two positive and two negative emotions) or cognitive (including five pairs of opposing beliefs) components of attitude, based on our review of relevant literature (Table 1). Scores were recorded on a four-point ordinal scale (from 1 to 4, where 1 = 'nothing', to 4 = 'high'; see questionnaire in Supplementary material). Self-perceived knowledge about sharks, and previous experiences with sharks in the wild, were also evaluated and ranked (on scales of 1–4 and − 2 to + 2, respectively). Behavioural responses to sharks were assessed by asking respondents' willingness to coexist with sharks (i.e., tolerance), to support their conservation or to increase knowledge about them, and were evaluated through positive/neutral/negative categorizations.