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Framing Effects on Attitudes and Intentions Toward Shark Meat Consumption in Lima, Peru

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Peru has one of the major shark fisheries in the world. Moreover, shark meat consumption is popular and the main commercially exploited species are considered threatened. Recent studies have found high mislabeling rates and high concentrations of methylmercury in shark meat. The purpose of this study is to explore the effectiveness of different framing messages in persuading fish consumers to avoid shark meat consumption and promote sustainable fish ("popular fish") consumption. Specifically: To what extent do intrinsic and extrinsic risk messages differ in terms of deterring the intention to eat shark meat and promoting the consumption of popular fish, in the presence or absence of an efficacy message about mislabeling of shark meat? The three message frames were: intrinsic (sharks have mercury), extrinsic (sharks are threatened), and efficacy (sharks are mislabeled). The experiment had a factorial design of 2 × 2 × 2 (present vs. absent for each message). Participants (n = 285), surveyed through an online questionnaire, were assigned to one of eight experimental conditions. Participants then completed a survey regarding their intentions and attitudes toward shark meat and popular fish consumption. Attitudes and intentions toward consuming shark meat were discouraged in all experimental conditions. Moreover, the mislabeling message did not reduce participants' perceived response efficacy (how effective the recommendations for dealing with the problem are), but enhanced it. This study suggests that not all consumers' attitudes about sharks are negative or that a negative attitude does not affect shark consumption in an adverse way. More research targeting different audiences is needed to determine the optimal approach for promoting sustainable seafood that is also healthy for consumers.

Keywords: attitudes, message framing, efficacy beliefs, shark meat, Peru, seafood mislabeling, sustainable seafood, methylmercury

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INTRODUCTION

Shark meat has been consumed by Peru's coastal dwellers for millennia. Cartilaginous fish remains found at archeological sites date back to 7,735 BCE (Reitz et al., 2015). Currently, small-scale fisheries in Peru target 31 shark species (IMARPE, 2015). Between 1950 and 2010, Peru was the country that reported the highest accumulated historical landings of sharks in the Pacific basin (Gonzalez-Pestana et al., 2016). Despite the growth of the global shark meat trade (Shiffman et al., 2020) and shark meat being commonly consumed in Peru (Del Carpio and Vila, 2010), research

suggests that most shark meat consumers in Peru are not aware of their consumption [(Lopez de la Lama et al., 2018); this phenomenon is not restricted to Peru, a similar situation was reported for Brazil (Bornatowski et al., 2015)]. In Peru, shark meat is found in markets labeled interchangeably as tiburón ("shark") or tollo. Tollo is an all-encompassing term referring to some species of sharks of the families Carcharhinidae, Scyliorhinidae, Squalidae, and Triakidae (Biffi et al., 2020). A study conducted along the Peruvian coast found that 72% of people surveyed had consumed tollo, however, only 20% of those reported eating shark meat (Lopez de la Lama et al., 2018). Moreover, perceptions about sharks were mainly negative (Lopez de la Lama et al., 2018).

Lack of knowledge about sharks is a worldwide problem (Friedrich et al., 2014) and it represents a barrier to shark conservation (Simpfendorfer et al., 2011). An approach used to minimize unsustainable shark meat consumption in Peru has been the inclusion of shark information in consumer-based sustainable seafood guides. However, there is evidence that the efforts sought by these initiatives, like changes in purchasing decisions, may be ineffective due to mislabeling and unsafe due to high mercury content in recommended species (Biffi et al., 2020). Recent research on mislabeling in Peru has been covered extensively by the media (La Republica, 2018; Machuca-Castillo, 2018; Sierra-Praeli, 2018) and researchers have argued that increasing consumers' awareness of the mislabeling problem may help in discouraging this practice (Oceana-ProDelphinus, 2018). However, to reduce the incidence of mislabeling, efforts like the enforcement of extant regulations are crucial (Mariani et al., 2014). Consumers' awareness of seafood mislabeling alone cannot help reduce the incidence of mislabeling. For example, despite the widespread media attention on fish mislabeling in the United States, studies find that mislabeling is still pervasive (Stern et al., 2017; Korzik et al., 2020).

In addition, there is a dearth of research regarding the impact of mislabeling messages on consumers' behavior. Understanding the impact of these messages is essential for ensuring successful conservation. Campaigns aimed at consumers that focus on sharks' endangered status and seafood fraud can be classified as risk messages because they intend to elicit beliefs of harm doing (either to sharks themselves or to the people who consume them). The impact of these messages can be experimentally tested using the paradigm of message framing. Framing is a communication strategy used for shaping public attitudes within mediated messages. Depending on the frame with which a problem is depicted, a message can produce different reactions in an audience (Jacoby, 2000). One type of framing regards whether the locus of risk affects the individual message recipient or not (i.e., intrinsic risk vs. extrinsic risk). The effects of intrinsic-extrinsic framing are explained by the motivational theory of self-determination (SDT; Vansteenksite et al., 2004). SDT distinguishes between two main types of human motivations: intrinsic motivation (e.g., acting due to inherit satisfaction) and extrinsic motivation (e.g., acting out of guilt; Ryan and Deci, 2000). Thus, intrinsic messages frame risk according to consequences to the self and extrinsic messages frame risk according to consequences to others or one's environment. Overall, intrinsic risk messages motivate better than extrinsic risk messages (Pelletier and Sharp, 2008).

Within this context, a message stating that shark meat consumption is diminishing shark populations and subsequently destroying marine ecosystems frames the problem as one of extrinsic risk. Conversely, a message about the presence of high concentrations of mercury in shark meat and how this can negatively affect consumers' health frames the problem as one of intrinsic risk. As risk messages, both are designed to enhance audiences' perceived risk severity (the seriousness of the threat) and perceived risk vulnerability (the degree to which targets are susceptible to the threat).

The risk perception attitude framework (RPA) states that the relationship between risk perception and self-protective motivations and behaviors is moderated by efficacy beliefs (Rimal and Real, 2003). Efficacy beliefs refer to the degree to which people perceive that they are able to engage in behaviors that reduce risk. Efficacy perceptions are subject to messages that target such beliefs. In context, a message indicating the presence of seafood mislabeling in markets and restaurants would feasibly decrease consumers' efficacy for avoiding shark meat because it emphasizes consumers' inability to know what fish species they are purchasing. That is, mislabeling information would reduce one's efficacy for responsible seafood consumption. The RPA posits that people need to perceive sufficient levels of both risk and efficacy in order to behave in ways that alleviate the threat. When presented with the efficacy issue of seafood mislabeling, are consumers motivated to increase their knowledge on seafood and change their purchasing decisions, or do they feel powerless regarding their seafood choices and act accordingly?

Therefore, we predicted that individuals presented with an intrinsic risk message will have more negative attitudes and lower intentions toward consuming shark meat, and more positive attitudes and intentions toward consuming sustainable fish—low in mercury, cheap, and less likely to be mislabeled (hereafter "popular fish") —than individuals presented with an extrinsic risk message (Hypothesis 1). We also predicted that individuals presented with an intrinsic risk warning and the mislabeling efficacy message will have less favorable attitudes and intentions toward consuming shark meat, and more favorable attitudes and intentions toward popular fish, than individuals presented with an extrinsic risk warning and the mislabeling efficacy message (Hypothesis 2). Finally, we expected that participants presented with all three messages will have the most unfavorable attitudes and lower intentions to consume shark meat while participants presented with an extrinsic risk and efficacy messages will have positive attitudes and high intentions to consume shark meat (Hypothesis 3). The purpose of this study is to investigate how message framing of the risks of eating shark meat deters its consumption and encourages popular fish consumption, in the presence or absence of a mislabeling efficacy message (**Figure 1**).

METHODS

This study was approved by the Texas Christian University Institutional Review Board (DRB 1811-017-1811; Biffi, 2020).

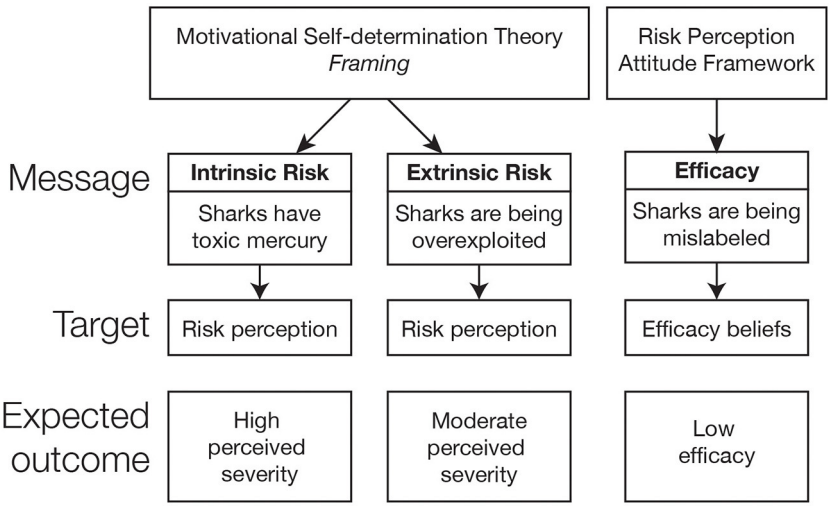

FIGURE 1 | Theoretical framework. Theoretical framework showing the targets of the experimental messages and the predicted changes in the perceived states.

Participant eligibility criteria included being at least 18 years of age, being a regular seafood consumer (i.e., consumes fish once a month, once a week, or more than once a week), and being a resident of the city of Lima, Peru.

Experimental Design

The experiment used a 2 (Intrinsic risk message: present vs. absent) x 2 (Extrinsic risk message: present vs. absent) x 2 (Mislabeling efficacy message: present vs. absent) between-subjects factorial design (**Table 1**). A one-time online survey was administered through Qualtrics (qualtrics.com), in June, 2019. Participants first answered a quality check question and a filter questionnaire. General information about the study was provided, and respondents were then asked to confirm their consent for participating in the survey anonymously by checking a box. The pretest questionnaire assessing fish consumption habits and demographic information followed. Then, participants were assigned randomly to one of eight experimental message conditions (**Table 2**). Conditions 1 and 5 counterbalanced the intrinsic and the extrinsic risk message in random order (intrinsic/extrinsic vs. extrinsic/intrinsic). The efficacy message always appeared after the risk message(s). Participants in the control condition read an unrelated article about the Mexican singer Luis Miguel. A 1:1 quota for each gender (male and female) was assigned. Within the gender quota, ∼16 respondents were randomly assigned to each condition (**Table 2**). After being exposed to the messages, participants completed the posttest questionnaire assessing the manipulation check, attitudes, and intentions.

TABLE 1 | Experimental messages presented to participants.

Frame	Message content
Introduction	To live a healthy life, you need to eat fish three times a week But there are some factors you should consider before your next ceviche…
Intrinsic risk message	Eating shark meat poisons your body • Shark meat (known as "tollo") has high levels of mercury, a toxic compound for people • In adults, mercury causes fatigue, headaches, as well as decreased memory and concentration • Mercury does not go away if you cook the fish
Extrinsic risk message	Eating shark meat is destroying sharks • The high demand for shark meat (known as "tollo") in Peru is driving them to extinction • Sharks have a very important role in the ocean regulating other fish populations
Efficacy message	You have no control over what fish you are eating • Markets and restaurants often change the name of the fish they sell you, so you are not eating the fish you think you are eating • Once the fish is cut into filets it is impossible to know what type of fish it is
Final recommendation	What fish should I eat? There is a way to ensure that the fish you eat is labeled correctly/is healthy for you/protects life at sea… *Say yes to Popular fish* • Anchoveta, Bonito, Caballa, Jurel, Lisa, Pejerrey *Say no to sharks or tollos* Any fish labeled as shark or tollo. For example: • Tollo de leche o bebe, Tollo diamante, Blue shark, Tollo cachito

Instruments

Independent Variables

The informational pamphlets were developed using arguments extracted from Peruvian government educational material and graphic material found on social media (Ministerio del Ambiente, 2016; A Comer Pescado, 2018a). The pamphlets were developed using Adobe Illustrator. Each message was a standalone so they can be combined for each condition (**Figure 1**). Each message was of similar length and the pamphlets have the same layout. The text used the same size, color, and type of fonts.

TABLE 2 | Study participants by experimental condition and gender.

Condition	Messages	Number of participants		
		Total (%)	Male (%)	Female (%)
1	Intrinsic + extrinsic + efficacy	38 (13)	19 (13)	19 (13)
2	Intrinsic + efficacy	33 (12)	16 (11)	17 (12)
3	Extrinsic + efficacy	37 (13)	19 (13)	18 (13)
4	Efficacy	35 (12)	17 (12)	18 (13)
5	Intrinsic + extrinsic	35 (12)	16 (11)	19 (13)
6	Intrinsic	35 (12)	19 (13)	16 (11)
7	Extrinsic	37 (13)	20 (14)	17 (12)
8	Control	35 (12)	17 (12)	18 (13)

Pretest Questionnaire. This multiple-choice questionnaire included one question (within the past 2 months, which of the following fish have you consumed?). Eighteen options were given and the opportunity to write other species not specified among the choices (**Supplementary Table 1**).

Manipulation Check Questionnaire

A 16-item questionnaire was developed to check the effects of the messages on participants' perceived states (**Supplementary Table 1**). The questionnaire was divided into: (a) perceived severity, (b) perceived susceptibility, and (c) efficacy.

Attitudes and Intentions Toward Shark Meat and Popular Fish Consumption

Attitudes toward eating shark meat and popular fish were assessed by using the statement "Eating shark/popular fish is," with three distinct bipolar adjectives scales (negative vs. positive, bad vs. good, irresponsible vs. responsible; Nan et al., 2016). The statements for popular fish included the common names of the six species mentioned in the pamphlet. Intentions toward each fish group consumption were measured using a 2-item questionnaire {(i.e., In the future, I will eat [shark meat/popular fish] and I plan to include [shark meat/popular fish] in my diet; (Cho and Boster, 2008)}.

Data Analysis

Demographics were analyzed and presented using descriptive statistics. Cronbach's alpha was conducted for internal consistency of the scales for the intrinsic risk, extrinsic risk, and efficacy manipulation checks. The reliability of the intrinsic response efficacy was calculated with the items for intrinsic response efficacy for popular fish (2 items) and intrinsic response efficacy for sharks (2 items). The reliability for the extrinsic response efficacy was calculated in the same way. Cronbach's alpha was used on the attitudes and intentions questionnaires.

A factorial ANOVA was conducted for the manipulation check measures with efficacy (efficacy message: present vs. absent) and presentation order of the intrinsic and extrinsic risk messages (intrinsic vs. extrinsic, extrinsic vs. intrinsic) as factors for the sub-conditions 1a, 1b, 5a, and 5b. In order to determine the three-way interaction, an ANOVA was conducted with attitudes and intentions toward consuming shark meat as the dependent variables. We explored the significant interactions observed using simple slopes analysis.

RESULTS

The survey was delivered to 285 individuals (143 men, 142 women; age: M = 30.73 years, SD = 9.49). A Chi-square test indicated no significant differences in gender distribution among the eight conditions, χ^2 (9) = 0.89, p = 0.99. Most participants reported eating fish frequently (once a week: n = 139, 48.77%), followed by regularly (more than once a week: n = 92, 32.28%), and occasionally (once a month: n = 54, 18.28%). Cronbach's alpha was conducted for consistency for the intrinsic and extrinsic risk manipulation check measures. Scales had a strong internal consistency (αs = 0.80–0.92). The scales for attitude and intention for shark and popular fish had a strong internal consistency (αs = 0.85–0.93).

Manipulation Checks

A factorial ANOVA was conducted for the manipulation check measures with efficacy (efficacy message: present vs. absent) and presentation order of the intrinsic and extrinsic risk messages (intrinsic vs. extrinsic, extrinsic vs. intrinsic) as factors for the sub-conditions 1a, 1b, 5a, and 5b. There was no main effect for order. This suggests that being exposed to the intrinsic or extrinsic risk message first had no impact in participants' responses. Thus, for all subsequent analysis, sub-conditions 1a/1b and 5a/5b were collapsed into the same condition.

Intrinsic Risk Message

The means for intrinsic perceived severity and susceptibility were in the expected direction, with a higher score indicating higher agreement with the statements presented. Only perceived susceptibility, $t(278.5) = 10.475$, $p < 0.001$ was significant. Thus, the intrinsic manipulation was successful.

Extrinsic Risk Message

Extrinsic perceived severity, $t(267.6) = 4.505$, $p < 0.001$, perceived susceptibility, $t(257.7) = 4.514$, $p < 0.001$, were significant. The results support the manipulation of the extrinsic message on participants.

Mislabeling Efficacy Message

T-tests indicated that participants in the conditions where the mislabeling efficacy message was absent scored significantly lower than those where the mislabeling message was present [intrinsic: $t(283) = 2.44$, $p = 0.15$, extrinsic: $t(283) = 2.30$, $p = 0.02$]. This finding was unexpected and suggests that participants that read the mislabeling message resulted in an enhanced efficacy, that is, a greater belief that they can effectively avoid the risks (i.e., ingesting mercury, and harming sharks and the marine ecosystem). Thus, with the efficacy message resulting in the opposite effect than had been predicted, the manipulation of the efficacy message was not successful.

Hypotheses

Attitudes and intentions toward consuming shark and toward consuming popular fish were heavily skewed. However, *t*-tests and ANOVAs are considered robust to skewness (Norman, 2010). Therefore, the hypothesis testing was performed on non-transformed data (*t*-tests and ANOVAs were conducted on transformed data replicating the results presented here). Three-way factorial ANOVA tests were conducted for the four main persuasive outcomes: attitudes toward consuming sharks, attitudes toward consuming popular fish, intentions of future consumption of shark meat, and intentions of future consumption of popular fish.

A Gabriel's *post hoc* test was performed to assess the difference between the scores of the eight conditions for the four main outcomes (**Figure 2**). Overall, there was a significant difference between the score of the control condition and scores of the seven experimental conditions for the four persuasive outcomes ($p < 0.05$). However, the Gabriel *post hoc* tests did not indicate significant differences between the seven experimental conditions for attitudes toward consuming shark meat (*post hoc* Gabriel's test $p = 0.19$), intentions toward consuming shark meat (*post hoc* Gabriel's test $p = 0.48$), attitudes toward consuming popular fish (*post hoc* Gabriel's test $p = 0.53$), and intentions toward consuming popular fish (*post hoc* Gabriel's test $p = 0.32$).

Hypothesis 1. The first hypothesis predicted that the intrinsic risk message (Condition 6) was going to be more persuasive than the extrinsic message (Condition 7). The means for the four outcomes were in the predicted direction. Participants who were presented with the intrinsic risk message had more negative attitudes and lower intentions toward shark meat consumption, and more positive attitudes and higher intentions toward popular fish consumption. However, only the attitudes [attitude intrinsic: $M = 4.74$, $SD = 0.60$, attitude extrinsic: $M = 4.45$, $SD = 0.83$, $t(65.5) = 1.72$, $p = 0.04$] and intentions [intentions intrinsic: $M = 4.89$, $SD = 0.30$, intentions extrinsic: $M = 4.72$, $SD = 0.49$, $t(70) = 1.75$, $p = 0.04$] toward popular fish were significant. When the Bonferroni adjusted alpha level of 0.012 was applied to the *p*-values to correct for multiple comparisons, none of the differences were significant. Therefore, the results do not support Hypothesis 1.

Hypothesis 2. The second hypothesis predicted that Condition 2 (intrinsic risk message: present, mislabeling efficacy message: present) was more persuasive than Condition 3 (extrinsic risk message: present, mislabeling efficacy message: present). The mean for the attitudes toward shark meat and popular fish consumption were in the predicted direction, unlike the means for intention toward shark meat and popular fish. However, none of the differences were significant ($ps > 0.1$). Thus, the results do not support H2.

Hypothesis 3. The last hypothesis predicted a three-way interaction between the intrinsic risk, extrinsic risk, and mislabeling efficacy messages. In particular, we expected people in the efficacy-present condition exposed to the intrinsic and extrinsic risk messages (Condition 1) to be persuaded the most, but people in the efficacy-absent condition exposed to the extrinsic and efficacy risk messages (Condition 3) to be persuaded the least. A weak statistically significant three-way interaction was found for attitude toward shark meat ($p = 0.08$, $\eta^2 = 0.01$) (**Table 3**). There was no interaction for intention toward shark meat consumption. Thus, the results do not support Hypothesis 3.

The analysis further revealed a significant two-way interaction between the risk messages and the efficacy message for all dependent variables ($ps < 0.05$), except for the interaction between the extrinsic risk and efficacy message for intentions toward popular fish (**Table 3**).

The simple slopes of the intrinsic and extrinsic risk messages on attitudes and intentions toward eating shark meat were statistically significant only when the efficacy message was absent (**Table 4** and **Figure 3**). The slopes for the intrinsic risk message on attitudes and intentions toward eating popular fish were significant also in the efficacy-absent condition (**Table 4** and **Figure 4**). Additionally, there was a significant difference between the intrinsic risk message, and the intrinsic risk and efficacy message condition for intention to consume popular fish in the future ($\beta = -0.30$ [SE = 0.11], $t = -2.82$, $p = 0.005$, $r^2 = 0.04$). That is, in the presence of the intrinsic risk message, the efficacy message caused the undesired response of decreasing intention to consume popular fish in the future.

DISCUSSION

This study investigated how different frames shape people's attitudes and intentions toward the consumption of shark meat and the more sustainable alternative of popular fish. Our results suggest that, relative to no message intervention at all, each of the experimental risk messages decreased the attitudes and intentions toward consuming shark meat while increasing the attitudes and intentions toward consuming popular fish in the future. That is, regardless of the risk messages to which participants were exposed, they expressed less favorable attitude about and lower intention to consume shark meat in the future while exhibiting the opposite trend, more favorable attitude and higher intention, regarding the consumption of popular fish. These results suggest that any exposure to sustainable seafood consumption communication campaigns is more important than the specific content conveyed in the messages. These results agree with a recent meta-analysis that found that the persuasiveness of campaigns utilizing different message frames is negligible (O'Keefe and Hoeken, 2021).

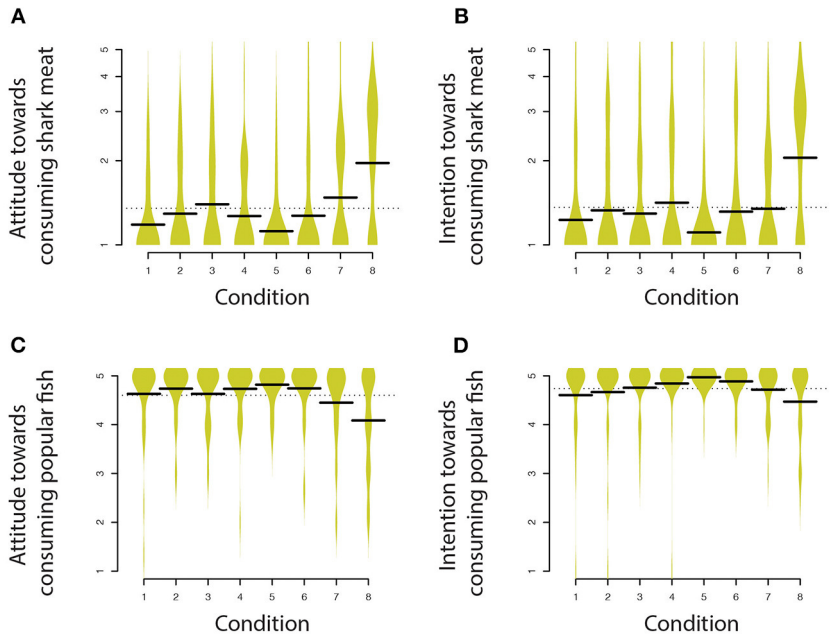

FIGURE 2 | Beanplots of the four outcomes by condition. Each "bean" shows the distribution of participants' attitudes and intentions. The black lines indicate the mean score for each condition. The dotted lines indicate the overall mean of each outcome. Scales for attitudes range from 1 (*negative/bad/irresponsible*) to 5 (*positive/good/responsible*). Scales for intentions range from 1 (*completely disagree*) to 5 (*completely agree*). **(A)** Means for attitudes toward consuming shark meat. **(B)** Means for intentions toward consuming shark meat. **(C)** Means for attitudes toward consuming popular fish. **(D)** Means for intentions toward consuming popular fish.

TABLE 3 | Factorial ANOVA for the four main outcomes.

Variables	Attitude shark			Attitude popular			Intention shark			Intention popular		
	F	η^2	*p*	*F*	η^2	*p*	*F*	η^2	*p*	*F*	η^2	*p*
Intrinsic	18.35	0.06	0.000	9.83	0.03	0.002	11.78	0.04	0.001	1.33	0	0.249
Extrinsic	4.93	0.02	0.027	0.5	0	0.480	12.59	0.04	0.000	0.38	0	0.537
Efficacy	6.66	0.02	0.01	3.73	0.01	0.055	1.64	0.01	0.202	0.34	0	0.559
In*Ex	0	0	0.989	0.79	0	0.376	2.36	0.01	0.125	0.21	0	0.650
In*Eff	8.14	0.03	0.005	9.64	0.03	0.002	5.27	0.02	0.022	11.35	0.04	0.001
Ex*Eff	5.95	0.02	0.015	3.9	0.01	0.049	4.14	0.01	0.043	2.61	0.01	0.107
In*Ex*Eff	3.16	0.01	0.077	0.75	0	0.386	1.32	0	0.252	0.39	0	0.535

Moreover, the simple slopes analysis revealed that the mislabeling efficacy message did not further persuade consumers when the intrinsic or extrinsic risk messages were present. That is, the mislabeling efficacy message had no effect when combined with the message about mercury content in shark meat or the threat to shark populations, with one exception. The presence of the mislabeling message significantly decreased the intention to consume popular fish when combined with the intrinsic risk message.

In other words, when participants were exposed to a health-related message that encouraged the consumption of certain fish species with low mercury content, combined with a mislabeling message, they reported lower intentions to adhere to the recommendations. These results should be explored further since government campaigns such as "Let's eat fish" promote the frequent consumption of popular fish (e.g., Peruvian anchovy, jack mackerel, horse mackerel, flathead gray mullet) often for their nutritional content (e.g., source of protein, high in iron; Biffi et al., 2020). Taken together, the results of this research provide experimental evidence that mislabeling information does not make an intrinsic or extrinsic risk message more persuasive, and, more importantly, can even decrease the persuasive effect produced by an intrinsic risk message.

These findings contradict previous arguments that emphasized the importance of targeting message frames to match people's motivations (i.e., intrinsic vs. extrinsic; Pelletier and Sharp, 2008), and those that argued that a lack of knowledge and negative attitudes toward sharks among Peruvians represent barriers to conservation efforts (Lopez de la Lama, 2014). A possible explanation is that study participants may not

TABLE 4 | Simple slope analysis of the interaction between intrinsic and extrinsic messages, and the efficacy message.

Slope of…	DV	Simple effects	*t*	*p*
Intrinsic without efficacy	Attitude shark	−0.629	−4.945	0.000
Intrinsic with efficacy		−0.130	−1.028	0.305
Extrinsic without efficacy		−0.413	−3.234	0.001
Extrinsic with efficacy		0.026	0.207	0.837
Intrinsic without efficacy	Attitude popular	0.509	4.351	0.000
Intrinsic with efficacy		−0.001	−0.009	0.993
Extrinsic without efficacy		0.219	1.854	0.065
Extrinsic with efficacy		−0.110	−0.931	0.353
Intrinsic without efficacy	Intention shark	−0.587	−3.966	0.000
Intrinsic with efficacy		−0.111	−0.755	0.451
Extrinsic without efficacy		−0.579	−3.906	0.000
Extrinsic with efficacy		−0.152	−1.028	0.305
Intrinsic without efficacy	Intention popular	0.332	3.168	0.002
Intrinsic with efficacy		−0.166	−1.588	0.114

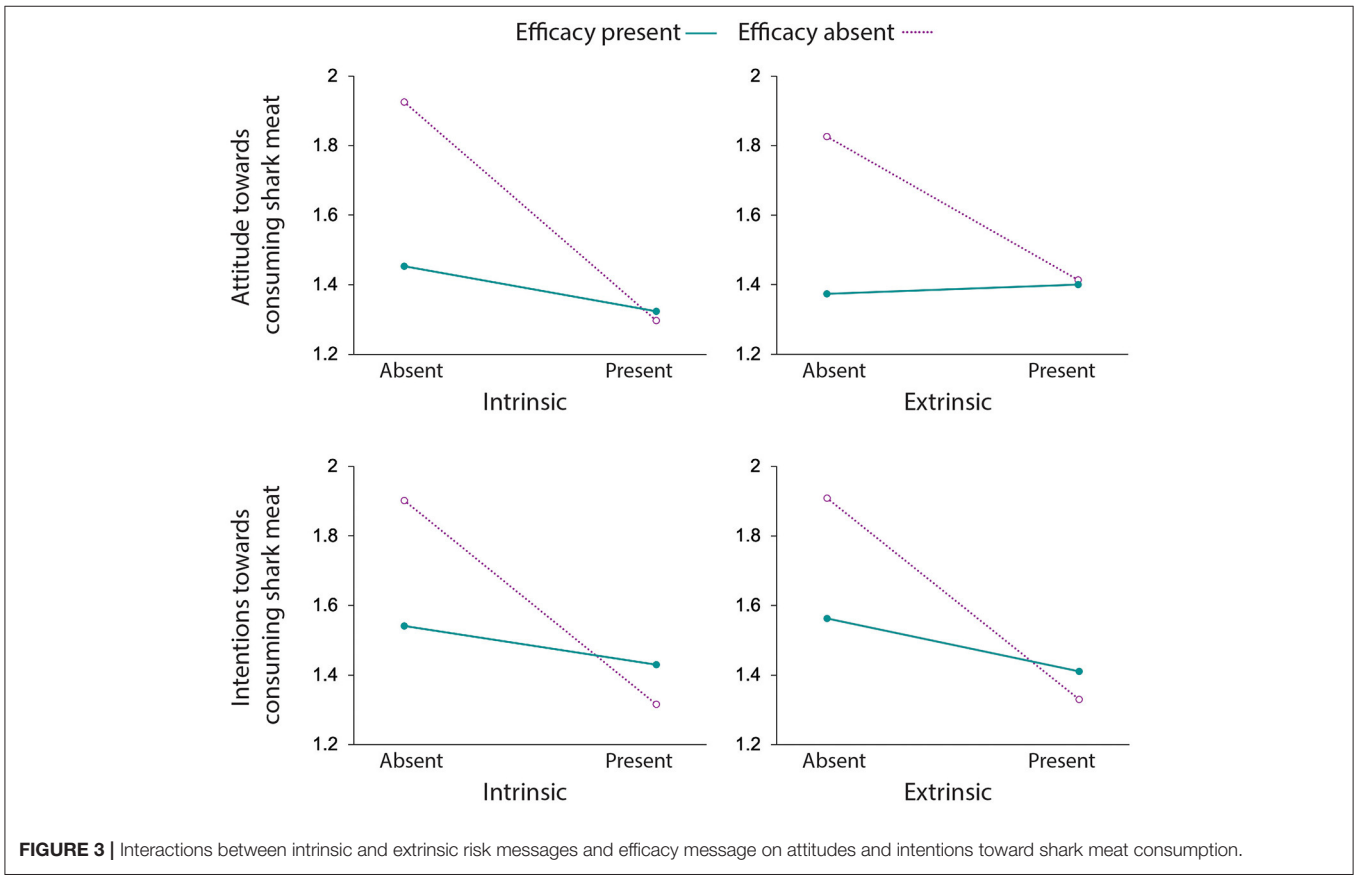

FIGURE 3 | Interactions between intrinsic and extrinsic risk messages and efficacy message on attitudes and intentions toward shark meat consumption.

constitute a representative group of the Lima Metropolitan Area population; specifically, the sampling methodology may have resulted in a biased sampling frame representing a higher socioeconomic status (McCutcheon, 2008). For instance, participants who reported consuming fish less than once a month were filtered out in order to ensure that the experimental messages were salient to them. In Lima, fish consumption is associated with higher incomes (A Comer Pescado, 2018b). Moreover, nearly 80% of the participants reported eating canned tuna in the past 2 months, a product consumed mainly by high and middle socioeconomic groups in Lima (Andina, 2009). More than 60% of the participants had obtained a higher educational degree, a further indication of high socioeconomic status (INEI, 2019). Finally, people with no direct access to

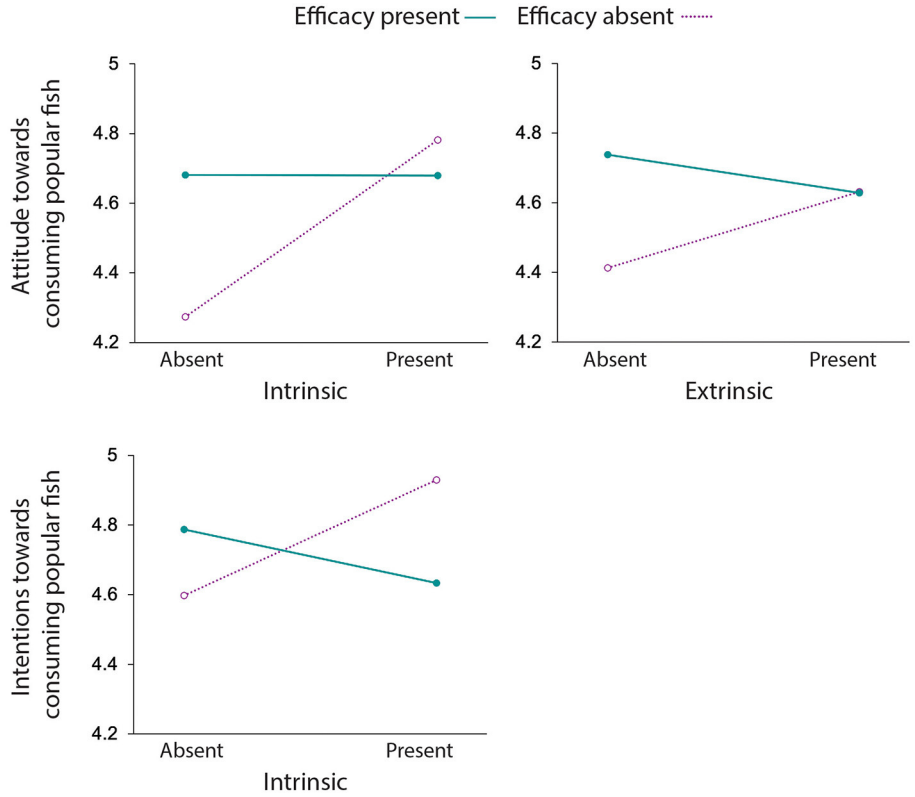

FIGURE 4 | Interactions between intrinsic and extrinsic risk messages and efficacy message on attitudes and intentions toward popular fish consumption.

a computer or a smartphone may have been excluded from the sample.

This sample bias may have resulted in participants with a higher level of scientific knowledge, positive attitudes regarding sharks and marine conservation, and awareness of the mislabeling problem in the country. Recent seafood studies in Peru have received extensive national media attention [e.g., consumers being unaware that tollos are sharks (Machuca-Castillo, 2018; Sierra-Praeli, 2018), and tollo as a label for different shark species (La Republica, 2018)]. This may have allowed participants to enter the study with preexisting beliefs regarding seafood issues, especially shark meat consumption. Lopez de la Lama et al. (2018) suggested emphasizing the cultural importance of sharks as a food source to leverage the significant value associated with traditional gastronomy among Peruvians in order to improve negative attitudes toward sharks. This study suggests that in some socioeconomic groups there might be an overall dislike toward shark meat consumption. Future research should investigate how risk frames and mislabeling information influence fish consumption for message recipients from lower income audiences.

The finding of an overall rejection toward shark meat consumption may align with previous studies in which certain groups expressed positive attitudes toward sharks (Friedrich et al., 2014). However, targeting a narrow group (e.g., high-end consumers from the capital) within the population is a well-known shortcoming of sustainable seafood campaigns (Iles, 2004). For example, the Lima Metropolitan Area has the largest population belonging to the socioeconomic levels A and B (APEIM, 2016); however, higher shark meat consumption has been reported for citizens from the northern cities of Tumbes and Piura (Lopez de la Lama et al., 2018), which makes them at higher risk of methylmercury excess (Biffi et al., 2020). Thus, the rejection toward shark meat consumption may indicate that not all Peruvians hold a negative attitude toward sharks, or that this attitude does not interfere with pro-environmental behaviors related to them. Therefore, messaging that associates threats to sharks and their ecosystems and shark meat consumption may produce some internal regulation in consumers (i.e., identified regulation, integrated regulation; Ryan and Deci, 2000) or even an intrinsic regulation. However, this study shows the effectiveness of different messages for a segment of Lima residents, an important finding considering the lack of audience segmentation in conservation messaging studies (Kidd et al., 2019).

One of the most surprising findings of this study is that the mislabeling efficacy message did not reduce participants' perceived efficacy but rather enhanced it. This reaction may be attributable to a denial-based response. According to the threat orientation model, a denial response involves being extremely optimistic about a risk, resulting in the dismissal of it (Thompson and Schlehofer, 2008). A possible reason might be

the belief that one can easily follow certain recommendations to avoid mislabeled fish (e.g., asking for the "catch of the day" at restaurants). However, there is evidence that these recommendations are misguided (Biffi et al., 2020) and are mostly aimed at high-end consumers (Lopez de la Lama, 2014, 2016; Oceana, 2017; Scheske, 2018).

Another possible explanation is that participants exposed to the mislabeling message may have perceived this message as a threat to their autonomy as a seafood consumer and thus chose to ignore the message as a symbol of agency. This reactance might have been fueled by a sense of the disdain for the criollada culture. Criollada is a colloquial expression in Peru referring to the savvy and urbane as contrasted with the provincial or naive (Porras, 2010). As illustrated by a 2008 survey conducted in the Lima Metropolitan Area, however, "being criollo" is the worse defect that a Peruvian can have (being criollo is associated with being a cheater; Instituto de Opinion Publica, 2008; Porras, 2010). An example of "being criollo" in this context would be fishmongers who deliberately mislabel fish in order to charge more for more desirable species. The idea of mislabeling as a purposeful practice, and as an example of criollada, is mentioned in a blog post about sustainable fish consumption in Peru. The first recommendation is to find a reliable fishmonger (a "casero/a"); the assumption is that establishing a relationship with the seller will reduce the likelihood of chicanery (Oceana, 2017). However, this explanation should be approached with caution and future research should determine the underlying factors behind the enhanced efficacy beliefs.

The three messages used in this study represent popular themes surrounding the sustainable seafood conversation, both locally in Peru and globally (Biffi et al., 2020; Farmery et al., 2020; Shiffman et al., 2020). In recent years, Peru has experienced an increase in research associated with sustainable seafood and a corresponding uptick in popular press coverage on shark meat consumption and seafood mislabeling, including recommendations on how to avoid being cheated (El Comercio, 2018; Oceana Peru, 2021). These recommendations place the burden on consumers, often requiring considerable effort (e.g., learning to differentiate bony fish from cartilaginous fish or purchasing molecular identification kits that includes sample collection tools and molecular laboratory services; El Comercio, 2018). Clearly, the effort required presents a barrier for many consumers. In addition, this consumer-centric guidance fails to address many of the core issues (e.g., absence of an official list of unique names for commercial species, dearth of enforcement and compliance), and, perhaps more critically, proposes an intervention at a very advanced stage of the problem and relies on consumer behavior alone to change market dynamics.

Moreover, popular media and gray literature have seemingly ignored the issue of mercury as a common contaminant in fish with significant human health effects. Interestingly, seafood mislabeling reports and associated social media coverage have mentioned allergies, parasites, chemicals, antibiotics, and natural toxins as potential human health risks associated with mislabeled seafood consumption but have avoided the topic of mercury, despite a large body of research on the deleterious health effects of mercury poisoning (El Comercio, 2018; Oceana-ProDelphinus, 2018, 2019, 2021).

While the topic of mislabeling has a place in the overall discussion of sustainable seafood consumption in Peru, this study demonstrates that messaging associated with seafood mislabeling was no more persuasive than messaging focused on conservation or human health. Thus, the conservation community may be better served by focusing popular media attention on mercury contamination and its human health implications, rather than mislabeling, which distracts from the core problems, unfairly burdens consumers, and arguably intervenes too late in the process to protect sharks. Shark meat is a cheap source of protein in many countries (e.g., France; Dent and Clarke, 2015) which may override concerns about human health for less affluent people. This is not the case for Peru, where shark meat is a mid-priced marine product (Grillo-Nuñez and Gozzer-Wuest, 2019; Biffi et al., 2020) and there are species highly appreciated by consumers as well as undesirable ones (e.g., *Mustelus* spp. and *Prionace glauca*, respectively). This issue is not unique to Peru (e.g., Italy; Marchetti et al., 2020). The diversity of shark species available at landing points and markets, the range of their demand, and the difference of prices along the supply chain heightens shark meat mislabeling. Focusing on mercury contamination also affords simplified guidance for consumers that they are more likely to follow.

This study has some limitations that may need to be addressed in future research. First, less than one fourth of participants (19%, $n = 53$) reported eating shark meat in the last 2 months. In the future, researchers could recruit participants from cities where shark consumption is more common (e.g., Piura and Tumbes; Lopez de la Lama, 2014). Second, while Qualtrics is efficient in recruiting a large number of participants in a short period of time, their research panels may not be a true representation of the population. As mentioned above, people with no direct access to a computer or a smartphone may have been excluded since the quotas may have been filled before potential participants had the opportunity to access the internet through public internet booths (cabinas de internet; Holmes, 2001). A combination of online and face-to-face surveys delivered using the mall intercept approach (Butler, 2008) might ultimately represent the best way to guarantee a representative sample. Finally, some of the findings in this study need to be interpreted with caution. The messages used may affect frequent shark meat consumers and others in different ways. For example, artisanal fisherfolk and fishmongers could perceive these messages as a threat to their livelihoods and therefore choose to reject them.

This study has important theoretical and practical implications. Theoretically, this study aimed at exploring the effect of intrinsic and extrinsic risk messages on participants with high and low efficacy beliefs. Specifically, this study investigated seafood mislabeling as a message aimed at respondents' perceived efficacy resulting in puzzling findings. This research adds to the growing body of literature on the risk perception attitude framework (and related theories) and thus represents a valuable contribution to the field of conservation marketing, a field growing in popularity but with associated studies often lacking appropriate theoretical foundations (Kidd et al., 2019). In

addition, recent studies in Peru have explored people's beliefs, intentions, and behaviors regarding seafood consumption (Higuchi et al., 2017; Morales and Higuchi, 2018). However, no experimental studies that explore the influence of different message frames on seafood consumption have been conducted.

Practically, as mentioned above, this study suggests that not all consumers' attitudes about sharks are negative or that a negative attitude may not affect shark consumption in an adverse way (e.g., someone may be scared of sharks but at the same time recognize sharks' importance in the marine ecosystem). Therefore, it is important to develop and test messages that are targeted to specific audiences.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Texas Christian University Institutional Review Board (DRB 1811-017-1811). The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

DB contributed to funding acquisition, conceived and designed the study, analyzed the data, wrote the manuscript, prepared figures and tables, and reviewed drafts of the manuscript. AR conceived and designed the study, analyzed the data, and reviewed drafts of the manuscript. MW contributed to funding acquisition and reviewed drafts of the manuscript. All authors contributed to the manuscript and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcosc.2022.807252/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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