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Art can provide a means for promoting biophilia as an aspect of zoonoses risk communication

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The COVID-19 pandemic served as a call to action for scientists to find new and creative ways to prevent future pandemics. Because value-based emotions underly human behavior, scientific facts alone have proven to be a poor motivator to change the behaviors that increase zoonotic spillover risk. Emotions can translate in psychological stances such as biophobia, the fear of or aversion to nature, and biophilia, the appreciation of nature. Educating the public about species that may pose a zoonotic risk can have the unintended effect of inducing biophobia into the public psyche. This can lead to increased zoonoses risk. In this Perspective, I make the case that strategically employing art can be an effective method to communicate zoonotic risk while promoting biophilia. Using art as a method of communication has been explored by various scientific fields but has not been sufficiently applied to infectious disease messaging.

KEYWORDS

zoonoses, biophilia, biophobia, art, communication, education, nature

1 Introduction

Land use change and other ecological impacts can drive the emergence and spread of zoonotic pathogens—disease-causing microbes transmitted between non-human animals and people. Deforestation and urbanization can also lead to increased rates of interaction between wildlife that hosts zoonotic pathogens and humans, allowing for an increased rate of spillover (transmission) events. Therefore, zoonotic disease mitigation is an environmental issue and nature-oriented solutions are needed to mitigate zoonoses risk (Reaser et al., 2022).

If spillover events are caused by increased instances of interaction between humans and the wildlife, shouldn't public health messaging be focused on distancing people from the natural world? No. A disconnection from nature can intensify the factors driving spillover events. For example, when people fear wildlife species that have the potential to transmit zoonotic pathogens, they may kill (cull) these species and/or destroy their habitats. This can increase pathogen exposure in the short-term (Anderson and Reaser, 2024) and further degrade ecosystems over the long-term. There is a need to educate people on how to

appreciate nature safely—to promote biodiversity conservation while responsibly providing public health messaging.

During the COVID-19 pandemic caused by SARS-CoV-2, it became apparent that scientific data alone could not convince all people to engage in behaviors that would reduce their risk of contracting or transmitting the disease. Kwon et al. (2021) found that effective social distancing caused a 31% decrease in COVID transmission risk, and wearing a mask reduced COVID risk by 62%; yet Taylor and Asmundson (2021) found that, despite the science proving the effectiveness of masks in COVID prevention efforts, 10%-15% of American and Canadian adults did not wear masks in public. Several anti-mask rallies took place globally, participants often numbering in the thousands (Taylor and Asmundson, 2021). Gorman and Gorman (2021) conclude that people are often resistant to changing their minds based on fact alone and are more responsive to emotions than to statistics. They propose that scientists must find a way to bridge this communication gap by acknowledging the emotions that drive human behavior rather than relying on facts alone to generate behavior change. The challenge of responsibly communicating infectious disease risk while fostering biophilia is complicated and requires a creative solution. In this Perspective, I propose the use of art as an effective means of communicating environmental understanding to move people away from fear (biophobia) of wildlife that may host zoonotic pathogens toward feelings of appreciation and respect (biophilia), thereby promoting biodiversity conservation efforts and decreasing zoonoses risk. Positive, associative experiences with nature have been shown to increase feelings of human wellbeing, connectedness, and empathy, which in turn can lead to an increased appreciation for conservation efforts (Kirkey, 2024). Recognition that interactions with nature influence human emotions and thus human behavior informs development of a dual-purpose messaging strategy.

2 Biophobia

> "There are many animals, who though far from being large, are yet capable of raising ideas of the sublime, because they are considered as objects of terror. As serpents and poisonous animals of almost all kinds. And to things of great dimensions, if we annex and adventitious idea of terror, they become without comparison greater." (Burke, 1958)

Pathogen transmission from wildlife to humans is one of the main sources of emerging infectious diseases (Ellwanger and Chies, 2021). The frequency of these spillover events can be attributed to several factors, including increasing land use and the widespread wildlife trade. The lack of global education and awareness about the risks of coming into contact with wild animals is a major cause for public health concern (Vora et al., 2023) The solution may seem simple – educate the public about the risks associated with exposure to wildlife. However, public health messaging can unintentionally create a negative impact by generating feelings of biophobia towards different animal species associated with disease (Anderson and Reaser, 2024).

Soga et al. (2023) defines biophobia as, "the adverse response, such as fear and disgust, that people can show towards some natural stimuli, settings, or situations." Biophobia exists for a variety of reasons, ranging from pop culture horror to personal traumatic experiences. Some argue that biophobia is an innate reaction meant to keep oneself safe from the parts of nature that could be dangerous (Soga et al., 2023). Sentiments of fear, disgust, and other aspects of aversion cause people to use chemical repellents, glue traps, or poison to protect themselves from animals viewed as disease-carrying pests. Typically, these pest-control methods kill the target species in inhumane ways and may have adverse consequences for non-target species as well (Mason and Littin, 2003). Thus, biophobic responses to wildlife disease risk can harm wildlife populations and impact delicate ecological systems (Soga et al., 2023). It is true that wildlife can carry zoonoses. It is also true that animals associated with zoonoses play important roles in keeping their ecosystems healthy by stimulating plant growth, spreading seeds to promote biodiversity, and acting as a source of food for other animals (Sieg, 1987). However, once an animal is associated with disease it can be challenging to refocus the narrative on the ecological importance of these species (Soga et al., 2023).

3 Biophilia

> "Humanity is exalted not because we are so far above other living creatures, but because knowing them well elevates the very concept of life. Splendor awaits in minute proportions." (Wilson, 1984)

Vora et al. (2023) point out that humanity's broken relationship with nature heightens pandemic risk. Promoting biophilia could be the answer to mending this rift. Wilson (1984) defines biophilia as "the innate tendency to focus on life and lifelike processes." Humans have a natural curiosity about the world and fostering that sense of curiosity instead of allowing fear to rule perceptions of nature is necessary to transmute biophobic patterns (Soga et al., 2023). Kirkey (2024) proposes that fostering biophilia can promote conservation efforts while mitigating spillover risk. The question is: How? Feelings of biophobia can be deeply ingrained in the public psyche and thus pose a challenge to promulgating feelings of biophilia.

4 Art

For the purposes of this Perspective, art is inclusive of both visual and performing arts. In an examination of the emotional responses tied to art, Ducasse (1964) observes that "art is the language of the emotions" and therefore has the ability to communicate the feelings of the artist to the audience. Art induces emotional reactions at

multiple levels of the psyche. Basic emotions are those related to our survival such as fear, joy, disgust, sadness, and anger (Collet et al., 1997). These emotions drive biophobic and biophilic responses. The emotions evoked by art are called "aesthetic" emotions (Tan, 2000). Aesthetic emotions may stem from basic emotions, but they tend to be more specific and nuanced. Some examples of aesthetic emotions include pleasure, awe, and wonder (Schubert, 2024). Tan (2000) examined the relationship between aesthetic and basic emotions and found that aesthetic and basic emotions work together to form opinions of art works. When an individual views art, they are aware that the art is a representation of a theme, and therefore can appreciate it from an objective and aesthetic perspective. However, if the theme in the art sparks a memory in the individual, this will evoke an empathetic and emotional response, allowing them to connect to the art piece on a deeper level. Nummenmaa and Hari (2023) observed that visual art can induce a physical response in its audience, such as facial movements or clenched fists, in the same way as basic emotions.

Throughout human history, lessons and other information have been communicated to society using various artistic methods such as paintings, sculptures, and stories (Carroll, 2004). Art as means of communicating ideas has been extensively explored in a variety of scientific fields. The World Health Organization reviewed 900 publications reporting on nearly 4000 studies focused on the benefits of using art to improve health and found conclusive evidence that there is a positive correlation between the two—art benefits human health (Fancourt and Finn, 2019). Thomson et al. (2020) evaluated the biopsychosocial effects of using art and nature to improve mental health and found that, along with improved wellbeing, the arts were an effective way to communicate messages and encourage positive behavior change to the participants.

Interactive, art-based education has proven to be an effective tool for raising awareness about endangered species conservation. Boonchutima et al.'s (2022) study evaluated memory retention of participants interacting with an artistic exhibit focused on Thai elephant conservation. Participants who perceived the experience as interactive noted an increase in their awareness of Thai elephant conservation efforts. Upon follow-up a year and a half later, participants were able to share remembered details about the exhibit and facts about elephant conservation practices. Art-based education has also been used to raise awareness about the conservation of less charismatic species. An art exhibit focused on the Salt Creek tiger beetle (*Cicindela nevadica lincolniana*) compiled a diverse collection of pieces from local artists interested in beetle conservation. Of the exhibit's attendees, 13% were surveyed. The most significant change in perceptions of the Salt Creek tiger beetle was observed in adult non-academics who had little to no prior knowledge of the insect. Some recorded responses from these individuals indicated that the exhibit had evoked an emotional response and their knowledge on Salt Creek tiger beetle conservation had increased. Overall, there was shown to be an increase in recognition of the importance of insects in an ecosystem (Brosius et al., 2014).

The application of art at the biodiversity conservation-zoonoses prevention interface is not yet well established. However, the travel exhibit, *ZOONOSES*, which examines human perceptions of zoonoses and zoonotic hosts, provides a useful model (Hooper and Reeves, 2022). The goal of *ZOONOSES* is to raise awareness about zoonotic pathogens and their hosts through an interactive, fairy-tale inspired exhibit. Hooper recognizes that there are many animals that are negatively perceived because of their association with disease and strived to create an educational space where viewers "end up being less fearful and also have a more balanced perspective of nature" (Devonport Regional Gallery, 2023). Along with providing education through the art itself, Hooper assisted in the creation of an educational resource to be reviewed and completed while viewing the *ZOONOSES* exhibit. This educational resource challenged the audience to contextualize the exhibit by asking what roles humans and animals play in the spread of zoonoses (Hooper and Reeves, 2022).

5 Conclusion

Promoting biophilia is essential in maintaining public respect for wildlife while also providing education about zoonotic disease risk. On their own, neither fact nor emotion are strong enough to influence the type of behavior change needed to prevent zoonotic spillover. There is merit in exploring art as a pathway to pandemic prevention and biodiversity conservation. Allowing an audience to interact with art is a way to generate feelings of empathy and understanding towards subjects that may be uncomfortable to look at through a purely scientific lens. Interdisciplinary approaches allow for various interpretations to help resolve conflicts in creative ways. It is time to eliminate the divide between the fields of art, science, and healthcare and unite under the shared motivation to put an end to the pandemics that impact us all. There is a need for a social marketing campaign that engages the public health and conservation communities in the practice of using art to communicate zoonoses risk mitigation and biodiversity conservation messaging in concert.

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.

Author contributions

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Conflict of interest

Author PB was employed by Beaumont Consulting. The author declares that this Perspective was developed in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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