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Communicating about marine disease: The effects of message frames on policy support

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ABSTRACT

Oceans are suffering from the dual climatic pressures of warming temperatures and acidification, increasing the presence of disease risks that affect marine organisms and public health. Through a randomized field-based experiment, this study examines the effects of communicating about risks to marine organisms and public health on people's support for policies aimed at mitigating those risks as a function of different message frames. To maximize the salience of these issues, participants were recruited from ferry passengers ($N=543$) in the San Juan Islands of Washington State in the summer of 2013 and randomized to read one of four fictitious news articles detailing the increased incidence of deadly bacteria (*Vibrio*) in oysters in the Pacific Northwest. Depending on condition, the article attributed the causes to global warming *or* climate change and the consequences primarily to oyster health *or* public health—frames that recent research suggests can influence how the public responds to environmental messages. Results showed high levels of support for marine policy and high concern about the prevalence of marine disease risks across the sample (i.e., irrespective of framing condition). Analysis of individual differences suggested that participants with lower biocentric (i.e., environmental) values were more supportive of marine policy when exposed to the article highlighting consequences to oyster health from global warming, an effect that was fully mediated (or explained) by level of self-reported concern. The results demonstrate the importance of communication about marine disease in showing how subtle changes in message frames can elicit differential support for marine policy.

1. Introduction

Marine disease risks and ocean health threats are forecast to change significantly with the dual climatic pressures of rising ocean temperatures and acidification [5,12,35]. Addressing these disease threats will require greater collaboration across diverse scientific fields to better elucidate human dimensions of marine disease. This includes exploring how the public perceives marine disease risks that have been linked to climate change and the factors that shape support for actions to mitigate them. Ultimately, such efforts can aid in the development of comprehensive solutions to promote environmental stewardship and encourage sustainable actions that protect ocean health and human health.

The present study builds on emerging research into the framing of environmental issues and its effects on human judgments, including beliefs, perceived risks, and policy preferences (e.g., [17]). Framing theory recognizes that the words chosen to convey a given issue can exert a powerful effect on how audiences process and perceive messages by bringing certain considerations to mind over others (e.g., [10,9]). Empirical studies of framing typically expose audiences to different versions of the same core message (by varying wording or some other feature) and take any observed differences in stated attitudes, beliefs, or preferences as evidence that a framing effect has occurred (e.g., [7,15,34]). These effects are theorized to operate through basic principles of human cognition, such that frames in their operationalized forms (e.g., variants in wording) increase the accessibility or salience of previously stored knowledge structures in the minds of an audience ("priming" in psychological terms), thereby increasing the likelihood that *that* knowledge – as opposed to other relevant considerations – will be brought to bear on subsequent judgments (e.g., [6], Higgins and Brendl, 1995, [39]).

In this vein, research in climate change communication has begun to explore how the different ways of framing climate change and related issues may influence the public's climate-related beliefs and concerns. To date, two lines of climate framing research have garnered the most attention from scholars. One line considers how highlighting the public health consequences of climate change as opposed to its more traditional environmental consequences affects audience perceptions and suggests that a public health frame can

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bolster concerns and support for climate-mitigating actions (e.g., [24,25]). Another line explores the influence of framing the issue through the use of different labels that are commonly applied to it—including global warming, climate change, global climate change, and so on (e.g., [1,30,31,36]).

Evidence suggests that, despite their interchangeable usage in many mainstream media outlets and everyday public discourse, these terms are perceived differently by the public. Whereas global warming has been found to carry stronger associations with human causes (e.g., pollution) and heat-related consequences (e.g., melting polar ice), climate change may evoke stronger thoughts related to natural causes and broader, more wide-scale climatic alterations (see [2,37,9]). These patterns may partly account for the observation that U.S. survey respondents report weaker belief in the existence of global warming than climate change and other effects of these frames on survey responses [17,18,28]. Among other findings, research suggests that global warming is a more politicized frame than climate change, invoking greater skepticism from individuals who may be predisposed to challenge the existence of the phenomenon (e.g., Republicans and conservatives in the United States; [7]). Thus, rejecting the view that messages have the same effects on all audiences, researchers have shown that when exposed to messages, audiences' predisposed values and ideological orientations may perform as a perceptual filter, leading them to engage in motivated reasoning, whereby they actively select a subset of considerations that are consistent with and support their pre-existing attitudes and ideologies [6,33]. In this manner, audiences' environmental values may influence their responses to messages (e.g., [20,29,30,38]).

Further, although climate change is commonly framed in terms of its consequences for environmental and ecosystem health (by highlighting threats to species survival or shifts in wildlife habitats), framing the issue in terms of its possible public health impacts may evoke stronger emotional responses and help mobilize support for climate mitigation ([21,24]). Although this notion is bolstered by previous work suggesting that apathy and inaction on climate issues may be due, in part, to many people's abstract and distant construal of the threats (e.g., [19,35]), limited research has explored whether emphasizing the public health versus environmental health consequences of emerging climate-related issues shapes how audiences perceive indirect effects of climate change, such as infectious disease or loss of biodiversity. Moreover, little is known about the possible combined effects of different health frames (environmental vs. public) and label frames (global warming vs. climate change), which routinely co-occur in mass media that inform the public about marine disease outbreaks linked to a changing climate. For instance, does the effect of public health versus environmental health framing depend on whether the threat is attributed to "global warming" or "climate change"? On one hand, given past research suggesting that both public health and climate change framing promote stronger climate-related beliefs and concern, it may be reasonable to predict that, in general, the most pro-environmental attitudes and beliefs would be observed when these frames co-occur. On the other hand, any given marine disease context likely evokes unique thoughts and considerations that may themselves interact with these frames. In the specific case of *Vibrio* outbreaks in oysters, for example, "global warming" might prove a more impactful frame, given the negative connotations that pairing "warm" and "oysters" is likely to evoke. Thus, outbreaks like that of *Vibrio*, which poses a serious risk to human health through the consumption of raw oysters and other routes of infection, represent ideal cases for studying the intersection of these different climate frames, in addition to providing insight into the public's awareness and concern about marine disease—a topic receiving little attention in recent social scientific work on perceptions of biodiversity and species conservation (e.g., [4,11,16]).

After a brief overview of the study context, this paper reports on an experimental survey in which participants read differing versions of a fictitious news article about diseases in oysters that was designed to address some of these gaps. Specifically, the experiment explored the effects of different ways of framing risk communication messages on people's support for marine policy to mitigate the causes and consequences of diseases in the ocean.

2. Materials and methods

2.1. Study context: Oysters in the Pacific Northwest

The context for this study is the recent increase in disease vulnerability of oysters due to ocean warming and acidification. Oysters provide important economic and ecosystem services in estuaries worldwide. The Northeast Pacific Coast, particularly the U.S. West Coast and Pacific Northwest, is an important oyster growing area, accounting for $73 million in oyster harvest annually [27]. In addition to threatening the health of oysters and oyster larvae in particular [3], ocean warming has increased both the geographic distribution and number of cases of human illness due to *Vibrio* bacteria (including cases from the Pacific Northwest) through both the ingestion of raw oysters and wound infections (for a review, see [5]).

2.2. Data collection procedure

Over the course of two weeks in July 2013, passengers riding the Washington State Ferries in the San Juan Islands were recruited to participate in the experiment. Passengers were approached by undergraduate research assistants wearing university name tags and asked if they would be interested in participating in a social science survey. Those who agreed[1] ($N=543$) were handed iPads© preloaded with the experimental materials using Qualtrics survey software and given brief instructions about how to operate the device if necessary.

Participants were randomly assigned to one of the five different conditions: four message conditions and a no message, control condition. Participants in the message conditions were presented with a fictitious news article modeled after local media coverage of *Vibrio* outbreaks and ocean acidification affecting the Pacific Northwest oyster industry, which was reviewed prior to the study for scientific accuracy. Depending on the experimental condition, the article highlighted consequences either for public health or oyster health; in addition, effects were attributed either to *climate change* or *global warming*. These treatments were crossed to create the following four message conditions: oyster health × global warming, oyster health × climate change, public health × global warming, and public health × climate change. Besides these variations, the articles were similar across conditions (see the Appendix for all message conditions). After reading their assigned article, participants completed a series of survey items containing key measures and demographics; participants in the control condition advanced immediately to the survey items.[2] Upon completion of the survey, participants were debriefed and given the opportunity to ask questions about the study. On average, the study took 15 minutes to complete.

[1] Response rates, including number of refusals, were not tracked systematically since the intent was not to obtain a random sample or generalize to a population, e.g., all ferry passengers. Even so, most passengers who were approached were willing to participate.

[2] Participants were oversampled in the control (no message) condition relative to the message conditions in order to establish reliable baseline measures of the outcome variables of interest (support for marine policy and concern about marine disease).