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Changing trends: Beliefs and attitudes toward sharks and implications for conservation

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ABSTRACT

As history shows, and contrary to modern western society's feelings, sharks were once respected and worshipped. Sensationalized media coverage negatively impacts the public's perception of sharks and lack of information about management and conservation options negatively impacts policy makers' ability to keep shark populations healthy. Understanding that people's attitudes about sharks will influence their willingness to find a way to coexist with them, it is essential to acknowledge these attitudes when developing conservation measures. Just as risk management policies must adapt to new evidence-based information, so must shark conservation efforts adapt to the realities of public opinion. This perspective review, focused on the psychological aspects of human-shark interactions, highlights some of the current research, mostly from Australia and other countries where those interactions are more salient, on the beliefs and attitudes people have toward sharks. With this review, we hope to help policymakers and stakeholders, such as Environmental Non-Governmental Organizations (ENGOs) and the zoological community to better address some of the shark conservation challenges ahead.

Keywords: Sharks; Attitudes; Conservation; Environmental Education; Behavioral change.

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SIGNIFICANCE STATEMENT

Today, only a short number of review studies focus on the influence of individuals' knowledge and attitudes toward shark conservation. This review article offers an up to date approach to some of the most relevant advances on the social and psychological factors that affect shark conservation efforts globally. We also include a fairly novel approach to the shark's social representation and stereotype that, to our best knowledge, has not yet been included in other reviews. It also explores the potential effect that media outlets and other forms of mass communication have on the public opinion, policymakers and stakeholders. Finally, we share possible paths to follow toward more effective shark conservation. Overall, our review article offers a strong perspective of the most challenging issues related to the conservation of sharks.

INTRODUCTION

Early scientific classification and description of sharks started in Ancient Greece, but it was only in the 20th century that sound scientific knowledge progressed (Castro, 2013). Starting with the mere identification of shark species, knowledge increased to detailed descriptions of their anatomy, biology, physiology and behavior (Castro, 2013). Mostly due to the research funding from the US Office of Naval Research between 1950 and 1980, knowledge on shark biology, sensory mechanisms and behavior grew considerably, enabling a more biological and myth-free appreciation of these fish and an understanding of their importance to a balanced ecosystem (Castro, 2013). This trend shift has greatly influenced the scientific community and sharks are now subject to a wide array of research approaches which may lead to an equally wide array of publications which can help to broaden the public's perception. Ranging from biological to social sciences, sharks are now a recurring theme in academic journals, news bulletins, movies and documentaries (for a review, see Pepin-Neff, 2019).

The purpose of this essay is to present some of the current relevant topics and areas that help us better understand the social framework of sharks and its consequences for conservation efforts. By highlighting some of the most recent literature on public perception and management of sharks, we explore factors such as media influence, policy management, knowledge and attitudes toward sharks, as well as, for the first time, the stereotypical traits of the shark that affect public opinion and shark conservation. While public prejudice toward sharks, enhanced by inaccurate media reporting, is detrimental to future shark survival and current conservation efforts, history shows us that perceptions can be changed. In centuries passed, marine mammals - now revered and loved - were once vilified. As our feelings toward these animals changed, so did our motivation to protect them.

Current conservation status

Today, shark populations face the threat of extinction worldwide due to many factors, such as overfishing driven by the high demand for shark fins (Dulvy et al., 2014). By-catch fishing, where sharks are caught as a non-target species, recreational fishing, fishing for the cosmetic or health supplement industry or destruction of habitat are amongst other real and current threats to sharks. Removing sharks in an unsustainable way, either through targeted fishing or by-catch, will result in cascading effects in the trophic structure of the entire ocean (McCauley et al., 2010; Estes et al., 2011). As shark populations decrease, ocean biodiversity diminishes leading to a decrease in fish stocks. Since we, as humans, increasingly depend on fish as a protein source, any decrease in the availability of these animals has a global effect on world nutrition (FAO, 2014). Although there is a general lack of reliable reporting on the number of sharks caught annually, according to the Food and Agriculture Organization (FAO), shark fisheries worldwide increased threefold between 1950 and 2000, reaching a peak of 888,000 tons per year. Since then, a decreasing trend can be observed with about 11% fewer catches in 2014, although this decline was not directly related to fisheries management (Davidson et al., 2015). In fact, this decrease was mostly due to fishing pressure and ecosystem attribute measures. Despite this decrease in shark catches, an increasing number of shark species are already listed as endangered according to the International Union for Conservation of Nature (IUCN). By 2009, around 24% of shark species were considered to be endangered by the IUCN Red List (Dulvy et al., 2014). More recently, Pacoureau and colleagues (2021) showed a dramatic 71% decrease in the world population of sharks and ocean rays since 1970. Due to an 18-fold increase in fishing pressure throughout the last decades, 75% of all sharks and rays are at risk of extinction.

From a distant reality to a close threat

Public perception, especially in the last decades, has greatly contributed to this negative decline in shark populations. Although public sentiment and species decline may seem disconnected, the indirect influence of the public's negative perception of sharks has led to an overall vilification of these animals and subsequent anthropogenic threats on their survival.

Once upon a time, in a not so distant past, when the coastal areas began being used for recreational activities, myths and stories about marine life, told from generation to generation did not compromise the interest in playful exploration of the marine ecosystems. Indeed, throughout the 20th century, several authors described the general perception of sharks as opposite to the dangerous animals we now observe (Coppleson, 1958; Cortney, 1962; Whitley, 1940). It was probably the movie 'Jaws' (1975), commonly referenced as a turning point in the western perception of sharks, that massively influenced the public's perception about sharks with a worldwide ripple effect. Shark fear spread around the world and this apparent phobia conditioned bathers and beach goers' behaviors, afraid to get in the water because of the potential danger underwater. The media was quick to take advantage of the public's reaction and continued to exacerbate this fear of sharks because of the popularity and enthusiastic response to stories about supposed

"shark attacks".

Media as a key stakeholder in the shark's public image

Even though public perceptions are not shaped exclusively by the media, it is commonly accepted that the media does play an important role in the public's attitude towards a specific topic. The media often shapes public debate in terms of setting agendas and focusing the public's interest, limiting the information with which audiences understand particular subjects and removing alternative thoughts from public debate. This was confirmed by McCagh et al. (2015) by studying the influence of the media on the development of the management of the presence of sharks on the coast of Australia. Results showed that, although media-directed public pressure apparently influenced the decision to implement mitigation measures (safety nets), culling of shark populations in an effort to protect people did not have the public's support. The authors also identified several dissonances in media coverage (use of emotive language about man-shark incidents; use of two opposing framings: anthropocentric and conservation) that contributed to the public's perception of ineffective management, stressing the importance of rethinking the communication, and involving the population, researchers and stakeholders in the strategic design. Sabatier and Huveneers (2018) study also reinforced this idea of media 'attempting' to shape public opinion, by looking at the way media reported events of contact between sharks and humans between 2011 and 2013 in Australia. By analyzing over 350 articles published in popular newspapers before and after a series of six fatal attacks, the media framework tended to exaggerate public anxiety about the presence of sharks (e.g., "Sarah Kate Whiley, 21, mauled to death by up to three bull sharks off North Stradbroke Island (Qld)."). The results obtained reinforced the idea of the need for government agencies, the scientific community and the media to work closer together on communication, in order to provide concrete and effective advice and information about the biology and behavior of sharks. Hardiman and colleagues (2020) found similar results when surveying the content of four major newspapers in Australia, during a period of record human-shark interactions in 2015, resulting in just two fatalities within the study period. As the authors highlight, the news content was strongly focused on the negative aspects of these interactions. Among the 309 articles analyzed, most were markedly anthropocentric, with around 90% emphasizing, in one way or another, the risk to humans from sharks and with negligible mention to shark conservation. Also worth mentioning, accompanying photographs pictured human 'victims' or 'dangerous taxa'. Of 70% of all studied articles with at least one photograph, almost half featured sharks and within these, a marked predominance of images of the Great White was noted. As information now comes to people through social media, as well as more traditional methods, scientists are beginning to take the stage and make use of social media channels, like Twitter and Facebook, to reach out to an increasingly broader public (Parsons et al., 2014; Côté & Darling, 2018; Kidd et al., 2018). With sound and realistic information about threatened species, many scientists are now betting on this parallel source of information to reach out and nudge those who may later take a stand to counteract misinformed narratives. Le Busque et al. (2019) analyzed the content and themes of 2,643 Facebook posts by 100 Australian media outlets in 2016. Selected media outlets corresponded to the most frequently read newspapers, radio stations with the largest audiences and television free-to-view "news" and "current affair" genre programs. Around 76% (2,018) of all posts and 35,553 users' comments, were shark-related and included in the study analysis. Only 49 (out of 366) days did not include news in any way associated with sharks, which denotes the abundance of the theme in Australia's news scene. At the global scale, a total of just 95 reported human-shark interactions happened that year (26 in Australia and 69 elsewhere), but they accounted for 76% of the social media posts (from a total of 2,643) and 87% of the year's media posts (from a total of 40,373 posts). Of the 19 shark-related identified themes, human-shark interactions were the most common theme in the Facebook posts, comprising close to half (45.6%) of the overall posts. Interestingly, the information collected from the users' comments, as a way to understand the general public's reaction to the specific media theme, showed a general fear towards the ocean, even though most users expressed that they were not in favor of aggressive mitigation techniques, such as drum-lines or culling. Following this last study, Le Busque et al. (2021a) strived to understand what impact media messaging has on people's risk perception, acceptance of sharks, blame towards sharks, and preferred methods for reducing shark interactions. Four different types of media headlines were tested for their influence: non-shark attack: e.g., 'Extremely rare megamouth shark caught in Japan'; non-intent: e.g., 'Shark attack: Shark Mistakes surfer for seal'; statistics: e.g. 'Taking a selfie on a cliff is more risky than a shark attack, says academic. Zoo tries to save shark's reputation'; and sensationalism: e.g., 'Stay out of the water. Shark attacks have hit a record high around the world and experts say the number is set to rise'. Although the authors found no significant differences in any of the measured items (risk perception, acceptance of sharks, blame towards

sharks, and mitigation preferences) between pre and post exposure to the headlines, the participants' associated thoughts of the media approach and sharks in general confirmed their belief that the media usually portrays sharks negatively, using terms such as 'monsters', 'savages' and 'mindless killers', intentionally evoking fear emotions and exaggerating stories for sensationalism. Ostrovski and colleagues (2021), through the application of an online questionnaire, asked 354 Brazilian citizens about their perceptions of sharks, including media influence. Results confirmed what was previously found in other studies, i.e., respondents pointed to media, such as films, news or documentaries, as a source of fear and negative influence on their perception.

Stereotypes, attitudes and knowledge

The last two decades showed a growing number of research efforts focused on acknowledging the people's current perceptions toward sharks, hoping to better understand the social cognitions behind the shark's reputation. Knowledge of the public's attitudes towards animals not only influences coexistence between the two but is also an essential factor in the implementation of applicable and effective conservation and mitigation measures (Batt, 2009). Like Kretser et al. (2009) points out, in the context of the conflict between wildlife and man, acknowledging attitudes is crucial. As such, an honest and complete understanding of what psychological drivers affect the public's behavior toward sharks will allow conservation actors to create effective campaigns and efforts. Although the shark is considered one of the 20 most charismatic animals according to Albert et al. (2018), current narratives continue to associate negative connotations that affirm the idea of the ruthless and voracious predator (Muter et al., 2013; Neff & Hueter, 2013).

A gendered, mixed stereotype

Overall, plenty of knowledge on the peoples' attitudes toward sharks has emerged over the last two decades. To date, various quantitative and qualitative methods have been used to study attitudes towards sharks or shark conservation including the general knowledge about sharks (Friedrich et al., 2014), attitudes toward sharks (Thompson & Mintzes, 2002; Acuña-Marrero et al., 2018), conceptual maps (Thompson & Mintzes, 2002), content analysis of websites (e.g., Discussion board, see Shiffman et al., 2017), newspapers (Boissonneault, 2011; Boissonneault et al., 2005) and movies (Rugen, 2013), people's fear of sharks (Le Busque et al., 2021b) and finally analysis of children's drawings and interviews (Neves & Monteiro, 2014).

To our knowledge, not much research has been done on detailing the stereotype of the shark, except from two recent studies by Neves et al. (2021a). In one study, the authors found the shark to be associated with a stereotypical gendered perception, i.e., mostly perceived as a masculine social object (Neves et al., 2021). The authors highlight the possible connection to the social approach which posits that men and women are socialized to endorse and valorize stereotypical gender roles. Males are usually depicted as more competent (e.g., active, independent, egotistic and action-oriented) and female as more social (e.g., passive, dependent, generous and family care-oriented). Thus, sharks being seen as highly agentic and less communal animals may carry with them those same expected stereotypical social roles associated with males. In one other study (Neves et al., 2021a), the shark was found to fit in the threatening-awe/predator stereotype (high competence and low warmth), a mixed-stereotype associated with admiration, fear and avoidance or harmful behaviors, as previously found by Sevillano and Fiske (2016) for other animals such as lions or bears. Animals associated with such mixed stereotypes usually evoke respect and fear because of their perceived high competence (e.g., aggressiveness, dominance), but also hold our attention and admiration due to other traits such as beauty, intelligence, determination, etc. (Sevillano & Fiske, 2016). This newly published work highlighting the similarities between our stereotypes of sharks and our stereotypes of male gender (powerful, self-centered, antisocial) may be a critical point in understanding our perceptions and also in controlling them. Is there a possibility that conservationists and educators using mascot sharks showing warmth related traits as teaching tools could help to reassign our perceptions of sharks from the stereotype of dominant and aggressive animals to a warm and social stereotype from the very early stages of education? To our best knowledge, this has not yet been a subject for research.

Education and gender-related attitudes

Thomson and Mintzes (2002) were the first to adapt Kellert's Attitudinal Inventory for sharks with regard to education and gender and the identified parallels have been confirmed in subsequent studies (Garla et al. 2015, Tsoi et al. 2016). Higher knowledge was consistent with greater scientific and naturalistic attitudes and lower utilitarian and negative attitudes. Females were significantly more moralistic and significantly less naturalistic and utilitarian than males. Also, personal experience with sharks, pro-environmental attitudes and exposure to specific

media coverage, with a relatively high profile of conservation messaging, proved to be relevant factors for a positive image of sharks.

More recently, Lucrezi et al. (2019) searched for the attitudes and perceptions toward sharks of beachgoers in South Africa. They found that basic knowledge of sharks positively influences attitudes and reduces the perceived risk they pose. Half of the participants who learned about sharks when children, criticized current shark media framing and folk culture.

For these authors, educating the general public on basic knowledge about sharks should be a first step to influence their attitudes and behaviors. Three main challenges related to this step were drawn from this study: reducing the 'distance' between people and sharks, including more information about sharks through school education and addressing misinformation and misbelief toward sharks.

Biased policy management

Human-shark interactions are considered low probability / high consequence events so any incidents will attract substantial media attention for short periods of time, greatly affecting the general perception of these animals. This, just as mentioned before, influences government policy responses which tend to magnify fear messages, influenced by feelings about the idea of a given outcome rather than the reality of its occurrence. This apparent knee-jerk policymaking in reaction to anecdotal situations of human-shark interactions is now being questioned in its effectiveness by that same public opinion which policymakers want to influence (Neff & Yang, 2013; Gibbs & Warren, 2015).

By incorrectly citing facts, presenting them out of context or from unknown sources, and even the existence of coverage bias on specific topics, simplified or inaccurate information about sharks in the media is affecting people's understanding of the real problem sharks face today. In fact, people ill-informed about threats and solutions can condition successful conservation projects that already exist through the active acceptance of wrong policies (without confirmation from science-based information) or by voting for policies that support the wrong strategies. This general misunderstanding was confirmed by Shiffman et al. (2020) through the study of the mainstream media aimed at understanding if the layperson could actually learn about sound and factual shark conservation through mainstream media.

Policyholders also seem to be negatively influenced by the media. This was confirmed by Neff (2015) who studied the way in which several Australian political actors used movie narratives to influence risk management measures after shark accidents. Through an analysis of political decisions for risk management after shark accidents between 2000 and 2014, the author concluded that many of the political speeches, and inherent legal consequences, were aligned with cinematic narratives rather than based on scientific evidence.

Mitigation measures and public acceptance

Even after the occurrence of human-shark interactions, the implementation of risk management strategies may well be an overestimated narrative by policyholders as a safeguard to beachgoers.

Neff and Yang (2013) studied the attitudes, before and after shark accidents, among residents of two coastal cities in South Africa, cities with a history of continuous presence of Great White Sharks on the coast. The results obtained demonstrated that both levels of pride in the local wildlife, as well as confidence in the safety measures in force did not change after shark attacks. This was the first study that dissociated attitudes towards the occurrence of shark accidents, questioning the narratives commonly used by the media and governments to manage risk situations at the expense of shark lives. It also demonstrated that it is possible to assume that shark attacks do not always produce negative emotional responses, confirming that a strategy of general information on behaviors and preventive measures can be more effective than directly negative measures for shark populations.

Gibbs and Warren (2015) studied the attitudes of ocean users in Australia when they encountered sharks and about the mitigation measures imposed, namely the directed killing of sharks. Results showed that these ocean users showed a positive attitude towards sharks, being aware of the need for personal experience adjusted to the associated risk. Most were opposed to the mitigation measures based on direct killing, supporting instead more research and education focused on shark behavior in order to understand and accept the risks associated with using the ocean. In accordance with these findings, Pepin-Neff and Wynter (2018) studied the public attitudes and risk management preferences after shark accidents, in 2015 and 2016, in two Australian cities. Even after serious accidents resulting in deaths, study participants showed they preferred non-lethal shark risk management policies, stressing that the attacks would have been accidental rather than intentional. According to the authors, the Australian public seems to have a more equitable perception of sharks with fish than sea monsters, considering the sensationalist language of "shark attacks", often adopted by political leaders.

Despite the growing scientific evidence showing

that a major issue in shark conservation is in the way we look at and act towards the shark and not in the negative impact the shark objectively has on humans (human-shark interaction), the misunderstanding about which management and conservation policies should be implemented, and which may work best in certain situations, remains.

Slow but growing awareness

Even though negative attitudes toward sharks are still dominant, there is growing evidence that things may be slowly changing (Mazzoldi et al., 2019) and a gradual but clear shift toward appreciation for sharks can be seen through analysis of popular media.

In a Whatmough et al. (2011) study where the authors analyzed the content of 94 water sport-related magazines dated between 1953 and 2006, significant changes in diver and recreational fishermen's attitudes towards sharks were noted over time. A shift was noted in the value they placed in the shark, increasing over time the perceived value in their existence in the wild and a lowering value of catching them.

Over the last 20 years we have seen a change in the narrative of nature documentaries, markedly defined by scientific facts about sharks (Mazzoldi et al., 2019). Discovery Channel's Shark Week, a program that has been running every year since 1988, is an essential television event in western society, annually bringing together tens of millions of viewers in more than 70 countries (Hibberd, 2014; Hamedi, 2014). Evans (2015) carried out a content analysis study on Shark Week's programming between 2001 and 2012, where he confirmed an increase in the presence of scientific and conservation content from 2010, although numerous narrative elements that continued to be used to present sharks as deadly predators, reinforcing the negative and prejudiced idea of these fish.

The future in the making

Despite an overall media focus on misinformed facts, interventions promoting integrated nature and digital-based activities are now being drawn that hope to appeal to an ever-growing digital-media-oriented youth (Larson et al., 2019; Edwards & Larson, 2020). These interventions make use of engaging communication strategies and using technology-enhanced learning approaches, among others.

Another effective tool in changing the perceptions of many species with associated prejudices is the long-term exposure to documentaries and other forms of mass streaming tools. Although today it may seem otherwise, cetaceans, like whales and dolphins, were once vilified. There are countless historical records where whales were perceived as synonyms for danger in the sea (Bearzi et al., 2010). According to Mazzoldi et al. (2019), 1851 Herman Melville's Moby Dick novel initiated an attitudinal change in relation to this group of charismatic marine animals. Later, with the use of other communication and awareness tools, such as television and subsequent documentaries, there was a change in public perception of these animals. Since then, the perception of these marine animals has moved to a universe of scientific interest and the need for protection. A similar change in perception has also occurred with dolphins. Although historical records are not as negative as with whales, dolphins did not enjoy the positive status they have today. Although they were not perceived as a danger to man, they were often considered pests for fishing. They were, therefore, targeted for capture or extermination, due to their role as predators of other fish (Bearzi et al., 2004).

We may also hope to find allies where they are least expected. Balmford et al. (2002) tested children's knowledge of natural and unnatural history. These authors found that children between the ages of 4 to 11 recognized and described human-made characters (Pokémon 'species') with more detail and ease than those drawn from the local and national wildlife. These findings give conservationists some very interesting food-for-thought. The use of likable animated but man-made species as tools for connecting students with animals may be more effective than the use of biologically accurate images of species found in nature. Even though, to our knowledge, no specific study was done with sharks, there is a path yet to be explored.

Other stakeholders involved

As mentioned before, evidence shows that increasing knowledge directly relates to more positive attitudes toward sharks. Aside from the 'shark' concept featuring anatomical and ecological examples in biology classes, formal school education has not been identified as a sound source for shark-specific information (e.g., Tsoi et al., 2016, Giovos et al., 2021). For the last decades, different social players (aquariums, ENGO's, etc.) have been working, individually or collaboratively, to change the laymen's perception of sharks aiming to protect them. Aquariums worldwide have a tremendous potential to educate and engage in conservation, as well as helping to invert some erroneous concepts. With more than 700 million visitors every year (WAZA, 2005), the majority of these institutions strongly embrace conservation education while offering visitors unique and different educational experiences when compared to the traditional and more formal learning experiences (Belle, 1982; Colardyn & Bjornavold, 2004). This strategy also allows visitors a close visual or physi-

cal contact with many species, among them sharks, properly planned and available for interpretation or complementing formal education methods, thus contributing to an increase of species-driven conservation awareness (Ogden & Heimlich, 2009; Packer & Ballantyne, 2010). Even though individual zoos and aquariums may deploy their daily activities independently, there are several concerted international efforts focusing on sharks. These efforts, many times in the form of international campaigns, involve governments, ENGOs and schools in strategic and cross-sector synergies. And though communication strategies are changing, such as adopting the IUCN's 'Love, not loss' approach, these institutions are still struggling to find ways to, effectively and consistently, reframe laymen's shark-view with the true nature of sharks. One recent study conducted by Pepin-Neff and Wynter (2018a) showed that this is, in fact, possible. By priming aquarium goers with different messages to test a possible reduction of perceived fear of sharks, they found very promising results. Priming visitors before entering a 'shark-tunnel' with science-based education messages, common to many facilities worldwide and by attempting to lower the threat perception with the use of science-based information (e.g., only a very small percentage of shark species are known to bite humans), did not reduce the visitors' perception of sharks as sources of threat and fear. Conversely, by priming visitors with messages highlighting qualities having nothing to do with a shark's hunting abilities and adaptations (e.g. science-based information), as well as their lack of intention to prey on humans, fear significantly decreased thus exposing a subtle communication strategy to change attitudes toward sharks. In sum, research has shown that the more knowledge people have about sharks and their perceived importance to the marine ecosystem, the more favorable attitudes and pro-conservation intentions they possess (e.g., O'Bryhim & Parsons, 2015) and contributions may come from other indirect stakeholders.

Conclusion and agenda for future research

Current research on beliefs, knowledge and attitudes toward sharks lead us to believe that there is an ongoing trend toward the conservation of shark populations. Today, there seems to be a dichotomy between perspectives in the western world. While some countries are showing signs of a social transformation from protection 'from' to 'for' sharks (e.g., UK: Friedrich et al. 2014; Australia: Pepin-Neff & Wynter, 2018a), others are yet far from these shift and still perceive sharks as sources of fear and danger (e.g., Hong Kong: Tsoi et al., 2016; Peru: López et al., 2018). This transition from bad to good/needed is due to our increasing comprehension of the many psychological factors involved in decision making, risk management, public awareness and science-based knowledge. As Neff (2015) remarks, we live in a world evermore connected, where the emotional perception of multiple, frequent and clustered events is unlimited. The overwhelming amount of news, social networks and other communication tools enhance the way people perceive the frequency and intentionality of interconnected events, increasing the public's anxiety and driving national and local policy makers to immediate and, yet to be determined, effective actions to the associated risk. In the end, shark populations are those that really suffer in the long run.

As sharks are culturally constructed objects, we believe that there is a clear need to deepen the knowledge of their social representations, a very little explored area, allowing access to information about our collective and shared perception. Expanding and detailing these social representations will allow explaining and substantiating opinions and behaviors, useful to improve the effectiveness of many conservation approaches. Moving from theory to practice, we propose that by selecting specific representations (positive and congruent to the aimed message), it is possible to avoid dissonant messages from the current social dialog. As social representations are not fixed in time, these selected messages, to be included in communication campaigns and education strategies, may lead to a change in the perception of sharks in the long run. In addition, and as these animals trigger strong emotional reactions, studying the psychological underpins of the shark's negative stereotype, which often lead to unwanted attitudes and behaviors, is also of fundamental importance. On a practical perspective, by acknowledging the mixed stereotype of sharks (Neves et al., 2021a), the use of strategies to enhance the warm perception of them may lead to more empathetic emotions and thus more positive emotional reactions. This could be done through the use of a careful anthropomorphic approach when communicating about sharks. As mentioned by Chan (2012), through the use of anthropomorphic features such as attributing human names to the characters, emphasizing unique personalities, social nature, and rich mental and emotional life, it is possible to create greater public interest in their conservation. The authors also argue that the existence of a gendered stereotype (Neves et al., 2021) is of foremost importance to any communication approach. As social role theory posits, sharks being perceived as male social elements carry with them a set of stereotypical perceptions contrary to the aimed conservation messaging. If opting for communicating through storytelling, the use of key characters displaying warm traits instead

of the already marked agentic perception, could help nudge the emotional component of attitudes and the willingness to participate in conservation actions. As sharks are usually portrayed as solitary animals detached from human presence, we also argue that it would be beneficial to add humans and sharks in the same frame in future communication strategies and education approaches. This would work in addition to other measures to encourage a slow but consistent stereotype change.

It is also important to continue to acknowledge the weight that knowledge has on attitude formation and, consequently, its implication on future conservation strategies. Education of new generations, outlining strategies tailored to different age-groups, and using regional social norms to facilitate the integration of new conservation messages, should be considered.

Lastly, but not of least importance, aquariums and other ENGO's focused on non-formal and informal education approaches should also have in mind that most current awareness strategies may well be stereotype maintainers. Contextualizing the shark through its biology and ecology may not add much for changing its resilient stereotype and inherent prejudice, as noted by Pepin-Neff & Winter (2018a). Oftentimes, by embracing the shark's unique and extraordinary biological characteristics, it may only be reinforcing its competence and adaptability, giving rise to some cognitive dissonance when appealing to its conservation. We argue that leveraging the social aspects of sharks, instead of the biology and ecology facts, should bring benefits to the overall perception of these animals. There is, however, a thin line to be taken into account. A common message of many aquariums is to highlight the non-dangerous nature of sharks (which, although scientifically sound, is nevertheless a counter-normative message) and this may well be inducing the same cognitive dissonance to the target audience and, thus, be ineffective in the long run.

In sum, history has shown that it is possible to reverse the current social perspective of some animals. Cetaceans (Mazzoldi et al., 2019) and manatees (Goedeke, 2004) are good examples of such shifts in public opinion and conservation efforts. As for sharks, increased education, different communication strategies and a growing awareness in some media outlets and policyholders are, no doubt, working toward their sustainability and conservation, despite the long way still to go.

CONFLICT OF INTEREST

No potential competing interest was reported by the authors.

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