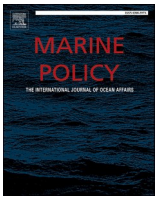
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Sharks, tourism and conservation: a test of causative and mediating effects on scuba divers' attitude

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ABSTRACT

Sharks play an important ecological role and support economies worldwide but are globally threatened by a series of impacts. Shark-based tourism is a potential tool to conserve sharks and raise awareness of their value. However, research is required to untangle the complexity of factors potentially determining favourable opinions of shark-based tourism and shark conservation. This study investigated the influence of perceived shark uniqueness, shark relatability, shark knowledge, and attitude towards shark framing on attitudes towards shark-based tourism and shark conservation among recreational scuba divers in Southern Africa. This region hosts a diversity of sharks and provides different opportunities to interact with sharks. A questionnaire survey was administered to 294 divers at three locations in South Africa and Mozambique in 2021 and 2022. Structural equation modelling and multiple regressions were used to analyse the data. The results showed that perceived shark uniqueness, shark relatability and shark knowledge positively influenced attitude towards shark-based tourism, while attitude towards shark framing mediated the influence of these factors on attitude towards shark conservation. Diving experience positively influenced attitudes. Recommendations are advanced to endorse further engagement in shark support, through efforts from information to shark interactions and destination branding to increase pride in sharks.

1. Introduction

Sharks species globally hold enormous value as apex predators, indicators of ocean health, and providers of innumerable ecosystem services from fisheries to tourism [13,21,31,55]. However, sharks are also concernedly affected by human impacts, especially overfishing, and are also subject to negative public opinion that is exacerbated by negative media framing [22,35]. Shark-based tourism, including viewing, snorkelling and diving with sharks, is an instrument of economic development that can also benefit shark conservation on different levels. From an economic point of view, shark-based tourism represents a significant tourist attraction and revenue stream for destinations such as Fiji (42 million USD), Australia (25.5 million USD) and the Bahamas (109 million USD) [66], also offering alternative livelihoods to fishing [37,66]. From a conservation point of view, the economic value offered by shark-based tourism can result in more protection of sharks and their habitats in several marine destinations, for example through the establishment of shark sanctuaries [64]. Shark-based tourism can increase public awareness of the role of shark species and their importance, through the education of tourists on the need for shark conservation, and interpretation [3,32,54,61]. Positive education and interpretation, together with the experience of interacting with sharks, can lead to tourists being willing to support shark conservation and practice pro-environmental behaviours [3,51].

The potential of shark-based tourism to endorse shark conservation and turn the tide of public opinion towards favourable perceptions of sharks and their protection calls for further exploration. In particular, an investigation of the determinants of willingness to engage in shark-based tourism and support shark conservation is relevant and timely. Scuba divers represent a group likely to engage in shark-based tourism and become supportive of sharks [39]. However, the literature highlights how various factors, such as accumulated diving experience, favourite species to observe, awareness of sharks, affinity to sharks, knowledge of sharks, and shark framing, can be critical in influencing, either positively or negatively, willingness to favour sharks as a tourism product and support shark conservation [3,30,44,50,61,39]. The mixed results yielded by previous studies regarding the influence of these factors call for further exploration and investigation. This study aimed to

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contribute to filling gaps in knowledge regarding what determines divers' willingness to engage in shark-based tourism and support shark conservation.

2. Southern Africa as a case study

The Indian Ocean side of Southern Africa, including South Africa and Mozambique, has a diversity of sharks contributing to the ecology of marine environments and the economy of many communities [13,23]. Countries like South Africa have historically been considered leading in marine conservation efforts, for example, through the National Environmental Management Biodiversity Act, the National Plan of Action for Sharks, several marine protected areas, and transfrontier conservation areas enabling shark migration (e.g. between South Africa and Mozambique) [15,16]. Despite these efforts, sharks continue to experience population declines due to fishing and bycatch [20,48,53]. Southern Africa is also recognised as a top shark-based tourism and diving destination globally, with positive economic growth [19,27]. For example, the presence of key species including the great white shark, tiger shark, grey nurse shark, hammerhead shark, and bull shark has led to the proclamation of South Africa as the tenth top shark diving destination in the world [56]. Shark-based tourism can be considered a tool to assist shark conservation and mitigate, at least in part, other detrimental impacts on sharks in Southern African waters. This potential is relevant to explore especially since South Africa is known to experience human-shark conflicts in bathing waters of coastal tourism destinations, which have been dealt with using a mixture of mainly lethal but also non-lethal shark control programmes [14,24]. Lethal programmes include the installation of shark nets and baited hooks or drum lines along the coast in recreational areas, followed by the killing of targeted individuals of various shark species caught in this equipment, such as the great white shark, the tiger shark and the bull shark [29]. Paradoxically, lethal shark control is run along coastal areas hosting shark populations that attract international diving tourism [14].

Recent research has demonstrated that the public may not support lethal shark control in South Africa [38], possibly marking a new era for shark conservation management in the country and benefiting neighbouring regions like Mozambique. An example of this advent is the implementation of non-lethal shark control in the City of Cape Town, where shark cage diving tourism is also important. Here, research by Neff and Yang [43] showed how public pride in shark populations plays a critical role in shaping support for shark conservation and opposition to lethal shark control. Feelings of pride, underpinned by an understanding of sharks' uniqueness, a connection with sharks, and knowledge, could be the foundation for the establishment of Southern Africa as a shark-based tourism and shark conservation area. Endorsing a uniform sense of pride in sharks among people, beginning with tourism stakeholders such as scuba divers, could represent the quickest way in which support for shark conservation is generated and transformed into shark stewardship.

3. Background

3.1. Shark uniqueness, relatability and knowledge

There are a series of biological and ecological characteristics associated with sharks which make them unique. A prime example is their role as apex predators capable of structuring food webs and regulating predator-prey dynamics [55]. Sharks also possess distinctive morphological and behavioural features compared with other fish species, such as their size, shape, teeth, skin, and movement [42]. The literature reports how these characteristics can instil a sense of fascination and awe, or the opposite, a sense of repulsion or even hate directed at sharks [7,12,26,52,61]. Similarly, people can relate to sharks in different ways. For example, sharks can be positively associated with certain products (e.g. tourism); people seeing or interacting with sharks (e.g. through diving) can feel a connection with sharks as well as a sense of camaraderie with others sharing similar experiences [2,4,5,39]. However, people may also feel no association with sharks, perceiving them as something abstract to them [26,36,44]. Finally, public knowledge of sharks is known to vary, from no knowledge at all to some basic or advanced knowledge of sharks' characteristics, ecological role, and economic and cultural value [1,46,38]

Perceived shark uniqueness, shark relatability and shark knowledge have been documented to influence, either positively or negatively, various attitudes towards sharks, especially shark conservation. Concerning perceived shark uniqueness, on the one hand, recalling shark features like their teeth, size and predatory behaviour could result in negative attitudes generated by repulsion and hate [11,26]. On the other hand, awareness of the unique ecological role of sharks and fascination with sharks can result in favourable attitudes towards sharks [1,61]. Shark relatability, for example feeling a strong connection with sharks during an interactive experience like scuba diving, can be linked to strong support for shark protection and positive attitudes towards experiencing sharks in the future [3,50,39]. However, a sense of abstraction from sharks can lead to people being uninterested in either the protection of sharks or interactions with sharks, as well as negative behaviours like shark consumption [36]. Finally, people possessing some knowledge of sharks have been documented to be more positively inclined to support shark conservation and engage in activities like shark-based tourism, while poor knowledge of sharks is known to be associated with negative perceptions and behaviours towards them [46,49,61,38].

Based on the putative influence of perceived shark uniqueness, shark relatability and shark knowledge on attitudes towards sharks, the following hypotheses were formulated:

H1. : Perceived shark uniqueness influences attitude towards shark-based tourism.

H2. : Perceived shark uniqueness influences attitude towards shark conservation.

H3. : Shark relatability influences attitude towards shark-based tourism.

H4. : Shark relatability influences attitude towards shark conservation.

H5. : Shark knowledge influences attitude towards shark-based tourism.

H6. : Shark knowledge influences attitude towards shark conservation.

3.2. Shark framing

How sharks are portrayed by people and the media is known to play a central role in influencing public opinion and shark management and conservation policies [41,38]. For example, the media including news reports, movies, documentaries and social media can cover shark-bite incidents and other human-shark interactions, and present both accurate and inaccurate information about sharks, generating mixed feelings such as fear, hatred, compassion and concern [35,57,58,8]. Research has demonstrated that shark framing and perceptions around it can influence attitudes towards sharks; for example, positive framing or believing that the media is engaged in a misrepresentation of sharks can result in greater sentiment towards shark protection [44,8]. Attitude towards shark framing may be in turn influenced by other factors, such as perceived shark uniqueness, shark relatability and shark knowledge. For example, knowing about sharks and feeling a connection with sharks can result in perceptions that shark framing is damaging to sharks [38].

Based on the central role of shark framing in shark conservation discourses, the following hypotheses were formulated:

H7. : Perceived shark uniqueness influences attitude towards shark framing.

H8. : Shark relatability influences attitude towards shark framing.

H9. : Shark knowledge influences attitude towards shark framing.

H10. : Attitude towards shark framing mediates the influence of perceived shark uniqueness, shark relatability and shark knowledge on attitude towards shark-based tourism.

H11. : Attitude towards shark framing mediates the influence of perceived shark uniqueness, shark relatability and shark knowledge on attitude towards shark conservation.

4. Method

Based on the hypotheses formulated (H1-H11), a research model was developed (Fig. 1), including the following antecedents: perceived shark uniqueness, shark relatability, and shark knowledge. These were hypothesised to influence attitude towards shark framing, shark-based tourism and shark conservation. Attitude towards shark framing was also hypothesised to mediate the influence of the three antecedents on attitude towards shark-based tourism and shark conservation.

The data were collected using a self-administered structured questionnaire survey (Appendix A) targeting recreational scuba divers. The questionnaire was created by the authors based on the available literature on the main topic of research. To establish validity, two external researchers, namely shark biologists with expertise in shark conservation and marine social science, were asked to complete the questionnaire and evaluate whether the questions effectively captured the topic under investigation. A statistician was asked to assess the structure and wording of the questions. The final questionnaire was evaluated by a scientific committee and an ethics committee at the authors' institution. The questionnaire contained a section covering demographic background, diving experience, favourite species to see when scuba diving, and learning about sharks. The second section included 40 Likert-scale statements the participants had to indicate their level of agreement with (where 1 = strongly disagree and 5 = strongly agree). The statements covered aspects including the unique attributes of sharks (six statements); fascination with and relatability to sharks (five statements); awareness of sharks and knowledge of sharks' ecology (eight statements); shark framing (six statements), shark-based tourism (six statements), and shark conservation (nine statements). These items were selected based on the analysis of literature according to the background section in this paper.

The population under investigation included scuba divers diving in South Africa and Mozambique for recreation and tourism. To access divers, three locations were visited for the research, namely Umkomaas in KwaZulu-Natal (South Africa), Simon's Town in Cape Town, Western Cape (South Africa), and Ponta do Ouro (Mozambique) (Fig. 2). These locations are known to be visited by scuba divers who share a similar demographic profile [40]. For example, Ponta do Ouro is mainly visited by scuba divers from South Africa [40]. This selection was intended to reduce the potential bias in the data resulting from demographic differences between samples. However, the study locations offer different types of shark diving as a tourism attraction including deep shark diving without bait, baited shark diving, and observing bottom-dwelling sharks [16,19,27,32]. Sampling was convenience-based to maximise the number of responses at the time of data collection and was carried out between December 2021 and November 2022. During this time, the locations were visited once for ten days by a group of 3–4 trained field workers. On a given day, field workers would approach divers at dive centres after their diving experience and invite them to participate in a 20-minute questionnaire survey about sharks. The divers who agreed to participate were informed of the study's ethical considerations via an informed consent letter. Questionnaires were distributed in hard copy and collected immediately after completion. For the study locations, the number of diving visitors was estimated to be between 2000 and 10,000 per year [19,38]. Based on these figures, an ideal sample size would be 360–380 divers (95% confidence level and 5% margin of error). The final sample was 294 divers (95% confidence level and 8% margin of error), specifically, 109 participants for Umkomaas, 113 for Simon's Town, and 72 for Ponta do Ouro.

Questionnaire data were analysed using the software Statsoft Statistica (Version 14, 2020), the Statistical Package for the Social Sciences (SPSS Version 25, 2017) and its module Analysis of Moment Structure (AMOS). The profile of the participants and their answers were first outlined using descriptive statistics (mean, standard deviation, standard error). The demographic and diving experience profile of the participants was compared across study locations using cross-tabulations (Pearson χ^2 test) for categorical variables (e.g. gender) and Kruskal-Wallis tests for continuous variables (e.g. age), all of which were non-parametric. Exploratory statistics including confirmatory exploratory factor analyses (CEFA) and reliability tests were performed on the data to assess whether and which of the factors in the research model had validity and internal consistency (Cronbach α) [45,60]. Spearman's correlation analysis (r_s) was performed to highlight significant correlations between factors, as well as correlations between demographic variables and factors. For this analysis, all data met the relevant assumptions (variables were binary, categorical or continuous and

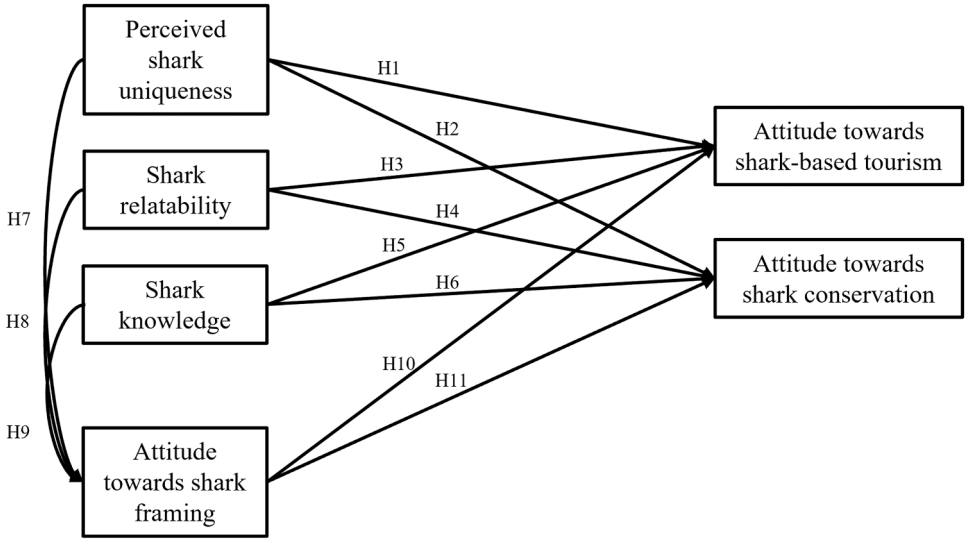


Fig. 1. Research model and underlying hypotheses.

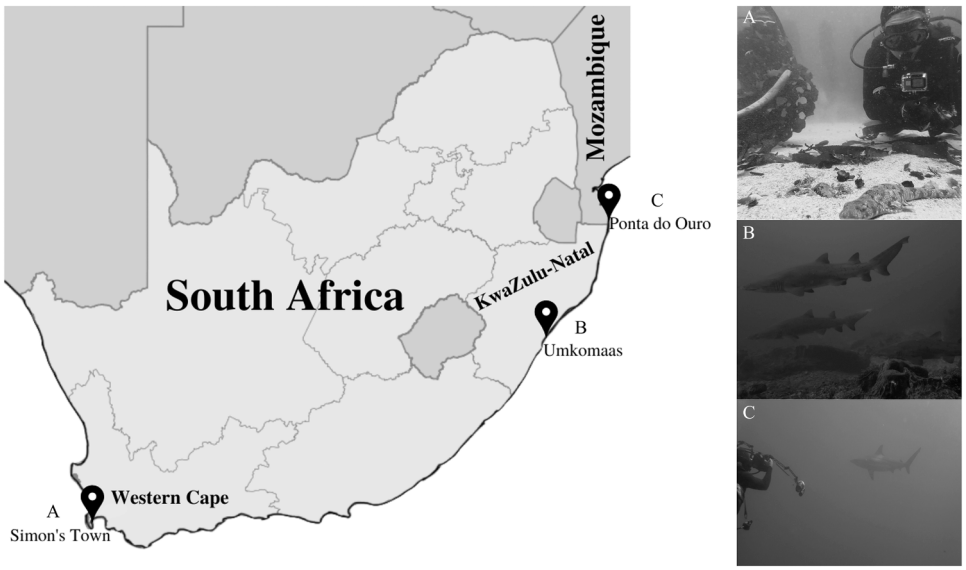


Fig. 2. Map of the study locations and related shark diving tourism offerings. Photo credits: Filippo Bargnesi, Mike Barron.

presented monotonic relationships). The AMOS module was used to test the hypotheses in the research model (using the maximum likelihood estimation technique as recommended by [47]) and perform structural equation modelling (SEM). Data were centred to remove multicollinearity (for each variable values were changed by subtracting the mean of each variable). Multiple regression analysis was also performed to establish whether factors were significantly influenced by specific variables of the divers' profile (demography, experience, preferences). In this analysis, only variables that displayed significant r_s with the dependent variables were included as independent variables. Tolerance was calculated to check for multicollinearity between the independent variables, and whether this would affect the results of the regression analysis. Regression analysis followed the equation: $Y = b_0 + b_1X_1 + b_2X_2 + . + b_pX_p$, where b_0 is the value of Y when all of the independent variables (X_1 through X_p) are equal to zero, and b_1 through b_p are the estimated regression coefficients.

5. Results

The demographic background of the participants in this study is presented in Table 1 and supplementary material is provided in Appendix B. A statistical comparison shows that there were no substantial differences between samples except for the country of residence, which was Mozambique for participants in Ponta do Ouro and South Africa for participants in Umkomaas and Simon's Town. The divers were slightly more males than females, 37 years old on average. Most possessed tertiary education as opposed to high school education. About a third worked in the diving industry, while the rest had different professions. Diving qualifications were similarly spread between basic (e.g. the equivalent of PADI Open Water Diver), advanced (e.g. the equivalent of PADI Advanced Open Water Diver) and professional (e.g. the equivalent of PADI Instructor). The participants had dived for an average of ten years and had accumulated an average of approximately 600 lifetime dives. They did 60 dives per year on average. For nearly 60% of participants, the favourite species to see when diving were sharks. The participants had learnt about sharks mainly through the TV, word of mouth, the internet and social media.

The results of CEFA and reliability tests on the items in the questionnaire are given in Table 2. The factors extracted (perceived shark uniqueness, shark relatability, shark knowledge, attitude towards shark framing, attitude towards shark-based tourism, and attitude towards shark conservation) had loadings exceeding the cut-off value of 0.40 in all instances except for one statement. The factors explained 37–59% of the variance in the data. Cronbach's alpha (α) values demonstrated good factors' reliability, above the threshold of 0.60 established by [45]. The factor with the highest average score (mean = 4.66, SE = 0.03) was perceived shark uniqueness, implying that the participants recognised the unique attributes of sharks in general and were aware of the presence of sharks in Southern African waters. Shark knowledge was also good (mean = 4.14, SE = 0.04), with the participants understanding some of the ecological aspects of sharks and their species diversity, also in Southern Africa. Shark relatability was average (mean = 3.52, SE = 0.05); this signifies how the participants could relate to and feel connected with sharks. Concerning attitude towards shark framing, the participants tended to agree or strongly agree (mean = 4.37, SE = 0.03)

Table 1
Participants' profile (N = 294).

Variable	Categories	Values	Test results for comparison between samples
Gender (%)	Male	54	$\chi^2 = 3.57$ ns
	Female	46	
Age (y)	Mean±SE	37 ± 0.81	Kruskal-Wallis H = 2.65 ns
Residence (%)	South Africa	66	$\chi^2 = 61.09$ * **
	Mozambique	12	
	Other	22	
Education (%)	School	38	$\chi^2 = 0.24$ ns
	University	62	
Occupation (%)	No diving	64	$\chi^2 = 7.16$ *
	Diving	36	
Diving qualification (%)	Basic	30	$\chi^2 = 12.11$ *
	Advanced	38	
	Professional	32	
Years diving	Mean±SE	10 ± 0.56	Kruskal-Wallis H = 1.49 ns
Lifetime dives	Mean±SE	588 ± 100	Kruskal-Wallis H = 2.35 ns
Dives per year	Mean±SE	57 ± 8	Kruskal-Wallis H = 2.95 ns
Favourite species to see (%)	Sharks	59	$\chi^2 = 6.12$ ns
	Other	41	
Learning about sharks (%)	TV	30	–
	Word of mouth	29	
	Internet	27	
	Social media	25	
	Other	8	

ns p = not significant; * $p < 0.05$; * ** $p < 0.001$.

Table 2
Results of confirmatory exploratory factor analyses on perceived shark uniqueness, shark relatability, shark knowledge, attitude towards shark framing, attitude towards shark-based tourism, and attitude towards shark conservation (N = 294).

Factor[a]	Factor loading	Eigenvalue	Variance explained	Cronbach alpha (α)	Average factor score (mean±SE)
Perceived shark uniqueness		2.63	44%	0.74	4.66 ± 0.03
I am aware of the presence of sharks in Southern Africa	-0.64				
I have a clear mental picture of sharks as marine animals	-0.67				
I find sharks to be fascinating animals to engage with	-0.65				
Sharks are a unique type of wildlife that gives me a sense of wonder/awe	-0.68				
Sharks are distinctive animals	-0.72				
I see sharks as natural animals	-0.62				
Shark relatability		2.72	54%	0.78	3.52 ± 0.05
Sharks have a natural association with humans that I can identify with	-0.64				
I associate sharks with certain brands, products, services, and activities	-0.57				
On some level, sharks reflect who I am and my personality	-0.84				
I feel an emotional connection with sharks compared to other wild animals	-0.84				
When I engage in shark-related activities, I feel as if I am part of a unique group	-0.76				
Shark knowledge		4.75	59%	0.90	4.14 ± 0.04
I am familiar with the different types of shark species	-0.83				
I am aware of how sharks live and act in the marine environment	-0.78				
I can quickly recall the different shark species present in Southern Africa	-0.83				
I do not have difficulty imagining different shark species in my mind	-0.74				
My knowledge of sharks allows me to visualise different types of sharks	-0.86				
It is clear to me what sharks are as apex predators in nature	-0.68				
I trust my knowledge of sharks and their behaviour in the wild	-0.74				
Some exceptional characteristics of sharks come to mind quickly	-0.68				
Attitude towards shark framing		2.25	37%	0.64	4.37 ± 0.03
I would post positive messages about sharks on my social media	-0.69				
I am sympathetic towards how sharks are generally perceived	-0.52				
I feel that sharks are misinterpreted	-0.63				
I feel the images of sharks are always related to negative experiences	-0.55				
I believe that the media such as films contribute to the negative image of sharks	-0.69				
Sharks are not blood-thirsty, man-eating animals	-0.53				
Attitude towards shark-based tourism		2.97	49%	0.79	4.01 ± 0.04
I would like to see (or have seen) sharks in person	-0.61				
I can recommend shark-based tourism to others	-0.78				
It is important for me to dive/interact with sharks as much as possible	-0.79				
Sharks are my first choice when considering which animals to view	-0.76				
I plan to purchase products/services associated with sharks	-0.58				
I visit shark conservation areas	-0.66				
Attitude towards shark conservation		3.63	40%	0.75	4.36 ± 0.03
I consider sharks to be a natural part of the sea and it should stay that way	0.46				
I support the conservation of sharks	0.30				
When humans interfere with marine environments, it can have disastrous consequences for sharks	0.42				
The establishment of conservation areas for sharks is important	0.78				
Establishing shark conservation areas increases my appreciation of Southern Africa as a tourism destination	0.82				
Increasing shark conservation areas would improve familiarity with sharks	0.81				
Shark-based tourism can be a sustainable shark conservation approach	0.76				
I feel sad or angry about the threats to sharks	0.63				
I contribute to the conservation of sharks	0.48				

[a] Based on scale of agreement: 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree.

that negative and false images of sharks as portrayed in the media can be detrimental to sharks. Attitude towards shark-based tourism was positive (mean = 4.01, SE = 0.04) with the participants being willing to partake in interactions with sharks and recommend these interactions to others. Last, the attitude towards shark conservation was also good (mean = 4.36, SE = 0.03); here, the participants showed concern for threats to sharks and supported endeavours to conserve sharks, such as the establishment of conservation areas and sustainable shark-based tourism.

The research hypotheses were tested via SEM (Fig. 3). The factors considered in the model were significantly correlated with one another, with correlation coefficients (r_s) ranging from 0.41 to 0.71. The model had a satisfactory fit. The chi-square divided by the degrees of freedom was 3.23, within the limits of 2.00 and 5.00 [62,67]. The comparative fit index (CFI) was 0.78, very close to 0.95 [33]. The root mean square error of approximation (RMSEA) was 0.09, lower than the cut-off limit of 0.10 [10]. According to the standardised β-coefficients displayed in Table 3, perceived shark uniqueness and shark relatability had a significant positive influence on attitude towards shark-based tourism (confirming H1 and H3), while shark knowledge had no influence (disconfirming H5). Perceived shark uniqueness and shark relatability significantly and positively influenced attitude towards shark framing (confirming H7-H8), while shark knowledge had a significant negative influence (confirming H9). Attitude towards shark framing did not mediate the influence of these factors on attitude towards shark-based tourism (disconfirming H10). Perceived shark uniqueness, shark relatability and shark knowledge had no influence on attitude towards shark conservation on their own (disconfirming H2, H4 and H6), but this influence was completely and positively mediated by attitude towards shark framing (confirming H11).

For the multiple regression analysis testing the influence of divers' profile on the factors (Fig. 3), tolerance was always higher than 0.51, well above the threshold of 0.2 [63]. Perceived shark uniqueness was positively influenced by the number of years diving (β = 0.21, SE = 0.09, t stat = 2.32, p = 0.02) and shark preference (β = 0.22, SE = 0.07, t stat = 2.26, p = 0.001). Shark relatability was positively influenced by

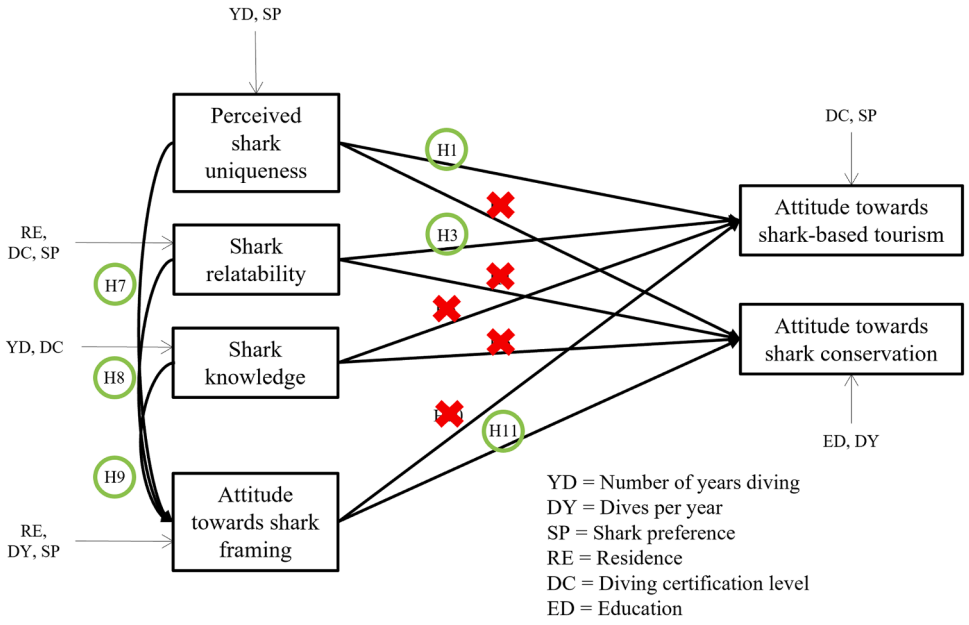


Fig. 3. Final results of the research model.

Table 3
Standardised regression weights (β-coefficients) for estimated structural model testing H1-H11.

Independent variable		Outcome variable	Regression weight	*p*	*Hypothesis accepted?*
H1: UNIQUENESS	→	ATT_TOURISM	0.76	* **	YES
H2: UNIQUENESS	→	ATT_CONSERVATION	-0.14	0.58	NO
H3: RELATABILITY	→	ATT_TOURISM	0.60	* **	YES
H4: RELATABILITY	→	ATT_CONSERVATION	-0.04	0.65	NO
H5: KNOWLEDGE	→	ATT_TOURISM	-0.18	0.17	NO
H6: KNOWLEDGE	→	ATT_CONSERVATION	0.05	0.74	NO
H7: UNIQUENESS	→	FRAMING	1.04	* **	YES
H8: RELATABILITY	→	FRAMING	0.23	* *	YES
H9: KNOWLEDGE	→	FRAMING	-0.41	* **	YES
H10: FRAMING	→	ATT_TOURISM	-0.14	0.35	NO
H11: FRAMING	→	ATT_CONSERVATION	0.84	* **	YES

* * $p < 0.01$; * ** $p < 0.001$.

(South African) residence (β = 0.13, SE = 0.06, *t* stat = 2.02, $p = 0.04$), diving certification level (β = 0.14, SE = 0.07, *t* stat = 2.07, $p = 0.04$), and shark preference (β = 0.36, SE = 0.06, *t* stat = 5.80, $p < 0.001$). Shark knowledge was positively influenced by diving certification level (β = 0.20, SE = 0.08, *t* stat = 2.56, $p = 0.01$) and the number of years diving (β = 0.18, SE = 0.08, *t* stat = 2.27, $p = 0.02$). Attitude towards shark framing was positively influenced by (South African) residence (β = 0.20, SE = 0.07, *t* stat = 3.06, $p = 0.003$), dives per year (β = 0.16, SE = 0.08, *t* stat = 2.03, $p = 0.04$), and shark preference (β = 0.17, SE = 0.07, *t* stat = 2.53, $p = 0.01$). Attitude towards shark-based tourism was positively influenced by diving certification level (β = 0.19, SE = 0.07, *t* stat = 2.51, $p = 0.01$) and shark preference (β = 0.35, SE = 0.06, *t* stat = 5.64, $p < 0.001$). Attitude towards shark conservation was positively influenced by (high school) education (β = −0.16, SE = 0.07, *t* stat = −2.44, $p = 0.02$) and dives per year (β = 0.20, SE = 0.09, *t* stat = 2.29, $p = 0.02$).

6. Discussion

The participants in this study tended to be experienced divers residing in South Africa, in line with previous research conducted on diving tourism at the chosen study locations [19,39]. Although this study did not exclusively target shark divers but any type of scuba diver, the participants tended to favour sharks over other species to see underwater. This result, together with the positive average score of attitude towards shark-based tourism, suggests a favourable inclination towards this type of tourism among scuba divers in Southern Africa. The greater scores of shark relatability and attitude towards shark framing provided by South African participants are in support of research showing that South African people using the coast can display high levels of pride in shark populations [43].

The average scores for factors including perceived shark uniqueness, shark knowledge, attitude towards shark framing, and attitude towards shark conservation confirm that the participants in this study understood the role and importance of sharks, favoured positive media narratives surrounding sharks, and endorsed shark conservation. While the shark relatability score was the lowest, it still showed that divers felt a connection with sharks on different levels. The average scores on the factors extracted support the literature on the positive affective, cognitive and behavioural attitude that ocean-based tourists including divers show towards species like sharks, suggesting that activities like diving can instil a sense of appreciation towards and a better understanding of sharks, their social-ecological role and their potential as a tourism product that can contribute to shark conservation [3,7,39]. These findings are also corroborated by the influence of variables in the participants' profile on the factors examined in this study. In particular, accumulated diving experience had a significant positive effect on various factors. The literature describes how experience and specialisation in scuba diving are accompanied by shifts in motivations to dive, expectations from the diving experience, preferences, knowledge,

attitude and behaviour [17]. In the case of this study, as divers became more proficient and specialised, their knowledge, interest and appreciation concerning sharks seemingly increased. This confirms theories of diver specialisation coming with a greater interest in species like sharks, which are often considered challenging to dive with due to environmental conditions [18,59,65,39].

The results of SEM confirmed six of the 11 hypotheses formulated as part of the research model. Perceived shark uniqueness and shark relatability had an important positive influence on attitudes towards shark framing and shark-based tourism. These findings show that being aware of the unique attributes of sharks, fascination and feeling a connection with sharks, can result in sympathetic feelings about the way sharks are depicted (e.g. by the media) [38]. Similarly, these perceptions can positively affect behavioural intentions to partake in shark-based tourism and generate its support as a potential conservation tool [3,61]. Interestingly, in this study, knowledge of sharks negatively affected attitude towards shark framing and did not influence attitude towards shark-based tourism. This finding, which tends to be in contrast with what the literature shows [46,49,61,38], suggests that scuba divers may be driven to support proper shark framing and engage in shark-based tourism by affective elements (such as fascination, awe, and relatability) rather than cognitive ones like knowledge. Human-shark interactions like scuba diving offer more personal and direct experiences with sharks, as opposed to other experiences like shark sightings in aquaria [3,50,39], possibly resulting in the affective component of the interaction playing a greater role compared with the cognitive one in influencing subsequent attitudes towards shark-based tourism. However, it must be noted that this study only measured self-reported knowledge and not actual knowledge, possibly confounding the results and subsequent interpretations.

The results of the SEM also show that attitude towards shark framing mediated the influence of perceived shark uniqueness, shark relatability and shark knowledge on attitude towards shark conservation. This finding supports the knowledge that attitude towards shark framing can strongly affect sentiment towards shark conservation, including leniency towards various management and policy measures [44,8]. Since attitude towards shark framing did not mediate influences on attitude towards shark-based tourism, care must be taken in assessing various types of attitudes towards sharks, as each one could be influenced by different factors with or without the mediation of specific constructs (like attitude towards shark framing). The results of this study suggest that shark framing may be more relevant for shaping perceptions of tangible shark conservation measures (e.g. the establishment of marine protected areas) and less relevant for determining behavioural intentions to engage in interactions with sharks (e.g. through shark diving), which would be driven by other more powerful factors. The strength of affective components such as shark relatability may be sufficient in shaping willingness to engage in experiences with sharks regardless of attitude towards shark framing.

6.1. Study implications

This study offers insight that can guide shark-based tourism's sustainable development as well as shark conservation, education and framing. While the research focused only on scuba divers, it also has implications regarding wider public engagement in shark support. Concerning shark-based tourism, the results of this study demonstrate that scuba divers' inclination towards shark encounters is positive and influenced by perceived shark uniqueness and shark relatability, as well as diving experience. Considering the interest of divers in sharks, it is important to focus on the proper marketing and management of shark diving offerings to ensure that shark diving continues to be supported while remaining a sustainable niche tourism industry. Much research has examined the positive and negative sides of shark-based tourism, such as non-baited diving, baited diving and cage diving with sharks. On the one hand, shark diving can be educational and generate empathy and support for shark protection, while indirectly contributing financially to shark conservation and endorsing alternative livelihoods to fishing [3,37,66]. On the other hand, shark diving can cause ecological harm and put the safety of tourists at risk, particularly under poor operational management, risk frames and reckless diver behaviour [28,34,39]. A recommendation for shark-based tourism marketing is to use the right frames to advertise shark encounters, avoiding excessive risk frames and rather emphasising safety, ethical aspects, ecological aspects and the enriching value of the experience (e.g. encountering unique and vulnerable species). These elements can underpin safe and ethically sound shark diving experiences potentially improving perceptions, knowledge and relatability concerning sharks, resulting in other positive attitudes and behaviours. For this purpose, operational management must be in line with marketing messages and emphasise the importance of safety, information and education to improve the connection between tourists and sharks and generate memorable experiences.

The results of this study concerning the influence of perceived shark uniqueness and shark relatability on attitude towards shark-based tourism call for some recommendations on how to generate interest in shark-based tourism and other shark-based experiences among the public. Diving with sharks is an activity that may not be easily accessible to people compared with other activities, such as aquarium visits, where sharks can be encountered. Therefore, it would be beneficial to market, support and properly structure alternative shark encounters to diving, as they can educate people, raise awareness and engender positive feelings towards sharks, such as empathy and relatability. Research by [50] has demonstrated the value and impact of these encounters, such as walking through a 'shark tunnel'. Other studies have focused on the potential of documentaries and television series to create interest in sharks while debunking various shark-related myths [25,68]. The results of this study, which showed how the divers had come to know about sharks not through diving per se but through other sources like the television and the internet, support the idea that educational tools including documentaries are instrumental in sparking interest in sharks. Creating possibilities for people to become exposed to sharks, either through the media or encounters in aquaria, is a way to ensure that the general public becomes informed and aware of various ocean issues and in particular, shift perceptions towards normally stigmatised species including sharks from repulsion and abstraction to fascination, connectedness and eventually support.

The results of this study show that shark framing continues to play a central role in shaping perceptions of sharks and attitudes towards indirect and direct shark conservation efforts. The fact that the majority of participants had learned about sharks through television, the internet and social media emphasises the importance of fair shark framing to the general public. Believing that sharks are not properly represented in the media, and willingness to share positive images of sharks in the media, emerged as key elements mediating the influence of perceived shark uniqueness, shark relatability and shark knowledge on attitude towards shark conservation. This means that the divers who participated in this study had strong feelings towards shark framing and these feelings controlled the influence of their perceptions in favour of shark conservation. Several studies have analysed media content focusing on shark narratives and have demonstrated that false information, sharks' misrepresentation, and the melodramatization of human-shark encounters can result in negative public sentiment [35,57,58,8]. This sentiment can be detrimental when shark conservation policymaking takes into account public opinion and is also conditioned by media narratives [38]. The available research and the results of this study call for the generation of narratives directed at the general public that demystify the role of sharks in nature, their threatened status, and the false information shared about them through movies and other media.

Finally, the findings of this study highlight the potential for branding Southern Africa as a sustainable shark-based tourism destination. The diving industry in the region is economically florid, with shark diving, in particular, representing one of the most important forms of marine

wildlife tourism [19,27]. Elements measured in this study including perceived shark uniqueness, shark relatability and attitude towards shark-based tourism indicate that sharks were recognised by the participants as a unique, relatable and attractive product for non-consumptive tourism. With this in mind, shark-based destination branding could be deployed both as a destination marketing tool and as an indirect conservation tool. However, branding strategies for shark-based tourism would need to focus on the importance of promoting sustainable and ethically sound practices that would not be to the detriment of sharks, setting very high standards for service quality, safety, education and research associated with this form of tourism. This is particularly important given recent incidents involving divers and sharks in South Africa [6].

6.2. Study limitations

This study presents some limitations which need to be considered in the interpretation of the findings and planning of future research. First, this study focused on a single group of stakeholders, namely recreational scuba divers, from a circumscribed geographical area, namely Southern Africa. These choices call for care in generalising the findings. The scuba diving community is small and the results cannot be generalised to the majority of people without further research. It is often the opinion of the majority that matters the most. Second, it may be argued that the comparison of scuba divers between countries (South Africa and Mozambique) is inappropriate due to potential differences in demographic and diving experience profiles. However, the results showed that the only variable differing substantially between samples was the country of residence of the participants. Third, the study did not explore perspectives on different types of shark-based tourism offered in the study region, some of which may be considered controversial, like baited shark diving or shark cage diving [9]. Considering this diversity may have yielded divergent responses, especially concerning attitude towards shark-based tourism. Fourth, shark knowledge items only explored self-reported knowledge and not actual knowledge, and may not have properly captured the extent of the participants' self-reported knowledge of sharks, confounding the results. For example, some might think "different shark species" are species like the ragged-tooth shark, bull shark, and hammerhead shark, while others might include a much greater variety of species. Finally, while the selection of the factors examined in this study was based on their relevance in the literature, the addition of other factors to the research model may have provided richer data and enabled a better interpretation of the results.

7. Conclusion

This study aimed to contribute to filling gaps in knowledge regarding what determines willingness to engage in shark-based tourism and support shark conservation, with recreational scuba divers in Southern Africa as a study group. The focus of the research was on the influence of perceived shark uniqueness, shark relatability and shark knowledge, and the mediation role of attitude towards shark framing. The results presented here show that scuba divers in Southern Africa acknowledge the uniqueness of sharks, can relate to sharks, and possess basic knowledge of sharks; these factors positively influence attitude towards shark-based tourism, while influences on attitude towards shark conservation are mediated by attitude towards shark framing. These findings have implications for the way sharks are portrayed and shark-based tourism promoted, also enabling reflections on wider public engagement in shark-based information, education and experiences outside diving tourism. The study also highlights the potential to brand destinations offering shark-based tourism in a manner that can benefit both tourism growth and shark conservation. Future research needs to ensure that factors like shark uniqueness, relatability, knowledge and framing continue to be assessed as well as their relation with various attitudes and behaviours. Studies would benefit from exploring the perspectives of different stakeholder groups, since this research only focused on a single group that is known to have favourable tendencies towards sharks. In particular, it is important to prioritise an investigation of the attitudes of the general public. At any rate, the data presented here contribute to the existing work based on the human dimensions of sharks and offer new angles of research and interpretation of the human-shark relationship, which ought to be further explored to ensure that shark conservation is enhanced while supporting sustainable tourism growth.

CRediT authorship contribution statement

Serena Lucrezi: Conceptualisation, Methodology, Formal Analysis, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualisation, Supervision, Project Administration, Funding Acquisition **Tafadzwa Matiza:** Conceptualisation, Methodology, Writing – Review & Editing, Project Administration.

Data Availability

The authors do not have permission to share data.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.marpol.2023.105996.

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