proposal

Communicating about diseases that originate in animals: Lessons from the psychology of inductive reasoning

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Methods & Analysis

Supplemental Survey Methods

Participants (N = 153) were recruited from Amazon's Mechanical Turk and paid $2 upon completion of the online experiment. All survey procedures were approved by the Human Rights Protection Program of Texas Tech University. The survey was administered in April 2017, shortly after a cluster of leptospirosis cases arose in New York City (Kupferman, Coffee, & Eckhardt, 2017).

The survey consisted of a demographics section, a vignette describing leptospirosis as arising from either common farm animals (pigs, cattle, horses) or common wild or forest animals (rats, raccoons, deer), a generalization section on susceptibility of nondescribed species, sections on swimming in animal habitats and interacting with animals, and standardized measures of disgust (Haidt, McCauley, & Rozin, 1994) and risk attitudes (Weber, Blais, & Betz, 2002).

The demographics section included questions about age, sex (male, female, other), sexual orientation (straight or heterosexual, gay or homosexual, bisexual, other, prefer not to say), ethnicity (Asian American, Black

or African American, Hispanic, Native American or Alaskan Native, Native Hawaiian or Pacific Islander, White or European American, other, prefer not to say), first language spoken fluently, all languages spoken, ZIP code in which they spent most of childhood, highest level of education (middle/junior high school, high school, some college, college degree, some postgraduate, postgraduate degree), highest level of education for mother and father (same categories), political orientation (very liberal, somewhat liberal, neither liberal nor conservative, somewhat conservative, very conservative), whether they own a pet, types of pets owned, if they eat meat, how often they eat meat, how often they would like to eat meat, and if they eat meat from wild animals.

After they completed the demographics section, participants were randomly assigned to read a vignette on leptospirosis, where only the types of animals described as being susceptible to leptospirosis varied between the two conditions. The vignette was based off of the World Health Organization page for leptospirosis (available at https://www.who.int/topics/leptospirosis/en/):

> *Leptospirosis is a bacterial disease that affects both humans and animals. Humans become infected through direct contact with the urine of infected animals or with a urine-contaminated environment. The bacteria enter the body through cuts or abrasions on the skin, or through the mucous membranes of the mouth, nose and eyes.*
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> *Mammals can harbor the bacteria that cause leptospirosis in their kidneys and genital tracts and act as source of infection to humans and other animals. Many mammals can be reservoirs for human infection, including: [Pigs, Cattle, and Horses] or [Rats, Raccoons, and Deer].*

At the end of the vignette, participants answered the question, "According to this paragraph, which animals can humans catch leptospirosis from?" as a manipulation check.

After reading the leptospirosis vignette, participants completed the generalization section. For the generalization section, participants were given seven new animals in a random order (dogs, sheep, donkeys, goats, rabbits, opossums, skunks) and were asked, "For the following animals, answer how likely they are to be able to catch leptospirosis on a 1–7 scale. Use the following scale: 1 = very unlikely to be able to catch leptospirosis, 7 = very likely to be able to catch leptospirosis." After the generalization section, participants completed the interaction and swimming safety sections. For each section, participants saw the same seven animals as used in the generalization section in a new random order. The interaction question asked, "For the following animals, answer how safe it would be to directly interact with (by holding, petting, feeding, etc.) the animal, in terms getting a disease. Answer how safe it is to interact with the animal on a 1–7 scale. Use the following scale: 1 = very unsafe to interact with, 7 = very safe to interact with." The swimming question asked, "For the following animals, answer how safe, in terms of getting a disease, it would be to swim or wade in water near the animal's habitat (e.g., a meadow or a forest known to have a large population of the animal). Use the following scale: 1 = very unsafe to swim near, 7 = very safe to swim near." The animal rating sections were followed by the disgust (Haidt, McCauley, & Rozin, 1994) and risk attitudes scales (Weber, Blais, & Betz, 2002), in that order.

Supplemental Statistical Methods

Survey data were analyzed using the R statistical package. Prior to averaging the animal ratings into measures of perceived farm (dogs, sheep, donkeys, goats) and forest (rabbits, opossums, skunks) animal susceptibility, farm and forest animal interaction safety, and farm and forest animal swimming questions, we assessed the different groupings for reliability using Cronbach's coefficient alpha. Standardized alphas for each grouping were adequate: forest animal susceptibility = .93, farm animal susceptibility = .93, forest animal interaction = .63, farm animal

interaction = .89, forest animal swimming = .80, farm animal swimming = .91. A split-plot analysis of variance was used to test how the between-subject effect of vignette (farm versus forest animal) affected each of these measures for farm and forest animals. Pearson's correlation was used to test the associations between each of the susceptibility measures and the swimming/wading and animal interaction measures. To test whether perceptions of susceptibility mediated the effect of vignette condition on the swimming/wading and animal interaction measures, we used a nonparametric bootstrap test (Preacher & Hayes, 2008) of the indirect pathway (a*b) from vignette condition to susceptibility (a) and susceptibility to swimming or interaction (b).

Supplemental Results

There was a significant interaction between vignette condition and type of animal (farm or forest) on the leptospirosis susceptibility ratings, $F(1,151) = 55.41$, $p < .001$, $\eta_p^2 = .27$. In the farm vignette condition, people were significantly more likely to generalize to other farm animals (dogs, sheep, donkeys, goats) than to other forest animals (rabbits, opossums, skunks), $t(151) = 3.00$, $p = .003$, and in the forest animal condition, people were significantly more likely to generalize to other forest animals than to other farm animals, $t(151) = 2.53$, $p = .012$. This interaction was approaching significance for swimming/wading safety ratings, $F(1,151) = 3.77$, $p = .054$, $\eta_p^2 = .02$, and nonsignificant for animal interaction safety ratings, $F(1,151) = 1.60$, $p = .20$, $\eta_p^2 = .01$.

Susceptibility perceptions were negatively associated with perceived safety of interacting with and swimming around the respective animals, such that stronger beliefs about leptospirosis susceptibility in forest animals was associated with lower ratings of how safe it would be to interact with ($r = -.26$, $p = .001$) or swim/wade near ($r = -.33$, $p < .001$) forest animals. Likewise, stronger beliefs about leptospirosis susceptibility for farm animals was associated with lower safety ratings of interacting with ($r = -.20$, $p = .01$) or swimming/wading near ($r = -.28$, $p < .001$) farm animals.

In all cases, there were significant indirect pathways from the effect of vignette condition on susceptibility ratings to lowered safety ratings for interacting with or swimming around animals. The bootstrap 95% confidence intervals (CIs) did not contain zero for any of the pathways. For swimming, farm 95% CI [−0.012, −0.001]; forest 95% CI [0.002, 0.020]. For interaction, farm 95% CI [−0.011, −0.001]; forest 95% CI [0.001, 0.019].

references

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