3-2015

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DOI: https://doi.org/10.1177/1075547015575181

How Motivated Reasoning and Temporal Frames May Polarize Opinions About Wildlife Disease Risk

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Abstract

We draw from theories of motivated reasoning, dual-processing models, and attribution of responsibility to examine how scientific messages may increase public polarization with respect to emerging risk issues such as Lyme disease. A nationally representative sample of Americans (N = 460) read messages about Lyme disease that varied the framing of responsibility for the prevalence of the disease (human/wildlife vs. wildlife only) and when its effects will occur (today vs. in the next 10 years). The influence of framing was contingent on participants' partisanship, which resulted in a boomerang effect among Republicans and increased the degree of political polarization regarding support for proenvironmental behaviors.

Keywords

framing, motivated reasoning, temporal distance, dual-processing, One Health

The next several decades are expected to witness an unprecedented increase and prevalence of infectious wildlife disease risks, including zoonotic diseases such as Lyme disease, avian influenza, West Nile virus, and rabies (Cutler, Fooks, & van der Poel, 2010; Kahn, Kaplan, Monath, & Steele, 2008). Many argue that successful efforts to respond to wildlife disease risk will require public understanding of the linkages among human, animal, and environmental health and well-being, also referred to as the "One Health" approach (Rock, Buntain, Hatfield, & Hallgrimsson, 2009; Singer, 2009). In part, One Health rests on the premise that greater understanding of the role that humans play in perpetuating shared disease risk might lead to a greater likelihood of humans accepting some responsibility for addressing the problem (Weiner, 2006). Thus, well-intentioned communication efforts in support of a One Health approach would likely highlight the responsibility that humans have in the existence or prevalence of zoonotic disease while also emphasizing the need to act with some urgency to mitigate or stop the spread of disease (Keesing et al., 2010).

While such a strategy may seem intuitively appropriate for mobilizing public support, such as engagement in proenvironmental behaviors, little is known about how individuals might respond to different ways of framing the problem in relation to anthropogenic stressors and also its urgency or temporal distance. A growing body of research on partisan motivated reasoning and dual-processing casts doubt on the effectiveness of highlighting human responsibility and the urgency of the issue. Namely, such research, as reviewed below, illustrates how audiences' predisposed political orientation in relation to environmental beliefs may produce a backlash to such messages.

Specifically, research has demonstrated that public opinion about the environment is often politically polarized in the United States (Bomberg & Schlosberg, 2008; McCright & Dunlap, 2011). Thus, although emerging wildlife disease issues may be less publicized and thus politicized than issues like climate change, the potentially divergent partisan responses to messages that emphasize human responsibility merit further thought. Prior work suggests that not only legislators and activists (Dunlap & Allen, 1976; Kenski & Kenski, 1980) but also members of the public (Dunlap, Xiao, & McCright, 2001) on the liberal and Democratic side of the political spectrum are often more supportive of proenvironmental regulation and policy proposals than those on the conservative and Republican side. In addition, the diversity of the U.S. media marketplace suggests that audiences are exposed to not only messages highlighting human responsibility but also competing arguments about environmental issues, each reflecting the partisan divide that seeks to influence the debate over causes and consequences of environmental

problems (see Bomberg & Schlosberg, 2008; Boykoff & Boykoff, 2004; Nelkin, 1987, for a more general discussion of the politicization of environmental health issues in U.S. news media). Taken together, these considerations suggest a need to examine message effects across political lines.

The current research investigates how partisan differences arise in relation to messages about an emerging public and environmental health risk: Lyme disease. In particular, it focused on the role of temporal cues, given that an important attribute of many risk messages is the question of when the issue will affect public health. For example, some messages may focus on the *immediate* impact of such a disease (e.g., today), whereas others may predict the *future* impact of the disease risk (e.g., in the next 10 years). To the best of our knowledge, no previous research has investigated how the temporal distance of risk may influence audience polarization regarding potentially controversial risk messages. Although the use of different temporal distance frames to characterize a given risk seems an innocuous choice in communicating the severity of the problem, based on the dual-processing model of social information (Chaiken, 1980; Petty, Rucker, Bizer, & Cacioppo, 2004), varying temporal distance may produce different reactions in response to value-incongruent attribution of responsibility.

With this in mind, this study tests how different attributions of responsibility frames for Lyme disease (human vs. wildlife) in combination with temporal distance frames (today vs. in the next 10 years) influence whether partisans (Democrats vs. Republicans) are more or less likely to attribute the prevalence of wildlife disease to anthropogenic causes (e.g., human destruction of wildlife habitat) and express intentions to engage in conservation behaviors. To build a framework for the hypotheses tests, we draw from work on framing attribution of responsibility, dual-processing model of information, and partisan motivated reasoning on issues related to the environment.

Emphasizing Human Responsibility in Framing Infectious Wildlife Diseases

Extant literature in message framing suggests that emphasizing a certain facet of a given issue and neglecting other aspects can influence how the public defines the issue, interprets its causes and consequences, judges good and bad actors, and defines a set of solutions in response to the issue (Druckman, 2001; Entman, 1993; Iyengar, 1991). In this vein, to communicate about zoonotic disease risk using a "One Health" frame, one would contextualize the risk not only as a wildlife and environmental issue but also in

relation to possible anthropogenic origins, such as farming practices, urban sprawl, or reduction of natural predators. In a similar vein, messages connecting the prevalence of zoonotic disease risk to a change in biodiversity (e.g., depletion of wildlife habitat, decrease in natural predators) could emphasize the importance of conservation efforts, such as preservation of parks and natural areas, alongside specific actions people can take to reduce their risks of contracting the disease. Thus, the One Health frame would provide information not only about public health implications but also about wildlife and ecosystem health implications (DesJardin, 2005; Ojala & Lidskog, 2011; Stenmark, 2002). In contrast to the frame detailed above, what we refer to as a "blame wildlife" frame would attribute the responsibility of disease risk more narrowly to wildlife behavior or natural variation, essentially absolving humans from any role or responsibility for its prevalence and potentially its mitigation.

Framing, Values, and Partisan Motivated Reasoning

Recent work in *science communication* has shown that an audience's predisposed values and ideological orientations may serve as perceptual filters, leading them to engage in motivated reasoning: actively selecting a subset of considerations that are congruent with and support their preexisting attitudes and ideologies (e.g., Gollust, Lantz, & Ubel, 2009; Hart & Nisbet, 2012; Maibach, Nisbet, Baldwin, Akerlof, & Diao, 2010; Schuldt & Roh, 2014). For example, Gollust et al. (2009) found that public health messages emphasizing the framing of environmental causes of type 2 diabetes (e.g., lack of availability of healthy food in a neighborhood) increased political polarization of the issue by increasing policy support (e.g., banning fast food in public schools) among Democrats but decreasing it among Republicans. In a similar vein, Schuldt and Roh (2014) found that climate change skeptics make use of motivated reasoning—picking and choosing only the evidence that supports already-held beliefs—in response to cold weather cues to maintain a disbelief in the reality of climate change. A similar study found that prior climate change beliefs significantly affected individuals' likelihood of recalling the previous summer as being warmer than normal. An asymmetric effect was observed only among climate change skeptics in the sample (Howe & Leiserowitz, 2013).

Recent work has examined psychological mechanisms of the interplay between message frames and audience predispositions (Druckman & Bolsen, 2011; Gollust & Cappella, 2014). This work indicates that the inclusion of frames that are value congruent with partisan stances can make politically driven predispositions salient, which in turn can increase political polarization

on given issues. For example, a frame that is value congruent with a Republican audience can increase the intended persuasive effects of issue frames in shaping Republicans' opinions/preferences. However, at the same time, a frame that is incongruent with Republicans' value system can produce "boomerang" or counterpersuasive effects (i.e., effects in the opposite direction of the intended issue frame; Byrne & Hart, 2009). These boomerang effects are likely the outcome of an audience's exposure to worldview-incongruent frames (Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012). Motivated to engage in self-serving processing of evidence to support their predisposed partisan stance, audiences tend to accept favorable arguments with little examination, while refuting worldview-challenging frames—a psychological process named motivated reasoning/skepticism or defensive motivated reasoning (Ditto & Lopez, 1992; Kunda, 1990; Taber & Lodge, 2006).

In the context of environmental issues, differences may emerge between how audiences aligning with a more conservative political ideology and those with a more liberal political ideology perceive the role of humans in causing or responding to risk. Consider, for example, climate change, which has sparked conversation about what is causing it and who is responsible for solving the problem (Iyengar, 1991) and perpetuated a partisan divide with respect to environmental issues (Krosnick, Holbrook, Lowe, & Visser, 2006; Krosnick, Holbrook, & Visser, 2000). Furthermore, survey research has demonstrated not only that Democrats or liberals tend to express more proenvironmental beliefs than their Republican or conservative counterparts (Dunlap et al., 2001) but also that Democrats or liberals are more likely to express beliefs consistent with scientific consensus: namely, that climate change is occurring, can be linked to human activities, and should inspire widespread concern (McCright & Dunlap, 2011). Further research suggests that Democrats' or liberals' willingness to attribute the cause of climate change to anthropogenic actions (e.g., burning fossil fuels) matters in determining their support for climate change policy. That is, believing that climate change has anthropogenic stressors influences support for government initiatives, such as a carbon tax, or individual behaviors, such as driving less, to help mitigate its impacts (Bord, O'Connor, & Fisher, 2000; O'Connor, Bord, Yarnal, & Wiefek, 2002).

Though the risks associated with infectious wildlife disease are not directly analogous to those related to climate change, communicating about the causes of and responses to both environmental issues can involve attributing responsibility to human factors. By referring to climate change as exacerbated by increasing cars on the road, or the prevalence of Lyme disease as due in part to human destruction of wildlife habitat, messages may activate political predispositions, increasing issue polarization among certain audiences.

In fact, in scientific literature and popular media, Lyme disease is often linked to climate change. In 2014, the U.S. Environmental Protection Agency (EPA) added the rate of reported Lyme disease cases across the United States to its list of climate change indicators—that is, one of the effects of climate change that scientists have been able to document and that the agency uses to communicate about climate change to public audiences (EPA, 2014). In areas in which Lyme disease incidence has increased in recent years, such as the Adirondack region of northern New York State, media reports often attribute this phenomenon to climate change. For example, a recent report in the *Adirondack Daily Enterprise* quoted Melissa Prusinski, a research scientist and laboratory supervisor with the New York State Health Department's Bureau of Communicable Disease Control, as noting, "Climate change is playing a role in the expansion of the deer tick's geographic range, as well as that of the small mammals like the white-footed mouse that carry the Lyme disease bacteria" (Knight, 2014). Moreover, some sources, including the EPA, acknowledge that *multiple* causal factors likely contribute to the increasing incidence of Lyme disease across the United States, including the changing range of ticks and mammal vectors, human proximity to wildlife populations, ecosystem disturbances, and specific human behaviors, such as spending time outdoors (EPA, 2014). Thus, we expect that audiences with partisan leanings may interpret the same message about a risk issue with different causes differently, evoking their predisposed inclination and increasing public polarization rather than engendering a unified effect.

The Moderating Role of Temporal Distance Frames

One factor that may interact with motivated reasoning is temporal distance: When will the infectious wildlife disease presented in the message pose a risk? For example, when communicating about infectious wildlife disease risk, health departments or other public agencies often communicate the severity of the issue with temporal markers. Indeed, a comprehensive publication about Lyme disease produced by the U.S. Centers for Disease Control and Prevention (CDC) includes a section labeled "Lyme Disease—Past, Present, and Future" in which the reader learns the past origin of the disease (an unusual outbreak of arthritis near Lyme, Connecticut), its current impacts (over 30,000 cases of Lyme disease are reported to the CDC each year), and that medical and environmental research continues to address future risks associated with the disease (CDC, n.d.).

We expect that this seemingly innocuous choice regarding temporal distance cues may have the potential to increase or mitigate partisan political

polarization by reducing or enhancing the effectiveness of messages among partisans. This expectation stems from the idea that there exist distinct levels of relevance for proximal and distal temporal distances of a risk event. Prior work (Chandran & Menon, 2004) hints that risk events occurring at more distal temporal points will be perceived as less relevant, whereas risky events occurring at more proximal points will be perceived as more relevant (e.g., Zwickle & Wilson, 2014). For instance, Spence, Poortinga, and Pidgeon (2012) found that the majority of a U.K. sample surveyed perceived climate change as temporally close and that this perception was linked with higher concern about climate change. In the context of the present study, it is possible that when the zoonotic disease risk is presented as posing public health problems today, people might perceive it as riskier, thus feeling the issue is more relevant to them. On the other hand, if the risk is to happen in the future, it may feel less risky and less relevant. Indeed, prior work documented that when risks are presented in a temporally proximal manner, people tend to see relatively more relevance from the event than when the risk tasks are presented in a temporally distal manner (see Study 1 in McElroy & Mascari, 2007).

The mechanism behind this effect may be due to the information-processing style that is induced due to the relevance of an event. Theoretical models of dual-processing posit that processing of information occurs via two fundamentally different routes: more systematic, in-depth processing and more peripheral, less in-depth processing (Petty & Cacioppo, 1986). Relevance is one of the key factors that can determine which processing style will be more or less likely to be used (McElroy & Seta, 2003). Widely examined dual-processing models such as the elaboration-likelihood model (Petty et al., 2004) and the heuristic-systematic model (Chaiken, 1980) suggest that systematic processing—where people process the merits of a given argument—is more likely when the message content is relevant to the audience. Prior work (McElroy & Seta, 2003) suggests that tasks of sufficiently high personal relevance induced more effortful, systematic processing, whereas tasks of low personal relevance induced the less effortful processing. Such different mode of processing may, in turn, differentially activate motivated reasoning.

Specifically, in the current study, we expect that framing the risk as temporally proximal or temporally distal will result in different ways of processing that information and thus incur different likelihoods of activating motivated reasoning. Since events occurring at a proximal temporal distance should be perceived as more relevant (or concrete), they should also be more likely processed using the more effortful, analytic style (McElroy & Mascari, 2007). Consequently, under these conditions, partisans' defensive or motivated

skepticism is more likely to occur in response to value-incongruent messages. However, if the individual perceives the event as occurring in the more distant future, she or he should perceive the event as less relevant (or abstract) and be more likely to use the less effortful, heuristic processing style, resulting in less motivated skepticism toward value-incongruent messages.

Study Context

We chose Lyme disease for the topic of our messages because of its public health significance and isomorphism with a One Health message, meaning a message that makes linkages among human, environment, and animal health and well-being. Lyme disease is transmitted to humans through the bite of the black-legged tick, which feeds on white-footed mice that are common in Eastern and Midwestern forests and woodlands (Keesing et al., 2010). Incidence rates of Lyme disease have increased drastically in recent years in the United States. Between 2003 and 2012, the number of cases increased by approximately 110% in Massachusetts, 400% in Maine, and 790% in Vermont (CDC, 2013). The prevalence of Lyme disease illustrates the complicated relationship between the loss of biodiversity and destruction of habitat and the prevalence of zoonotic disease. White-footed mice are a particularly resilient species, whereas other hosts, such as opossums, are not; as biodiversity is lost, species that might have served as buffers for the disease, such as opossums, disappear, whereas mice, which serve as amplifiers for the disease, remain (Keesing et al., 2010). Furthermore, human encroachment into wildlife habitat has both brought humans into closer proximity to mice and decreased natural predators: for example, foxes and coyotes, which control the mice population (Levi, Kilpatrick, Mangel, & Wilmers, 2012). A decline in predators has also increased human interactions with white-tailed deer, which often transport black-legged ticks into suburban neighborhoods and are frequently blamed for the increase in Lyme disease prevalence.

Study Objectives and Hypotheses

This study sought to assess the impact of messages combining attribution of responsibility frames and temporal frames on anthropogenic attribution of wildlife disease and conservation intentions. Furthermore, given potential differences in predisposed attitudes about environmental issues among political partisans, we sought to assess whether the framing effects would depend on the political orientation of the reader. As discussed earlier, the available evidence suggests that risk messages using frames combining attributions of responsibility that are congruent/incongruent with

one's partisan belief system with temporal distance cues may exacerbate or mitigate political polarization by evoking or reducing motivated skepticism toward these messages.

We consider messages emphasizing wildlife responsibility for wildlife disease as an argument congenial to Republican audiences since the focal point of the argument is in nonhuman causes for disease. Such a focus links to psychological correlates of conservative political views, including the attribution of the cause of an environmental issue to environmental factors, rather than to humans (McCright & Dunlap, 2011). In contrast, we consider the acknowledgment of human responsibility in a One Health message as congenial with Democratic audiences due to the party's traditional support for environmental issues and tendency to agree with scientific consensus—in this case, that humans have a role to play in the recent prevalence of Lyme disease (Dunlap et al., 2001).

Based on our theoretical reasoning, we hypothesized the following:

Hypothesis 1: Exposure to a One Health message with a temporally proximal frame will lower Republicans' (a) conservation intentions and (b) acknowledgment of anthropogenic contributions to the presence of zoonotic disease.

Hypothesis 2: Exposure to a One Health message with a temporally proximal frame will produce a gap between Republican and Democrat participants in (a) conservation intentions and (b) acknowledgment of anthropogenic contributions to the presence of zoonotic disease.

Hypothesis 3: Exposure to a "blame wildlife" message with a temporally proximal frame will raise Democrats' (a) conservation intentions and (b) acknowledgment of anthropogenic contributions to the presence of zoonotic disease.

Hypothesis 4: Exposure to a "blame wildlife" message with a temporally proximal frame will produce a gap between Republican and Democrat participants in (a) conservation intentions and (b) acknowledgment of anthropogenic contributions to the presence of zoonotic disease.

Regarding the One Health and "blame wildlife" messages with the temporally distal frame, we expected the following:

Hypothesis 5: When participants read a temporally distal framed message, Republicans will show no difference compared to Democrats in terms of (a) conservation intentions and (b) acknowledgment of anthropogenic contributions to the presence of zoonotic diseases in response to the One Health message.

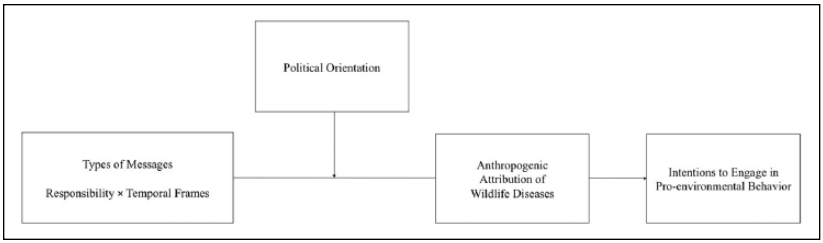

Figure 1. Conceptual model for current research: Proposed mediated-moderation model.

Hypothesis 6: When participants read a temporally distal framed message, Democrats will show no difference compared to Republicans in terms of (a) conservation intentions and (b) acknowledgment of anthropogenic contributions to the presence of zoonotic diseases in response to the blame wildlife message.

Finally, we hypothesized the process of the proposed message effects (a mediated-moderation effect; see Figure 1) as follows:

Hypothesis 7: The polarizing effects of the messages on acknowledging anthropogenic attributions for wildlife disease will explain (mediate) the partisan-based contingent message effects on conservation intentions.

Method

Participants

Data were collected from November 8 to 16, 2012.[1] We invited a national panel of U.S. adults maintained by GfK (Gesellschaft für Konsumforschung) to participate in a web-based, randomized experimental survey and recruited via random-digit-dialing. A random sample of 900 panelists was invited to participate; 460 finished the study, resulting in a cooperation rate of 51%, which is typical of GfK studies (Callegaro & DiSogra, 2009).[2]

Procedure and Stimuli

We randomly assigned participants to one of five questionnaire versions using a 2 (attribution of responsibility: One Health vs. blame wildlife) × 2 (temporal frames: defining Lyme disease as a proximal vs. distal public

health threat) design, including a fifth, no-exposure control group. Those assigned to one of the four message conditions read a one-page vignette about Lyme disease concerning its causes, symptoms, and consequences.

Each vignette contained three main ideas expressed in a separate paragraph (see the appendix for all messages). First, the vignette defined Lyme disease as a bacterial infection and described its mode of transmission. Depending on the experimental manipulation, the disease was described as affecting public health "today" or "in the next 10 years." The subsequent paragraph presented common symptoms of Lyme disease and the treatment and more serious, long-term effects of the disease. The last paragraph discussed possible reasons for the prevalence of Lyme disease and included a quotation attributed to a fictional expert from the "Association for Wildlife Managers" (also a fictional organization). The emphasis on the reasons for the prevalence of Lyme disease, for example, attributed to human movement into suburbia versus behavior of wildlife, varied depending on the experimental manipulation (i.e., blaming human actions vs. wildlife). We developed our message in consultation with an expert in medical entomology and vector-borne disease risk to ensure its scientific accuracy.

After reading the vignette, respondents answered questions about the blameworthiness for the prevalence of Lyme disease, including human-related, wildlife-related, and/or environmental-related factors (i.e., manipulation checks). They also indicated their views on anthropogenic attributions of wildlife diseases, intentions to engage in conservation behaviors, and a host of variables measuring individual differences. Participants randomly assigned to the control condition advanced directly to the questionnaire without reading a vignette.

Measures

Moderating Variable: Partisan Leanings. Most respondents self-identified as either Republican or Democrat; however, approximately 36% (168 out of 460) of respondents identified not as one or the other but rather as Independent. GfK offers pretest information on whether respondents who initially self-identified as Independents are in fact leaners, meaning those who have political leanings that closely align with one of the two major political parties. Prior work has shown that most of those who identify themselves as Independents or having no preference for either party actually behave as party identifiers (Keith et al., 1992). More recent work suggests that a majority of citizens who self-identify as Independents have political leanings that closely align with one of the two major political parties (Petrocik, 2009). These leanings are even more closely aligned with political parties when

using implicit measures of party affiliation (Hawkins & Nosek, 2012). For this reason, recent work investigating the role of values and political orientation in message processing considers party leaners as partisans (Gollust & Cappella, 2014). The GfK data showed that 151 of the 168 participants who did not identify as one or the other, but rather as Independent, were considered party leaners; that is, the 151 participants identified themselves as either Republicans or Democrats when they were further asked, "Do you think of yourself as closer to the . . . Republican Party or Democratic Party?" We subsequently recoded these participants into the corresponding party (see Table 1 for respondents' distribution in terms of party leanings).

Mediating Variable: Anthropogenic Attribution of Wildlife Disease. To measure the degree to which respondents acknowledged that human factors can affect the prevalence of wildlife disease, we asked to what extent they saw removal of wildlife habitat as being relevant to the cause of wildlife diseases. Participants answered using a 7-point scale running from 1 = *not at all relevant* to 7 = *very relevant* ($M = 5.10$, $SD = 1.74$).

Dependent Variable: Conservation Intentions. To measure conservation intentions, respondents were asked if they were 1 = *very likely, likely, somewhat likely, somewhat unlikely, unlikely* or 6 = *very unlikely* to engage in the following behaviors in the next 3 months based on an established scale (Halpenny, 2010): (a) volunteer to stop visiting a favorite spot in a park or natural area if it needs to recover from environmental damage, (b) volunteer time to projects that help a park or natural area, (c) tell friends not to feed the animals in a park or natural area, (d) participate in a public meeting about managing a park or natural area, (e) pick up litter at a park or natural area left by other visitors, (f) contribute donations to ensure protection of parks and other natural areas, (g) sign petitions in support of a park or natural area, and (h) encourage others to reduce their waste and pick up their litter when they are at a park or natural area. We established a mean scale with these eight items (Cronbach's $\alpha = .91$; $M = 3.25$, $SD = 1.17$). While this measure may not directly address ways to prevent Lyme disease, these items do indicate a support for preservation of parks or natural areas—behaviors that can be critical to preserving biodiversity, which is indirectly important in wildlife disease prevention and other One Health efforts.

Control Variables. We collected demographic data on respondents' sex, age, income, level of education, and ethnicity. We also collected respondents' direct (ever had Lyme disease) and indirect (ever heard of Lyme disease) experiences with Lyme disease (see Table 1 for descriptive statistics of variables). Following previous work, we used sex, age, income, level of educa-

Table 1. Demographics of Study Participants (N = 460).

Variables	Unweighted analytic sample, proportion (n) or M (SD)	Weighted analytic sample, proportion (n) or M (SD)	Test for differences by condition, χ^2/p or F/p
Randomized experimental condition			
No message exposure (control) group	0.22 (101)	0.22 (103)	
One health with temporally proximal frame	0.21 (98)	0.24 (111)	
One health with temporally distal frame	0.20 (90)	0.18 (83)	
Blaming wildlife with temporally proximal frame	0.19 (86)	0.16 (74)	
Blaming wildlife with temporally distal frame	0.18 (85)	0.20 (90)	
Political party leanings			
Republican	0.47 (216)	0.47 (215)	
Democrat	0.49 (227)	0.49 (225)	
No leaning	0.04 (17)	0.04 (20)	
Female	0.54 (249)	0.52 (239)	$\chi^2(4) = 0.61$, $p = .96$
Age, years	50.17 (16.73)	46.85 (17.23)	$F(4, 455) = 0.32$, $p = .86$
Income (19-point variable, rescaled 0-1)	4.22 (1.53)	4.19 (1.51)	$F(4, 455) = 0.84$, $p = .50$
Highest level of education completed			
Less than high school diploma	0.12 (56)	0.12 (55)	
High school diploma or equivalent	0.32 (149)	0.30 (139)	$\chi^2(12) = 2.47$, $p = .98$
Some college	0.27 (126)	0.29 (134)	
Bachelor's degree or higher	0.28 (129)	0.29 (132)	
Race/ethnicity			
White, non-Hispanic	0.73 (335)	0.67 (306)	
Black, non-Hispanic	0.09 (39)	0.11 (51)	
Other, non-Hispanic	0.05 (22)	0.06 (26)	$\chi^2(16) = 15.43$, $p = .49$
Hispanic	0.12 (54)	0.15 (68)	
2+ Races, non-Hispanic	0.02 (10)	0.02 (8)	
Heard of Lyme disease	0.92 (425)	0.89 (410)	$\chi^2(4) = 5.72$, $p = .22$
Ever had Lyme disease	0.02 (10)	0.02 (8)	$\chi^2(4) = 1.60$, $p = .81$

Note. All sample characteristics are proportions with sample sizes in parentheses, except for age and income, which are means (standard deviations in parentheses).

tion, and ethnicity as control variables in the main analyses in that (a) our focal point of analysis dealt with the interaction between message conditions and party identification, (b) party identification was not randomly assigned to participants, and (c) party identification is correlated with those social characteristics—namely, the demographics that we measured (see Gollust & Cappella, 2014, for the list of variables controlled in examining the moderating effects of political partisanship while using GfK sample).

Weighting Procedures

GfK calculates statistical weights by sex, age, education, race/ethnicity, U.S. Census region, metropolitan area, and Internet access in an effort to make the resulting sample nationally representative. Table 1 describes the demographic characteristics of the analytic sample. The first column presents unweighted sample characteristics, while the second column demonstrates the impact of the weights on these estimates. The final column shows that there were no differences in any demographic characteristic among the experimental and control conditions. Main inferential statistical analyses testing hypotheses (i.e., ordinary least squares [OLS] regressions) employ the GfK's poststratification weights in Stata by using the "svy" command, applying population weight (pweight) to the data.

Manipulation Check

To ensure that the attribution of responsibility manipulation worked as intended, we compared how respondents in each condition attributed responsibility for the prevalence of Lyme disease using a blame index. Specifically, we asked, "Which one of following should be blamed for Lyme disease? Please use the scale below to indicate the total percentage of blame each group or factor should be given for Lyme disease (Total must sum to 100)." With three scores given to animals, humans, and environment, respectively, we formalized an index representing the ratio of human to animal blame.[3] Respondents placed relatively more blame on humans and less blame on animals in the conditions that explicitly acknowledged human responsibility than the conditions that did not ($M_{\text{One Health}} = -.09$, $M_{\text{Blame Wildlife}} = -.26$; $t = -2.72$, $df = 304$, $p < .004$, $d = 0.31$). We thus judged the manipulation successful.

Analytic Approach

To test the proposed predictions and research questions, we performed a series of OLS regression analyses. Note that we did not hypothesize any

main effects of the frames. Consequently, the OLS regression analyses only include the models testing our hypotheses, which are interactions between message conditions and partisan leanings. The proposed mediated moderation hypothesis (i.e., politics-based contingent effects of messages on conservation intentions via the message effects on the anthropogenic attribution of wildlife diseases) requires multiples steps of analyses (Muller, Judd, & Yzerbyt, 2005).[4] First, we tested if there were overall moderations of message effects on conservation intentions (Model 1 of Table 2) and anthropogenic attribution of wildlife diseases (Model 2 of Table 2) by political leanings. Then we ran an analysis to see if there was a partial effect of anthropogenic attribution on conservation intentions (Model 3 of Table 2). Last, we tested if controlling for the indirect effect of anthropogenic attribution (regardless of whether or not this effect is moderated by party leanings) reduced the moderation of the residual direct effect of messages by political leanings (Model 3 of Table 2).

Results

The Interplay of Message Conditions and Political Leanings on Conservation Intentions

We first assessed the interplay of message type and party identification on respondents' intentions to engage in proenvironmental behaviors. As shown in Model 1 of Table 2, the One Health temporally proximal framed message influenced conservation intentions differently depending on respondents' political orientations compared to the control condition, $b = -0.90$, $t(407) = -2.11$, $p = .03$. Complementing this test (and corresponding to Hypothesis 1a), the postestimation analysis using the linear combination of coefficients ("lincom") command in Stata indicates that after exposure to the message, Republicans expressed lower levels of conservation intentions relative to Republicans in the control condition, $b = -0.62$, $t = -2.04$, $p = .04$. Although we found no significant differences between Republicans' and Democrats' conservation intentions in the control condition, $b = -0.19$, $t = -0.81$, $p = .42$ ($M_{\text{Democrats}} = 3.45$, $M_{\text{Republicans}} = 3.25$; Figure 2), exposure to the One Health temporally proximal message produced a divergence in conservation intentions by political party, $b = -1.09$, $t = -2.98$, $p = .003$, with Democrats and Republicans differing in their views by over one unit on the 6-point scale ($M_{\text{Democrats}} = 3.72$, $M_{\text{Republicans}} = 2.63$). Recall that we expected to observe less support from Republicans than Democrats when they were exposed to value-incongruent messages (i.e., One Health) with a temporally proximal frame. This result is consistent with Hypothesis 2a.

Table 2. Ordinary Least Squares Regression Models Testing Predictions of the Current Research.

	Model 1: Intentions to engage in conservation behaviors (moderation; Hypotheses 1a–6a)		Model 2: anthropogenic attributions for wildlife diseases (moderation; Hypotheses 1b–6b)		Model 3: Intentions to engage in conservation behaviors (mediated moderation; Hypothesis 7)	
Variables in the equation	*b* (*SE*)	*t*	*b* (*SE*)	*t*	*b* (*SE*)	*t*
Key variables						
One Health and temporally proximal frame (reference = no message)	0.27 (0.30)	0.90	1.27 (0.42)	3.01***	0.09 (0.27)	0.33
One Health and temporally distal frame (reference = no message)	0.14 (0.22)	0.64	0.86 (0.42)	2.07*	0.01 (0.22)	0.02
Blaming wildlife and temporally proximal frame (reference = no message)	0.01 (0.23)	0.06	0.39 (0.45)	0.87	−0.04 (0.22)	−0.19
Blaming wildlife and temporally distal frame (reference = no message)	0.10 (0.28)	0.38	0.39 (0.45)	0.87	0.07 (0.27)	0.27
Republicans (reference = Democrats)	−0.19 (0.24)	−0.81	0.88 (0.38)	2.30*	−0.12 (0.46)	−0.26
One Health and temporally proximal frame × Republicans	−0.90 (0.42)	−2.11*	−1.95 (0.55)	−3.56***	−0.63 (0.40)	−1.57
One Health and temporally distal frame × Republicans	−0.19 (0.39)	−0.50	−0.79 (0.54)	−1.46	−0.06 (0.37)	−0.17
Blaming wildlife and temporally proximal frame × Republicans	−0.24 (0.39)	−0.63	−0.99 (0.57)	−1.73	−0.13 (0.38)	−0.33
Blaming wildlife and temporally distal frame × Republicans	−0.29 (0.37)	−0.79	−0.67 (0.63)	−1.06	−0.21 (0.36)	−0.59
Anthropogenic attribution for wildlife diseases					0.15 (0.05)	2.91**
Anthropogenic attribution for wildlife diseases × Republicans					−0.04 (0.07)	−0.50

(continued)

Table 2. (continued)

Variables in the equation	Model 1: Intentions to engage in conservation behaviors (moderation; Hypotheses 1a–6a)		Model 2: anthropogenic attributions for wildlife diseases (moderation; Hypotheses 1b–6b)		Model 3: Intentions to engage in conservation behaviors (mediated moderation; Hypothesis 7)	
	b (*SE*)	*t*	*b* (*SE*)	*t*	*b* (*SE*)	*t*
Controls						
Female (reference = male)	0.37 (0.14)	2.64**	0.34 (0.19)	1.76	0.32 (0.14)	2.31*
Age	0.00 (0.00)	0.58	0.00 (0.01)	0.63	0.00 (0.00)	0.48
White (reference = nonwhite)	−0.30 (0.17)	−1.77	−0.31 (0.21)	−1.45	−0.27 (0.17)	−1.60
Income (19-point scale, rescaled 0-1)	0.22 (0.31)	0.72	0.56 (0.46)	1.22	0.13 (0.30)	0.43
Less than high school (reference = college graduate)	0.03 (0.28)	0.12	−0.61 (0.40)	−1.53	0.12 (0.27)	0.44
High school diploma (reference = college graduate)	0.31 (0.19)	1.63	0.07 (0.26)	0.28	0.31 (0.19)	1.61
Completed some college (reference = college graduate)	0.07 (0.19)	0.38	0.19 (0.23)	0.80	0.05 (0.19)	0.25
Constant	3.10 (0.34)	9.05***	4.12 (0.59)	7.01***	2.47 (0.42)	5.86***
% R^2	13.7		7.6		17.3	
No. of observations	423		440		422	

*$p < .05$. **$p < .01$. ***$p < .001$.

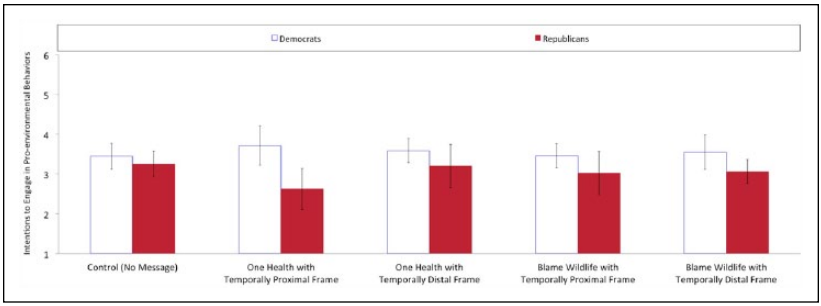

Figure 2. Degree of intentions to engage in conservation behaviors after exposure to a message about Lyme disease by message type and respondents' political party leanings.

Note. Intentions to engage in proenvironmental behaviors were measured using a Likert-type scale ranging from 1 = *strongly disagree* to 6 = *strongly agree*. Error bars represent 95% confidence intervals around the predicted mean of the item. The difference between Democrats and Republicans in response to the message combining One Health and temporally proximal frames relative to the control condition is statistically significant (b of interaction term from ordinary least squares regression = −.90, p = .03).

In addition, supporting Hypothesis 5a, which predicted no substantial differences between Republicans and Democrats when they were exposed to the One Health temporally distal message, we observed no differences between partisans, $|t|$ (407) < 1, p = .62. This was also the case when participants were exposed to the blame wildlife temporally distal message (corresponding to Hypothesis 6a), $|t|$ (407) < 1, p = .43.

Contrary to Hypothesis 3a, neither the temporally proximal nor temporally distal blame wildlife message produced interactive effects with party leanings on conservation intentions, $|t|$ (407) < 1, p = .53. Thus, reactive responses from Democrats in response to the message combining a value-incongruent and a temporally proximal frame were not observed (rejecting Hypothesis 4a).

The Interplay of Message Conditions and Political Leanings on Anthropogenic Causal Relevance of the Prevalence of Wildlife Diseases

With regard to anthropogenic attribution of wildlife disease (Model 2 of Table 2), the results again showed a significant interaction between the One Health temporally proximal message and participants' party identification, b = −1.95, t(424) = −3.56, p < .001, indicating that the message effect was

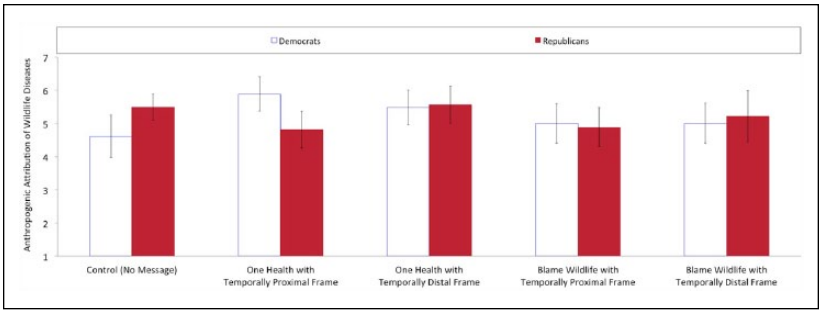

Figure 3. Degree of attributing wildlife diseases to removal of wildlife habitat after exposure to a message about Lyme disease by message type and respondents' political party leanings.

Note. Anthropogenic attribution of wildlife disease was measured using a Likert-type scale ranging from 1 = *not at all relevant* to 7 = *very relevant*. Error bars represent 95% confidence intervals around the predicted mean of the item. The difference between Democrats and Republicans in response to the message combining One Health and temporally proximal frames relative to the control condition is statistically significant (b of interaction term from ordinary least squares regression = −1.95, $p < .001$).

significantly different for Republicans and for Democrats. To probe this interaction, we ran postestimation analysis on a linear combination of coefficients. The analyses revealed—somewhat surprisingly—that Republicans seemed to acknowledge more anthropogenic attribution than Democrats in the control condition (before participants read the message), $b = 0.88$, $t = 2.30$, $p = .02$ ($M_{\text{Republicans}} = 5.49$, $M_{\text{Democrats}} = 4.61$; Figure 3). However, as expected, after they read the message combining One Health and temporally proximal frames, Republicans and Democrats differed such that Republicans tended to acknowledge anthropogenic attribution less than Democrats, $b = -1.07$, $t = -2.79$, $p = .006$ ($M_{\text{Republicans}} = 4.81$, $M_{\text{Democrats}} = 5.89$; supporting Hypothesis 2b). The polarization was driven by the fact that, after exposure to the message, Republicans expressed lower levels of acknowledgment for anthropogenic attributions relative to Republicans in the control condition, $b = -0.68$, $t = -1.99$, $p = .04$ (consistent with Hypothesis 1b). Also, we observed that Democrats expressed greater levels of acknowledgment for anthropogenic attributions relative to Democrats in the control condition, $b = 1.27$, $t = 3.01$, $p = .003$.

In addition, consistent with our expectations (Hypotheses 5b and 6b) that Republicans and Democrats might show no backlash when they receive value-incongruent messages with a temporally distal frame, we observed no differences between partisans when they received the One Health temporally

distal message, $|t|$s < 1.46, ps < 15. Again, we observed no reactive responses from Democrats to value-incongruent messages (here, blame wildlife messages) with a temporally proximal frame compared to the control condition; as a result, we found no partisan differences on anthropogenic attributions, $b = -0.99$, $t(424) = -1.73$, $p = .08$ (rejecting Hypotheses 3b and 4b).

Testing the Mediated Moderation Effect

We found a correlation between anthropogenic attributions and conservation intentions ($r = .22$, $p < .001$, two-tailed). We thus examined anthropogenic attributions as a potential mediator of the observed relationships between message design features, political partisanship, and conservation intentions. We employed procedures that Muller et al. (2005) described to test the mediated moderation Hypothesis 7 for the message combining One Health and temporally proximal frames.

As the earlier OLS regression indicated, respondents' political leanings moderated the message's effect (here, One Health temporally proximal framed message relative to control condition) on conservation intentions (Model 1 of Table 2). We also identified an analogous finding on anthropogenic attributions (Model 2 of Table 2). Furthermore, we found a partial effect of anthropogenic attributions (our proposed mediator) on conservation intentions, $b = 0.15$, $t = 2.91$, $p = .004$ (Model 3 of Table 2). Last, when we controlled for anthropogenic attributions and its interaction with party leanings, the residual direct effects of the message were no longer moderated by political leanings (Model 3 of Table 2). The coefficient of the One Health temporally proximal framed message relative to control condition and party leanings interaction term was reduced from $t = -2.11$, $p = .03$ to $t = -1.57$, $p = .12$. Hence, on controlling for anthropogenic attributions and letting the indirect effect be moderated via the mediator, the residual direct effect of the One Health temporally proximal framed message relative to control condition on conservation intentions no longer depend on party leanings, thus establishing the conditions for a mediated moderation (supporting Hypothesis 7).

Discussion

This study sought to combine insights from theory and research on attribution of responsibility framing, dual-processing models, and partisan motivated reasoning on emerging public health risks in the context of Lyme disease. Particularly, it proposed the role of temporal distance frames in polarizing partisan opinion toward causes and prevention of wildlife disease. Extending

research in these areas, we hypothesized that the combination of a One Health temporally *proximal* frame would negatively affect Republicans' anthropogenic attribution for wildlife diseases and intentions to engage in conservation behaviors. At the same time, we predicted that a One Health temporally *distal* message could buffer these effects among Republicans. Conversely, we expected that the combination of blame wildlife and temporally proximal frames would lead to reactive responses among Democrats, raising their acknowledgment of anthropogenic attributions for the prevalence of wildlife disease and conservation intentions. Also, we predicted that the blame wildlife temporally distal message would not show similarly reactive responses from Democrats. Finally, we predicted that the contingent effect of the message on conservation intentions by party leanings would be mediated by the interaction of message and politics on anthropogenic attribution.

Results from our web-based experiment using a nationally representative sample of U.S. adults partially supported our predictions. The One Health temporally proximal message increased the partisan divide between Republicans and Democrats by decreasing Republicans' acknowledgment of anthropogenic attribution of wildlife diseases and intentions to engage in conservation behaviors, thereby suggesting Republican backlash to a worldview-incongruent message with a temporally proximal frame. Revealing the mechanism of the motivated information processing, the partisan polarizing effect of the message on conservation intentions was mediated by the similar, but not entirely the same, polarizing effect on anthropogenic attributions. We did not, however, find the polarizing effects between Republicans and Democrats in response to the worldview-incongruent message with a temporally distal frame. Neither did we find reactive responses from Democrats when they received the message combining wildlife blame and temporally proximal frames.[5] These findings suggest that although infectious wildlife disease is not currently a politicized issue, increasing communication regarding issues such as Lyme disease with emphasis on human responsibility and temporal proximity of risk may lead to a partisan divide on this issue.

Study Implications

Social scientists have devoted recent attention to understanding when and why partisans engage in motivated reasoning and skeptical evaluation of health and environmental risk issues (e.g., Druckman & Bolsen, 2011; Gollust & Cappella, 2014; Gollust et al., 2009; Hart & Nisbet, 2012). This work would argue that a worldview-incongruent attribution of responsibility frame (attributing the prevalence of Lyme disease to human actions), consciously or not, prompts Republicans to evaluate information in a reactive manner, a

process that appears particularly likely when exposed to an attribution of responsibility frame that is matched to a partisan ideology (Peffley & Hurwitz, 2007). Our study suggests conditions under which the politics-based polarization and boomerang effects can be buffered by introducing a novel message frame: temporal distance. These results have implications for both theoretical developments in partisan motivated reasoning around scientific and public health issues and practical implications for the design of more effective strategic message frames to support One Health initiatives.

Theoretically, these findings support the notion that political polarization around scientific issues is not merely due to a knowledge deficit between groups and/or lack of effortful information processing by one group compared to another (Mooney, 2012). Instead, consistent with Kahan (2013), both political groups seem to engage in more effortful, conscious information processing when exacerbating the polarizing effects of identity-protective cognition (Roh & Hancock, 2014). Practically, this research informs our understanding of how to address public perceptions of impending infectious wildlife disease risk in the face of a skeptical public. Messages about zoonotic diseases issued by health departments or other public agencies often communicate the urgency of the issue with a temporal cue, particularly with a temporally proximal marker (e.g., Lyme disease is a public health threat *today*). Although perhaps intuitively appealing, persuasive messages with temporal markers may not be universally effective in drawing more public support for intended social action (e.g., boosting conservation intentions).

Our findings suggest using caution when considering temporally proximal frames in messages designed to raise awareness of human responsibility for wildlife diseases and increase conservation intentions. In comparison, a temporally distal frame at least seemed not to engender backlash to this study's messages. While combinations of the Republican worldview-incongruent (i.e., blaming human actions) message and temporally proximal frame undermined support for those outcomes among Republicans, when the message was combined with the temporally distal frame, support for conservation intentions did not decrease. Also, given that the distally framed message lowered neither Republicans' nor Democrats' conservation intentions, communicating about long-term risk when highlighting human responsibility for an environmental issue seems the most desirable approach among those combinations tested in the current research.

Overall, our results suggest that those seeking to communicate about human responsibility must consider multiple audiences for their messages and effective message design strategies to maximize the positive impacts of such efforts while minimizing potential backlash. Given that the policy actions of democracies ultimately rest on public opinion, understanding the

precursors to citizens' acknowledgment of human responsibility is foundational to addressing and preventing ecological health risks (Decker et al., 2011; Weiner, 2006). Message strategies that increase the polarization of beliefs about the importance of taking action to address the issue are likely to be counterproductive. Future work should continue to explore message strategies that increase support for these efforts across the political spectrum.

Study Limitations and Future Research Directions

A few study limitations are worth noting. Our message focused solely on one infectious, wildlife disease: Lyme disease. Although the findings reflect previous relationships identified in the literature, we cannot claim that the results would be the same if the focus were on another disease. Future work needs to determine if the results can be generalized to other cases, such as avian influenza, West Nile virus, or rabies. In addition, although our study used both One Health and blame wildlife frames to reflect a saturated, competitive environmental-message context, we did not expose participants to both message conditions at the same time (e.g., Chong & Druckman, 2007; Nisbet, Hart, Myers, & Ellithorpe, 2013). This combination, which was outside of our scope given the focal theoretical aim of the current work, merits further research.

From a measurement standpoint, in contrast to open-ended or free-response measures, we employed closed-ended rating scale measures as a mediator explaining the partisan polarization regarding conservation intentions. Thus, the current study did not provide a more direct process measure showing motivated processing. The absence of such process data can be a limitation, in that we cannot know for certain if the temporal frames actually alter the depth of processing. As relevant literature has explored such motivated processes by examining thought-listing exercises (e.g., Maibach et al., 2010), future work should extend this path to illuminate the process underlying the motivated processing of scientific, environmental, and health-based messages. Moreover, thought listing may provide an avenue for researchers to better understand unexpected results. For instance, in the current study, Republican respondents acknowledged more anthropogenic attribution than Democrats in the control condition, although this pattern reversed after Republicans read the message. Possibly, a targeted thought-listing activity for respondents in *all* conditions (including control) might better characterize the specific nature of these attributions both before and after reading; for instance, some Republican respondents might be envisioning human responsibility in a positive light—for example, human advances in medicine and environmental management could, in some cases, make Lyme disease *less* prevalent than it could have been without these contributions.

An alternative mechanism that could explain this effect is that temporal framing leads to different levels of psychological distance from the risk. Research describing the concept of psychological distance has established that people can perceive objects, events, and individuals in either concrete (low-level) or abstract (high-level) terms (i.e., construals; Trope & Liberman, 2010). These construal-level approaches have shown that these two distinct construals exert strong influence on people's judgments, attitudes, and behaviors, not only regarding perceptions about the physical world but also with respect to judgments about the social world (Eyal, Liberman, & Trope, 2008). Acknowledging that this theoretical area may be potentially informative in this line of research, the current study takes an information processing approach; future research should attempt to compare the efficacy of these two approaches for explaining reactions to temporally based risk messages.

Conclusion

This study suggests that the effects of strategic messages in shaping responses to potentially polarizing health and environmental issues may depend on the interplay of attribution of responsibility, temporal framing, and the political identity of the message recipient. Furthermore, results suggest that communicating scientifically accurate knowledge (e.g., acknowledging human responsibility in the spread of wildlife disease) is not a panacea for ensuring that people will agree with policies that may prevent or mitigate the prevalence of infectious wildlife disease risk. Specifically, our results suggest caution in combining messages emphasizing human responsibility with a temporally proximal frame, particularly among a Republican audience. Partisan backlash was not observed, however, when the message was conveyed with a temporally distal frame.

Appendix

The full text of the messages appears below (alternative temporal frames in brackets):

One Health Frame

Scientists are investigating the rates of Lyme disease along the East Coast, which is a major problem affecting public health today [in the next 10 years]. Lyme disease is a bacterial infection that can be transmitted to humans by the bite of infected black-legged (also known as "deer") ticks. Black-legged ticks

can be found on many species of wildlife, including deer and small animals like white-footed mice.

Lyme disease symptoms include fever, headache, and a characteristic "bull's eye" skin rash in 80% of cases at the site of the tick bite. In most cases, antibiotics can eliminate the infection and its symptoms, especially if the illness is treated early. Delayed or inadequate treatment can lead to more serious symptoms, such as joint problems, neurological effects, and even heart issues.

Scientists believe that human actions and environmental conditions have played a role in the prevalence of Lyme disease. Human movement into suburbia and woodlands has brought people into closer proximity to infected ticks. Development of open areas and woodlands has reduced the numbers of natural predators of mice, leading to an increase in mice populations. Dr. Tim Wilson, of the Association for Wildlife Managers, explained the connection: "The increases in mice provide greater number of reservoirs for Lyme bacteria, and increases in deer lead to greater numbers of ticks, which carry and transmit the disease." All of these factors may contribute to rates of Lyme disease today [in the next 10 years].

Blame Wildlife Frame

Scientists are investigating the rates of Lyme disease along the East Coast, which is a major problem affecting public health today [in the next 10 years]. Lyme disease is a bacterial infection that can be transmitted to humans by the bite of infected black-legged (also known as "deer") ticks. Black-legged ticks can be found on many species of wildlife, including deer and small animals like white-footed mice.

Lyme disease symptoms include fever, headache, and a characteristic "bull's eye" skin rash in 80% of cases at the site of the tick bite. In most cases, antibiotics can eliminate the infection and its symptoms, especially if the illness is treated early. Delayed or inadequate treatment can lead to more serious symptoms, such as joint problems, neurological effects, and even heart issues.

Scientists believe that animal behavior has played a role in the prevalence of Lyme disease, particularly increases in mice and deer populations. Dr. Tim Wilson, of the Association for Wildlife Managers, explained the connection: "The increases in mice provide greater number of reservoirs for Lyme bacteria, and increases in deer lead to greater numbers of ticks, which carry and transmit the disease." All of these factors may contribute to rates of Lyme disease today [in the next 10 years].

Authors' Note

Any opinions, findings, conclusions, or recommendations expressed in this article are those of the authors and do not necessarily reflect the views of the U. S. Department of Agriculture or National Park Service.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by the Cornell University Agricultural Experiment Station federal formula funds, Project No. NYC-131404, received from the National Institutes for Food and Agriculture, U.S. Department of Agriculture, and the National Park Service under Task Agreement J2340100021 of the Great Lakes-Northern Forest Cooperative Ecosystem Studies Unit under Cooperative Agreement H6000082000 between the National Park Service and the University of Minnesota.

Notes

1. This study was exempt by the institutional review board of the first author's home institution (Protocol No. 1206003133).
2. GfK reported a recruitment rate of 14.7% and a profile rate of 65%, yielding a cumulative response rate of 4.9%. The recruitment rate computed by GfK uses the AAPOR response rate 3 for telephone surveys (see Callegaro & DiSogra, 2009, for additional details on computing response rate for online panels).
3. The index was formulated as follows, which runs from −1 (*absolute animal blame*) to 1 (*absolute human blame*).

$$\text{Relative human blame index} = \frac{\textit{Human Blame Score} - \textit{Animal Blame Score}}{\textit{Human Blame Score} + \textit{Animal Blame Score}}$$

4. The oft-employed PROCESS macro (Hayes, 2013) could not be used in the current research because we employed population weights in the analysis. The PROCESS macro, as of now, does not accommodate the analysis incorporating the population weights.
5. This pattern may reflect more crystallized beliefs in conservation intentions among Democrats, who therefore may already engage in conservation behaviors and thus are not easily influenced by transient cues, such as a single message.

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