What's in a Label and Who's on the Table: Examining Consumer Perceptions of Plant-based Alternatives and Animals used for Food

Dissertation

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Abstract

Animal agriculture is a dominating contributor to anthropogenic climate change. Thus, decreasing animal product consumption is an essential step in mitigating the global climate crisis. Substantial research has investigated consumption behaviors pertaining to meat products and herbivorous alternatives for them, but research up to this point has largely neglected products from three of the largest categories of animal agriculture: dairy, eggs, and seafood. Chapter 1 presents an overview of why this research is needed, outlining prior research that has informed the current work, and introducing the prevailing theoretical foundations woven throughout this dissertation. In Chapter 2, consumer perceptions of dairy and egg product alternatives are explored in omnivorous and herbivorous populations to understand how different labeling strategies—vegan and plant-based—impact beliefs about product attributes and consumer choice. Then, the concept of meat-related cognitive dissonance is applied to such non-meat animal products and their alternatives to examine if and how it manifests beyond meat-eating behavior. Results suggest that among omnivores, the vegan label is associated with more loss compared to the plant-based, but the opposite is true in the herbivorous sample. Findings also show that people who choose an animal-based dairy and egg product when they could have instead chosen an herbivorous alternative experience more cognitive dissonance than those who choose the herbivorous option. Chapter 3 builds on this by

exploring how the belief that a dairy product is healthy or unhealthy can impact related opinions about herbivorous alternatives for it. Results reveal that when a dairy product is viewed as healthy (i.e., Greek yogurt), herbivorous alternatives for it are viewed as significantly less healthy and less sustainable, but when the product is viewed as unhealthy (i.e., ice cream), the alternatives are seen as significantly healthier and more sustainable. Chapter 4 then incorporates marine animal consumption behavior, comparing experienced social closeness towards different animals used for food, and testing two messaging strategies aimed at fostering experienced social closeness. Results find that marine animals used for food are generally seen as more socially distal than terrestrial animals used for food, and are also viewed as healthier, more environmentally sustainable, and more morally permissible to consume. Messaging strategies aimed at increasing social closeness between humans and the most socially distal marine animals reveal that highlighting shared goals between humans and an animal significantly increases social closeness and empathy, also leading to a decrease in willingness to consume that animal. Finally, Chapter 5 summarizes and synthesizes the results from all five studies, and discusses their practical and theoretical implications.

Dedication

To those who endure the consequences of humanity's indifference.

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My love for all of you is truly infinite.

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Chapter 1. Introduction and Literature Review

1.1 Background

At the crux of the climate crisis are greenhouse gas emissions, the vast majority of which are human-caused (National Aeronautics and Space Association, 2023). Globally, it is estimated that over 25% of anthropogenic emissions are due to food production practices (Poore & Nemecek, 2018), necessitating a reevaluation of current agricultural systems and consumer behavior. As the global population continues to grow, so too does the demand for food, and continued inaction promises dire environmental consequences (Ekberg et al., 2022; Kemp et al., 2022).

Animal agriculture—the practice of breeding and maintaining animals to use for human gain—accounts for a massive proportion of global emissions annually. While experts generally agree that 14.5% of global emissions are due to animal agriculture, recent research suggests 16.5% is the minimum share attributable to this sector (Twine, 2021), accounting for over 60% of food-related emissions (Poore & Nemecek, 2018; United States Environmental Protection Agency, 2021). Despite this, animal products only account for 18% of calories consumed globally, as over one third of them are wasted in landfills where they continue emitting methane (Poore & Nemecek, 2018).

Globally, 936 million tons of dairy, 93 million tons of eggs, and 184 million tons of marine animal meat are produced annually (Food and Agriculture Organization of the

United Nations, 2023, n.d.). For added perspective, this means that by weight, more dairy is produced than all meat products combined, more eggs than cow meat, and more marine animal meat than meat from any single terrestrial species. Despite the widespread consumption of dairy, eggs, and marine animals, terrestrial meat has been the overwhelming focus of consumer research on sustainable consumption and perceptions of vegan/plant-based alternatives.

1.1.1 Dietary Choice

A fully vegan/plant-based diet excludes all foods containing animal-derived ingredients. From a dietary perspective, the terms "vegan" and "plant-based" are often used interchangeably, and their lifestyle differences (e.g., wearing animal-derived clothing or not) are outside the scope of the current research. As such, any diet or product excluding all animal-based ingredients will hereafter be described as "herbivorous". Following such a diet has the smallest environmental impact compared to all other common diets (Bruno et al., 2019; Castañé & Antón, 2017; González-García et al., 2018), decreasing an individual's dietary carbon footprint by 51-61% (González-García et al., 2018; Scarborough et al., 2014; Xu et al., 2021). In fact, only removing meat from one's diet has a significant environmental benefit, decreasing one's dietary carbon footprint by 35% relative to meat eaters (Scarborough et al., 2014). Thus, reducing animal product consumption while simultaneously remediating animal agriculture practices can profoundly lower emissions, mitigating ecological strain. The individual dietary change component of this call to action will be the focus of this dissertation.

It is well-supported that humans can not only maintain their levels of health on an herbivorous diet, but are even able to thrive in ways they cannot when following an omnivorous diet, defined as consuming products derived from both plants and animals (Castañé & Antón, 2017; Marrone et al., 2021). Switching to an herbivorous diet has been shown to lower cholesterol levels, decrease stomach problems, and increase energy levels, among other benefits (Sakkas et al., 2020; Selinger et al., 2023; Wirnitzer, 2020). Further, in most places, financially maintaining an herbivorous diet is comparable and can even be more budget-friendly than an omnivorous diet (Giacoman et al., 2023; Kabisch et al., 2021). If adopting an herbivorous diet is beneficial or innocuous to one's health and finances, and positively impacts the environment and animal welfare, it may be a viable option for those seeking to address any one of these issues. Despite this, a very small percentage of the population follows a diet restrictive of animal products in any way. It is estimated that globally, only 3% of the population excludes meat from terrestrial animals (pescatarian), 5% excludes meat from all animals (vegetarian), and 3% is herbivorous (Ipsos, 2018). The farming industry and related systemic entities certainly have a responsibility to address these issues as well, but at the heart of production and supply is consumer demand, a figure only individuals can alter. This dissertation contributes to the growing pool of knowledge that could be instrumental in future research endeavors and practical applications aimed at reducing animal product consumption and increasing the acceptance of their herbivorous alternatives.

1.2 Goals and Objectives

The primary objectives of this dissertation are to illuminate consumption behaviors pertaining to dairy and egg substitutes, and marine animals used for food. Chapter 2 initially investigates how the labeling of herbivorous dairy and egg alternatives impacts experienced loss aversion and perceptions of product characteristics (e.g., health, sustainability). Next, it explores the relationship between product choice and experienced dissonance. Chapter 3 builds on this by exploring how health perceptions of dairy products impact perceptions of herbivorous alternatives for them, and by measuring product perceptions before and after tasting. Finally, Chapter 4 investigates experienced social psychological distance towards different animals used for food, differentiating between terrestrial and marine animals. This information is then used to compare the efficacy of messaging strategies rooted in theory to increase social closeness with the animals viewed as socially farthest.

1.3 Literature Review

Nearly all research on herbivorous labeling perceptions and consumer choice has centered around meat replacements such as veggie burgers, 'meat'balls, etc. (Caputo et al., 2023; Demartini et al., 2022; Rosenfeld et al., 2022). A modest but growing body of research has investigated consumer perceptions of non-meat herbivorous replacements (e.g., non-dairy cheese) (Amyoony et al., 2023; Rombach et al., 2023), and very few studies have explored labeling effects among them (Anderson, 2019; Ruby et al., 2024). Among those that have, egg and dairy alternatives have typically been excluded entirely, or been only a peripheral consideration compared to meat alternatives.

1.3.1 The Impact of Labeling

In a variety of contexts, the way products are labeled and how such labels are perceived can impact the choices people make (Hahnel et al., 2015; Raheem et al., 2014; Roberto et al., 2010).

There are a number of attributes companies may choose to highlight when labeling products. For example, adding environmental information can increase purchasing of sustainable products (Bastounis et al., 2021; Potter et al., 2021; Vlaeminck et al., 2014), and labeling products as low-fat causes people to believe they contain fewer calories (Fernan et al., 2018). Further, food products with nutritional claims are sometimes perceived as less delicious (Oostenbach et al., 2019), products labeled as gluten-free are perceived as healthier (Dunn et al., 2014), and people are not willing to pay as much for milk labeled as 98% fat-free compared to milk labeled as 2% fat (Kazi et al., 2022).

Research on labeling herbivorous food products has increased in recent years, perhaps due to rising numbers of herbivorous people and/or more available herbivorous alternatives to animal products (Aschemann-Witzel et al., 2021; Gheihman, 2021). Herbivorous alternatives can be labeled vegan, plant-based, or a variety of other ways, but only a certified label—a registered trademark companies can pay for—ensures there are no animal products in an item. Regardless, products with certified or non-certified plant-based/vegan labels are largely understood as and expected to be animal product-free (Palmer, 2021).

Effects of Labeling on Product Choice. Much existing research on herbivorous alternative food labeling has centered around perceptions of product attributes (i.e., health, taste) depending on label, but notably, research evaluating what consumers intend to choose or actually choose is limited (Besson et al., 2020; Demartini et al., 2022). Of the studies that have examined choice, most have compared an herbivorous meat alternative to an animal-based meat option (as opposed to comparing two herbivorous options labeled differently). Unsurprisingly, when omnivorous individuals are faced with a meat vs. non-meat choice, they are more likely to choose the meat option (Caputo et al., 2023). In fact, a 2021 survey showed that nearly three quarters of people would still choose slaughtered animal meat even if cultured meat—an alternative nearly indistinguishable from slaughtered meat in taste and makeup—was offered as another option (Webster, 2021).

A modest number of studies have simultaneously compared the effects of multiple herbivorous labels on product preferences (H. Lee et al., 2024; Ruby et al., 2024)—which will be further discussed in Chapter 2—but there is no clear consensus on which label is rated most favorably, or is chosen most often.

1.3.2 Motivators of Herbivorous Choices

When considering motivations for choosing to adopt an herbivorous diet or herbivorous alternatives to animal products, there are three main foci in existing literature: health, environmental sustainability, and animal welfare. While vegan and plant-based labels often mean the same thing when put on food products, a label can and

often does evoke opinions about many product attributes including nutritional qualities, impact on the environment, and relationship to animal welfare.

A great deal of research has investigated health perceptions between herbivorous meat alternatives and their animal-based counterparts, but few have compared health perceptions between herbivorous alternatives with different labels. This type of work is critical because one label may be perceived as nutritionally superior, an attribute that is often fundamental to product selection (Aggarwal et al., 2016). One example of the former found that two meat alternatives labeled as "vegetarian sausage" and "vegetarian nuggets" were perceived as less healthy than steak (Michel, Hartmann, et al., 2021). However, among a sample of omnivorous people who reported being open to herbivorous foods, a meat alternative labeled as "plant-based" was perceived as healthier than animal meat by 45% of participants (International Food Information Council, 2020). One study comparing herbivorous alternatives to one another found that dishes labeled with terms such as "meat" (e.g., vegan meatballs), were perceived as healthier than labels without reference to meat (e.g., vegan product) (Demartini et al., 2022). These conflicting findings demonstrate the power of a label on health perceptions, but more research is needed on why. Chapter 2 of this dissertation compares health perceptions across herbivorous labels, and Chapter 3 delves deeper into health perceptions associated with herbivorous dairy alternatives and labels, evaluating whether such perceptions vary across healthy and unhealthy foods.

Beyond health, some research has explored the differences in perception of environmental impact between differently labeled herbivorous products (e.g., H. Lee et

al., 2024; Sucapane et al., 2021). Generally, research has shown that herbivorous foods—animal product alternatives or not—are perceived as more sustainable than omnivorous options, regardless of label (Stremmel et al., 2022; Van Loo et al., 2017). However, omnivorous individuals shown food with an explicitly environmental label (e.g., Environmentally Friendly Main Courses for a Happy Planet) were almost twice as likely to choose an item from that portion of the menu than when it was vegetarian-framed (e.g., Vegetarian Main Courses) (Krpan & Houtsma, 2020). The interplay between sustainability and herbivorous labeling warrants more research to gain insight into the minds of consumers. Chapters 2 and 3 investigate this by comparing sustainability ratings across different herbivorous labels and foods.

Decades of research have found that most herbivorous people are motivated to follow an herbivorous diet due to animal welfare concerns (Judge et al., 2022; Malek & Umberger, 2021; Tunç, 2023). Despite the major focus on animal welfare concerns in the literature on herbivorous eating, there is a lack of research testing animal welfare perceptions between plant-based and vegan labels. This is important because animal welfare is the most common reason for choosing to follow an herbivorous diet (Judge et al., 2022; Tunç, 2023). Chapter 2 of this dissertation compares the two labels on consumers' beliefs about whether the product was intended to address animal welfare concerns by producers, as well as the degree to which it actually addresses animal welfare concerns.

1.3.3 Marine Animals Used for Food

Perhaps even more so than dairy and eggs, the consumption of marine animals has been largely overlooked in existing research on dietary choice and herbivorous alternatives. Because fishing and aquaculture negatively impact the environment in many ways, such as contributing to greenhouse gas emissions and plastic pollution (MacLeod et al., 2020; Skirtun et al., 2022), investigating consumer perceptions of the consumption of these animals may ultimately yield insights that can curb such impacts.

Marine animals used for food, by definition, are meat, yet many people do not see them as such (Joy, 2020), evidenced by the common use of "vegetarian" to describe one's pescatarian diet (Cullen et al., 2024; Rosenfeld & Tomiyama, 2021). Both marine animals and birds are called by their animal names (e.g., chicken, shrimp, salmon) when eaten, yet cow and pig flesh have been assigned different names (e.g., pork, beef). This may be due to a sense of detachment from birds and fish that does not warrant the same efforts that mammalian meat does to combat feelings of dissonance (Cullen et al., 2024).

Additionally, marine animals are often perceived as the healthiest animal protein source, and the most sustainable meat (dos Santos Freitas et al., 2017; Grimshaw, 2013). Perhaps partially due to these beliefs, far more marine animals are killed to feed humans than any other animal (Martyn, 2023; Wadiwel, 2016). Existing research has measured feelings like empathy and disgust relating to terrestrial meat (Kubberød et al., 2002; Kunst & Hohle, 2016), but there are very few studies that even mention how marine animals fit into this (e.g., Cullen et al., 2024). Chapter 4 of this dissertation investigates

differences in consumer perceptions of terrestrial vs. marine animals used for food, and tests messaging interventions to increase social closeness towards them.

1.4 Theoretical Underpinnings

Several theoretical frameworks provide a foundation for the research questions and result interpretations of the following studies. The main theories applied to this work are prospect theory, cognitive dissonance theory, and construal level theory.

1.4.1 Prospect Theory

Prospect theory posits that people are more sensitive to losses than gains. In other words, someone is likely to react significantly more to the loss of ten dollars than they would to the gain of ten dollars (Kahneman & Tversky, 1979). Considering herbivorous labeling, it may follow that "plant-based" is the preferred term to use when labeling herbivorous items, because it signifies what ingredients are *prevalent* in the item, whereas foods labeled as "vegan" may remind consumers of what ingredients are *missing* from the item (Anderson, 2019; Rosenfeld et al., 2022). In a similar vein, people are more likely to choose herbivorous items when an intervention is framed as "eating more herbivorous foods" instead of "eating less meat" (Carvalho et al., 2022).

Prospect theory would suggest that products with labels indicating loss would be chosen less than those indicating gains. The "plant-based" label has often—but not always—led to more favorable ratings and higher levels of intended selection compared to other labels (e.g., H. Lee et al., 2024; Sucapane et al., 2021). From a prospect theory perspective, plant-based connotes what is prevalent in the product rather than what is

missing (Kahneman & Tversky, 1979; Rosenfeld et al., 2022), which may explain these findings.

Chapter 2 of this dissertation incorporates prospect theory by exploring how the loss associated with a product may differ depending on label (vegan vs. plant-based). This will be the first research to explicitly measure perceived loss between these two labels, as prior research comparing herbivorous labels has only incorporated prospect theory post hoc as a lens for interpreting results (e.g., Rosenfeld et al., 2022). This will yield valuable insight into whether these two labels are viewed differently—one as gain-framed and one as loss-framed—and if these differences impact product choice.

1.4.2 Cognitive Dissonance Theory

Cognitive dissonance theory—which postulates that people experience mental duress when they believe one thing but do another—is a well-studied and robust paradigm that can help shed light on omnivorous individuals' experiences. In this context, the phenomenon has been deemed the "meat paradox," which refers to the idea that most omnivorous people believe animals should be treated kindly, and experience dissonance when they are reminded that the animal they are eating was once alive (Loughnan et al., 2010). Highlighting this phenomenon, large proportions of omnivores have expressed holding the belief that animals deserve the same rights as humans and that factory farms should be outlawed, and even more have expressed disagreement with inhumane slaughtering methods; yet almost all animals used for food live on factory farms (Reese, 2018; Rothgerber & Rosenfeld, 2021). Among vegetarians, three recent iterations of this idea, coined the "cheese paradox" or the "dairy paradox," have found

evidence of dissonance when vegetarians consider eating dairy and eggs (Davies & Stanley, 2024; Docherty & Jasper, 2023; Ioannidou et al., 2023). It appears these feelings of discomfort are consistent when the subjective ethics behind a large part of one's diet come into question as the realities of animal agriculture are brought to light.

In a 2016 study, Kunst and Hohle provided pictures of different levels of "animalization" (e.g., a roasted pig with a head vs. a roasted pig without a head) and found that participants were more willing to eat meat when the animals were more processed (e.g., headless pig). These same researchers conducted another study in which they manipulated the animalization of menu item names, such as changing the word "beef" to "cow," and the word "pork" to "pig," resulting in menu items such as "Slow-roasted Cow Tenderloin" and "Baked Pig Chops." This labeling strategy significantly decreased willingness to choose a meat dish, and increased empathy towards animals and disgust towards meat menu items, perhaps as a result of decreasing the ability to use dissonance reduction strategies (Kunst & Hohle, 2016).

There are a number of ways omnivores may try to reduce their feelings of dissonance, including identifying with the "humane meat movement," deflecting blame onto the meat industry, and/or denying the intellectual capabilities of the animals they consume, among other strategies (Rothgerber & Rosenfeld, 2021). It has been suggested that a key mechanism by which omnivorous people reckon with this dissonance is through dissociation (Benningstad & Kunst, 2020; Kunst & Hohle, 2016; Zickfeld et al., 2018). In this context, dissociation can be understood as mentally detaching oneself from the reality of animal suffering and the environmental impacts caused by meat production,

thereby creating a psychological distance that helps reconcile actions with beliefs. For instance, processing lunch meat so that it no longer exhibits the blood its production entails rinses away the indignancies of the slaughtering process, enabling individuals to spare themselves exposure to its realities. In fact, even vegetarians in the cheese paradox study employed dissociative dissonance reduction strategies by favoring cheese over milk, expressing that it was easier to eat cheese because its level of processing makes it seem less related to the cruelty associated with dairy production (Docherty & Jasper, 2023). In the dairy paradox study, instead of seeking to justify their decision with reduction strategies, vegetarians were more likely to decrease their dairy consumption when faced with feelings of dissonance (Davies & Stanley, 2024).

Chapter 2 of this dissertation will explore how choice and herbivorous labeling may impact feelings of dissonance and negative affect, which has been shown to correlate with dissonance (Elliot & Davine, 1994; Harmon-Jones, 2000).

1.4.3 Construal Level Theory

Coined by Nira Liberman and Yaacov Trope, construal level theory (CLT) concerns how the psychological distance between a person and an object impacts the way in which that person thinks about it. Specifically, this theory posits that a greater level of psychological distance invokes more abstract or higher-level thinking compared to less psychological distance, which invokes more detailed and concrete thinking (Trope & Liberman, 2003). There are four key dimensions of CLT: spatial (proximal vs. distal), temporal (near vs. distant future), social (close to person/group vs. distant from person/group), and hypotheticality (concrete vs. abstract).

CLT research in the context of climate change primarily pertains to pro-environmental behaviors (or a lack thereof), and attitudes or beliefs about climate change. As previously discussed, decreasing or removing animal products from one's diet is considered sustainable, but very little CLT research has investigated animal product consumption as a pro-environmental behavior. One study manipulated message framing to invoke low-level construals and found support for dynamic normative messaging at decreasing meat consumption (De Groot, 2022). Another study sought to increase the use of low-level construals within all four dimensions of psychological distance by conducting a virtual reality experience of climate change consequences, but found no impact on meat and dairy consumption (Meijers et al., 2023). A recent study has differentiated between the consumption of marine and terrestrial animals through the lens of CLT (Cullen et al., 2024), interpreting their results as indicative of substantial experienced social distance from marine animals used for food. However, this semi-structured interview involved only ten participants via snowball sampling, and lacks statistical support for the nuanced differences between human relationships with marine vs. terrestrial animals used for food. Chapter 4 of this dissertation will build upon this by quantitatively exploring experienced social distance perceptions concerning marine and terrestrial animals, and comparing interventions to reduce this distance.

1.5 Intellectual Merit

This dissertation advances theoretical knowledge in several ways. Study 1a-b measures experienced loss between vegan and plant-based labels, adding to the literature on prospect theory by applying it to non-monetary situations. Loss aversion is somewhat

ambiguous, yet also tends to be examined in a narrow and formulaic way (Abdellaoui et al., 2007). Cumulative prospect theory has been presented as an appropriate means for investigating nonlinear situations (Tversky & Kahneman, 1992), but remains understudied in framing scenarios such as labeling.

Study 1c advances knowledge on meat-related cognitive dissonance by incorporating non-meat herbivorous alternatives and exploring the impact of herbivorous labeling. The lack of apparent death associated with dairy and egg production may limit feelings of dissonance, potentially because people are more able to rationalize their decisions and further dissociate from the farming practices since animal death is one level further from them (compared to meat, where death is essential to the product). Should exposure to one herbivorous label increase dissonance, this could broaden meat-related cognitive dissonance by incorporating animal products beyond meat, and elucidating if the addition of an herbivorous alternative to such a choice scenario has any effect on dissonance.

Study 2 contributes insights on health perceptions that vary as a function of product type and label by incorporating health perceptions of dairy products to interpret the health ratings of herbivorous alternatives for them. Further, this study advances research on the relationship between taste and health by measuring product attributes before and after tasting a product.

Study 3a explores the effects of social psychological distance between humans and nonhuman animals, extending the applicability of the social dimension of CLT beyond human-human interactions. Applying the social dimension to human-nonhuman

animal relationships reinforces its theoretical robustness as a fundamental aspect of psychological distance. Further, in comparing marine and terrestrial animals on experienced social closeness, this research tests whether psychological distance can explain why people are more willing to eat marine animals than terrestrial. This provides a foundation for Study 3b, which tests two intervention approaches for increasing social closeness. These intervention approaches are informed by literature on CLT as well as empathy towards animals, elucidating the most effective ways to increase social closeness between humans and nonhuman animals.

1.6 Research Questions

This dissertation addresses the following research questions:

Research Question 1: How do herbivorous labels influence experienced loss aversion, product attribute perceptions, and choice in the context of herbivorous alternatives to egg and dairy products?

Research Question 2: How do herbivorous labels and product choice impact experienced dissonance?

Research Question 3: How do health and sustainability perceptions vary as a function of label (vegan vs. plant-based vs. dairy) and product type (healthy vs. unhealthy)?

Research Question 4: Does social distance differ across marine and terrestrial animals used for food, and if so, how can this distance be reduced?

1.7 Broader Impacts

This dissertation research has the potential to provide valuable information for educational campaigns, policymaking, food production, and marketing to help decrease

animal product consumption by promoting herbivorous alternatives, and decreasing perceived distance from animals. While a considerable body of literature has examined consumer behavior related to terrestrial meat alternatives, there is a substantial gap in research pertaining to other environmentally deleterious animal products like dairy, eggs, and seafood, and herbivorous alternatives for them. By addressing this gap, this research will contribute to a more holistic understanding of how consumers respond to more sustainable replacements for some of the most commonly consumed animal products. Insights gained from comparing herbivorous product labels to uncover underlying consumer preferences will be critical for efforts at increasing consumption of herbivorous foods.

Understanding the differences in perceived distance between humans and nonhuman animals will provide insight into behaviors regarding the largest meat source globally. Application of these findings to policy or other systems may be used to address the sourcing process of marine animals used for food by increasing consumer empathy for marine animals, thereby decreasing intention to consume them. Ultimately, the potential impact of this work reaches beyond theory to contribute to informed decision making, advocacy efforts, and the shaping of sustainable food systems for the benefit of the ecosystem.

Chapter 2. Herbivorous Alternatives to Dairy and Eggs: Labeling Effects on Product Perceptions, Experienced Loss, and Choice-Induced Dissonance

Dairy and egg products have both been staple ingredients in the majority of Western households for decades (Henchion et al., 2021). Globally and by weight, dairy is produced at almost three times the amount of all terrestrial meats combined, making it the most produced animal product (Food and Agriculture Organization of the United Nations, 2023). And while eggs may be less popular and come from a much less resource-intensive animal, egg production has increased by over 600% since 1961, and by weight, more eggs are produced annually than beef (Food and Agriculture Organization of the United Nations, 2023, n.d.). Despite all of this, terrestrial meat products have remained the focus in consumer research on herbivorous alternatives to animal products. Using the term "meat" when describing products made only from plants is a contentious topic in modern society, with many people and even entire states claiming the term should be kept exclusive to animal flesh alone (Silverman, 2020). This furor has indeed made meat alternatives an alluring alley for consumer psychologists, but the conversation around dairy alternatives is growing in debate as well (e.g., Silverman, 2020; United States Food and Drug Administration, 2023). Regardless of the contention surrounding milk alternatives, the environmental impact of dairy makes it perhaps the most important animal product of all when it comes to changing consumer behavior.

Due in part to the environmental concerns resulting from egg and dairy production, many people have chosen to pursue consumption habits that reduce or eliminate animal products from their diet (Sullivan et al., 2024). Such diets include occasionally consuming meat (flexitarian), abstaining from eating terrestrial animals (pescatarian), abstaining from eating all animals (vegetarian), and abstaining from all products derived from animals (herbivore). While environmental concerns are reported as the second most common reason vegetarians and herbivorous individuals choose their diets, animal welfare concerns are the most cited reason for making such dietary changes (Dhont & Ioannidou, 2021). Further, some people choose a diet with fewer animal products for health reasons, as a plant-focused diet can have myriad benefits for one's health (Sakkas et al., 2020; Selinger et al., 2023; Wirnitzer, 2020). People following any kind of plant-heavy diet are often lumped together in research studies (e.g., Feiertag et al., 2023; Woodside et al., 2022), though the variation between these diets suggests that people following one may differ from people following another not only due to beliefs and values, but also perceptions of herbivorous alternatives to animal products.

2.1 Literature Review

2.1.1 Product Choice

The effects of product labeling on consumer perceptions and choice can be profound. Much research in this domain focuses on the inclusion of various kinds of nutritional information and its contribution to consumers making healthier choices (e.g., Lando & Lo, 2013; Ni Mhurchu et al., 2018), as well as the effect of labeling a product as environmentally sustainable on product choice (Potter et al., 2021). More recently,

herbivorous alternatives to animal products have become a subset of labeling research. Primarily focused on terrestrial meat alternatives, this research has compared several different labeling strategies to understand what people (primarily people who eat animal products [omnivorous]) are most receptive to when it comes to choosing an herbivorous alternative. Most of these studies compare an herbivorous-labeled product to an animal-based product, but do not directly compare different herbivorous labels to one another.

"Vegan" and "plant-based" are two commonly used herbivorous labels on food products. Beyond just labeling, it is well-supported that the term "vegan" has a stigma associated with it due to its disruption of social norms surrounding food (Cole & Morgan, 2011; Markowski & Roxburgh, 2019). In fact, this stigma has been shown to deter individuals from shifting to a more herbivorous diet (Markowski & Roxburgh, 2019). There have been several studies in which participants were only exposed to one of these two herbivorous labels compared to an animal-based option. One such study manipulated when an herbivorous chicken quesadilla in a dining hall was labeled vegan vs. plant-based, finding that the vegan-labeled quesadilla was chosen more often than the plant-based-labeled quesadilla (Rosenfeld et al., 2022). In contrast, two more recent studies measuring choice found that the plant-based-labeled product was slightly favored over the vegan-labeled. In one of these studies, participants were assigned to one of five conditions, two of which exposed them to either a vegan- or plant-based-labeled food basket, and compared them to a non-herbivorous food basket (Sleboda et al., 2024). In another study, participants were shown an animal-based and herbivorous version of multiple products, and were exposed to either the vegan, plant-based, or vegetarian label

for all their choices. Across the board, participants reported a higher likelihood of purchasing the plant-based-labeled product over the vegan-labeled and vegetarian-labeled products (Ruby et al., 2024).

In contrast to findings showing favor for one or the other label, other studies have found no significant effects of herbivorous labeling on choice. One such study observed no choice preference between the vegan and plant-based labels when ordering an herbivorous latte (H. Lee et al., 2024), and another compared vegan and plant-based labels to a novel religious label, finding minimal evidence of a relationship between label and product preference (Branković et al., 2025). Another study compared vegetarian, meat-free, vegan, and plant-based labels, and found that vegetarian dishes with no explicit labels indicating that no meat is included in the product (e.g., curry stew with coconut and sweet potatoes) were chosen more frequently than dishes explicitly labeled as being meat-free (e.g., vegan curry stew with coconut and sweet potatoes) (Hielkema & Lund, 2022). This suggests that labeling a product as herbivorous makes omnivores less likely to choose it compared to the same product labeled without herbivorous language.

2.1.2 Product Attributes

Prior research suggests that in addition to product choice, different labels prompt different perceptions of herbivorous alternatives on certain characteristics (H. Lee et al., 2024; Ruby et al., 2024). More research is needed to investigate the nuances of these perceived differences, as well as additional characteristics to which they apply.

Loss. Considering taste and quality, one label may convey that by choosing that product, the consumer would be missing out on key features of the animal product being

emulated. Investigating this will add to the literature on prospect theory, the idea that the pain of a loss is felt more strongly than the pleasure of an equivalent gain (Kahneman & Tversky, 1979). This theory suggests that the label associated with more experienced loss is less likely to be chosen than the alternative option. Prior research has found that herbivorous alternatives to meat are lacking in taste, texture, and satisfaction due to the absence of animal products deemed as necessary to experience (Szenderák et al., 2022; Vural et al., 2023). As a result, no matter how they are labeled, herbivorous alternatives made without eggs and dairy to emulate products that are traditionally made with eggs and dairy at the forefront are likely to be associated with more loss than the animal-based product being emulated. However, the vegan and plant-based labels may elicit different beliefs about which involves more loss. The Merriam-Webster (2025) definitions for the two terms explain that something labeled as "plant-based" is rich in plants, while a product labeled as "vegan" lacks animal products. Hence, I suspect that the plant-based label will be perceived as gain-framed and the vegan label as loss-framed.

Health. One product attribute that has been explored substantially in food research is the perceived health of a product (e.g., Bucher et al., 2015; Lusk, 2019; Provencher et al., 2009). The term "vegan", at a broader level than just product labeling, is primarily considered an ethical viewpoint that extends to diet (Zamir, 2004), while the term "plant-based" is widely considered as merely a dietary choice. Despite the primarily ethical origins of the vegan label, it has perhaps received more attention regarding health perceptions compared to the plant-based label (Besson et al., 2020; Bullock et al., 2020). The vegan label positively signals healthfulness in numerous studies, but recent research

incorporating the plant-based label finds that vegan-labeled products are viewed as less healthy than the same products with a plant-based label (H. Lee et al., 2024; Ruby et al., 2024). This suggests a need for more research on health perceptions associated with the plant-based label.

Sustainability. The perceived impact of a product on the natural environment can also play a role in consumer choice (e.g., Yu & Lee, 2019). The impact of labeling on product sustainability has been explored, but primarily in the context of consumer choice, not perceptions (e.g., Cai et al., 2017; Hahnel et al., 2015). A systematic review of environmental labeling in general found that sixty out of the seventy-six eco-labeling interventions included in the review resulted in a significant positive effect on selection, purchase, or consumption of consumable products (Potter et al., 2021). Specific to herbivorous alternatives, one study found that a plant-based-labeled herbivorous meat was perceived as more environmentally friendly than the same product labeled as "meat alternative" (Sucapane, 2020). Further, two studies comparing the vegan and plant-based labels between subjects found that for several animal product alternatives, the plant-based label was consistently rated as more sustainable than the vegan (H. Lee et al., 2024; Ruby et al., 2024). The reason for this needs to be explored in the context of loss aversion and other product attributes to understand the relationship between choice and sustainability.

Animal Welfare. Due to the ethicality associated with the term "vegan," it is likely there are differences in how the vegan and plant-based labels are perceived in the context of animal welfare. Specifically, there may be a difference between the two herbivorous labels in consumers' perceptions of the extent to which the product was

intended to address animal welfare concerns by its producer. No identifiable research has specifically explored this, but a 2024 study found that when an herbivorous-labeled product was compared to the animal-based product it was intended to emulate, the plant-based label was rated as more ethical than the vegan label (Ruby et al., 2024). This study did not define "ethical," nor did it ask participants to do so, so it cannot be concluded that it encompasses animal welfare.

Understanding the differences in perception of these products, depending on label, on the aforementioned product attributes will aid in the understanding of what information or heuristics people call upon when making a product choice. For example, should participants rate the vegan label as more sustainable, yet the plant-based label is rated as healthier and is chosen more, this may suggest that health perceptions play more of a role in product choice. This could have profound marketing implications and generally increase the understanding of how these two somewhat synonymous terms elicit different perceptions about an identical product. Further, understanding these attribute perception differences may contribute to the knowledge pool on stigmatization. Specifically, if people perceive the vegan-labeled product as superior on multiple attributes (i.e., healthier, more environmentally friendly etc.), yet choose the plant-based-labeled product, a possible reason may be the strength of the vegan stigma (MacInnis & Hodson, 2017).

A better understanding of attribute perception differences between labels and between dietary groups will grow existing knowledge on which characteristics contribute to consumer decisions in this context, and which may not. In other words, this research

will provide insight into the mental calculations people conduct to make the choice they believe to be the best.

2.1.3 Dietary Differences

While it is important to understand how omnivores perceive herbivorous alternatives to animal products as well as their labels, it is also necessary to understand how omnivores may differ from herbivorous and other non-omnivorous populations in these perceptions. Perhaps to omnivores, one label signals that a product is environmentally friendly, but to herbivores, the other label signals this. Many omnivorous people may often choose herbivorous alternatives that they believe fall in line with their values (e.g., sustainability, animal welfare), but the majority of herbivorous people have decided that *all* of their food decisions must be in accordance with their values. This difference may seem minute, but the stringent values-driven lifestyle of herbivorous individuals may cause an increased sensitivity and vigilance to labels that omnivorous people lack.

Depending on who the target audience is for a specific product, labeling strategies may need to vary in order to appeal to them. If herbivorous individuals prefer one label, but omnivorous people prefer another, those designing product labels must consider which they want to prioritize. Do they choose the label that appeals to herbivorous people since they are presumably more inclined to buy an herbivorous alternative to an animal product? Or do they choose the label that appeals to omnivorous individuals since they are the larger population, with the hopes that it will increase their willingness to try the product?

2.1.4 Dissonance and Affect

One's moral self-image (MSI) at a given time is likely to indicate experienced cognitive dissonance. Distinct from but positively related to one's moral identity, which is stable over time, the MSI is a more fluid concept shown to become more positive following recall of moral actions, and more negative following recall of immoral actions (Jordan et al., 2015). Dissonance is known to occur following an unethical action (Shalvi et al., 2015), and is precluded by acting inconsistently with one's self-concept (Christner et al., 2022; Koaik, 2024), a notion that may be captured by measuring one's MSI (Jordan et al., 2015).

The concept of meat-related cognitive dissonance suggests that people experience more aversion towards and unwillingness to consume meat when it resembles the animal from whom it was derived (e.g., a pig roast with a head vs. without one) (Rothgerber, 2020). This concept has rarely been applied to animal products other than meat. While the practices involved in commercial dairy and egg production are akin to those of meat (Gremmen et al., 2018; Leenstra et al., 2011; Mee, 2013; Tulloch & Judge, 2018), many are naive to this, as the resulting products—usually pure white, and free of blood—are unquestionably a far less visceral reminder of the methods required to supply them. By definition, meat requires killing while dairy and eggs require life, which certainly makes the latter products seem more benign. It follows that experienced dissonance in those considering consumption of dairy or egg products will be less severe, or even eliminated. However, when presented with an animal-product and an equivalent herbivorous alternative, dissonance may occur due to the reminder and presence of a less harmful

option. The research that has been conducted on dissonance related to egg and dairy consumption has focused on vegetarian samples, finding that they experience dissonance over consuming these products comparable to the dissonance omnivores feel when considering meat consumption (Davies & Stanley, 2024; Docherty & Jasper, 2023). One study on dissonance reduction strategies found that compared to omnivores, vegetarian individuals employed more dissonance-reduction strategies when considering dairy and egg consumption (Ioannidou et al., 2023). Similar to herbivorous people, a large proportion of vegetarians report their decision to make a dietary change as being due to animal welfare concerns (Rosenfeld, 2019). Despite their continued eating of dairy and eggs, this heightened sense of awareness in vegetarians may increase their experienced dissonance due to their presumably greater knowledge of commercial farming practices compared to omnivores. However, more research is needed on dairy- and egg-related dissonance among omnivorous individuals. Prior work has found that omnivores are in fact highly concerned about the treatment of egg-laying hens, and would pay significantly more for cage-free eggs, suggesting some level of knowledge about and disdain for the practices involved in production (Estévez-Moreno et al., 2025).

In making a decision that is inconsistent with one's self-concept, it is likely that experienced negative affect will increase along with experienced dissonance. Prior research shows this correlation (Elliot & Davine, 1994; Harmon-Jones, 2000), and observing both increased dissonance and negative affect in the current research would strengthen any findings showing a contrast in dissonance between participants based on choice.

Beyond this, the herbivorous label to which a participant is exposed may impact the amount of dissonance experienced when selected the non-herbivorous option. It may be that the vegan label is more associated with animal welfare concerns than the plant-based label, causing a person to subconsciously (or consciously) think more about the impact of a non-herbivorous option on animals. Supporting the rationale for this hypothesized discomfort associated with herbivorous labels, one study by found that exposure to a vegetarian person increased the level of dissonance experienced by an omnivorous person due to the increased salience of the impact meat has on animals (Rothgerber, 2014). Because adopting a vegetarian diet is heavily motivated by animal welfare concerns (Beardsworth & Keil, 1992; De Backer & Hudders, 2014), exposure to this identity (i.e., "label") may invoke feelings of dissonance in omnivorous individuals. In further support of this, Kunst and Hohle (2016) found that labeling meat products so as to remind participants about the process involved in curating their food decreased inclination to consume the product, perhaps due to dissonance. As such, the label most associated with animal welfare by omnivorous individuals may lead to feelings of dissonance, subsequent attempts to dissociate, and a decrease in willingness to choose a product. This idea has not been previously studied, and exploring mechanisms within this intricacy of label perceptions will provide further clarity on why omnivorous consumers choose what they do.

2.2 Goals and Contributions

The overarching goal of this research is to investigate consumer perceptions of herbivorous alternatives to egg and dairy products, and how labeling impacts product

attribute perceptions and choice. It is also intended to uncover differences in these perceptions and choices depending on dietary identity (e.g., omnivore, herbivore, vegetarian).

Study 1a aims to better understand how the attributes of an herbivorous quiche alternative may be perceived differently when it is labeled as vegan vs. when it is labeled as plant-based, and if these labels impact which product consumers choose. A quiche was chosen as the target product based on a pre-test (see section 2.3.1 for details). Study 1b will compare those following an herbivorous vs. omnivorous diet on these perceptions and choices. The goal of Study 1c is to understand how experienced cognitive dissonance and negative affect may differ depending on which quiche is chosen, taking label into account. In doing so, it also compares those following a vegetarian vs. omnivorous diet on experienced dissonance and negative affect.

Among the research on animal product replacements, the focus is on meat alternatives, and there is a lack of research directly comparing the two most commonly used labels, let alone on non-meat animal product alternatives. This is an important distinction to make because the options that one has for a given decision may influence how an individual perceives the attributes of the given options, and the subsequent decision they make (Tversky & Simonson, 1993). By directly comparing two herbivorous labels to one another, these studies will yield novel information on perceived differences between the two labels. It will also reveal preferred choice alternative when faced with only the two herbivorous options, a rarely researched pairwise comparison, but one that is commonly encountered in real-world situations. If presented with no animal-based quiche

option, the only two choices being herbivorous quiches may cause people to perceive one as better than if it were presented alongside an animal-based quiche, which prior research suggests will be preferable for most non-herbivorous individuals (Michel, Knaapila, et al., 2021).

The current research will advance knowledge on meat-related cognitive dissonance in two ways. First, this research incorporates intention to consume animal products other than meat (i.e., dairy and egg) to measure dissonance, building on prior research that observed the use of dissonance reduction strategies related to non-meat animal product consumption (Ioannidou et al., 2023). Because the dairy and egg industries involve similar practices to the meat industry, investigating experienced dissonance in this area is likely to produce valuable insight for broadening the applicability of meat-related dissonance as well as future research on the topic. Second, the research considers the inclusion of an herbivorous alternative at the decision point, serving as one of the first dissonance studies to incorporate an herbivorous alternative into a choice scenario (Bouwman et al., 2022), and the first to do so in a non-meat animal product scenario. Prior research has primarily offered the option of intending to eat meat or refraining from doing so, rather than incorporating a viable herbivorous alternative. It will also be the first to investigate how experienced dissonance may differ depending on the herbivorous labels to which people are exposed.

Additionally, this work will expand understanding of loss aversion by incorporating labels into the equation of what induces feelings of loss. No identifiable research has directly explored the impact of loss- and gain-framing on perceptions of

herbivorous alternatives with different labels. To fill this gap, the current research measures experienced loss associated with the choice alternatives, providing insight into what these labels signal to consumers regarding gains or losses.

Perceptions of herbivorous dairy and egg alternatives should not be assumed to mirror those of meat alternatives, and this research will shed light on if and how consumer perceptions and behaviors differ when considering dairy and egg alternatives rather than meat alternatives. Measuring choice and attribute perceptions for each quiche in three different choice sets will yield useful information not only for choice architecture research, but also companies marketing and selling herbivorous products. At a grocery store, people may often be confronted with products similar to one another, some labeled vegan, some labeled plant-based. Product marketers will be able to use the findings of this research to inform how they label their products to appeal to their target audience.

2.2.1 Broader Impacts

Due to the environmental impact of dairy and egg production, a decrease in their overall consumption is lucrative to addressing the global climate crisis. Acceptance of herbivorous dairy and egg alternatives may differ from that of meat alternatives, as meat is an entirely different food group that is often the center of a meal, while eggs and dairy are often embellishing ingredients that are deeply enjoyed. The distinct roles these animal products play in an omnivorous diet may very well alter the consumer perceptions of their herbivorous counterparts.

Health, sustainability, and animal welfare perceptions have not been investigated between the two labels, and any differences in these attribute perceptions and

experienced loss by label will have implications for the marketing of herbivorous alternatives. For example, should marketers want to cater to environmentalists, these findings will inform which label is more likely to attract that group. Generally, an understanding of which label elicits more feelings of loss in participants will inform marketers which label may be most preferred from a prospect theory perspective.

A list of hypotheses and the support found for each can be viewed in Table 1. This paper reports the results of two pre-registered studies. Survey instruments, data, and pre-registrations are available at https://osf.io/sfyg8/?view_only=de0d92958b824bea95d93b60a98a8e37. Some measures and results of one hypothesis were not reported in this paper, but for transparency, are available in Appendix A. All reported *p*-values are two-sided unless otherwise specified. Results with $p < 0.05$ are considered statistically significant, and those with $p < 0.10$ are considered marginally significant.

Table 1. Study 1a-c Hypotheses

Sample	Number	Hypothesis	Support
1a	*H1.1*	a) Omnivores will select the vegan-labeled quiche at lower rates than the plant-based-labeled quiche	*yes*
		b) Omnivores will select the vegan-labeled quiche at lower rates than the animal-based quiche	*yes*
	H1.2	a) Omnivores will select the animal-based quiche at higher rates than both herbivorous quiches	*yes*
		b) The difference will be greater in the vegan vs. animal-based condition	*yes*

	H1.3	Omnivores will rate the vegan-labeled quiche as less healthy, less environmentally sustainable, and more intended to address animal welfare concerns compared to the plant-based-labeled quiche	*mixed*
	H1.4	Omnivores will rate both the vegan-labeled and plant-based-labeled quiches as healthier, more environmentally sustainable, and more intended to address animal welfare concerns than the animal-based quiche	*yes*
1a/b	**H1.5*	a) Among omnivores, the vegan label will elicit stronger feelings of loss compared to the plant-based label	*yes*
		b) Among herbivores, the opposite will be true	*yes*
1b	*H1.6*	Herbivores will rate the vegan-labeled quiche as more intended to address animal welfare concerns compared to the plant-based-labeled quiche	*yes*
	**H1.7*	Herbivores will select the vegan-labeled quiche at higher levels than the plant-based-labeled quiche	*yes*
1c	*H1.8*	Those who choose the animal-based quiche will experience higher levels of dissonance and negative affect than those who choose the herbivorous quiche, regardless of label	*mixed*
	H1.9	Vegetarians who choose the animal-based quiche will experience higher levels of dissonance and negative affect than omnivorous individuals who choose the animal-based quiche	*no*
	H1.10	a) Those who choose the animal-based quiche compared to the vegan-labeled quiche will experience higher levels of dissonance and negative affect than those who choose the animal-based quiche compared to the plant-based-labeled quiche	*no*
		b) This effect will be moderated by perceived actual impact on animal welfare of the herbivorous option whereby greater perceived benefit to animal welfare increases dissonance	*no*

*Table note. *Indicates exploratory hypothesis not pre-registered.*

2.3 Study 1a-b

2.3.1 Methodology

Study 1a and 1b were online surveys with a cross-sectional design, where participants were randomly sorted into conditions. All study procedures were approved by The Ohio State Institutional Review Board (IRB protocol #2024E0328). Measures and analyses were identical for both studies; the only differences between studies were the samples and the process of sorting participants into conditions.

Participants. Participants were recruited via Prolific. Research has found that Prolific samples provide more representative (Peer et al., 2017) and higher quality data relative to samples from other platforms (Douglas et al., 2023). Eligible participants were English-speaking adults who live in either the United States, Canada, or the United Kingdom. The studies were open to multiple countries in order to reach the necessary quota of vegetarians and herbivores. To be eligible for 1a, participants needed to follow either an animal product-inclusive (omnivorous), vegetarian, or pescatarian diet, and had to consume both eggs and dairy, while eligibility for Study 1b required following an herbivorous diet. At the start of both surveys, participants answered several questions ensuring they met the eligibility criteria that they provided Prolific. An a priori one-way, within subject ANOVA power analysis with 95% power ($\beta = 0.05$), Type I error rate of 5% ($\alpha = 0.05$), and an effect size of $f = 0.15$ indicated a need for 348 participants in Study 1a and 116 in Study 1b. An additional 20% of participants were recruited for both studies to account for failed bot and attention checks (Simonsohn et al., 2014). As data was being

collected, those who did not meet eligibility requirements or missed multiple attention checks were eliminated by Prolific, leaving a total of 552 respondents across both dietary samples. After removing additional participants for at least one failed bot or attention check (9), the final sample for 1a was $N = 406$, and 1b was $N = 137$. The 1a sample was 77.1% omnivorous (or had some meat restrictions, but no restrictions on egg or dairy) and 24.1% vegetarian or pescatarian. The 1b sample was 100% herbivorous. For more demographic information, see Table 2.

Table 2. Study 1a-b Demographics

Variable	1a Respondents $N = 406$	1b Respondents $N = 137$
Median Age	39.0 (*SD*: 14.99)	39.0 (*SD*: 12.53)
Gender		
Woman	49.0%	50.4%
Man	48.5%	48.2%
Other	2.0%	1.4%
Missing	0.5%	0.0%
Race (could select multiple)		
White or Caucasian	69.7%	87.6%
Black or African American	13.8%	5.8%
American Indian or Alaska Native	0.7%	0.7%
Asian	15.3%	5.1%
Native Hawaiian or Pacific Islander	0.7%	0.7%
Other/Prefer not to say	3.2%	2.9%
Missing	0.5%	0.0%
Hispanic, Latino, or Spanish	6.4%	2.2%
Highest Education Level		
Less than a high school diploma	0.7%	2.2%
High school diploma or GED	13.8%	8.0%
Some college, but no degree	20.2%	16.8%
Associate's degree	10.1%	8.8%
Bachelor's degree	36.2%	44.5%
Graduate or professional degree	19.0%	19.7%

Political ideology		
Extremely liberal	13.5%	19.7%
Liberal	29.8%	39.4%
Slightly liberal	18.0%	12.4%
Moderate/Independent	19.7%	14.6%
Slightly conservative	7.1%	5.8%
Conservative	8.4%	5.1%
Extremely conservative	3.0%	2.9%
Missing	0.5%	0.0%
Median Household Income	$50,000–$59,000	$40,000–$49,000
Diet (could select multiple)		
Omnivorous (inclusive of animal products)	70.9%	0.0%
Pescatarian	1.7%	0.0%
Vegetarian	22.4%	5.8%
Vegan/Plant-based	0%	100%
Gluten-free	3.7%	5.8%
Other (specified)	3.0%	0.7%

Procedures. Participants responded to an online survey hosted by Qualtrics. Study 1a-b participants were paid between US$1.00, and US$1.20 for their participation in the roughly ten-minute survey.

Following the consent form, all participants responded to eligibility criteria questions and bot checks. Then, participants in 1a were sorted into one of three conditions, and participants in 1b were all put in the same condition due to their dietary restrictions. The 1a participants who were sorted into condition one (vegan/plant-based) were shown a picture of a quiche labeled “vegan quiche” and a picture of one labeled “plant-based quiche” (Figure 1). All of the 1b participants were assigned to that condition. The 1a participants sorted into condition two (vegan/animal-based) were shown a picture of a quiche labeled “vegan quiche” and a picture of one labeled “quiche”

which I refer to as the animal-based quiche. The 1a participants sorted into condition three (plant-based/animal-based) were shown a picture of a quiche labeled “plant-based quiche” and a picture of one labeled “quiche”. In all conditions, the order in which the quiches were initially shown was randomized for each participant. To strengthen the manipulation, following each quiche, participants were asked to write three descriptive words about the quiche and three ingredients they thought would be in it. They were not able to proceed to the next page for thirty seconds to ensure they spent a substantial amount of time with each stimulus.

Figure 1. Study 1a-c Quiche Stimuli

Following the stimuli, participants rated both quiches on several attributes. For each attribute scale, participants rated both quiches before proceeding to the next attribute. Each attribute scale had a small version of the corresponding quiche picture above its respective measures so that the participants continued to have a visual aid. The order in which participants initially saw each quiche remained the same for each participant throughout the survey. Further, the order in which they rated the attributes, as well as the order in which they saw the items in each scale, was randomized. Then

participants made a hypothetical choice between their two quiche options before proceeding to environmental identity and demographic questions.

Measures. The stimuli for these studies were quiches due to the findings of a pre-test, which showed that compared to another combined egg and dairy product—an egg and cheese burrito—the quiche was seen as more nutritionally neutral (Appendix B). This was intended to prevent any undue influence of the preconceived health perceptions of the animal-based quiche.

Health. The perceived healthiness of each quiche was measured using four items from a seven-item scale created by Fenko and colleagues (2016). Following the picture of each quiche, participants responded to "I expect this _____ quiche to be healthy," "I would consider this _____ quiche as good for me," "I have an impression this _____ quiche is healthy," and "This _____ quiche seems healthier than similar quiches" on a scale ranging from 1 = *fully disagree*, to 5 = *fully agree*. The mean of these four items was taken for each quiche to form a scale score (0.91 [animal-based] $\leq \alpha \leq 0.92$ [plant-based]).

Sustainability. To measure perceived environmental sustainability of the quiches, participants were asked to indicate the extent to which they agreed with the following three statements from Gershoff and Frels (2015): "This _____ quiche deserves to be labeled as 'environmentally friendly'," "Purchasing this _____ quiche is a good environmental choice," and "A person who cares about the environment would be likely to buy this _____ quiche." All items were rated on a scale from 1 = *strongly disagree*, to

7 = *strongly agree*. The mean of these three items was taken for each quiche to form a scale score (0.90 [plant-based] ≤ α ≤ [animal-based] 0.92).

Animal Welfare Intent. This attribute scale is aimed at measuring the degree to which participants believe the producers of the quiche intended to address animal welfare concerns in the making of the quiche. The three items in this scale were rated on a scale of 1 = *strongly disagree*, to 7 = *strongly agree*, and were as follows: "The producers of this _____ quiche intend it to be good for animal welfare," "The producers of this _____ quiche had animal welfare in mind when formulating this product," and "Protecting animal welfare was likely not a consideration in producing this _____ quiche" (reverse coded). These three items did not hold as a scale (0.61 [animal-based] ≤ α ≤ 0.69 [plant-based]), so only the first item was used in analyses.

Loss. Participants read "Please rate your level of agreement with the following statements about this _____ quiche:" and rated ten items on a scale ranging from 1 = *strongly disagree*, to 5 = *strongly agree*. The items were: "I would miss out by eating this," "It is lacking in important ingredients," "I would regret choosing this quiche if there was a non-_____ quiche option," "If I were to choose this quiche, I would end up wishing I chose a non-vegan quiche," and six reverse coded items: "It is appetizing," "It will be visually appealing," "It will be flavorful in a positive way," "I will feel satisfied after eating it," "It will taste good," and "I would feel full after eating this." The mean of these ten items was taken for each quiche to form a scale score (0.84 [animal-based] ≤ α ≤ 0.92 [vegan]).

Choice. Following these attributes, participants were prompted to make a choice between the two quiches they saw. They read "Imagine you are ordering groceries online, and you need a quiche. The two quiches you just saw—the _____ quiche and the _____ quiche—are the only two options you can pick from for your order. Which quiche would you choose? Please drag your selection to the box." The order of the quiches was randomized for this question, and there was a picture of each quiche to drag to the box.

Participants then answered questions to measure their environmental identity using a scale developed by Van der Werff and colleagues (2014). The following items were rated on a scale from 1 = *strongly disagree*, to 7 = *strongly agree*: "Acting environmentally friendly is an important part of who I am," "I am the type of person who acts environmentally friendly," and "I see myself as an environmentally-friendly person." The mean of these three items was taken to form a scale score ($\alpha = 0.93$).

Next, participants provided the following demographic information: age, gender, race, ethnicity, income, education, political beliefs, and diet. Throughout the survey, there were several attention and manipulation checks. At the end of the survey, participants read and responded to the following honesty check question "You will be paid regardless, but our research depends on high quality data. Did you answer these questions honestly?" Any participants who answered "no" to this question or responded incorrectly to any of the attention or manipulation checks were not included in data analysis.

2.3.2 Results

Choice (H1.1-1.2 & 1.7). To observe quiche choice and compare frequencies of choice in the 1a sample, a series of chi-square analyses were conducted. These findings

can also be viewed in Figure 2. The first chi-square analysis included only participants from Study 1a in condition one, using label as the independent variable and choice as the dependent variable. Supporting H1.1a, results revealed that significantly more people chose the plant-based-labeled quiche (60%) than the vegan-labeled quiche (40%) (χ^2 = 5.851, p = 0.016). To test H1.1b and H1.2a, two chi-square analyses were conducted within the 1a sample, one for condition two and one for condition three. Supporting H1.1b, the condition two model revealed a significant difference between choices, finding that 24% chose the vegan-labeled quiche, and 76% chose the animal-based quiche (χ^2 = 36.344, p < 0.001). The condition three model showed a significant difference in choice as well, finding that 28% of participants chose the plant-based-labeled quiche, and 72% chose the animal-based quiche (χ^2 = 26.770, p < 0.001). The condition one and two chi-square analyses support H1.2a, indicating that the vegan-labeled quiche was chosen at lower rates than the plant-based-labeled and animal-based quiches. The condition two and three chi-square analyses also support H1.2b, indicating that the animal-based quiche was chosen at higher rates than both the vegan- and plant-based-labeled quiches, and that the difference was greater in condition two.

Figure 2. Study 1a Quiche Choice by Condition

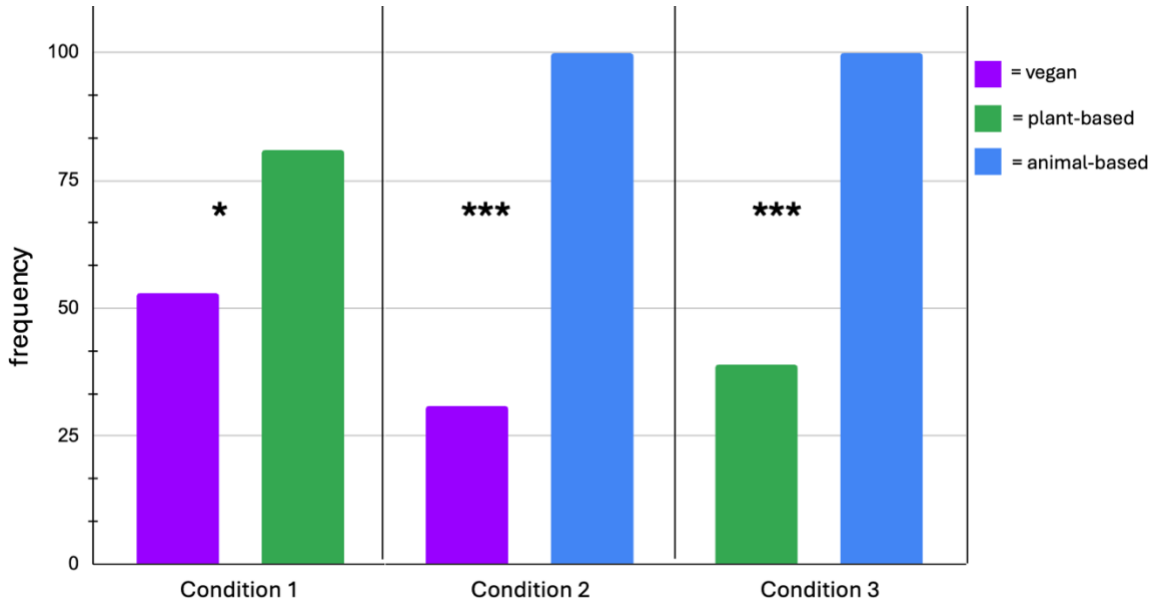


Figure note. * $p < 0.05$, *** $p < 0.001$.

To test H1.7, another chi-square analysis, using label as the independent variable and choice as the dependent variable, was conducted to compare choice between the vegan-labeled quiche and the plant-based-labeled quiche within the 1b sample. This chi-square showed that 80% of herbivorous individuals chose the vegan-labeled quiche while 20% chose the plant-based-labeled quiche ($\chi^2 = 49.441$, $p < 0.001$) (Figure 3). This finding supports H1.7, showing that herbivorous individuals were more likely to choose the quiche with the vegan label than the plant-based label.

Figure 3. Study 1b Quiche Choice

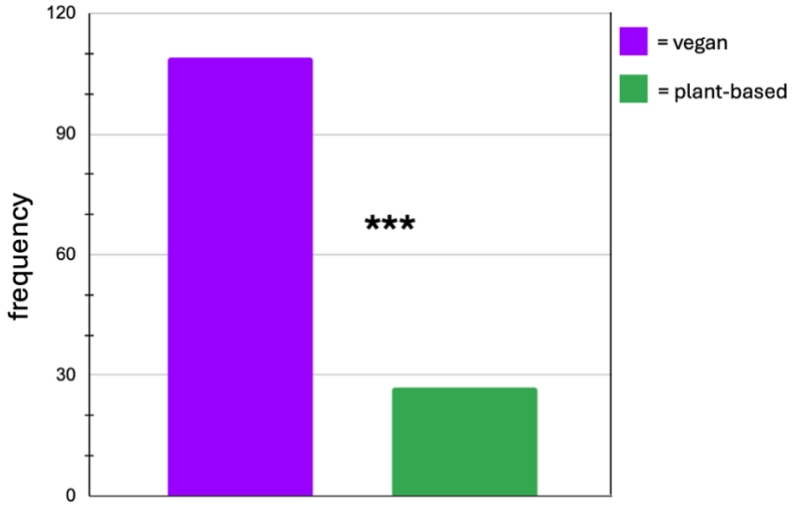


Figure note. *** $p < 0.001$.

Attribute Ratings and Loss (H1.3-1.6). To compare experienced attribute ratings associated with the vegan label compared to the plant-based label in the 1a sample, a one-way within subjects Multivariate Analysis of Variance (MANOVA) was conducted. This model found that when participants were exposed to both the vegan and the plant-based labels, there was a significant effect of label on attribute ratings, $F(3, 132) = 4.267$, $p = 0.007$; Wilks's lambda = 0.912, ηp2 = 0.088. Pairwise comparisons revealed that the vegan label ($M = 5.304$, $SD = 1.418$) was rated as more intended to address animal welfare concerns compared to the plant-based label ($M = 5.007$, $SD = 1.466$), $t(135) = 2.585$, one-sided $p = 0.005$. There were no significant differences between the health, $t(135) = -1.228$, one-sided $p = 0.111$, or environmental sustainability ratings, $t(134) = -1.042$, one-sided $p = 0.150$. When environmental identity, gender, race (Black or not Black)[1], political beliefs, and origin were added as covariates (Appendix C,

[1] Black veganism is a distinct subset of Black culture, with deeper roots in social justice and culture than Euro-centric veganism, leading Black Americans to engage with veganism differently than other races (Harper, 2009; Rib, 2022).

Table C1), this model as a whole was no longer significant, $F(3, 125) = 0.617$, $p = 0.605$; Wilks's lambda = 0.985, ηp2 = 0.015, but the pairwise comparison trends were the same. These findings show mixed support for H1.3.

To compare both herbivorous-labeled quiches to the animal-based quiche on health, environmental sustainability, and intent to address animal welfare concerns, two one-way, within subjects MANOVA models were conducted; one for condition two (vegan vs. animal-based) and one for condition three (plant-based vs. animal-based). The condition two MANOVA found that label had a significant impact on attribute ratings for those exposed to both the vegan-labeled quiche and the animal-based quiche, $F(3, 128) = 34.784$, $p < 0.001$; Wilks's lambda = 0.551, ηp2 = 0.449. Compared to the animal-based quiche ($M = 3.239$, $SD = 0.959$), the vegan-labeled quiche ($M = 3.704$, $SD = 0.884$) was rated as significantly healthier, $t(130) = 5.199$, one-sided $p < 0.001$. The vegan-labeled quiche ($M = 4.674$, $SD = 1.336$) was also rated as significantly more environmentally sustainable than the animal-based ($M = 3.725$, $SD = 1.456$), $t(130) = 6.866$, one-sided $p < 0.001$. Further, the vegan-labeled quiche ($M = 5.267$, $SD = 1.482$) was rated as significantly more intended to address animal welfare than the animal-based ($M = 3.534$, $SD = 1.556$), $t(130) = 10.056$, one-sided $p < 0.001$.

The condition three MANOVA found the same pattern of labeling impacts on attribute ratings, $F(3, 135) = 47.840$, $p < 0.001$; Wilks's lambda = 0.485, ηp2 = 0.515. Compared to the animal-based quiche ($M = 3.120$, $SD = 0.957$), the plant-based-labeled quiche ($M = 3.589$, $SD = 0.974$) was rated as healthier, $t(138) = 4.727$, one-sided $p < 0.001$. The plant-based ($M = 4.715$, $SD = 1.506$) was also rated as more environmentally

sustainable than the animal-based (M = 3.452, SD = 1.415), t(138) = 9.372, one-sided p < 0.001. Lastly, the plant-based-labeled quiche (M = 5.065, SD = 1.476) was rated as more intended to address animal welfare than the animal-based (M = 3.087, SD = 1.509), t(137) = 10.514, one-sided p < 0.001.

The findings of these two MANOVA models provide support for H1.4 by showing that the herbivorous-labeled quiches were both rated as healthier, more environmentally sustainable, and more intended to address animal welfare compared to the animal-based quiche. See Table 3 for more information on pairwise comparisons. When environmental identity, gender, race (Black or not Black), political beliefs, and origin were added as covariates (Appendix C, Table C2-C3), the condition two model was not significant, F(3, 123) = 0.742, p = 0.529; Wilks's lambda = 0.982, ηp2 = 0.018, but the condition three model was significant, F(3, 130) = 12.438, p < 0.001; Wilks's lambda = 0.777, ηp2 = 0.223. The pairwise comparisons in both models remained the same, and because H1.4 concerns the specific pairwise comparisons, these findings remain supportive.

Table 3. Study 1a Pairwise Comparisons of Attribute Ratings

Comparison	*n*	Measure	t	*SD*	95% Confidence Interval (CI)	*p*-value
Vegan vs. Plant-based	136	Health	-1.228	0.039	[-0.125, 0.029]	0.222
		Sustainability	-1.042	0.798	[-0.208, 0.064]	0.299
		Animal Welfare Intent	2.585	1.194	[0.062, 0.467]	0.011
Vegan vs. Animal-based	131	Health	5.199	1.025	[0.288, 0.643]	<0.001
		Sustainability	6.866	1.582	[0.676, 1.223]	<0.001
		Animal Welfare Intent	10.056	1.972	[1.392, 2.074]	<0.001

Plant-based vs. Animal-based	139	Health	4.727	1.189	[0.269, 0.669]	<0.001
		Sustainability	9.372	1.590	[0.995, 1.532]	<0.001
		Animal Welfare Intent	10.514	1.992	[1.447, 2.118]	<0.001

To compare experienced loss ratings between the two herbivorous labels in both dietary groups, one paired samples *t*-test was conducted for each sample (Figure 4). For the omnivores in condition one, the vegan label (M = 2.891, SD = 0.830) was associated with more loss than the plant-based (M = 2.808, SD = 0.818); $t(135) = 2.349$, one-sided $p = 0.010$, supporting H1.5a. Conversely, for the herbivores, the plant-based label (M = 1.931, SD = 0.565) was associated with more loss than the vegan label (M = 1.864, SD = 0.555); $t(136) = -3.316$, one-sided $p < 0.001$, supporting H1.5b. When environmental identity, gender, race (Black or not Black), political beliefs, and origin were added as covariates (Appendix C, Table C4), the pairwise comparisons remained the same.

Figure 4. Study 1a-b Violin Plots of Herbivorous Quiche Loss Ratings by Sample

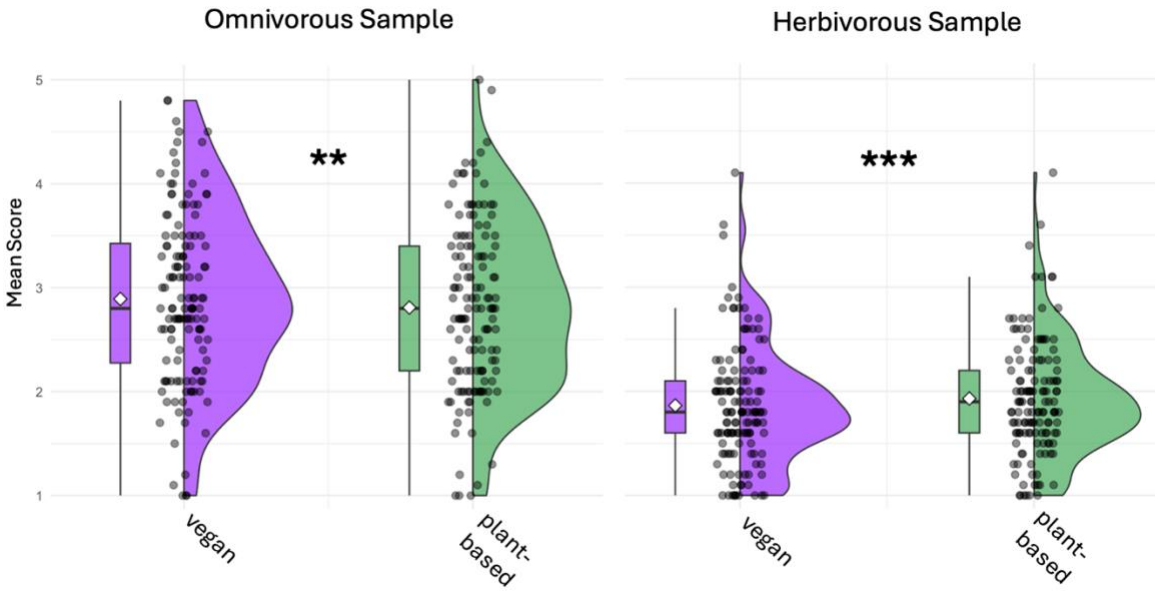


*Figure note. ** p < 0.01, *** p < 0.001. Mean indicated by white diamond.*

To compare intent to address animal welfare ratings for the 1b sample (herbivorous individuals who saw both the plant-based and vegan labels), a paired samples *t*-test was conducted (Figure 5). This test revealed a significant difference between labels for animal welfare intent ratings, finding that the vegan-labeled quiche (M = 5.690, SD = 1.315) was rated as significantly more intended to address animal welfare concerns than the plant-based-labeled quiche (M = 5.040, SD = 1.480); $t(136) = 5.059$, one-sided $p < 0.001$. This finding supports H1.6, suggesting that herbivorous individuals believe the vegan label is more intended to address animal welfare concerns than the plant-based label. When environmental identity, gender, race (Black or not Black), political beliefs, and origin were added as covariates (Appendix C, Table C5), the pairwise comparisons remained the same.

Figure 5. Study 1b Violin Plots of Animal Welfare Intent Ratings

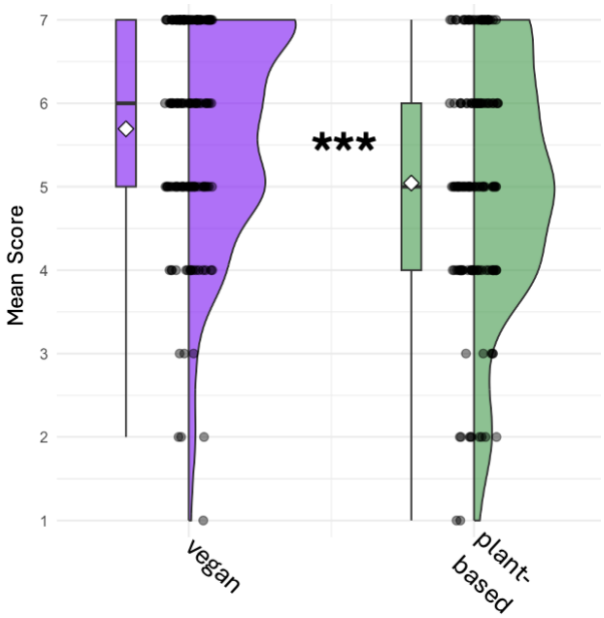


*Figure note. *** $p < 0.001$. Mean indicated by white diamond.*

2.3.3 Discussion of Study 1a-b

The results of Study 1a find that both vegan- and plant-based-labeled quiches are viewed as healthier, more sustainable, and more intended to address animal welfare concerns when compared to an animal-based quiche. Further, omnivorous individuals in the herbivorous-only condition associated the vegan label with more loss than the plant-based. Conversely, herbivores associated the plant-based-labeled quiche with more loss compared to the vegan-labeled. Both samples rated the vegan-labeled quiche as more intended to address animal welfare concerns than the plant-based. Omnivores ultimately reported a greater willingness to choose the plant-based-labeled quiche over the vegan-labeled quiche, whereas the herbivores were more likely to choose the vegan- over the plant-based-labeled quiche.

There are several implications of these findings in light of the theoretical foundations and prior literature. The opposite experienced loss and choice results in the two samples reveals groups differences that may challenge the general idea of prospect theory, as the loss results are in line with the theory for the omnivores but not the herbivores. This suggests that in non-consequential choice scenarios, there may be a greater propensity for group differences. Further, the fact that some prior research on primarily omnivorous samples has found a preference for the vegan label over the plant-based may indicate that feelings of loss are not a deal-breaker when choosing a product. Or as Study 1a suggests, they are when one has multiple herbivorous options. Perhaps when the choices are more similar (i.e., a vegan and a plant-based option), people resort to more micro-level details such as experienced loss when making their decisions.

Further, the vegan-labeled quiche was rated as more intended to address animal welfare concerns than the plant-based-labeled quiche, but the choice preference for the plant-based label suggests that factors other than animal welfare contributed more heavily to choice. Prior research shows that the majority of omnivorous people disagree with the practices involved in factory farming, but nearly all of them still choose to eat animal products derived from it (Martyn, 2023; Rothgerber & Rosenfeld, 2021). It would then make sense that when presented with two herbivorous alternatives (i.e., no temptation to support the animal agriculture practices they oppose), they would choose to prioritize the option that is best for animals. The choice results among omnivores exposed to the two herbivorous labels suggests that either a different product attribute (e.g., experienced loss) was more important to them when making their decision, they believed the plant-based-labeled quiche could contain different ingredients than the vegan-labeled quiche, or it is possible that the stigma associated with veganism deterred people from the vegan label, and they gravitated towards the plant-based label due to a lack of negative associations with the term. In a 2017 study, researchers examined attitudes towards veganism compared to common prejudice target groups. Compared to groups such as homosexuals and immigrants, attitudes towards vegans were worse than those towards all groups except for drug addicts (MacInnis & Hodson, 2017). Further, vegans are often categorized as multiculturally insensitive and unconcerned about human issues, despite 93% of herbivorous individuals participating in additional social justice movements (e.g., Black Lives Matter) (Wrenn, 2017). Some of this animosity may extend beyond humans to products with that label as well.

Regarding attribute perceptions other than loss, the results of the herbivorous-only condition 1a participants indicate the only notable difference between labels concerns animal welfare. While this somewhat contrasts the two 2024 studies that measured attribute perceptions—one of which found the plant-based label performed better on sustainability, health, and ethicality (Ruby et al., 2024), and the other of which found it was only rated as healthier (H. Lee et al., 2024)—it is not surprising given the mixed findings in prior research comparing the two labels. The mixed results of label preference across all these studies suggest the two are rather comparable in many ways, to a degree that makes observed differences minute or undetectable in certain populations. Differences may also fluctuate depending on what food is used and what other labels to which people are exposed.

The choice intention results provide perhaps the most intriguing finding, revealing a clear preference for the plant-based label among omnivores, but for the vegan label among herbivores. There are likely a number of factors contributing to these results, some of which can be investigated with this dataset in the future. Perhaps the plant-based label is appealing to all, but to herbivorous people, it signals an ambiguity that does not inspire confidence the product is truly animal product-free. Given the lack of nutritional information provided for the quiches in these studies, participants had to make assumptions about the products based on their understandings of the labels. Text-based responses from those in 1b or the herbivorous-only 1a participants show that people in both samples were more likely to believe the plant-based-labeled quiche contained

animal products. This could be the very reason omnivores preferred it while herbivores avoided it.

2.4 Study 1c

2.4.1 Methodology

Study 1c was an online survey with a cross-sectional design, where participants were randomly sorted into one of two conditions. All study procedures were approved by the Ohio State Institutional Review Board (IRB protocol #2024E0365).

Participants. Participants were recruited via Prolific. Eligible participants were either vegetarian or omnivorous, English-speaking adults who live in either the United States, Canada, or the United Kingdom. This survey was open to these countries in order to ensure enough vegetarian individuals would participate. An a priori global effects MANOVA power analysis with 95% power ($\beta = 0.05$), Type I error rate of 5% ($\alpha = 0.05$), and an effect size of $f = 0.16$ indicated a need for 622 participants. Due to budgetary constraints, participants were recruited and data was periodically cleaned until a sample of at least 622 was left. As data was being collected, Prolific automatically removed participants who failed multiple attention checks or did not meet the eligibility requirements. After manually removing additional participants who failed at least one bot or attention check, or did not meet the eligibility criteria in a way Prolific cannot preemptively verify (69), the final sample was $N = 637$. Of this sample, 72.7% reported following an omnivorous diet (or had some meat restrictions, but no restrictions on egg or dairy), and 27.3% reported following a vegetarian diet. For more demographic information, see Table 4.

Table 4. Study 1c Demographics

Variable	Respondents $N = 637$
Median Age	35.0 (*SD*: 12.69)
Gender	
Woman	48.4%
Man	49.0%
Other	2.5%
Missing	0.2%
Race (could select multiple)	
White or Caucasian	66.2%
Black or African American	19.2%
American Indian or Alaska Native	2.0%
Asian	13.5%
Native Hawaiian or Pacific Islander	0.5%
Other/Prefer not to say	4.0%
Hispanic, Latino, or Spanish	7.2%
Highest Education Level	
Less than a high school diploma	0.8%
High school diploma or GED	12.1%
Some college, but no degree	20.4%
Associate's degree	6.9%
Bachelor's degree	39.7%
Graduate or professional degree	20.1%
Political ideology	
Extremely liberal	16.2%
Liberal	26.1%
Slightly liberal	15.9%
Moderate/Independent	18.4%
Slightly conservative	7.7%
Conservative	9.6%
Extremely conservative	6.1%
Missing	0.2%
Median Household Income	$60,000–$69,000
Diet (could select multiple)	
Omnivorous (inclusive of animal products)	72.7%
Pescatarian	1.4%

Vegetarian	27.3%
Gluten-free	1.9%
Other (specified)	4.7%

Procedures. Participants responded to an online survey hosted by Qualtrics and were paid US$0.99 for their participation in the approximately seven-minute survey.

Following the consent form, all participants responded to eligibility criteria questions and bot and attention checks. Procedures were similar to those used in Study 1a-b in that participants were randomly sorted into a condition with two quiches shown in a random order and the quiche stimuli remained the same, but different in that all participants could be sorted into any condition and there were only two conditions. Those in condition one viewed the vegan-labeled and animal-based quiche, while those in condition two viewed the plant-based-labeled and animal-based quiche (Figure 1). Participants then completed the same write-in activity as Study 1a-b before proceeding.

Following the stimuli, participants rated both quiches on one attribute, their perception of the actual impact of the product on animal welfare. In other words, how much they believe the quiche actually benefits animal welfare, regardless of whether the producer intended it to or not. The order of items in this animal welfare measure was randomized for each participant. A small version of each quiche picture was above its respective measures so that the participants continued to have a visual aid.

After this attribute measure, participants were prompted to make a choice between their two quiche options. Following choice, participants responded to questions

measuring cognitive dissonance and affect. Then, participants responded to an environmental identity measure and demographic questions.

Measures.

Actual Impact on Animal Welfare. To measure perceptions of the actual impact of each quiche on animal welfare, participants responded to a three-item scale, adapted from the sustainability scale used in Study 1a-b (Gershoff & Frels, 2015). The items were, "This _____ quiche deserves to be labeled as 'animal welfare approved'," "Purchasing this _____ quiche is a good choice for someone who values animal welfare," and "A person who cares about animal welfare would be likely to buy this _____ quiche." All items were rated on a scale from 1 = *strongly disagree*, to 7 = *strongly agree*. The mean of these three items was taken to form a scale score (0.77 [plant-based] $\leq \alpha \leq$ [animal-based] 0.87).

Choice. To make a choice between quiches, participants responded to the same choice measure used in Study 1a-b.

Dissonance. Following choice, participants responded to a nine-item scale used to measure moral self-image (Jordan et al., 2015), and two added items to better relate with the content of the survey. In a post-test with a different sample ($N = 70$), this scale moderately correlated with a scale measuring cognitive dissonance ($\tau\_b = 0.261$, $p = 0.003$) (Hausknecht et al., 1998), providing evidence of convergent validity between the MSI and related concepts. Each item on this scale read "Compared to the _____ person I want to be, I am:" and the original scale included the following characteristics: caring, compassionate, fair, friendly, generous, hard-working, helpful, honest, and kind. The two

added items included “ethical” and “environmentally friendly” as the characteristics. Each item was rated on a scale ranging from 1 = *much less _____ than the person I want to be,* to 7 = *much more _____ than the person I want to be*. The center scale response was 4 = *exactly as _____ as the person I want to be*. All items were reverse scored such that a higher score indicated greater experienced dissonance. The mean of these nine items, as well as the additional two items, was used to form a scale score (α = 0.92).

To measure affect, the Scale of Positive and Negative Experience (SPANE) was used (Diener et al., 2010). Participants read: “Please report the extent to which you currently feel:” For each emotion, the response options range from 1 = *not at all*, to 5 = *a great deal*. It included six positive feelings (positive, good, pleasant, happy, joyful, and contented), and six negative feelings (negative, bad, unpleasant, sad, afraid, and angry). The sum of the six negative items was taken to form a scale score (α = 0.88).

Participants then answered the same environmental identity (α = 0.92) and demographic questions used in Study 1a-b.

Throughout the survey, there were several attention and manipulation checks. At the end of the survey, participants responded to the same honesty check question used in Study 1a-b. Any participants who answered “no” to this question or responded incorrectly to any of the attention or manipulation checks were not included in data analysis.

2.4.2 Results

Cognitive Dissonance and Negative Affect (H1.8-1.9 & 1.10a). To compare dissonance and negative affect ratings between groups, three between-subject

MANOVAs were conducted. The first model found that quiche choice (herbivorous vs. animal-based) had a significant impact on dissonance and negative affect, $F(2, 634) = 23.343$, $p < 0.001$; Wilks's lambda = 0.931, ηp2 = 0.069. Specifically, results showed that when participants chose the herbivorous quiche, regardless of label, over the animal-based quiche, they experienced less dissonance ($M = 3.623$, $SD = 1.082$) than those who chose the animal-based quiche ($M = 4.109$, $SD = 0.745$), $t(635) = -6.578$, one-sided $p < 0.001$ (Figure 6; Table 5). Conversely, choice did not have an impact on negative affect, $t(635) = 0.943$, one-sided $p = 0.173$. When environmental identity, gender, race (Black or not Black), political beliefs, age, and education were added as covariates (Appendix D, Table D1), this model remained significant, $F(2, 627) = 8.798$, $p < 0.001$, Wilks's lambda = 0.973, ηp2 = 0.027. The pairwise comparison for dissonance remained the same, and the pairwise comparison for negative affect became significant in the opposite direction as hypothesized. These results provide mixed support for H1.8.

Figure 6. Study 1c Violin Plots of Experienced Dissonance Based on Choice

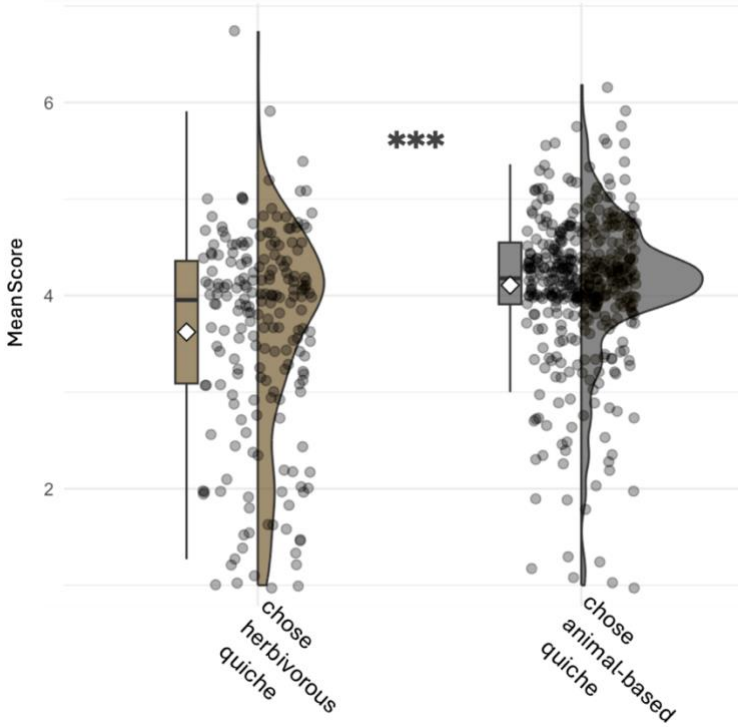


Figure note. *** *p* < 0.001. Mean indicated by white diamond.

To compare dissonance between vegetarians and omnivores who chose the animal-based quiche, regardless of condition, a second MANOVA was conducted. This model found that dissonance and negative affect did not differ between vegetarians and omnivores who chose the animal-based quiche, $F(2, 432) = 0.747$, $p = 0.474$; Wilks's lambda = 0.997, ηp2 = 0.003, $t(433) = 0.458$, one-sided $p = 0.324$ (cognitive dissonance); $t(433) = 1.155$, one-sided $p = 0.125$ (negative affect). This does not support H1.9.

The final MANOVA—conducted to compare conditions—found that among those who chose the animal-based quiche, whether they saw the vegan- or plant-based-labeled alternative did not have an impact on dissonance and negative affect, $F(2, 432) = 1.712$, $p = 0.182$; Wilks's lambda = 0.992, ηp2 = 0.008. However, examining the

pairwise comparisons revealed a difference in experienced dissonance. Specifically, results showed that those in condition one who chose the animal-based quiche over the vegan-labeled quiche experienced marginally less dissonance (M = 4.055, SD = 0.787) than those who chose the animal-based quiche over the plant-based-labeled quiche (M = 4.173, SD = 0.688), t(433) = -1.636, one-sided p = 0.051. This was in the opposite direction of the prediction. This model revealed no difference in negative affect as a result of condition, t(433) = 0.788, one-sided p = 0.216. These findings do not support H1.10a. See Table 5 for pairwise comparisons for all three MANOVA models.

Table 5. Study 1c Pairwise Comparisons of Dissonance and Negative Affect

Comparison	*n*	Measure	*F*	*t*	95% CI	*p*-value
Herbivorous Choice vs. Animal-based Choice	637	Dissonance	49.344	-6.578	[-0.630, -0.340]	<0.001
		Negative Affect	1.476	0.943	[-0.380, 1.082]	0.346
***Vegetarians vs. Omnivores**	435	Dissonance	1.139	0.458	[-0.155, 0.250]	0.647
		Negative Affect	0.446	1.155	[-0.476, 1.833]	0.249
***Vegan & Animal-based vs. *Plant-based & Animal-based condition**	435	Dissonance	2.052	-1.636	[-0.258, 0.024]	0.103
		Negative Affect	2.735	0.788	[-0.483, 1.129]	0.431

*Table note. *Participants in these models all chose the animal-based quiche.*

Influence of Animal Welfare Perceptions (H1.10b). To test whether perception of the actual impact on animal welfare of the herbivorous quiche to which participants

were exposed impacted the relationship between choice and dissonance, a moderation analysis was conducted using Process Model 1 (Hayes, 2017). This model did not detect a significant moderation effect (Figure 7). Choice and actual animal welfare perceptions accounted for 6.49% of the change in cognitive dissonance, $F(3, 632) = 14.611$, $p < 0.001$, and the interaction term between choice and actual animal welfare perceptions accounts for 0.01% of this variance. The interaction term was not significant ($\beta = -0.036$, $SE = 0.065$, $p = 0.289$, 95% CI [-0.165, 0.092]), which suggests the relationship between choice and cognitive dissonance is not moderated by actual animal welfare perceptions, which is not supportive of H1.10b.

Figure 7. Study 1c Moderation Model Testing H1.10b (Process Model 1; Hayes, 2017)

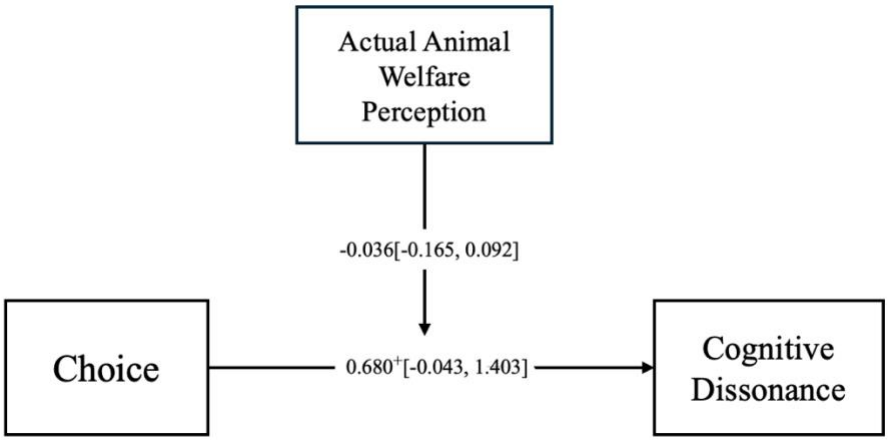


Figure note. $^{+}$ $p < 0.10$.

2.4.3 Discussion of Study 1c

Results of Study 1c find evidence of experienced dissonance as a result of product choice. Among both experimental groups, those who chose the animal-based quiche over the herbivorous alternative experienced significantly more dissonance than those who

chose the herbivorous option, but there were no differences depending on which herbivorous label the participant saw. This suggests there is some level of dissonance elicited by considering an herbivorous alternative before choosing the animal-based option. This may be due to the inclusion of an herbivorous alternative, but future research should test a similar choice scenario without an herbivorous alternative to see if dissonance remains. However, no differences in experienced dissonance were detected in any of the other models, and negative affect was not observed in any of them.

The lack of additional dissonance findings may indicate an absence of dietary group differences, and no effect of label exposure. Further, the lack of negative affect in all models, including the model that observed dissonance differences, may suggest eating egg and dairy products do not elicit the same level of moral conflict as eating meat does.

On top of veering away from meat, this study differs from prior work by incorporating herbivorous options, and by seeking to measure dissonance itself instead of measuring dissonance reduction strategies. Perhaps a manipulation increasing the salience of the animals used to create eggs and dairy would be more effective at inducing dissonance, and recording dissonance reduction strategies would help to capture it. Nevertheless, observing dissonance in those who chose the animal-based product, even without animalizing the products, suggests there is a moral discrepancy at play in some capacity.

2.5 General Discussion

The studies reported in this chapter demonstrate a diverse impact of label on consumer perceptions of herbivorous dairy and egg alternatives.

2.5.1 Theoretical Implications

Prospect theory research tends to consider gains and losses in financial terms, and this research extends beyond that to include other important factors playing into one's decision. The results showing the vegan label is associated with more loss among omnivores compared to the plant-based label suggest the labels are perceived as loss- and gain-framed, respectively. However, both herbivorous labels were associated with more loss than the animal-based quiche (Appendix E), so the plant-based label may only be considered as gain-framed when compared to the vegan label (or other herbivorous labels). Consistent with prospect theory, the results show more omnivores choose the plant-based quiche over the equivalent vegan quiche, suggesting more weight was placed on what could be gained in making a choice. This may also be why more people thought the plant-based-labeled quiche could contain animal products—in other words, when something is gain-framed, the probability of experiencing a gain (i.e., eating animal products) appears higher (Kahneman & Tversky, 1979).

Notably, the herbivorous sample viewed the plant-based-labeled quiche as associated with more loss than the vegan-labeled, which likely indicates that herbivores view loss differently than omnivores when making a food choice. Perhaps among this population, the loss associated with the plant-based label is the lack of safety in choice. For example, the vegan label is ethically driven, which may signify a smaller chance of animal products being present in the ingredient list. By expanding beyond monetary factors and comparing different groups, these findings strengthen the breadth of prospect

theory, while also indicating group differences in some scenarios. This provides an interesting avenue for future non-consequential choice research.

Concerning dissonance, this research adds to the literature expanding the concept of meat-related cognitive dissonance to other animal products by incorporating herbivorous alternatives as well as different labels. Findings show that while overarching dissonance was not observed, there was a significant difference in dissonance between those who chose the animal-based quiche over the herbivorous alternative they saw. This suggests there is an impact of choice on dissonance, perhaps due to the association of the herbivorous labels with animal welfare or ethics. Future research should build on this theoretical contribution by incorporating the animalization of cows and chickens during production of dairy and eggs, and measure dissonance reduction behaviors that can be more directly compared to the findings of prior research on meat-related dissonance.

2.5.2 Practical Implications

The differences observed in attribute perceptions and choice in the 1a and 1b samples have important practical implications. When labeling herbivorous alternatives for animal products like eggs or dairy, producers and marketers must determine their target audience. Though they are small in numbers, herbivores are presumably very willing to try herbivorous products, so prioritizing the vegan label may be ideal. But if trying to appeal to the skeptical omnivorous masses, the plant-based label is likely preferred. Prior research has not directly compared the two herbivorous labels to one another among the same individual, making the current findings that omnivores heavily favor the plant-based label more robust, and more reflective of real grocery store

scenarios. Though, even in the conditions where participants chose between an animal-based quiche and one of the herbivorous labels, those exposed to the plant-based label were more likely to choose it than those exposed to the vegan label.

Realistically, herbivorous individuals will still purchase plant-based-labeled products when in a real-life scenario where they are able to read the ingredient lists, whereas omnivores may immediately write off a product labeled as vegan. Herbivores have limited food options, and since their dietary choices are primarily driven by ethics, they may be more analytical of products before purchasing. Because of this, and due to the small portion of herbivores globally, the plant-based label may result in the most purchases.

2.6 Limitations and Future Directions

Interpretations of this research should consider several limitations. First, all measures were self-reported and hypothetical in nature, limiting the external validity of the results. Also, all samples used in these studies were not representative of the population, so results cannot be generalized to the broader public. Future research should employ realistic choice scenarios to measure actual behavior among a representative sample.

Some participants may have been unfamiliar with what a quiche is, limiting the accuracy of their responses. However, one question within the survey asked participants to provide three ingredients they believed could be in each of the quiches, and results of this question suggest most were familiar. Further, the quiche was the only product tested in these studies, so future research should include more egg and dairy substitutes. The

conflicting findings in past research comparing herbivorous labels suggest these results do not necessarily translate to all other herbivorous alternatives. Also, there was a significantly greater proportion of participants from the United Kingdom in the 1b sample compared to the 1a sample, which may have introduced cultural or other differences that impacted results.

The experienced loss scale used in Study 1a-b has not undergone psychometric analyses beyond what is reported here to establish its validity as a scale intended to measure loss. Also, the loss-frame of the vegan label and the gain-frame of the plant-based label cannot be assumed equivalent to one another. Thus, the loss results should be interpreted cautiously. Further, the MSI scale may not have accurately measured experienced dissonance, as it has not been psychometrically supported as doing so. While there is ample research supporting the relatedness of MSI to dissonance, caution is advised when making dissonance conclusions about this work.

Chapter 3. The Health Halo Effect of Herbivorous Alternatives for Healthy and Unhealthy Dairy Products

For each food product category, there are myriad versions one could choose, each intended to cater to diverse taste or health preferences, allergies, and/or moral convictions. When faced with so many options, how do people choose what to buy? Some are limited to a small subset of options due to their restrictions, but many have little to no food exclusions, leading to purchasing decisions driven by factors such as product attribute perceptions, price, or compelling labeling strategies.

Aside from allergy considerations, people value many factors very differently from one another when choosing a product, hence the multitude of options that have joined the market. Some people may be most compelled to buy a product based on its supposed health benefits (Aggarwal et al., 2016), but for others, their environmental identity drives their decision making (Whitmarsh & O'Neill, 2010). Most people take cost and convenience heavily into account before making a food purchase (Hebden et al., 2015), but if these factors are set aside (i.e., comparable products are equally available and priced), what product attributes have the potential to convince someone which product to buy? And beyond this, how can consumer perceptions of these factors be swayed by labeling?

3.1 Literature Review

3.1.1 Health and Taste

Considering factors that influence grocery selections, taste is consistently at the very top of the list, even above cost and convenience (Aggarwal et al., 2016; Dana et al., 2021; Hebden et al., 2015), and taste is closely followed by perceived healthfulness (Aggarwal et al., 2016). Importantly, health and taste attributes are inherently interlinked in a consumer's perception of a product (Plasek et al., 2020). Prior to tasting a food product, consumers perceptions of its health qualities can be impacted by many factors, including expected taste (Plasek et al., 2020; Raghunathan et al., 2006). Some research on U.S. American samples suggests that when a product is viewed as healthy, it is often also viewed as less tasty than products viewed as less healthy (Jo & Lusk, 2018; Raghunathan et al., 2006; Vadiveloo et al., 2013). However, the reverse of this has been observed in European, Chinese, and Korean samples, suggesting cultural differences (Jo & Lusk, 2018; van der Heijden et al., 2020; Werle et al., 2013).

Some foods are generally viewed as healthy, and others unhealthy, perceptions that are likely due to a combination of product attributes such as color, packaging, and nutritional information (Plasek et al., 2020). One food that tends to be perceived as healthy is Greek yogurt (Rao et al., 2017). Formulated with the same foundational ingredient as Greek yogurt, ice cream is also a beloved dairy product all over the world (Goff & Hartel, 2013), though in its classic form, it is generally perceived as unhealthy (Bullock et al., 2020).

Halo Effect. The halo effect posits that when a person believes another person or entity to display one positive attribute, they assume other unrelated positive attributes about the subject as well (Nisbett & Wilson, 1977; Thorndike, 1920). For example, when a food product is labeled as "organic", it can cause people to believe it is more environmentally sustainable, higher quality, and tastier than the same product without an organic label (Apaolaza et al., 2017; Küst, 2019).

The halo effect has been widely studied in the context of healthy food choices, referred to as the "health halo effect" (e.g., Bullock et al., 2020; Stremmel et al., 2022). For instance, high protein labels imply high fiber content (Fernan et al., 2018), fair-trade labels imply healthiness (Berry & Romero, 2021), and perceived corporate social responsibility of the food producer implies lower caloric density (Peloza et al., 2015). These types of assumptions can lead to less healthy food choices, as one positive attribute does not necessarily correlate with positive health attributes. Companies can and do capitalize on the health halo effect by using advertisements and labels that influence people—especially children—to view an unhealthy product as healthier than it is (Harris et al., 2018).

In recent years, the market for non-dairy alternatives to many dairy products has quickly expanded, likely due to the rise in people decreasing or eliminating dairy from their diets (Islam et al., 2021; Zingone et al., 2017). Because health reasons are among the top reported motivators for choosing to cut out some or all animal products (Miki et al., 2020), understanding how labeling impacts these perceptions is essential to increasing willingness to try an alternative. There has been a modest amount of health halo research

on herbivorous alternatives to animal products (Besson et al., 2020; Bullock et al., 2020). Among the work that has investigated this, a 2020 study conducted by Besson and colleagues found that a vegetarian-labeled burger was perceived as less caloric than an equivalent meat version, though this assumption did not lead to increased intention to choose the vegetarian burger. Another study observed a halo effect for a non-dairy ice cream, finding it was rated as healthier than a premium dairy ice cream (Bullock et al., 2020). Ultimately, the ice cream rated as tastiest in that study (premium dairy) was rated the least healthy, and the ice cream rated as least tasty (low-calorie dairy) was rated as the healthiest, further supporting an interaction between these two product attributes. Related research that does not incorporate the health halo effect but compares the vegan and plant-based labels on health perceptions finds that plant-based-labeled products are perceived as healthier than the same products with a vegan label (H. Lee et al., 2024; Ruby et al., 2024). If the plant-based label signals health, perhaps it is also associated with other positive attributes that drive consumer choice. As such, there is a need for research explicitly testing which label bears a brighter halo.

The lack of research on how preconceived health beliefs about an animal product impact perceptions of its herbivorous alternative introduces an additional component of intrigue to the health halo puzzle. Critically, past research finding an herbivorous health halo effect has focused on relatively unhealthy animal products (e.g., burgers, cookies, ice cream). However, it is unclear whether or not the health halo generalizes to herbivorous alternatives of foods that tend to be perceived as healthy. I predict that herbivorous alternatives to healthy foods, like Greek yogurt, will be perceived as less

healthy due to a perceived superiority of the dairy version. In other words, because Greek yogurt is likely perceived as a very healthy food, imitations of it are unlikely to elicit comparable health ratings. Perhaps in scenarios where the animal-based option is not viewed as a health food, people search for redeemable factors (e.g., health) in alternatives for it since they consistently believe these alternatives will not taste as good as the animal-based version (Michel, Knaapila, et al., 2021; Rosenfeld et al., 2024). Further, effects may also depend on the specific herbivorous label used (e.g., vegan, plant-based). Building on the Greek yogurt example, people deciding between herbivorous Greek yogurt alternatives may seek to maximize whatever health properties they can from their choice. This research will examine whether the health halo effect observed for herbivorous alternatives to unhealthy foods (e.g., cookies) also generalizes to healthy foods.

3.1.2 Sustainability

The environmental sustainability of a product has become a growing motivation for purchasing food items (Nguyen-Viet, 2022) and environmental identity has been shown to correlate with sustainable decision making (Dresner et al., 2015). Consumers generally believe that herbivorous alternatives for dairy products are more sustainable than their dairy counterparts (Schiano et al., 2020), and are even willing to pay more for them in certain scenarios such as coffee-drinking (Halabi et al., 2024).

Because herbivorous alternatives to dairy products are typically more environmentally sustainable than the dairy product they are emulating (Craig et al., 2023), and the health halo effect entails assigning additional positive attributes to a food

perceived as healthy, it follows that those who believe an herbivorous alternative to a dairy product is healthy may also believe it to be sustainable. Thus, herbivorous alternatives for dairy products perceived as unhealthy may be perceived as healthier and more sustainable than their dairy counterpart, while alternatives for dairy products perceived as healthy may be perceived as less healthy and less sustainable than their dairy counterpart. This possibility is challenged by the reality that herbivorous alternatives for dairy products are typically more sustainable, so it is unclear whether sustainability product perceptions will more closely reflect this reality, or the health halo effect.

3.1.3 Effects of Tasting on Health and Sustainability Ratings

When consumers are faced with herbivorous alternatives for otherwise familiar food, they usually choose the option they believe to be the tastiest (Aggarwal et al., 2016), which is almost always the animal-based version (Michel, Knaapila, et al., 2021; Vural et al., 2023). However, if another attribute, such as health or sustainability, reflects a prominent component of a consumer's identity, they may be more likely to consider herbivorous alternatives. Further, in research finding taste as the primary driver of grocery decision making, participants are asked questions such as, "How important is taste to you when choosing food to eat or buy for yourself?" (Dana et al., 2021), so it is unclear whether this captures expectations of how a product will taste, or ratings of actual taste if the person has eaten the product before. Because of the interactions between health and taste perceptions, health ratings may change after consumers taste a product, particularly if the product tastes better or worse than expected. If participants believe an herbivorous product will taste good and is unhealthy prior to tasting it, but it ends up

tasting worse than they expected, their health rating may subsequently increase. Prior research has not measured perceived taste and health both before *and* after eating a product, a gap the current study fills.

3.2 Goals and Contributions

There are two main goals of this research. First, it seeks to investigate the relationship between health and taste perceptions for herbivorous alternatives to dairy products before and after tasting. In doing so, this study will begin to elucidate how actual consumption, rather than hypothetical judgments, shapes the perceived relationship between health and taste.

Second, advancing knowledge related to the health halo effect, this study aims to understand how health perceptions of dairy products shape health and other attribute perceptions of herbivorous alternatives for such products. This research will be one of the first to shed light on whether there is a health halo effect associated with the vegan or plant-based labels, and how different foods may alter such a halo. Vegan and plant-based labels are two of the most prevalent marketing strategies used on herbivorous alternatives to animal-based products, so understanding health halo effects for one or both of them is vital for maximizing consumer willingness to try such products.

3.2.1 Broader Impacts

Investigating the impact of dairy product health perceptions on herbivorous alternative perceptions will inform food producers and marketers by clarifying if certain herbivorous alternatives warrant different labeling strategies than others. More specifically, better understanding how different food products and labels are perceived

will allow marketers to highlight information that may increase consumer receptivity of the product, or remove existing labels that may deter purchasing behavior.

The hypotheses for this study and the support found are listed in Table 6. This paper reports the results of one pre-registered study. All materials, the survey, data, and pre-registration are available at https://osf.io/sfyg8/?view_only=de0d92958b824bea95d93b60a98a8e37. All reported *p*-values are two-sided unless otherwise specified. Results with $p < 0.05$ are considered statistically significant, and those with $p < 0.10$ are considered marginally significant.

Table 6. Study 2 Hypotheses

Number	Hypothesis	Support
H2.1	In the Greek yogurt condition, the pre-taste health ratings of the plant-based- and vegan-labeled Greek yogurts will predict product choice, whereby participants will choose the herbivorous Greek yogurt they rated as healthier	*yes*
H2.2	In the Greek yogurt condition, the impact of pre-taste health rating on post-taste health rating will vary depending on the post-taste taste rating of the product. Specifically, when the taste rating is lower, individuals will be more likely to rate the Greek yogurt as healthier than their pre-taste health rating, compared to when the taste rating is higher	*modest*
H2.3	a) The herbivorous Greek yogurts will be rated differently on pre-taste health	*yes*
	b) Both herbivorous Greek yogurts will be rated as less healthy than dairy Greek yogurt	*yes*
H2.4	a) The herbivorous ice creams will be rated differently on pre-taste health	*no*
	b) Both herbivorous ice creams will be rated as healthier than dairy ice cream	*yes*

*H2.5	a) There will be pre-taste sustainability rating differences between the herbivorous labels within each food condition	*yes*
	b) Both herbivorous ice creams will be rated as more environmentally sustainable than the dairy ice cream, but this pattern will not be observed in the Greek yogurt condition	*partial*
*H2.6	a) In general, more Greek yogurt will be eaten than ice cream	*yes*
	b) There will be a difference in amount eaten between the two herbivorous labels for both food conditions	*no*

*Table note. *Indicates exploratory hypothesis not pre-registered.*

3.3 Study 2

3.3.1 Methodology

This study used a within-subjects experimental design. All study procedures were approved by the Ohio State Institutional Review Board (IRB protocol #2024B0086).

Participants. Participants were students enrolled in classes of the business school of a large university in the United States Midwest that allowed extra credit to be awarded for participating in research. To be eligible for this study, participants had to be English-speaking, at least eighteen years of age, and not allergic to coconut, cashews, or soy. This study was conducted in a lab with a pre-determined number of participant slots, which capped the sample size. Three hundred and forty-four people began the study; after removing participants for allergies (n = 21) and failed attention checks (n = 27), the final sample for was N = 296. See Table 7 for more information on participant demographics.

Table 7. Study 2 Demographics

Variable	Respondents N = 296
Median Age	20.00 (*SD*: 0.87)
Gender	

Woman	43.2%
Man	56.1%
Other	0.6%
Race (could select multiple)	
White or Caucasian	78.0%
Black or African American	5.1%
American Indian or Alaska Native	1.4%
Asian	19.9%
Native Hawaiian or Pacific Islander	0.0%
Other/Prefer not to say	2.0%
Hispanic, Latino, or Spanish	4.4%
Political ideology	
Extremely liberal	1.0%
Liberal	16.2%
Slightly liberal	17.6%
Moderate/Independent	23.6%
Slightly conservative	19.3%
Conservative	19.9%
Extremely conservative	2.4%
Diet (could select multiple)	
Omnivorous (inclusive of animal products)	83.8%
Lactose-Intolerant	7.1%
Pescatarian	1.7%
Vegetarian	3.7%
Vegan/Plant-based	0.0%
Gluten-free	4.7%
Other (specified)	4.4%

Procedures. Students came to the computer lab for a thirty-minute session in exchange for 0.5% extra credit in one of their classes. They were seated at computers and began the online survey hosted by Qualtrics. After providing allergy information and consent, eligible participants were randomly assigned to one of two conditions: the healthy (Greek yogurt) or unhealthy (ice cream) food condition. Results of a pre-test revealed that—compared to two other dairy products (milk chocolate, cottage cheese)—

Greek yogurt was rated as the healthiest, and ice cream was rated as least healthy (Appendix B). Participants read that they were going to answer questions about a few different types of their assigned product. Following this, participants responded to questions about their expectations of a dairy version, a vegan version, and a plant-based version of their assigned food. The order in which the three products were shown was randomized, and the order in which the attribute measures and scale items were shown was also randomized.

After the pre-taste attribute measures, participants reached a stop sign on their screen that instructed them to get a research assistant before proceeding. The research assistants brought two herbivorous products (i.e., no dairy option) based on condition assignment, and participants chose one to taste. The two herbivorous options were the same product with different labels.

After receiving their chosen product, participants were instructed via the survey to taste their product. They also read "You only need to eat a small bite, but you are welcome to continue eating for the rest of your time at this computer. Please note, you must leave behind the container before you exit the room, so be sure to eat the amount that you want before you leave."

After tasting their product, participants proceeded to more questions about their chosen product. These questions were the same attribute measures as the ones they answered prior to tasting their product (i.e., health, sustainability, taste, and appearance), but they only answered the questions for their chosen product, and the items were

reframed in a different tense to indicate they should use their opinion from the taste test to inform their responses.

Following these post-taste attribute measures, participants responded to an environmental identity measure and several demographic questions. Finally, participants were instructed to type in the number that was written on the bottom of the cup of product they were given, and read "If you would like, you may continue to eat your product until you leave this room. Once you leave the room, leave the container by your computer." After participants left the lab, research assistants recorded the number on the bottom of the cup, the label on the cup (for cross-referencing), and the weight in grams of the cup with the remaining product in it. The weights were later entered into the dataset manually by matching the numbers on the bottom of the cup with the numbers participants typed in on their survey.

Materials. The herbivorous Greek yogurt was a cashew-based unsweetened, tart yogurt produced by Trader Joe's[2]. The herbivorous ice cream was an oat-based vanilla ice cream produced by Breyers.

Products were given to participants in brown, four-ounce, compostable cups with lids made of the same materials. Four-inch wooden spoons were also provided. The labels were made by printing on sticker paper.

Measures.

Health.

[2] Dairy Greek yogurt differs from traditional yogurt in that it is produced by straining out the whey, which is not present in herbivorous yogurts.

Pre-taste. Four items (Fenko et al., 2016) were used to measure the perceived expected health of the three versions of Greek yogurt or ice cream, depending on condition. The items were rated on a five-point scale ranging from 1 = *fully disagree*, to 5 = *fully agree*. The items were: "I expect [dairy/vegan/plant-based] [Greek yogurt/ice cream] to be healthy," "I would consider [dairy/vegan/plant-based] [Greek yogurt/ice cream] as good for me," "I have an impression that [dairy/vegan/plant-based] [Greek yogurt/ice cream] is healthy," and "[Dairy/Vegan/Plant-based] [Greek yogurt/ice cream] seems healthier than similar [Greek yogurts/ice creams]." For each of the six product versions included in the pre-taste measures, the mean of these four items was taken to form a scale (0.86 [dairy ice cream] $\leq \alpha \leq$ 0.92 [vegan-labeled ice cream]).

Post-taste. Following the choice and the taste test, the same set of four items was used to measure the health of only the chosen product. The items were reworded a slightly (e.g., "I think the [vegan/plant-based] [Greek yogurt/ice cream] I ate is healthy,"). For each of the four product versions, the mean of these four items was taken to form a scale (0.84 [vegan-labeled Greek yogurt] $\leq \alpha \leq$ 0.92 [vegan-labeled ice cream]).

Sustainability.

Pre-taste. A three-item scale by Gershoff and Frels (2015) was used to measure pre-taste environmental sustainability of the three versions of their product. The three items were rated on a seven-point scale ranging from 1 = *strongly disagree*, to 7 = *strongly agree*. The items included: "[Dairy/Vegan/Plant-based] [Greek yogurt/ice cream] deserves to be labeled as 'environmentally friendly'," "Purchasing [dairy/vegan/plant-based] [Greek yogurt/ice cream] would be a good environmental

choice," and "A person who cares about the environment would be likely to buy [dairy/vegan/plant-based] [Greek yogurt/ice cream]." For each of the six product versions, the mean of these three items was taken to form a scale (0.83 [dairy ice cream] $\leq \alpha \leq$ 0.90 [vegan-labeled Greek yogurt]).

Post-taste. This same scale was used to measure sustainability of the chosen product after the participant tasted it, and the wordings of the items were slightly altered (e.g.,"The [vegan/plant-based] [Greek yogurt/ice cream] I ate deserves to be labeled as 'environmentally friendly,"). For each of the four product versions, the mean of these three items was taken to form a scale (0.88 [vegan-labeled Greek yogurt & plant-based-labeled ice cream] $\leq \alpha \leq$ 0.92 [vegan-labeled ice cream]).

Taste.

Pre-taste. To measure pre-taste taste of the three versions of their product, participants responded to, "I expect I will enjoy the taste of [dairy/vegan/plant-based] [Greek yogurt/ice cream]," on a five-point scale ranging from 1 = *fully disagree*, to 5 = *fully agree*.

Post-taste. The same item was used with slightly different wording to measure taste of the participant's chosen product following consumption. The item read, "I enjoyed the taste of the [vegan/plant-based] [Greek yogurt/ice cream]."

Choice. Participants were asked to choose between two items, either two herbivorous Greek yogurt options or two herbivorous ice cream options, depending on condition. There was no dairy option in either condition. When the research assistant viewed the participant's screen at the stop sign point with the picture of the person's

assigned product, they brought over two four-ounce containers of that product, along with a small wooden spoon. Due to density differences between the products, the Greek yogurt cups contained between 87 and 92 grams of the product while ice cream cups contained between 47 and 51 grams of the product. One container was labeled as "vegan [Greek yogurt/ice cream]" and one was labeled as "plant-based [Greek yogurt/ice cream]," but the products inside the containers were exactly the same within each condition. Research assistants held up the two products in a random order each time, with the labels facing the participant, and said, "please point to the one that you want to try" and gave them the product they selected, with the spoon. To ensure the correct choice was indicated, the research assistant then selected the participant's choice within the survey on the screen, and informed the participant they could proceed. See Appendix F for condition-specific stimuli and materials.

Amount Eaten. To obtain accurate weights of remaining product in cups, the weight of the cup (4.25 grams) was subtracted from the recorded weight. Then, the weights were converted to percentages and subtracted from 100 to reflect the percentage of the product eaten by each participant. Some cup numbers were not accurately recorded by participants (i.e., impossible numbers), some were duplicated by multiple people, and some cups may have been unopened. Those with cups that appeared unopened or could not be validated via label cross-checking (n = 46) were excluded from all weight-related analyses.

Environmental identity was measured using the same scale used in Studies 1a-c (α = 0.88), and the following demographic information: age, gender, race, ethnicity, political

beliefs, and diet. Additional measures beyond the scope of this project are reported in Appendices A and G.

3.3.2 Results

Health and Choice (H2.1). To test H2.1, a logistic regression analysis was conducted, with the difference in pre-taste health ratings between the two herbivorous Greek yogurts for each participant as the independent variable, and choice (vegan coded as 1, plant-based coded as 2) as the dependent variable. The model was statistically significant, $\chi 2$ (1, n = 145) = 6.901, p = 0.009, explaining 6.6% (Nagelkerke R^2) of the variance in choice and correctly classifying 70.3% of cases. This means the model revealed that health rating difference significantly predicted product choice. For every 1-point increase in the health rating difference, the odds of choosing the plant-based-labeled Greek yogurt decreased by 49.7% (OR = 0.503, 95% CI [0.294, 0.862], p = 0.012). Supporting H2.1, these results suggest that when a participant rated the vegan-labeled Greek yogurt as healthier than the plant-based, they were more likely to choose the vegan-labeled Greek yogurt. When gender and political beliefs were added to the model as covariates (Appendix H, Table H1), the results followed the same pattern, showing this relationship is robust to the addition of covariates.

Pre- and Post-taste Health Ratings (H2.2). To test whether post-taste taste rating moderated the relationship between pre-taste and post-taste health ratings of the Greek yogurt the participant ended up choosing, a moderation analysis was conducted using Process Model 1 (Hayes, 2017) (Figure 8). Overall, this model was statistically significant. Pre-taste health rating and post-taste taste rating account for 34.2% of the

variance in post-taste health rating, $F(3, 141) = 24.447$, $p < 0.001$, and the interaction term between pre-taste health and post-taste taste ratings accounts for 1.55% of this variance. The interaction term is marginally significant ($\beta = -0.142$, $SE = 0.078$, $p = 0.070$, 95% CI [-0.295, 0.012]), suggesting that as post-taste taste ratings increase, the strength of the positive relationship between pre- and post-taste health ratings weakens. That is, those who rated their Greek yogurt as less tasty exhibited a stronger increase in health rating from pre- to post-taste, whereas those who perceived it as tastier did not. When gender and political affiliation were added into the model as covariates (Appendix H, Table H2), this effect remained. Further supporting this, a Johnson-Neyman test indicated that the effect of pre-taste health on post-taste health was significant when post-taste taste ratings were below 3.03, but not significant when taste ratings exceeded that value. All of this suggests the relationship between pre- and post-taste health ratings may depend partially on post-taste taste rating. This finding provides modest support for H2.2.

Figure 8. Study 2 Moderation Model Testing H2.2 (Process Model 1; Hayes, 2017)

Figure note. $^{+}$ $p < 0.10$, *** $p < 0.001$.

Health and Sustainability Differences (H2.3-2.5). For the Greek yogurt condition, a one-way within subjects MANOVA was conducted to explore the impact of label (dairy, vegan, plant-based) on pre-taste health and pre-taste sustainability ratings. Results of this model revealed a significant effect of label on health and sustainability perceptions, $F(4, 141) = 28.348$, $p < 0.001$; Wilks's lambda = 0.554, $\eta p^2 = 0.446$. Pairwise comparisons showed that participants rated the dairy Greek yogurt ($M = 3.738$, $SD = 0.677$) as significantly healthier than the vegan-labeled Greek yogurt ($M = 3.395$, $SD = 0.862$), $t(144) = 3.870$, one-sided $p < 0.001$, and marginally higher than the plant-based-labeled Greek yogurt ($M = 3.585$, $SD = 0.781$), $t(144) = 1.636$, one-sided $p = 0.052$. Further, this model indicated that the plant-based-labeled Greek yogurt was rated as significantly healthier than the vegan-labeled, $t(144) = 3.100$, $p = 0.002$. These results provide support for H2.3a and b, indicating a difference in pre-taste health perceptions between the two herbivorous Greek yogurts, and between each of the herbivorous Greek yogurts compared to the dairy Greek yogurt (Figure 9).

Results of the Greek yogurt model found that the dairy Greek yogurt ($M = 3.809$, $SD = 0.077$) was rated as significantly less environmentally sustainable than the vegan-labeled ($M = 4.428$, $SD = 1.249$), $t(144) = -5.361$, $p < 0.001$, and the plant-based-labeled Greek yogurt ($M = 4.754$, $SD = 1.206$), $t(144) = -8.120$, p , 0.001. Further, the plant-based-labeled Greek yogurt was rated as significantly more sustainable than the vegan-labeled, $t(144) = -3.695$, $p < 0.001$ (Figure 10). When gender and political beliefs were added to this model as covariates (Appendix H, Table H3), the model remained significant, $F(4, 138) = 4.453$, $p = 0.002$; Wilks's lambda = 0.886, $\eta p^2 = 0.114$. Pairwise

comparison trends remained the same, but the health rating difference between the dairy and plant-based-labeled Greek yogurt went away.

For the ice cream condition, another one-way within subjects MANOVA was conducted to explore the impact of label (dairy, vegan, plant-based) on pre-taste health and sustainability scores. Results of this model revealed a significant effect of label on pre-taste health and sustainability perceptions, $F(4, 147) = 27.238$, $p < 0.001$; Wilks's lambda = 0.574, $\eta p^2 = 0.426$. Pairwise comparisons showed that while health ratings did not differ between the vegan-labeled ($M = 3.139$, $SD = 1.005$) and plant-based-labeled ($M = 3.195$, $SD = 0.952$) ice creams, $t(150) = -0.913$, $p = 0.362$, the dairy ice cream ($M = 2.113$, $SD = 0.758$) was rated significantly less healthy than the vegan-labeled, $t(150) = -9.360$, one-sided $p < 0.001$, and plant-based-labeled $t(150) = -10.068$, one-sided $p < 0.001$, ice creams. The lack of observed pre-taste health rating differences between the two herbivorous ice creams fails to support H2.4a, but the observed pre-taste health differences between the vegan and dairy as well as plant-based and dairy ice creams provides support for H2.4b (Figure 9).

Results of the ice cream model show that the dairy ($M = 3.366$, $SD = 0.973$) ice cream was perceived as significantly less environmentally sustainable than the vegan-labeled ($M = 4.099$, $SD = 1.343$) ice cream, $t(150) = -5.129$, one-sided $p < 0.001$, and the plant-based-labeled ($M = 4.294$, $SD = 1.258$) ice cream, $t(150) = -6.632$, one-sided $p < 0.001$. Further, the plant-based-labeled ice cream was rated as more sustainable than the vegan-labeled, $t(150) = 2.470$, $p = 0.015$ (Figure 10). When gender and political beliefs were added as covariates (Appendix H, Table H4), the model remained significant, $F(4,$

145) = 4.833, $p = 0.001$; Wilks's lambda = 0.882, $\eta p^2 = 0.118$. Pairwise comparison trends remained the same.

The pre-taste sustainability results from both food models support H2.5a, revealing that in both food conditions, the herbivorous-labeled products were rated differently from one another on sustainability. Results provide partial support for H2.5b, finding that in both food conditions, both herbivorous-labeled products were rated as significantly more sustainable than the dairy version.

Figure 9. Study 2 Violin Plots of Pre-Taste Heath Ratings

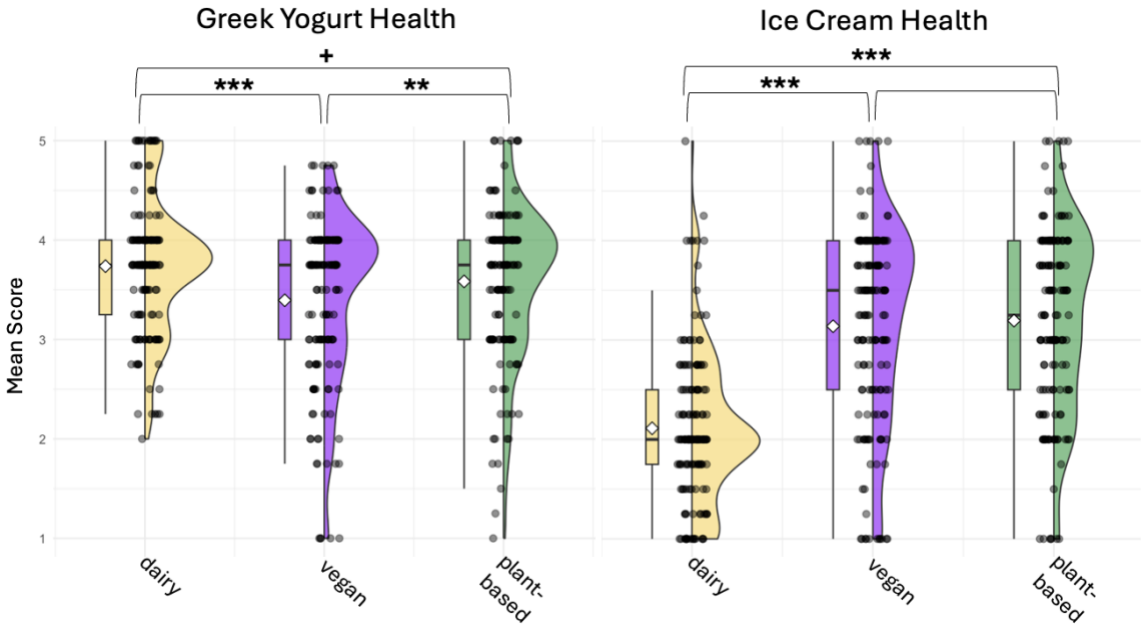


Figure note. $^{+}$ $p < 0.10$, ** $p < 0.01$, *** $p < 0.001$. *Mean indicated by white diamond.*

Figure 10. Study 2 Violin Plots of Pre-Taste Sustainability Ratings

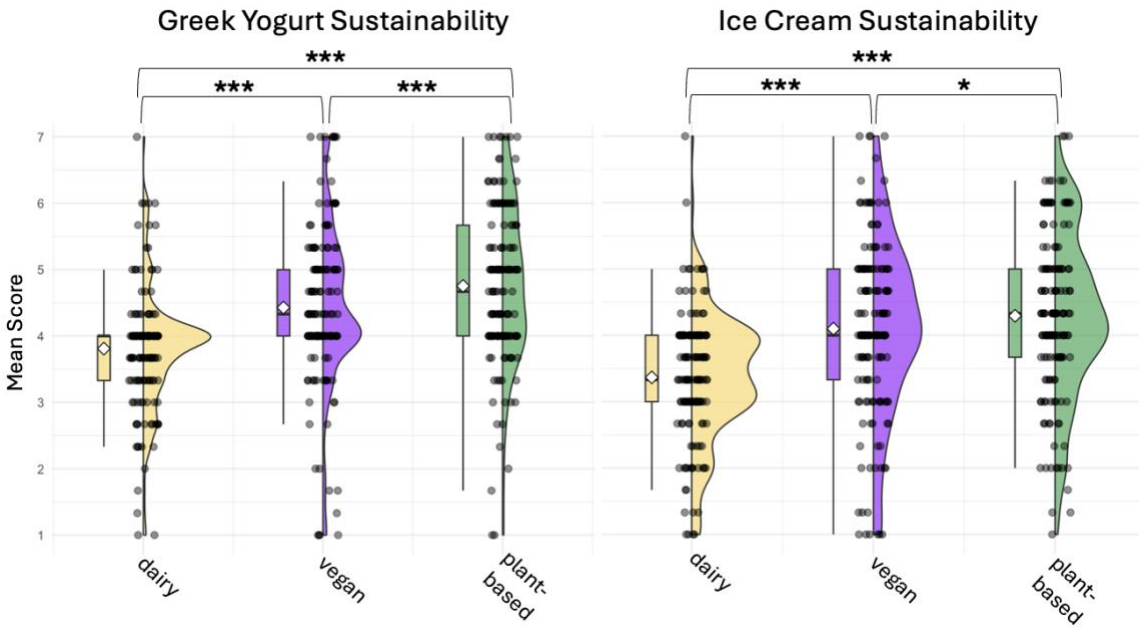


*Figure note. * $p < 0.05$, *** $p < 0.001$. Mean indicated by white diamond.*

Amount Eaten (H2.6). To compare the amount eaten between conditions and labels, three independent samples *t*-tests were conducted. First, the percentage eaten was compared between those in the Greek yogurt condition and those in the ice cream condition. Results revealed a significant difference between conditions on percentage of product eaten, $t(248) = -9.288$, one-sided $p < 0.001$. Those in the Greek yogurt condition ate 22.19% (19.98 grams) of the product on average, and those in the ice cream condition ate 55.58% (27.79 grams) on average.

Another *t*-test revealed that in the Greek yogurt condition, participants who chose the vegan-labeled Greek yogurt ($n = 33$) consumed 26.26% of their product, while participants who chose the plant-based-labeled Greek yogurt ($n = 88$) consumed 20.67%. No significant differences were detected between these amounts, $t(119) = 1.320$, $p = 0.189$. A final *t*-test showed that in the ice cream condition, participants who chose the

vegan-labeled ice cream (n = 54) consumed 56.11% of their product, while participants who chose the plant-based-labeled ice cream (n = 75) consumed 55.20%. No significant differences were detected between these amounts, $t(127) = 0.150$, $p = 0.881$.

In conclusion, there is evidence of a significant difference across conditions in amount of product eaten, but no differences within condition depending on what label was chosen. These results support H2.6a and do not support H2.6b.

3.4 General Discussion

This research found that when a dairy product was believed to be healthy (e.g., Greek yogurt), herbivorous alternatives for that product were viewed as less healthy, yet when a dairy product was believed to be unhealthy (e.g., ice cream), herbivorous alternatives for that product were viewed as healthier. These findings suggest that health perceptions of conventionally healthy or unhealthy dairy products may impact health perceptions of herbivorous replacements for them, though more evidence is needed to support a directional effect such as this.

Results also show perceived attribute differences and similarities between the food conditions, finding that the herbivorous-labeled products were rated as more sustainable than the dairy version in both conditions, but rated as healthier than the dairy version only in the ice cream condition. In the Greek yogurt condition, participants were more likely to choose the herbivorous-labeled product they rated as healthiest. Additionally, post-taste taste ratings may partially moderate the relationship between pre- and post-taste health ratings in the Greek yogurt condition, though the effect was marginal.

3.4.1 Theoretical Implications

In line with prior research (H. Lee et al., 2024; Ruby et al., 2024), these results find that the plant-based-labeled Greek yogurt was perceived as healthier than the vegan-labeled, and marginally less healthy than the dairy Greek yogurt. The current research also demonstrates that the plant-based label may have a health halo effect since it was rated as healthier than the vegan-labeled product in the Greek yogurt condition, as well as more sustainable than the vegan-labeled product in both food conditions. The high ratings of the herbivorous labels on health and sustainability in the ice cream condition indicate that a health halo effect may be associated with both herbivorous labels when herbivorous alternatives are meant to emulate an animal-based product perceived as unhealthy. Ratings in the ice cream condition across the three labels seem to follow a similar pattern for both outcome variables, demonstrating a perceived correlation between two positive attributes that are not inherently related. However, the contrasting Greek yogurt ratings between health and sustainability indicate that for herbivorous alternatives for animal-based foods perceived as healthy, the health halo effect may only apply between the plant-based and vegan labels, and not between the herbivorous labels compared to an animal-based option. Although, it could be argued that the marginal—rather than fully statistically significant—health difference between the plant-based-labeled and dairy Greek yogurt provides further evidence of a plant-based health halo.

Perhaps the lack of difference in health ratings between the herbivorous-labeled ice creams reflects that when people believe the product being emulated has no health benefits to offer, they do not look for differences in herbivorous alternatives. In other

words, both labels maintain a health halo effect; any alternative is healthier, so there is no need to look for maximizing health.

3.4.2 Practical Implications

Strengthening the implications of Study 1a-b, the findings of this research suggest that the plant-based label has a health halo effect, and therefore it may be preferable to use this label on herbivorous alternatives compared to the vegan label. This research also offers a rationale for producers and marketers to consider the perceived health of the animal product being emulated when labeling herbivorous alternatives. For example, when an animal product is viewed as unhealthy, an herbivorous alternative label should frame the product as a healthier option if there is reason to believe that is true. This may draw in omnivorous individuals looking to make healthier choices, possibly leading them to attribute additional positive qualities to the product, increasing the pool of consumers ultimately buying it. Alternatively, when the animal product being emulated is perceived as healthy (e.g., Greek yogurt, omelet), herbivorous alternatives may increase in popularity if health properties are not a focus in the labeling strategy. Unless there are metrics to demonstrate the herbivorous alternative is healthier in some way, the product label should center around another attribute, such as environmental benefits.

Ultimately, labeling strategies on herbivorous alternatives should be tailored based in part on how healthy the animal product counterpart is believed to be.

3.4.3 Limitations and Future Directions

Results from this research should be viewed in light of a number of limitations. First, the participants were all college students, who are not representative of the broader

population. Further, some measures were self-reported, and product choice was made under the observation of a research assistant; both of these factors introduce social desirability bias. During the choice portion of the study, participants were within eyesight of other participants, so those who watched the person next to them choose a product before reaching the choice point of the survey themselves, could have been impacted in what choice they ultimately made. Future research should seek to improve external validity by taking place in more realistic settings such as a dining hall or grocery store to better reflect natural behavior, and by accounting for factors such as social observation.

Participants may also have believed that non-dairy replacements are typically more sustainable than dairy products (Schiano et al., 2020), which could have impacted their ratings separate from the health halo effect. Additionally, research assistants differed throughout the sessions, limiting the ability to maintain that as a constant within the study. Research assistants were also unable to verify that all participants actually tasted their product. Future research should maintain consistent research assistants, seek to validate that each person tasted their product, and should include additional food items to compare products beyond dairy alternatives.

Chapter 4. Social Closeness to Animals Commonly Used for Food: Perceptions of Marine vs. Terrestrial Animals and an Intervention to Expand Regulatory Scope

To exist in modern society means inevitably participating in systems that cause harm to other beings—both human and nonhuman. Eating meat requires someone killing an animal, traveling via car means risking collisions with wildlife and other people, and merely walking on sidewalks involves unintentionally benefiting from the habitat destruction required to develop urban infrastructure. So where is the line between the harm people should be willing and unwilling to cause? To many in the United States, it is drawn between a dog and a pig—eating a dog is wrong, but eating a pig is not. For others, the line is drawn between a pig and a fish, and for even fewer, between a fish and an egg. Since research shows that a diet excluding animal products generally has no negative impact on health (Sakkas et al., 2020; Selinger et al., 2023), why do so many draw the line to protect certain animals, but not others? This seemingly subjective construction of ethical standards is a key aspect of speciesism, and necessitates a deeper exploration into the reasons behind consumption behavior.

4.1 Literature Review

"Speciesism" describes a biased preference for the interests of one's own species while disadvantaging or disregarding those of other species (Horta, 2010; Singer, 2009). It is not so much a binary system as it is a hierarchical one, where minimally valued

species (e.g., cows) are treated better than even less valued species (e.g., clams). There are individual and cultural differences that determine which species receive more moral consideration than others, and there are substantial inconsistencies (Lafollette & Shanks, 1996). Regardless of which species are assigned a high rank of moral consideration, many seek to justify their partiality by using religion or alleging superior intellectual capabilities (Singer, 2009). These arguments atrophy rather quickly when philosophically analyzed (Singer, 2009), but the question remains: does species membership determine moral status? The way society currently lives suggests yes, but the variance among groups and individuals indicates it is a subjective determination.

Exploring the efficacy of rationales for indiscriminately ranking species through a philosophical lens falls outside the scope of this research; instead, this work is founded on the observable reality that, in typical Western society, speciesism has broadly categorized certain animals (e.g., cows, pigs, chickens) as food, and others as not (Joy, 2020). Specifically, it explores how U.S. Americans view the subset of species used for food relationally, and how their views differ depending on what type of animal they are considering.

The dichotomization of animals as food or not food has been socialized to most people since birth through the portrayal of farm animals living idyllic lives in children's media, and misinformation that animal products are nutritionally necessary (Clement, 2011; Plous, 1993; Stewart & Cole, 2009). Significant research has explored the consequences of this, finding that the way animals are categorized (i.e., pet, pest, or food) determines how they are viewed emotionally, and that children rate farm animals as less

intelligent and less able to feel emotions compared to dogs and cats (Hawkins & Williams, 2016; Wilkins et al., 2015). Further, when asked to indicate which animals they liked, children consistently preferred mammals like kangaroos over terrestrial mammals commonly used for food (Borgi & Cirulli, 2015). However, there is a lack of research comparing human perceptions towards the different animals used for food. Animals like cows, chickens, crabs, and clams are generally all categorized as food, but people likely perceive them differently in a relational and moral sense.

The idea that humans perceive the numerous species of animals used for food differently from one another is supported by research showing both adults and children prefer and express more concern for animals the more physically similar they are to humans (e.g., mammals) compared to those that are not (e.g., birds, reptiles) (Borgi & Cirulli, 2015; Tisdell et al., 2006). In fact, this preference for beings phenotypically similar to oneself has even been observed in human-human relationships (Liviatan et al., 2008). In the study by Borgi and Cirulli, some invertebrate marine animals were included, and children indeed preferred them less than they did terrestrial mammals. Another study found that people attribute fewer emotional abilities to fish compared to mammals, birds, and reptiles (Wilkins et al., 2015).

The animals most commonly used for food are mammals, birds, and various marine animals. Since these three general categories have drastically different phenotypes and have been shown to be viewed differently by humans, it would follow that this would apply to animals used for food as well. Even within the marine category of food animals, there is significant phenotypic variation—some species do not have faces, others are

covered in an exoskeleton. I suspect these differences manifest as feeling more socially connected to the marine animals with the greatest perceived similarities (e.g., those that have a face) than those that appear the least similar.

There are also likely perception differences between marine animals and between marine and terrestrial animals when considered specifically as food sources. Prior research has found that fish is perceived as the healthiest and most sustainable animal protein source (dos Santos Freitas et al., 2017; Grimshaw, 2013), but these researchers do not differentiate between marine animals or incorporate other types of them. Perhaps fish (e.g., salmon, tuna, cod) are perceived as superior on these attributes, but certain other marine animal types (e.g., mollusks, crustaceans, cephalopods) are not. Or perhaps some of the other marine animals are viewed as even more sustainable and healthy than fish. The current research explores perceptions of these species differences.

4.1.1 Psychological Distance

Construal level theory (CLT) introduces the idea that as an entity is more removed from one's personal experience (i.e., psychologically distant), it is construed more abstractly (vs. concretely) (Nguyen & Fujita, 2024; Trope et al., 2021; Trope & Liberman, 2003). The psychological distance between a person and a given entity affects such construals, leading to differing interpretations of/towards the same entity (Nguyen & Fujita, 2024). Such entities can include events, objects, beings, and ideas, and can differ on the four dimensions of psychological distance—temporal, spatial, social, and hypothetical. Building on this, regulatory scope describes the range of concerns and possibilities one has the capacity to take into consideration during decision making, or in

other words, the "span of psychological distance over which one is capable of regulating" (Trope et al., 2021). Considering the social dimension of psychological distance, expansive regulatory scope can lead to high level construals when thinking about a socially distal other (e.g., thinking about shared humanity or values), but contractive scope can lead to low level construals (e.g., thinking about the person's physical characteristics). The advantages and disadvantages of contracting or expanding scope vary widely depending on the situation and dimension, so interventions to alter scope are diverse and carefully tailored. In essence, regulatory scope is the dynamic mechanism by which people interact with the more static notion of psychological distance. This complex interplay of construal level and regulatory scope encompasses the dimensions of time, space, social relationships, and hypotheticality, and has been heavily utilized in human relationships with climate change (e.g., Brügger et al., 2016; Chen, 2020; Wang et al., 2019).

Despite the relatedness of all four psychological distance dimensions (Spence et al., 2012), the social dimension of CLT will be the focus of the current work. Research concerning the social dimension has primarily involved human-human relationships (e.g., Liviatan et al., 2008; Stephan et al., 2011), but humans frequently interact with nonhuman animals across a wide range of species by forming emotional connections with companion or wild animals, and via work partnerships like some have with police dogs, farm animals, or zoo animals. Given the interconnectedness of humans and nonhuman animals, this dimension should apply to these relationships to some degree.

CLT was investigated in human-nonhuman animal relationships in a 2008 study, which manipulated construal level by telling half of participants they could donate to a fundraiser that supported orcas, and telling the other half they could donate to one that supports a specific orca named Simoon (Fujita et al., 2008). They also manipulated temporal level by presenting the fundraiser as in the near or distant future, and manipulated argument strength by providing either strong or weak arguments for why participants should donate. Results showed that participants were more influenced by argument strength for a specific orca when the fundraiser was soon, and for orcas in general when it was distant. Similarly, another study sought to measure scope by showing a photo of an orangutan and describing threats to orangutan habitats, either by mentioning two orangutans by name (socially proximal), or without names (socially distal) (Muskavage, 2016). This study did not find a difference in conservation behaviors as a result of the manipulation alone, but they did find that those in the socially proximal condition who also read about specific conservation activities they could participate in had greater intentions to engage in orangutan conservation behaviors than those in the socially proximal condition who read a nondescript sentence about conservation.

Perspective-taking of a nonhuman animals has also been examined as a means for increasing social closeness. Some research on this predates the inception of CLT, but it has since been interpreted as related to social psychological distance (Pahl & Bauer, 2013). One study in 2000 found an increase in concern for the environment when participants were instructed to take the perspective of an animal impacted by climate change (Schultz, 2000). Similarly, instructing participants to take the perspective of a

bird influenced by climate change increased empathy for the bird, as well as financial allocations to protect the environment (Berenguer, 2007). Replicating the Schultz finding, another study expanded on the effects of perspective-taking, observing a decrease in egoistic concern as a result of the exercise (Sevillano et al., 2007).

Some research that has looked at psychological distance in the context of animal consumption can be interpreted as scope expansion research. One study on decreasing meat consumption manipulated static and dynamic normative messages as gain- or loss-framed, and found that dynamic norms framed as losses were most effective at decreasing intentions to consume meat (De Groot, 2022). The researchers interpreted these findings as indicative of engagement in low-level construals by expanding scope to include the temporally and hypothetically distal consequences of climate change. Two studies employed the use of virtual reality to decrease meat consumption by virtually placing participants in a future climate disaster scenario (Meijers et al., 2023; Plechatá et al., 2024). The 2023 study intended to manipulate construal level thinking across all four dimensions, but did not observe a decrease in any of them, finding only minor evidence of an indirect effect between a virtual reality experience and decreased meat consumption intentions. The 2024 study found a strong effect of a virtual reality experience on actual meat consumption as well as intentions to reduce in the future, but did not explicitly incorporate or interpret results using CLT.

Recently, the social and spatial dimensions of CLT have been applied to better understand why pescatarians choose to eat marine but not terrestrial animals (Cullen et al., 2024). Cullen and colleagues interpreted their results by citing CLT as a method by

which pescatarians alleviate the cognitive dissonance experienced as a result of caring about animal welfare enough to cut out some animals (i.e., terrestrial) from their diet, yet not others (i.e., marine). This study incorporated the synchroneity of the spatial and social dimensions of CLT, finding evidence that participants feeling less connection to and empathy for marine animals compared to terrestrial animals is due in part to the higher level of perceived similarity between terrestrial animals and humans, as well as the higher level of interaction between humans and terrestrial animals compared to marine animals. The researchers observed clear evidence of participants considering terrestrial animals used for food by engaging in lower-level construals than when considering marine animals used for food. While it contains compelling results, this research has methodological components that warrant a deeper investigation into this topic. This study was a semi-structured interview with ten participants, and it did not explicitly measure perceptions of social closeness. While the data is rich, it has limited validity and generalizability to pescatarians at large. It also did not intentionally differentiate between different marine animals used for food, something the current research introduces.

4.1.2 Interventions for Human-Nonhuman Animal Relationships

Collaboration. Intergroup collaboration—working towards a common goal—has been heavily tested as a strategy for increasing social cohesion between ingroup and outgroup members (Gaertner et al., 1993; Pettigrew & Tropp, 2006), and has more recently been explored specifically in the context of CLT as a mechanism for expanding one's regulatory scope to include socially distal others (Trope et al., 2021). Importantly, Trope and colleagues highlight that on-going rather than one-time intergroup interactions

are key for this type of scope expansion, a recommendation supported by research showing that extended intergroup relationships result in more empathy for outgroup members (Vezzali et al., 2017). Many studies have employed collaboration and working towards a common goal to facilitate positive intergroup relationships (Reimer et al., 2021), reduce intergroup conflict (Al Ramiah & Hewstone, 2013; Gaertner et al., 2000; Rothman, 2014), and decrease bias (Gaertner et al., 1990). Despite the strong rationale this prior research provides for collaboration as a successful mechanism for expanding scope to consider socially distal individuals using lower level construals, there has been no research explicitly testing it as an intervention strategy.

While more research is needed testing this idea in human-human relationships, the current research applies it to human-nonhuman animal relationships, because research on interspecies collaboration has rarely considered it as a way to encourage social consideration of nonhuman animals, especially those commonly used for food. Much of the work on human relationships with other species takes an anthropocentric approach, focusing not on mutualism, but on how humans benefit from using other species for specific purposes (Amiot & Bastian, 2015; Hemsworth et al., 2000; Rigg, 2001). Recently, more research has started moving beyond an anthropocentric perspective to consider not only the well-being of the nonhuman animals with whom people are working, but also the potential for maximizing their gains from the relationships as well (Emel et al., 2015; Romani et al., 2022). Further, quite a lot of research and literature examines art as an opportunity for interspecies collaboration, by investigating the role of artificial intelligence in the creation of symbiotic music (Ullrich & Trump, 2023),

physically using microorganisms as the art medium (K. Lee et al., 2022), and focusing on how a creative relationship between humans and nonhuman animals encourages the use of an animal-centric perspective (Bartram, 2023). One paper introduces interspecies collaboration as a part of traditional ecological knowledge, crediting the idea to Indigenous practices relying upon human-nonhuman animal relationships (Fix et al., 2019), an important perspective that provides a rich foundation for collaboration as a successful tool in such relationships.

Despite the myriad research on human-nonhuman animal collaboration generally, there is a need to investigate its role in scope expansion. Influencing people to consider socially distal nonhuman beings—specifically those that tend to be eaten—may be an effective tool for ultimately decreasing consumption of these animals. Beyond this practical implication, better understanding this strategy in interspecies relationships has the potential to broaden the applicability of CLT and regulatory scope to human-nonhuman animal relationships, which could be applied to an array of situations beyond meat consumption, including animal rights and welfare policies regarding companion animals, animals used for medical or cosmetic testing, and other working animal relationships.

Anthropomorphism. Anthropomorphizing—assigning human traits to a nonhuman—has been heavily investigated as a mechanism for increasing empathy towards nonhumans (Al Farisi et al., 2022; Yue et al., 2021). Multiple studies have connected empathy for animals to a decrease in willingness to eat meat (Kunst & Hohle, 2016; Zickfeld et al., 2018), and by incorporating anthropomorphism, some studies have

found a mediation effect of empathy between anthropomorphism and pro-environmental behavior, including a decrease in willingness to eat meat (Niemyjska et al., 2018; Tam, 2015; Yue et al., 2021). Providing further support for this, fMRI comparisons indicate that those following a vegetarian or herbivorous diet exhibit more empathy for animals in negative situations compared to omnivores (Filippi et al., 2010).

In human relationships, empathy has been supported as a mechanism for increasing social closeness (Huth-Stöckle & Heizmann, 2025; Pawlicka et al., 2019). Thus, it may be effective in expanding scope to include socially distal nonhuman animals. Supporting the use of anthropomorphism in expanding scope, and specific to meat consumption, one study found anthropomorphism of a pig to be a successful tool for decreasing intentions to consume or purchase meat (Jiang et al., 2024). To anthropomorphize the pig, they showed a cartoon pig with human clothes, a smile, and the use of first-person pronouns, while those in the non-anthropomorphic condition saw a real photo of a pig with the use of third person pronouns. The authors sought to measure social closeness following the anthropomorphism intervention, and found that not only did anthropomorphism of the animal lead to increased social closeness, but the increased feelings of closeness mediated the relationship between the intervention and meat consumption intentions. This intervention did not measure empathy, however, so could not explain the increase in social closeness via increased feelings of empathy.

Other research has found that anthropomorphism has only worked as an intervention for decreasing meat consumption in those already committed to reducing consumption (Kim & Yoon, 2021), and some work has found no impact of

anthropomorphism on pro-environmental behavior, though did not explicitly look at meat consumption behavior (Shiu, 2024). Because of the myriad ways to anthropomorphize nonhuman animals, and the multitude of possible pro-environmental behaviors, anthropomorphism may not always be the most effective strategy, but the many studies showing its efficacy as an intervention tool to increase empathy suggests that empathy is a key contributor to desired behavior.

4.2 Goals and Contributions

This research aims to better understand how humans experience social connection or disconnection with different animals used for food, and how this relates to willingness to consume a given animal.

Study 3a first develops a baseline measure of social closeness between humans and eight different animals commonly used for food—three terrestrial and five marine—with the goal of capturing differences in perceptions between the two categories of animals as well as differences between each animal and each other animal. Then, Study 3b focuses on the three animals rated as most socially distal in Study 3a, implementing two experimental messaging interventions to increase social closeness. Ultimately, experienced social closeness will then be tested as a predictor of willingness to consume the animal of focus.

While anthropomorphism has been extensively investigated in human-nonhuman animal relationships, and some research has incorporated the social dimension of CLT, this strategy has not been compared to social scope expansion strategies used in human-human relationships, and marine animals have rarely been considered. This research

compares the efficacy of two messaging intervention strategies—collaboration, and anthropomorphism—in their ability to expand scope, and ultimately decrease willingness to consume the nonhuman animal of focus. Due to the anthropocentric nature of CLT, intervention strategies for social scope expansion in human-human relationships may be more empirically sound as avenues for increasing social closeness, even in human-nonhuman animal relationships. Alternatively, the pool of literature demonstrating the efficacy of anthropomorphizing nonhuman animals commonly used for food in increasing empathy and decreasing meat consumption may be a more suitable approach as an intervention strategy. Due to its tailored approach to human-nonhuman animal relationships and strong connection with empathy, the anthropomorphism messaging condition will likely be a more successful intervention strategy.

4.2.1 Broader Impacts

Developing a better understanding of how social closeness towards animals used for food differs between terrestrial and marine animals, as well as several of the different marine animals commonly consumed will provide insight into what features are associated with animals viewed as most socially distal. Using this information to determine which strategies may be most effective at increasing social closeness between humans and the non-human animals viewed as socially furthest could have substantial implications for interventions to reduce marine animal consumption. Furthermore, examining how this sense of closeness relates to empathy and willingness to consume an animal may inform educational campaigns that promote pro-environmental behaviors

beyond reducing meat consumption, such as conservation efforts and respectful wildlife practices.

A list of hypotheses and the support found for each can be viewed in Table 8. This paper reports the results of two pre-registered studies. Survey instruments, data, and pre-registrations are available at https://osf.io/sfyg8/?view_only=de0d92958b824bea95d93b60a98a8e37. Some measures and the results of one pre-registered hypothesis were not reported in this paper, but for transparency, are available in Appendix I. All reported *p*-values are two-sided unless otherwise specified. Results with $p < 0.05$ are considered statistically significant, and those with $p < 0.10$ are considered marginally significant.

Table 8. Study 3a-b Hypotheses

Number	Study	Hypothesis	Support
H3.1	*3a*	People will rate the terrestrial animals as socially closer compared to the marine animals	*yes*
H3.2	*3a*	People will rate consumption of the marine animals as healthier than the terrestrial animals	*yes*
H3.3	*3a*	People will rate consumption of marine animals used for food as more environmentally friendly than pigs and cows, but not chickens	*mixed*
H3.4	*3a*	People will rate eating marine animals as more morally permissible than eating the terrestrial animals	*mixed*
H3.5	*3b*	For all three animal conditions, participants will experience more social closeness in both experimental messaging conditions, compared to those in the corresponding control condition	*yes*

H3.6	*3b*	The difference between social closeness ratings in the control and both experimental conditions will be smaller for the oyster condition compared to those of the other two animal conditions	*no*
H3.7	*3b*	The anthropomorphism messaging intervention will result in greater experienced social closeness than the collaborative messaging condition in all animal conditions	*no*
**H3.8*	*3b*	Empathy will positively predict social closeness ratings regardless of messaging condition	*yes*
H3.9	*3b*	Experienced social closeness with an animal will negatively predict willingness to consume it	*mixed*

*Table note. *Indicates exploratory hypothesis not pre-registered.*

4.3 Study 3a

4.3.1 Methodology

Study 3a was an online survey with a cross-sectional design. All study procedures were approved by the Ohio State Institutional Review Board (IRB protocol #2024E0847).

Participants. A representative sample of the United States on gender, age (among those 18 years or older), and ethnicity, was recruited via Prolific.co. A power analysis for a within subjects, repeated measures ANOVA indicated a need for a sample size of 329 with the following parameters: 95% power ($\beta = 0.05$), Type I error rate of 5% ($\alpha = 0.05$), an effect size of $d = 0.10$, and an estimated correlation between repeated measures of 0.70 (based on pre-test analyses). Due to budget constraints, only 328 people were recruited. As data was collected, Prolific automatically removed those who failed multiple attention checks until 328 participants remained. After manually removing participants who failed at least one bot or attention check (56), the final sample was $N = 272$. The majority

(84.2%) of participants reported following an omnivorous diet, which includes those with restrictions of non-animal products such as gluten, as well as those who have some restrictions of animal product quantities consumed, but no exclusions. For participant demographic information compared to the United States averages, see Table 9.

Table 9. Study 3a Demographics Compared to United States Average

Variable	Respondents	U.S. Average[i]
Median Age	47.0 (*SD*: 15.73)	39.2
Gender		
Woman	46.7%	50.5%
Man	51.8%	49.5%
Other	1.5%	--
Race (could select multiple)		
White or Caucasian	77.6%	72.3%
Black or African American	11.0%	14.4%
American Indian or Alaska Native	5.1%	2.6%
Asian	10.3%	7.4%
Native Hawaiian or Pacific Islander	1.1%	0.5%
Other/Prefer not to say	5.1%	--
Hispanic, Latino, or Spanish	12.5%	19.4%
Highest Education Level		
Less than a high school diploma	0.7%	10.2%
High school diploma or GED	15.4%	25.9%
Some college, but no degree	22.1%	18.9%
Associate's degree	11.0%	8.8%
Bachelor's degree	36.0%	21.8%
Graduate or professional degree	14.7%	14.3%
Political ideology[ii]		
Extremely liberal	10.3%	5.6%
Liberal	28.7%	14.2%
Slightly liberal	11.8%	11.7%
Moderate/Independent	21.7%	36.3%
Slightly conservative	10.3%	12.6%
Conservative	12.9%	15.0%
Extremely conservative	4.4%	4.6%

Median Household Income	$50,000–$59,000	$77,719
Diet (could select multiple)		
Omnivorous (inclusive of animal products)	84.2%	--
No eggs	2.2%	--
No dairy	4.8%	--
Pescatarian	3.3%	--
Vegetarian	5.9%	--
Vegan/Plant-based	2.2%	--
Gluten-free	5.5%	--
Other (specified)	7.4%	--

[i] *Data from U.S. Census Bureau American Community Survey (2023) unless otherwise noted.*

[ii] *Data from NORC General Society Survey (2022).*

Procedures. Participants responded to an online survey hosted by Qualtrics and were paid US$2.00 for their participation in the, on average, thirteen-minute survey.

Following the consent form, respondents answered questions to confirm eligibility (English-speaking, U.S. citizen, 18 years or older), and four bot and attention checks. Then, participants proceeded through questions about eight different animals commonly used for food—cow, pig, chicken, octopus, crab, salmon, shrimp, and oyster—and two decoy animals. The order in which the animals were presented to participants was randomized, and for each animal, participants answered questions about social closeness, anthropomorphism, and empathy. Within each of those three scales, the order of the items was randomized for each participant. There were six additional attention checks throughout the survey.

Then participants rated eating the meat from each animal on the attributes of health, sustainability, and moral permissibility. For each attribute, the order in which the animals were presented was randomized.

Lastly, participants responded to an environmental identity measure and several demographic questions.

Measures.

Social Closeness. Participants answered five questions to measure social closeness, adapted from a scale used for human relationships (Hernandez-Ortega, 2018). For each animal, participants read, "When I think about a/an [animal], I feel..." and then responded to, "That the [animal] is close to me," "I am similar to the [animal]," "A sense of connection with the [animal]," "Respect for the [animal]," and "There is potential to have a bond with the [animal]." These items were rated on an eleven-point scale of -5 = *strongly disagree*, to +5 = *strongly agree*. For each animal, the mean of these items was taken to form a scale score ($0.88 \leq \alpha \leq 0.92$).

Meat Attributes. To measure the perceived health, sustainability, and moral permissibility of eating meat from each animal, participants responded to "Eating [animal] meat is (healthy/environmentally sustainable/morally permissible)," each on a scale from 1 = *strongly disagree*, to 7 = *strongly agree*.

Participants then responded to the environmental identity questions from the same scale used in Studies 1-2 ($\alpha = 0.91$).

At the end of the survey, participants read and responded to the same demographic and honesty check questions used in Studies 1a-c. Any participants who answered "no" to the honesty question or responded incorrectly to any of the attention or manipulation checks were not included in data analysis.

4.3.2 Results

Social Closeness (H3.1). To compare experienced social closeness across animals, two one-way within-subjects ANOVAs were conducted. The first model contained all eight animals separately, and results revealed a significant effect of animal type on social closeness score, $F(7, 265) = 87.765$, $p < 0.001$; Wilks's lambda = 0.301, $\eta p^2 = 0.699$. Pairwise comparisons (Figure 11) revealed that the experienced social closeness with salmon ($M = 3.933$, $SD = 2.415$), shrimp ($M = 3.319$, $SD = 2.234$), crab ($M = 4.071$, $SD = 2.440$), and oyster ($M = 3.126$, $SD = 2.108$), was significantly lower than with cow ($M = 5.446$, $SD = 2.595$), pig ($M = 6.418$, $SD = 2.689$), and chicken ($M = 5.495$, $SD = 2.613$), 11.765 [chicken & crab] $\leq t \leq 23.322$ [cow & oyster], all one-sided $p < 0.001$. Results showed that the experienced social closeness with octopus ($M = 5.321$, SD = 2.843) was significantly lower than with cow and pig, $t(271) = 7.766, 8.537$, both $p < 0.001$, and marginally lower than chicken, $t(271) = 1.341$, one-sided $p = 0.090$.

Figure 11. Study 3a Point Range Plot of Mean Social Closeness Scores and Matrix Plot of Mean Differences Between Each Animal Pair

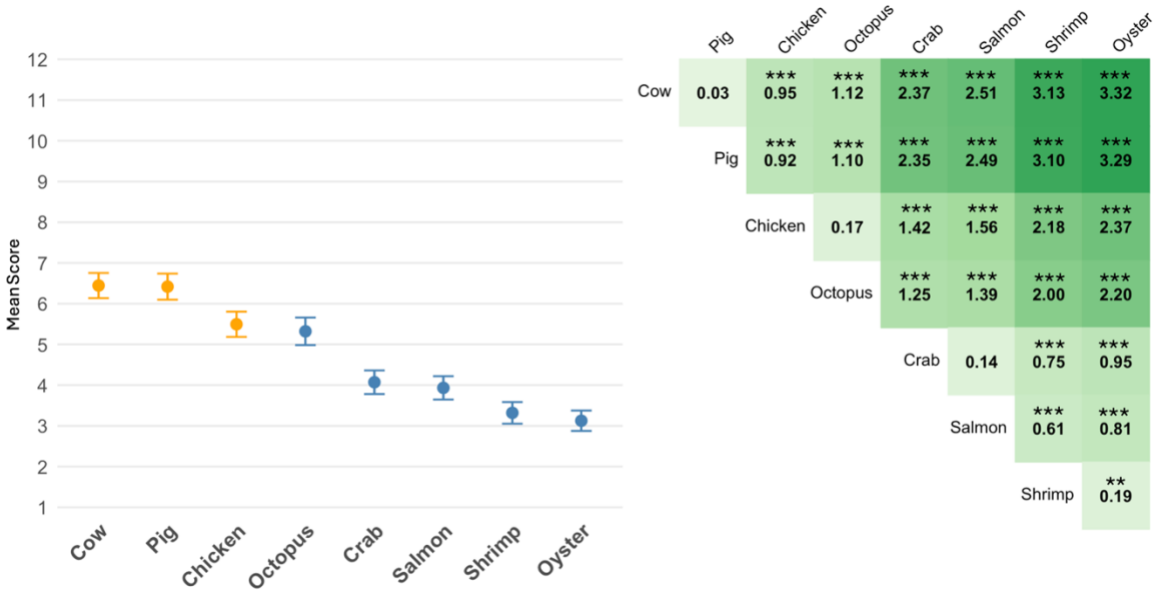


Figure note. *** $p < 0.001$. *Each value in the matrix represents the mean difference in social closeness scores, calculated as the mean score of the row animal minus the mean score of the corresponding column animal. Darker green indicates a greater magnitude of mean difference.*

The second model compared the animals as two categories, the terrestrial animals and the marine animals, on social closeness. To create the terrestrial animal score, the average of the cow, pig, and chicken scores for each participant was taken, and to create the marine animal score, the average of the salmon, shrimp, crab, oyster, and octopus scores for each participant was taken. This model also revealed a significant effect of animal type on social closeness rating, $F(1, 271) = 464.680$, $p < 0.001$; Wilks's lambda = 0.368, $\eta p^2 = 0.632$. Specifically, it showed that the experienced social closeness with marine animals ($M = 3.954$, $SD = 2.149$) was significantly less than with terrestrial animals ($M = 6.120$, $SD = 2.425$), $t(271) = 21.556$, one-sided $p < 0.001$. When environmental identity, gender, race (Black or not Black), and political beliefs were

added as covariates to the social closeness model with all eight animals (Appendix J, Table J1), the model remained significant, $F(7, 261) = 4.037$, $p < 0.001$; Wilks's lambda = 0.902, ηp2 = 0.098, and the pairwise comparison trends remained the same. All of these models provide robust support for H3.1, suggesting that people feel socially closer to terrestrial animals commonly used for food compared to marine animals commonly used for food.

Health (H3.2). To compare health ratings across animals, two one-way within-subjects ANOVAs were conducted. The first model contained all eight animals separately, and results revealed a significant effect of animal type on health rating, $F(7, 265) = 57.890$, $p < 0.001$; Wilks's lambda = 0.395, $\eta p^2 = 0.605$. Pairwise comparisons (Figure 12) revealed that health ratings for salmon ($M = 5.908$, $SD = 1.125$), shrimp ($M = 5.165$, $SD = 1.421$), and crab ($M = 5.195$, $SD = 2.440$), were significantly higher than health ratings for cow ($M = 4.746$, $SD = 1.569$) and pig ($M = 4.324$, $SD = 1.685$), -4.449 [cow & shrimp] $\leq t \leq$ -15.687 [pig & salmon], all one-sided $p < 0.001$. Salmon was rated as healthier than chicken ($M = 5.647$, $SD = 1.181$), $t(271) = -4.374$, one-sided $p < 0.001$, but chicken was rated as healthier than shrimp, crab, oyster ($M = 4.816$, $SD = 1.415$), and octopus ($M = 4.581$, $SD = 1.466$), 5.920 [chicken & salmon] $\leq t \leq$ 11.929 [chicken & octopus], all one-sided $p < 0.001$. Oyster health ratings were higher than those for pig, $t(271) = -5.238$, one-sided $p < 0.001$, lower than those for chicken, $t(271) = 9.497$, one-sided $p < 0.001$, and did not differ from those for cow, $t(271) = -0.713$, one-sided $p = 0.238$. Octopus was rated healthier than pig, $t(271) = -2.699$, one-sided $p = 0.004$, and marginally less healthy than cow, $t(271) = 1.603$, $p = 0.055$.

Figure 12. Study 3a Point Range Plot of Mean Health Scores and Matrix Plot of Mean Differences Between Each Animal Pair

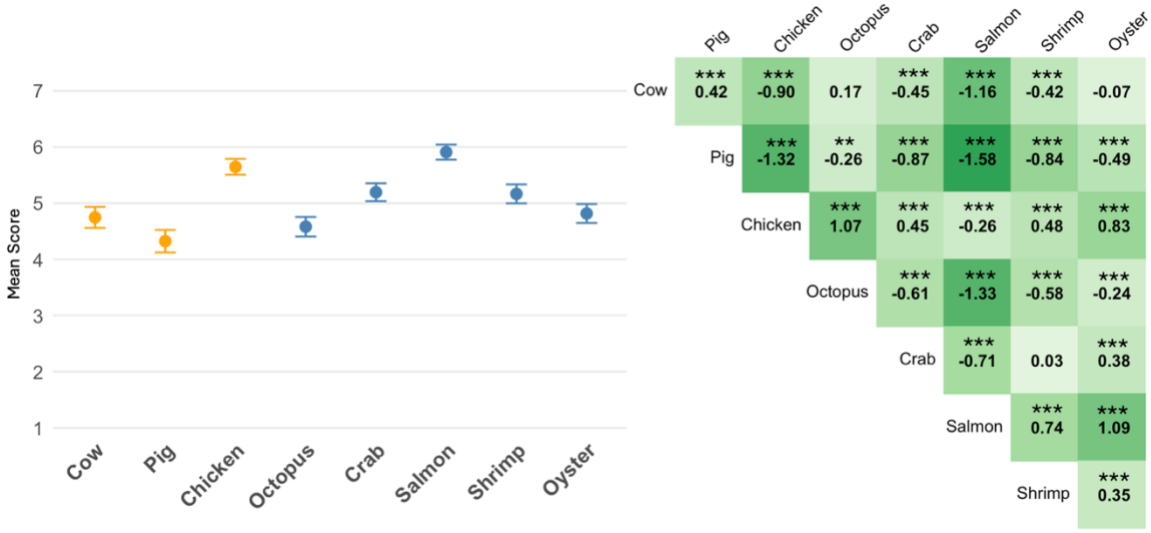


*Figure note. ** $p < 0.01$, *** $p < 0.001$. Each value in the matrix represents the mean difference in health scores, calculated as the mean score of the row animal minus the mean score of the corresponding column animal. Darker green indicates a greater magnitude of mean difference.*

The second model compared the terrestrial and marine animals as two categories, and the group scores were created the same way they were for the second model testing H3.1. This model also revealed a significant effect of animal type on health rating, $F(1, 271) = 12.805$, $p < 0.001$; Wilks's lambda = 0.955, $\eta p^2 = 0.045$. It specifically showed that the health ratings for marine animals ($M = 5.133$, $SD = 1.157$) were significantly higher than those for terrestrial animals ($M = 4.906$, $SD = 1.296$), $t(271) = -3.578$, one-sided $p < 0.001$. This model supports H3.2, and the first model partially supports H3.2. This suggests that generally, people view meat from marine animals as healthier than meat from terrestrial animals, but there are some exceptions. When environmental identity, gender, race (Black or not Black), and political beliefs were added as covariates to the health model with all eight animals (Appendix J, Table J2), the model remained

significant, $F(7, 261) = 3.533$, $p = 0.001$; Wilks's lambda = 0.913, ηp2 = 0.087, and the pairwise comparison trends remained the same.

Environmental Sustainability (H3.3). To compare sustainability ratings across animals, a one-way within-subjects ANOVA was conducted. Only one model was used for sustainability because H3.3 includes specific animals. The results of this model revealed a significant effect of animal type on sustainability scores, $F(7, 265) = 21.532$, $p < 0.001$; Wilks's lambda = 0.637, $\eta p^2 = 0.363$. Pairwise comparisons (Figure 13) show that consumption of salmon ($M = 4.640$, $SD = 1.601$), crab ($M = 4.574$, $SD = 1.486$), and oyster ($M = 4.603$, $SD = 1.492$) were all rated as significantly more sustainable than cow ($M = 4.048$, $SD = 1.827$) and pig ($M = 4.232$, $SD = 1.657$), -4.440 [pig & crab] $\leq t \leq$ -6.709 [cow & salmon], all one-sided $p < 0.001$, but similarly sustainable to chicken ($M = 4.651$, $SD = 1.556$), 0.146 [chicken & salmon] $\leq t \leq$ 1.060 [chicken & crab], 0.145 $\leq$ one-sided $p \leq 0.442$. Consuming shrimp ($M = 4.794$, $SD = 1.486$) was rated as significantly more sustainable than cow and pig, $t(271) = -8.248, -7.144$, both one-sided $p < 0.001$, and also more sustainable than chicken, $t(271) = -2.025$, one-sided $p = 0.022$. Lastly, consumption of octopus was rated similarly on sustainability compared to cow and pig, $t(271) = -0.968, 1.106$, one-sided $p = 0.167, 0.135$, and less sustainable than chicken, $t(271) = 6.038$, one-sided $p < 0.001$. When environmental identity, gender, race (Black or not Black), and political beliefs were added as covariates to the model (Appendix J, Table J3), the model remained significant, $F(7, 261) = 2.291$, $p = 0.028$; Wilks's lambda = 0.942, ηp2 = 0.058, and the pairwise comparison trends remained the same. These results provide partial support for H3.3, showing that most marine animals commonly used for

food are seen as more environmentally sustainable than cows and pigs, but not all marine animals were rated similarly to chickens on this measure.

Figure 13. Study 3a Point Range Plot of Mean Sustainability Scores and Matrix Plot of Mean Differences Between Each Animal Pair

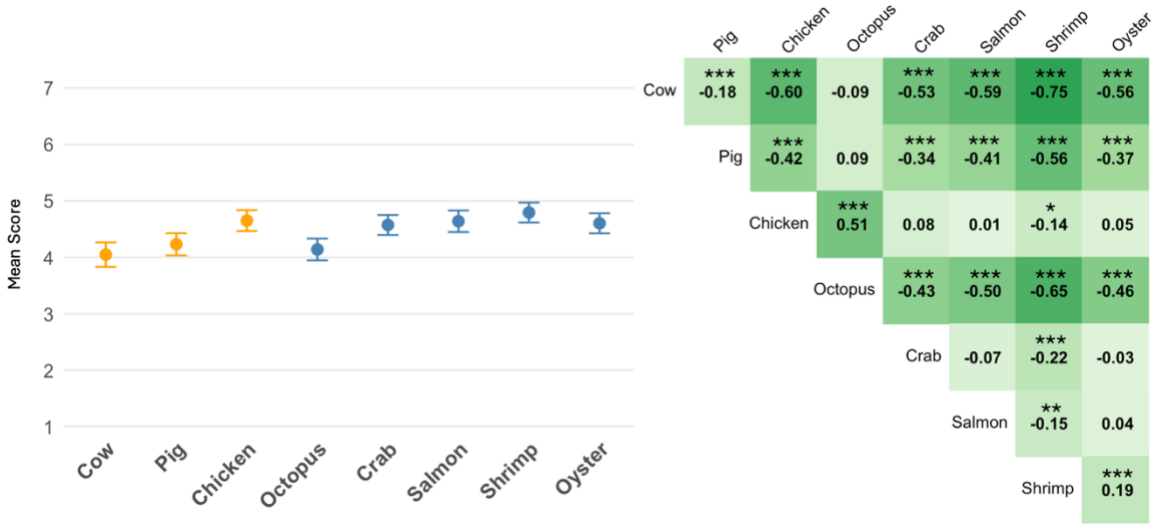


*Figure note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Each value in the matrix represents the mean difference in sustainability scores, calculated as the mean score of the row animal minus the mean score of the corresponding column animal. Darker green indicates a greater magnitude of mean difference.*

Morality (H3.4). To compare moral permissibility scores across animals, two one-way within subjects ANOVA were conducted. The first model contained all eight animals separately, and results showed a significant effect of animal type on moral permissibility scores, $F(7, 265) = 12.089$, $p < 0.001$; Wilks's lambda = 0.758, $\eta p^2 = 0.242$. Pairwise comparisons (Figure 14) revealed a modest number of significant differences between animals. Consumption of crab ($M = 5.629$, $SD = 1.531$) and oyster ($M = 5.658$, $SD = 1.482$) were both rated as significantly more morally permissible than consumption of pig ($M = 5.393$, $SD = 1.676$), $t(271) = -4.222, -4.925$, both one-sided $p < 0.001$, but were not rated differently from cow ($M = 5.581$, $SD = 1.547$), $t(271) = -0.817$,

-1.228, one-sided $p = 0.207$, 0.110. Consumption of crab was rated as marginally less morally permissible than chicken ($M = 5.713$, $SD = 1.475$), $t(271) = 1.595$, one-sided $p < 0.056$, but there were no differences between chicken and oyster on moral permissibility, $t(271) = 0.950$, one-sided $p = 0.171$. Consumption of shrimp ($M = 5.695$, $SD = 1.500$) was rated as significantly more morally permissible than pig, $t(271) = -5.453$, one-sided $p < 0.001$, and cow, $t(271) = -1.936$, one-sided $p = 0.027$. Shrimp and chicken did not significantly differ on this measure, $t(271) = 0.334$, $p = 0.369$. Consumption of salmon ($M = 5.754$, $SD = 1.446$) was rated as significantly more morally permissible than cow and pig, $t(271) = -3.361$, -5.122, both one-sided $p < 0.001$, but not chicken, $t(271) = -0.867$, one-sided $p = 0.193$. Lastly, the consumption of octopus ($M = 5.048$, $SD = 1.839$) was rated as significantly less morally permissible than all three terrestrial animals, 4.486 [pig & octopus] $\leq t \leq 7.385$ [chicken & octopus], all one-sided $p < 0.001$.

Figure 14. Study 3a Point Range Plot of Mean Moral Permissibility of Consumption Scores and Matrix Plot of Mean Differences Between Each Animal Pair

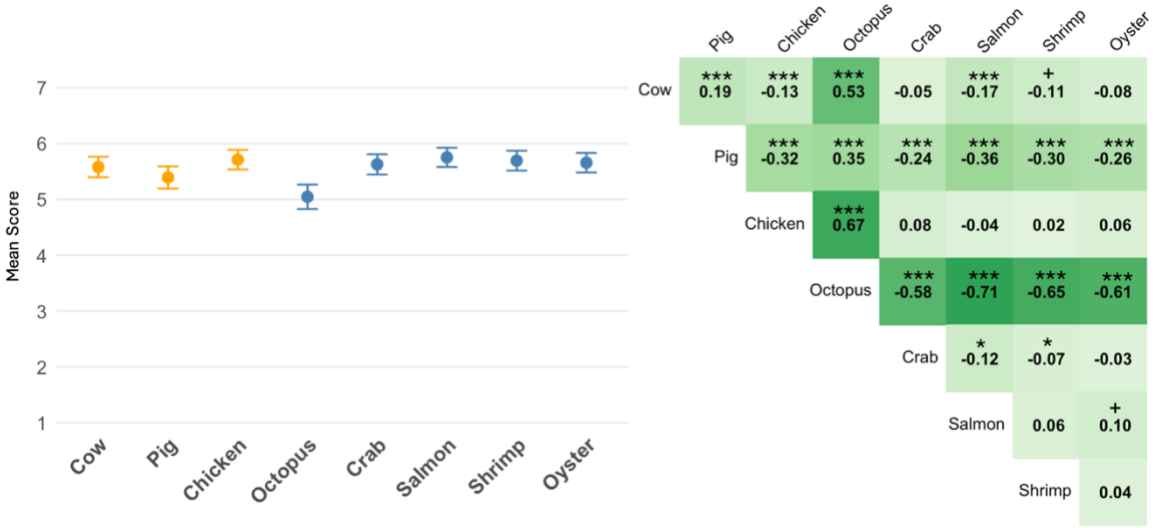


Figure note. $^{+}$ $p < 0.10$, * $p < 0.05$, *** $p < 0.001$. *Each value in the matrix represents the mean difference in moral permissibility scores, calculated as the mean score of the row animal minus*

the mean score of the corresponding column animal. Darker green indicates a greater magnitude of mean difference.

The second model compared the terrestrial and marine animals as two categories, and the group scores were created the same way they were for the second models testing H3.1 and H3.2. This model did not detect a significant effect of animal type on moral permissibility scores, $F(1, 271) = 0.020$, $p = 0.886$; Wilks's lambda = 1.000, $\eta p^2 = 0.000$. In other words, when grouped together, consumption of terrestrial animals ($M = 5.563$, $SD = 1.495$) and marine animals ($M = 5.557$, $SD = 1.426$) were rated as similarly morally permissible, $t(271) = 0.143$, one-sided $p = 0.443$. However, removal of octopus from the model does result in a significant effect of animal type on moral permissibility scores whereby the marine animals are rated as more morally permissible to consume than terrestrial animals, $F(1, 271) = 8.834$, $p = 0.003$; Wilks's lambda = 0.968, $\eta p^2 = 0.032$. When environmental identity, gender, race (Black or not Black), and political beliefs were added as covariates to the moral permissibility model with all eight animals (Appendix J, Table J4), the model was no longer significant, $F(7, 261) = 1.236$, $p = 0.283$; Wilks's lambda = 0.968, $\eta p2 = 0.032$, and the pairwise comparison trends remained the same. All of this provide partial support for H3.4.

4.3.3 Discussion of Study 3a

Results of Study 3a demonstrate that marine and terrestrial animals are generally perceived differently in several ways. The animals rated as more socially distant were oyster, salmon, and shrimp. Participants reported lower levels of social closeness when considering marine animals compared to terrestrial, and the only exception to this was the lack of difference observed between chicken and octopus. This suggests there are factors

impacting the ability of one to feel socially close with these marine animals. Like humans, cows and pigs are mammals. And like humans, cows, pigs, and chickens, breathe oxygen. Supported by research on phylogenetic similarity (Borgi & Cirulli, 2015), there could be an impact of perceived similarity to these terrestrial animals absent with marine animals, causing people to feel less potential for a relationship with them. Further, research shows that when people use an expansive scope when considering an entity on one dimension of psychological distance, it often transfers to others (Spence et al., 2012). Terrestrial animals are typically spatially closer to us than marine animals, so they may be perceived as more concrete at lower level construals since they share the same space with humans. This could partially explain the findings of this research.

The marine animals included in this study were generally rated as healthier than the terrestrial animals, though oyster and octopus were rated no differently than cow, and chicken was rated as healthier than all of the marine animals except salmon, which was rated as the healthiest of all. These findings show that the general perception of the public reflects the growing body of research showing a decrease in risk of certain diseases when people replace consumption of red meat (pig and cow) with fish (e.g., Lasota et al., 2019; Venø et al., 2018; Vulcan et al., 2017). While these results are not surprising, they do raise questions about what causes people to view some marine animal meat as healthier than others.

Additionally, the marine animals were generally rated as more environmentally sustainable than cow and pig, but not chicken. However, shrimp was rated as more sustainable than chicken as well. Octopus was quite an outlier, rated no differently on

sustainability than cow and pig, and rated as less sustainable than chicken. This finding could be due to a lack of familiarity with octopus as a food source in the United States, or because they are the largest of the marine animals included in this study, suggesting they may be the most resource intensive.

Octopus continued on as an outlier on the moral permissibility of consumption measure, rated as significantly less morally permissible to consume than all other animals in the survey. Only pig was rated as less morally permissible than the other four marine animals, and cow was less compared to shrimp and salmon. Generally, there were not substantial differences in moral permissibility scores other than for pig and octopus compared to the other animals.

The octopus results indicate marine animals used for food are not all perceived similarly. This study included five marine animals, each intended to represent a distinct category of marine animals commonly consumed. It may be that just cephalopods (i.e., octopus and squid) are perceived differently from the other categories of marine animals used for food (e.g., mollusks, fish, crustaceans), or there may be more nuance to these beliefs. Supporting this idea, prior research has found an unexplained preference for butterflies compared to many other animals, including dogs and cats (Borgi & Cirulli, 2015), despite their lack of phenotypic similarities to humans. Thus, the octopus may have been rated as significantly socially closer and less morally permissible to eat than the other marine animals due to aesthetic preferences, perceived intelligence, or something else not captured here. Future research should investigate the complexities of perception differences between marine animals.

These findings indicate a clear difference between how marine and terrestrial animals are perceived. The greater social distance experienced towards the marine animals could serve as a justification for consuming them, but the lack of major differences in the moral permissibility scores does not provide robust support for this. The actual health and sustainability of marine animal consumption varies heavily by species, source, and environmental factors (i.e., ocean pollution) (Bushkin-Bedient & Carpenter, 2010; Gao et al., 2018; Iue et al., 2022), but the general belief that they are superior on these traits compared to terrestrial animals stands. Because of their perceived advantage on attributes known to drive consumption choices (Aggarwal et al., 2016; Bastounis et al., 2021), strategies aimed at increasing social closeness with these animals may be an effective mechanism for decreasing consumption of them.

4.4 Study 3b

4.4.1 Methodology

Study 3b was an online survey with a 3x3 factorial design. All study procedures were approved by the Ohio State Institutional Review Board (IRB protocol #2024E1186).

Participants. A representative sample of the United States on gender, age (among those 18 years or older) and ethnicity, was recruited via Prolific.co. Eligible participants were English-speaking adults who live in the United States, and had to report following a diet inclusive of at least marine animals and non-meat animal products (i.e., could not be herbivorous or vegetarian). A power analysis for a two-way ANOVA indicated a need for a total sample size of 1464 with the following parameters: 95% power ($\beta = 0.05$), Type I error rate of 5% ($\alpha = 0.05$), an effect size of $d = 0.25$. To account for failed bot and

attention checks as well as an uncertain effect size, over 20% more participants than necessary were recruited for a total of 1821. After removing participants who did not consent (n = 1), failed to meet eligibility criteria (n = 139), reported not answering questions honestly (n = 2) and for failed bot (n = 23) or attention checks (n = 177), the final sample was N = 1479. For participant demographic information, see Table 10.

Table 10. Study 3b Demographics Compared to United States Average

Variable	Respondents	U.S. Average[i]
Median Age	45.0 (SD = 37.25)	39.2
Gender		
Woman	50.4%	50.5%
Man	48.1%	49.5%
Other	1.5%	--
Race (could select multiple)		
White or Caucasian	76.6%	72.3%
Black or African American	13.7%	14.4%
American Indian or Alaska Native	3.6%	2.6%
Asian	8.4%	7.4%
Native Hawaiian or Pacific Islander	0.7%	0.5%
Other/Prefer not to say	4.4%	--
Hispanic, Latino, or Spanish	11.4%	19.4%
Highest Education Level		
Less than a high school diploma	0.5%	10.2%
High school diploma or GED	12.1%	25.9%
Some college, but no degree	21.9%	18.9%
Associate's degree	11.5%	8.8%
Bachelor's degree	36.7%	21.8%
Graduate or professional degree	17.3%	14.3%
Political ideology[ii]		
Extremely liberal	10.7%	5.6%
Liberal	22.7%	14.2%
Slightly liberal	12.8%	11.7%
Moderate/Independent	19.8%	36.3%
Slightly conservative	11.6%	12.6%

Conservative	16.3%	15.0%
Extremely conservative	6.1%	4.6%
Median Household Income	$60,000–$69,000	$77,719
Diet (could select multiple)		
Omnivorous (inclusive of animal products)	86.3%	--
No eggs	1.3%	--
No dairy	4.8%	--
Pescatarian	2.4%	--
Gluten-free	4.0%	--
Other (specified)	5.3%	--

[i] *Data from U.S. Census Bureau American Community Survey (2023) unless otherwise noted.*

[ii] *Data from NORC General Society Survey (2022).*

Procedures. Participants responded to an online survey hosted by Qualtrics and were paid US$1.04 for their participation in the approximately 8-minute survey.

Following the consent form, participants answered questions to confirm eligibility (not vegetarian or herbivorous, English-speaking, U.S. citizen, 18 years or older), followed by four bot checks. Then, participants were randomly sorted into one of three animal conditions—oyster, salmon, or shrimp. Within their condition, each participant was then randomly assigned to one of two experimental messaging conditions, or a control condition. After answering two filler questions to cover the purpose of the study, participants proceeded to their condition-specific messages. Participants in either of the two experimental conditions read a brief passage about their assigned animal, while those in the control condition did not.

Following the messaging intervention, participants in the experimental conditions proceeded to a condition-specific exercise intended to encourage active engagement with the stimuli. After the activity, all participants responded to a social closeness measure,

and the items were randomly ordered for each participant. This was followed by anthropomorphism, empathy, and collaboration scales serving as manipulation checks for the experimental conditions. The order in which those three scales were presented was randomized, and the items within each scale were randomized.

Next, all participants responded to randomized questions measuring perceived health, environmental sustainability, and moral permissibility of consuming meat from their assigned animal. Then they provided their willingness to eat several different animals, including the one to which they were assigned for this study.

Lastly, participants responded to environmental identity and demographic measures.

Measures. All participants, regardless of condition, read, "For the next part of this study, you are going to answer some questions about a/n **[animal]**." Those in one of the experimental conditions then read, "Please carefully read the following passage before proceeding. Although this passage is about a particular [animal], it describes [animal]s in general."

***Collaboration*.** Those in the collaboration condition read a brief passage about their assigned animal. To facilitate the perception of an on-going collaborative relationship rather than a one-time experience, the passage uses present tense to signify the two are continuously working together towards a common goal (Trope et al., 2021). The passages differed only slightly between animals to maintain species-specific accuracy. For example, the oyster collaboration passage read: "Consider an oyster in the wild. You and the oyster share a crucial goal: maintaining clean waterways and

preserving aquatic biodiversity, which are critical for both your species' survival. The oyster contributes to this goal by filtering dozens of gallons of water a day, providing essential habitats to other species, and protecting coastlines from erosion. You contribute to this goal by supporting conservation efforts, keeping litter out of waterways, and making sustainable choices when you shop. This collaboration between you and the oyster demonstrates a mutual commitment to aquatic stewardship. By working together, both of your species enhance the health of our waterways and ensure the wellbeing of future generations—both human and aquatic." The collaboration passages for the other two animals are reported in Appendix K.

Following the passage, those in the collaboration condition participated in a brief exercise where they responded to: "Based on the passage you read, please write a brief sentence or two about how you and the [animal] could work together towards a common goal, and specify what that goal is."

Anthropomorphism. Those in the anthropomorphism condition read a brief passage about their assigned animal. Like the collaboration conditions, the passages differed only slightly between animals to maintain species-specific accuracy. For example, the oyster anthropomorphism passage read: "Similar to many people, Emma the oyster has a life goal that is very important to her: to ensure the well-being of her community, which she holds dear. As an individual, Emma has her own ideas about how to use her skills to reach this goal. Some days, she decides to spend time filtering water, whereas on other days, she chooses to help out her neighbors by providing habitats for other species or bravely shielding the coastline from erosion. Generally, she strives to

keep the delicate balance of aquatic life in check by creating a clean and healthy environment for everyone. Day after day, Emma makes her own decisions, striving to make each day a little better than the day before. Like many oysters, Emma cares deeply about her beloved community, and her goodwill and kindliness propel her efforts to care for it." The anthropomorphism passages for the other two animals are reported in Appendix K.

Following the message, those in the anthropomorphism condition participated in a brief exercise where they responded to: "Based on the passage you just read, please write a sentence or two about Emma's goals or a typical day in her life."

Social Closeness. Participants answered the same questions to measure this as used in Study 3a, but only for the animal to which they were assigned. For each animal condition, the mean of these items was taken to form a scale score (all $\alpha = 0.92$).

Empathy. To measure empathy, participants answered three items from a short-form animal empathy scale developed by Okutan (2023). For their assigned animal, participants read, "Please respond to the following statements with your level of agreement" and responded to, "It would make me sad to see a/an [animal] on its own in a small enclosure," "I would get very angry if I saw a/an [animal] being mistreated," and "Seeing a/an [animal] in pain would upset me." They responded on an eleven-point scale of -5 = *strongly disagree*, to +5 = *strongly agree*. For each person, the mean of their empathy scores for their assigned animal was taken to form a scale score (0.89 [oyster] $\leq \alpha \leq 0.92$ [shrimp]).

Meat Attributes. To measure the perceived health, sustainability, and moral permissibility of eating meat from their assigned animal, participants responded to the same measure used in Study 3a.

Meat-Eating Behavior. To measure future intention to consume certain animals, participants read, "Please indicate how willing you are to eat meat from each of the following animals in the future," and rated ten animals on a scale of 1 = *completely unwilling*, to 7 = *completely willing*. The animals for which they responded to this question included cow, pig, chicken, octopus, crab, oyster, salmon, shrimp, shark, and alligator.

Throughout the survey, there were three bot checks, four attention checks, and three manipulation checks. At the end of the survey, participants responded to the same environmental identity questions used in Studies 1-3a ($\alpha = 0.93$), as well as the same demographic and honesty check questions used in Studies 1a-c and 3a. Data from any participants who failed the honesty check or responded incorrectly to any of the attention or bot checks were not included in data analysis. For the condition-specific exercises, participants who provided answers that did not pertain to the study were excluded from analyses.

4.4.2 Results

Social Closeness Differences (H3.5-3.7). A two-way ANOVA was conducted to measure the effects of animal condition and messaging condition on social closeness, and to compare the differences between animals. Results showed a significant main effect of animal type on social closeness, $F(2, 1471) = 6.305$, $p = 0.002$, $\eta p^2 = 0.008$, and a

significant main effect of messaging condition on social closeness, $F(2, 1471) = 199.315$, $p < 0.001$, $\eta p^2 = 0.213$. Specifically, both the collaborative and anthropomorphism messaging conditions resulted in greater experienced closeness with all three animals compared to the control condition. Collectively (i.e., regardless of animal type), the social closeness scores in the collaborative messaging condition ($M = 6.316$, $SD = 2.406$) were significantly greater than those in the anthropomorphism condition ($M = 5.803$, $SD = 2.650$), $t(972) = 3.198$, $p = 0.001$, and the social closeness ratings in both experimental messaging conditions were significantly greater than those in the control condition ($M = 3.467$, $SD = 2.157$), $t(989) = 19.658$ [collaborative], $t(993) = 15.252$ [anthropomorphism], both one-sided $p < 0.001$. See Figure 15 for messaging condition comparisons within each animal condition. When environmental identity, gender, race (Black or not Black), age, education, and income were added to the model as covariates (Appendix L, Table L1), the main effect of both predictors remained, and the pairwise comparisons of the messaging conditions also stayed the same. These results provide support for H3.5, showing that in all three animal conditions, those in the two experimental messaging conditions experienced more social closeness than those in the control condition.

Figure 15. Study 3b Violin Plots of Mean Social Closeness Ratings

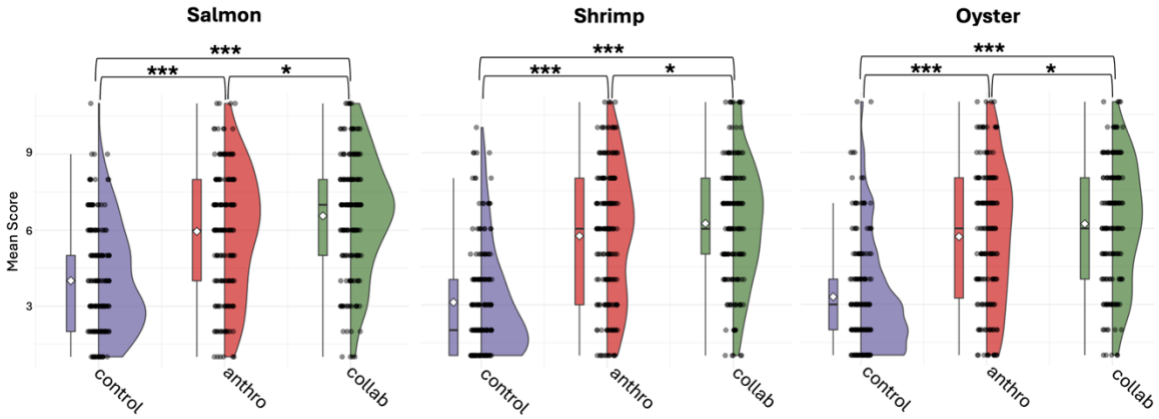


Figure note. * $p < 0.05$, *** $p < 0.001$. *Mean indicated by white diamond.*

This model revealed no significant omnibus interaction between animal type and messaging condition, $F(4, 1471) = 0.894$, $p = 467$, $\eta p^2 = 0.002$, indicating that overall, the pattern of responses did not significantly differ when considering both predictors. However, H3.6 predicted that the difference between the experimental and control messaging conditions would be smaller for the oyster condition than for the salmon and shrimp conditions, so planned contrasts were conducted to compare the mean differences experimental messaging conditions and the control condition between the animal conditions. In other words, within each animal condition, the mean social closeness score of the control condition was subtracted from the mean social closeness score of the collaborative and anthropomorphism means, then the resulting oyster score was compared to the scores of the salmon and shrimp conditions. The mean difference in the oyster group was larger than the mean difference in the salmon group, but the contrast test revealed this difference was not significant, $\beta = 0.311$, $SE = 0.639$, $p = 0.627$. In support of H3.6, the shrimp group mean difference was larger than the oyster group mean

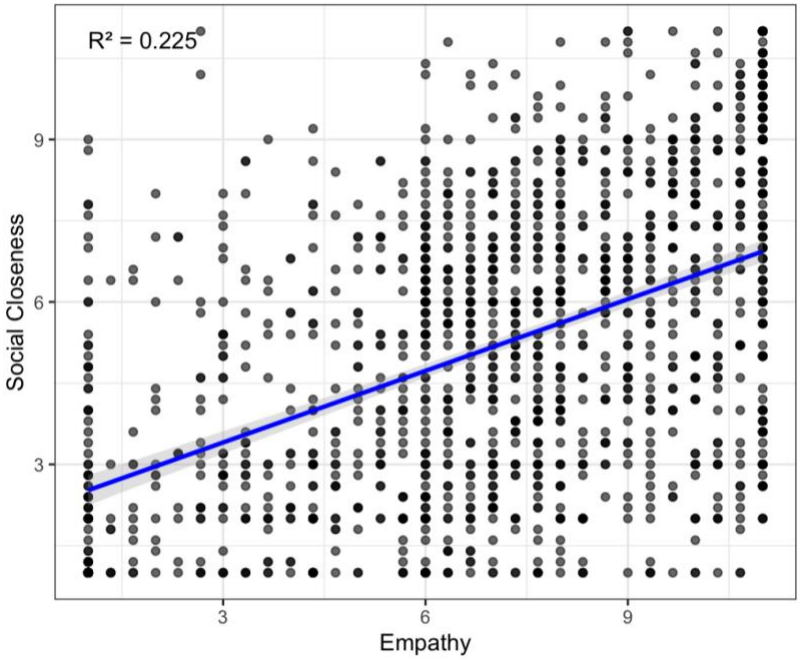
difference, but the contrast test revealed this difference was not significant, β = -0.766, *SE* = 0.638, *p* = 0.230. Overall, these results do not support H3.6.

To test H3.7, an independent samples *t*-test was conducted between the two experimental messaging groups in each animal condition (Figure 15). The oyster *t*-test showed that the social closeness scores in the collaborative condition (*M* = 6.187, *SD* = 2.437) were significantly greater than those in the anthropomorphism condition (*M* = 5.701, *SD* = 2.749), *t*(311) = 1.657, one-sided *p* = 0.049. The salmon *t*-test revealed that the social closeness scores in the collaborative condition (*M* = 6.549, *SD* = 2.335) were significantly greater than those in the anthropomorphism condition (*M* = 5.976, *SD* = 2.535), *t*(326) = 2.131, one-sided *p* = 0.017. Lastly, the shrimp *t*-test showed that the social closeness scores in the collaborative condition (*M* = 6.210, *SD* = 2.447) were significantly greater than those in the anthropomorphism condition (*M* = 5.733, *SD* = 2.670), *t*(331) = 1.693, one-sided *p* = 0.046. When environmental identity, gender, race (Black or not Black), age, education, and income were added to these models as covariates (Appendix L, Table L2-4), the difference between the two experimental conditions only remained significant in the salmon group. All three *t*-tests fail to support H3.6, finding instead that either the collaborative messaging was more successful in increasing experienced social closeness, or there were no differences between messaging conditions.

Empathy and Social Closeness (H3.8). To test whether empathy predicts experienced social closeness, a simple linear regression analysis was conducted without differentiating between animal or messaging condition (Figure 16). Results indicated a

significant effect of empathy on social closeness, $F(1, 1478) = 428.097$, $p < 0.001$, finding that empathy explained 22.5% of the variance in social closeness. That is, for each one-point increase in empathy, the predicted social closeness rating also increased by 0.441 points. This effect remained just as strong when controlling for environmental identity, gender, race (Black or not Black), age, education, and income as covariates (Appendix L, Table L5). All of this provides support for H3.8.

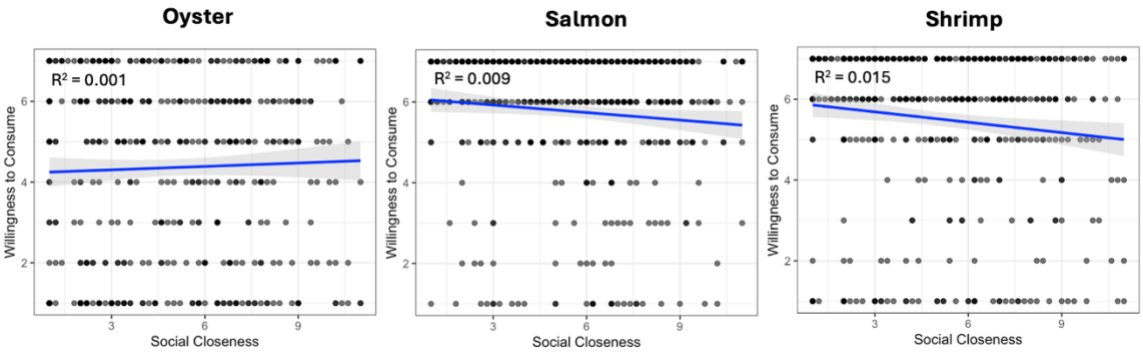
Figure 16. Study 3b Scatter Plot of Empathy and Social Closeness



Willingness to consume animal (H3.9). To test if greater social closeness predicts a decrease in willingness to consume, a simple linear regression was conducted for each of the three animals (Figure 17). The oyster regression model did not find a significant effect of social closeness on willingness to consume, $F(1, 476) = 0.569$, $p = 0.451$, revealing that social closeness explained only 0.1% of the variance in willingness to consume oysters in the future. The salmon regression model found a significant effect

of social closeness on willingness to consume, $F(1, 497) = 4.580$, $p = 0.033$. It showed that 0.9% of the variance in willingness to consume can be attributed to social closeness. Lastly, the shrimp regression model found a significant effect of social closeness on willingness to consume, $F(1, 501) = 7.478$, $p = 0.006$, showing that 1.5% of the variance in willingness to consume shrimp is due to social closeness.

Figure 17. Study 3b Scatter Plots of Social Closeness and Willingness to Consume



When environmental identity, gender, race (Black or not Black), age, education, and income were added to the salmon and shrimp models as covariates (Appendix L, Table L6-7), the shrimp results remained the same, but the salmon model became marginal, and the effect of social closeness on willingness to consume salmon also decreased to marginal significance. These results partially support H3.9, revealing that greater social closeness significantly decreased willingness to consume the animal in the salmon and shrimp conditions, but the low R^2 values indicate this change is not heavily explained by social closeness. Further, this effect was not observed in the oyster model. Exploratory analyses where empathy was added to each animal model (Appendix M) reveal a slight increase in the R^2, indicating that is also not a primary explanatory variable for a decrease in meat consumption. Additional exploratory analyses (Appendix N)

revealed that for each animal condition, higher ratings on health, sustainability, and morality of consuming the animal increased willingness to consume, and accounted for 22%(salmon) to 36%(oyster) of the proportion of variance, suggesting they are among the primary drivers of willingness to consume.

4.4.3 Discussion of Study 3b

Study 3b tested and compared the efficacy of two messaging strategies in increasing experienced social closeness with a marine animal Study 3a indicates is seen as quite socially distant. The results reveal a substantial positive effect of both experimental messaging conditions compared to the control on social closeness ratings in all animal conditions, but the collaborative condition was most effective in all animal conditions. The overwhelming success of the collaborative messaging strategy may demonstrate that certain human-human strategies for expanding scope to include a socially distal other are more effective than methods intended for human-nonhuman animal relationships, like anthropomorphism. Supported by an exploratory *t*-test (Appendix O), this may be due to the fact that the anthropomorphism condition did not induce as much empathy as the collaborative condition, thereby increasing social closeness to a lesser extent. Anthropomorphism is often examined in relation to empathy (T. Chen et al., 2021; Harrison & Hall, 2010), but the current results suggest it may not be the most effective tool for inducing empathy.

Further, the findings revealed that the difference between the experimental conditions and control condition in the oyster condition was not significantly different from the same values in the salmon and shrimp conditions. Notably, the salmon control

condition mean social closeness score was substantially higher than the oyster and shrimp control means, perhaps due to the greater phenotypic similarities between salmon and humans (i.e., salmon have faces like humans). Because the baseline salmon social closeness rating was high, this may have impacted the degree of difference observed between the experimental and control messaging conditions. Further, given the similar scores across all six animal experimental messaging conditions, there may be a ceiling effect of the messaging interventions regardless of animal.

Results also found that empathy towards an animal explained a large proportion of experienced social closeness towards it. This is consistent with the modest amount of research finding that empathy in human-human relationships serves as a mechanism for increasing social closeness (Huth-Stöckle & Heizmann, 2025; Pawlicka et al., 2019), but this is the first time it has been empirically observed in human-nonhuman animal relationships. Because social closeness is a supported mechanism for many positive behaviors in human-human relationships (e.g., Sip et al., 2015; van den Bos et al., 2018), increasing it in human-nonhuman animal relationships may be a useful tool for positive behavior change, including a decrease in meat consumption.

Results modestly support that experienced social closeness towards an animal decreases one's willingness to consume it, showing that only in the salmon and shrimp conditions, social closeness significantly decreases willingness to consume. The small R^2 values suggest something other than social closeness is driving the decrease in willingness to consume the animal, and exploratory analyses (Appendix N) reveal health,

sustainability, and moral perceptions of consuming the animal are potential explanatory variables for willingness to consume.

4.5 General Discussion

The two studies reported in this chapter reveal a clear difference in human perceptions of marine and terrestrial animals commonly used for food, and found support for two intervention strategies to increase social closeness between them.

4.5.1 Theoretical Implications

By adding to the work on the social dimension of CLT and regulatory scope to human-nonhuman animal relationships, this research suggests the applicability of the theory beyond human-human relationships. While regulatory scope research has considered human relationships with humans, nonhuman animals, objects, events, etc., the differences between the social closeness scores of the Study 3a experimental messaging groups are the first empirical demonstration that regulatory scope expansion strategies can apply to human relationships with nonhuman animals. Further, this work replicates and advances research showing a preference for animals and humans phenotypically similar to oneself (Borgi & Cirulli, 2015; Liviatan et al., 2008) by including and differentiating between a variety of marine animals commonly used for food.

This work also has substantial implications for anthropomorphism and empathy research pertaining to nonhuman animals. Consistent with prior research, Study 3b found that that anthropomorphic messaging increases empathy, but comparing it to another strategy revealed that it may not be the most effective intervention for doing so. Future

research should compare anthropomorphism strategies (e.g., cartoons, stories), as some may be more effective than the messaging intervention used in Study 3b.

Additionally, analyses revealed empathy is correlated with social closeness, and it increased following both messaging intervention strategies. It is unclear whether social closeness drives empathetic feelings or if the relationship is bidirectional, so future research should investigate this relationship.

4.5.2 Practical Implications

The findings of these two studies also have practical and policy implications, such as conservation initiatives and educational campaigns. Policies and interventions aimed at increasing concern for marine life and marine-related pro-environmental behavior should emphasize shared ecological roles and other collaborative relationships between humans and marine life. While increasing social closeness may not heavily motivate decreasing consumption of an animal, it's correlation with empathy and prior research demonstrating the benefits of increased social closeness for outgroup members likely makes it an effective strategy for encouraging certain pro-environmental behaviors.

Further, the perception that marine animals are generally healthier and more sustainable than terrestrial animals indicate a lack of knowledge on the variation in these qualities between different marine animals. Because health and sustainability perceptions influence purchase decisions (Aggarwal et al., 2016; Bastounis et al., 2021), educational campaigns should focus on dismantling misinformation in this realm by informing consumers about the intricate factors that influence health and sustainability metrics for marine animals (e.g., source, mercury levels, species). This may ultimately result in

decreasing consumption of the most environmentally harmful marine species to catch or farm for food.

4.5.3 Limitations and Future Directions

Results of these studies should be viewed in light of several limitations. First, all measures were self-reported, limiting the external validity of the results. Despite collecting a representative sample on several demographic variables, comparisons with U.S. averages reveal both study samples overall, were not representative of the population. As such, results cannot be generalized to the broader public.

Additionally, the scale used to measure social closeness in both studies may not adequately capture expansion of regulatory scope on the social domain. Presently, there are no scales that claim to do so, so future work in this domain should prioritize the development of a validated scope expansion scale. While differences in social closeness may appropriately indicate scope expansion and contraction, this has not undergone confirmatory psychometric testing.

Lastly, while the anthropomorphism passage was informed by prior research and piloted multiple times to ensure successful manipulation of the concept, most interventions using anthropomorphism focus on images or videos. As such, the passage manipulation in Study 3b may not have produced the results that would have occurred with an image manipulation. Future research should compare the anthropomorphism strategies to maximize the desired outcome.

Chapter 5. Discussion and Concluding Thoughts

This dissertation addressed five research questions to better understand the intricacies of herbivorous labeling implications, and relationships between humans and non-human animals commonly used for food. Prior research has primarily involved meat and meat alternatives, and this research captures the main remaining animal products—dairy, eggs, and marine animals—that make up a massive proportion of global emissions from animal agriculture (Food and Agriculture Organization of the United Nations, 2023, n.d.). While far more work is needed to fully understand the psychological mechanisms for decreasing consumption of these animal products, this dissertation presents data illustrating a rich landscape for future work.

Chapter 2 explored how product perceptions differed between the plant-based and vegan labels when applied to a quiche, and how choosing between an herbivorous-labeled and an animal-based quiche may elicit varying levels of experienced dissonance. Chapter 3 investigated how perceived health properties of a dairy product influence attribute perceptions of its herbivorous alternative, and how taste rating may impact health rating. Finally, Chapter 4 compared differences in social closeness between humans and terrestrial vs. marine animals used for food, and tested messaging strategies to increase social closeness towards animals perceived as most socially distant.

5.1 Study Summaries

Study 1a-b investigated perceived attribute differences and choice between the vegan and plant-based label when applied to a dairy and egg replacements, and compared both labels to an animal-based quiche. Omnivores and herbivores were also compared in this study to investigate labeling perception group differences and preferred label differences. Results found that among omnivores exposed to only the plant-based and vegan labels, there were no differences in perceived health nor environmental sustainability, contrary to prior research finding higher health and sustainability ratings for the plant-based label then the vegan label (H. Lee et al., 2024; Ruby et al., 2024). Omnivores did view the vegan-labeled quiche as more intended to address animal welfare concerns compared to the plant-based-labeled quiche, though when it came time to choose, they preferred the plant-based label. Herbivores on the other hand, were more likely to choose the quiche with the vegan label, and associated the plant-based label with more loss.

Study 1c investigated experienced dissonance as a result of product choice and the herbivorous labels to which participants were exposed. Results showed that those who chose the animal-based quiche over the herbivorous quiche, regardless of its label, experienced more dissonance than those who chose the animal-based quiche. There were no differences in experienced dissonance based on the herbivorous label to which people were exposed. This study revealed no other dissonance differences, and found no impact of the degree to which participants believed the product to address animal welfare concerns on dissonance.

Study 2 explored the differences in health perception of herbivorous alternatives to Greek yogurt and ice cream due to different health perceptions of the two dairy products, and measured health perceptions before and after tasting a product. Results revealed that both herbivorous-labeled ice creams were rated as healthier than the dairy ice cream, while both herbivorous-labeled Greek yogurts were rated as less healthy than the dairy ice cream. Contrasting the findings of Study 1a, the Greek yogurt results reveal that the plant-based label was perceived as healthier than the vegan label. Results also indicate evidence of a health halo effect for both herbivorous labels, but perhaps greater evidence of this for the plant-based label. Importantly, measuring health before and after actually tasting a product provided robust support for prior research suggesting that negative taste ratings predict positive health ratings.

Study 3a examined differences in social closeness between humans and eight different animals commonly used for food. Results showed that marine animals are generally viewed as more socially distal than terrestrial animals. Results also revealed that participants believe generally believe consumption of marine animals is healthier and more sustainable than consumption of terrestrial animals. When comparing the moral permissibility of consumption, participants believed all marine animals except for octopus were more morally permissible to consume, but there were no other clear trends. Octopus was rated as significantly less morally permissible to consume than all seven other animals.

Study 3b compared two messaging interventions with the goal of increasing regulatory scope to increase social closeness between humans and one of the three most

socially distal animals based on the findings of 3a. Results revealed that both anthropomorphism and collaboration were successful strategies for increasing social closeness compared to the control condition, but collaboration was the most effective. Further, analyses revealed that more empathy towards a given animal was predictive of greater experienced social closeness with it. Results also showed that social closeness was significantly associated with a decrease in willingness to consume the animal in the salmon and shrimp conditions, but exploratory analyses revealed that health, sustainability, and morality ratings explained far more variance in willingness to consume than social closeness.

5.2 Theoretical Implications

5.2.1 Prospect Theory and The Health Halo Effect

The combined findings of this dissertation research have substantial significance to the three main theoretical frameworks employed. Considering prospect theory, the results of Studies 1-2 reveal a powerful effect of product labeling on consumer perceptions and choice. This primarily adds to prospect theory research by incorporating non-consequential (i.e., non-financial) options, something that is relatively rare in research using this theory. The results of Study 1a-b reflect the sensitivity to loss observed in consequential decisions, demonstrating the applicability of gain and loss framing to choice scenarios like food consumption decisions. While financial decision scenarios are ideal for studying decision making trends due to the universal use and understanding of money, this strength also limits the theory's applicability. By focusing on financial decisions, previous research minimizes the influence of individual and group

differences, thereby reducing confounding variables. However, this also represents a huge limitation when considering the breadth of the theory's applicability. There are myriad non-consequential situations where options are the same but are framed differently (e.g., loyalty programs: get points vs. missing out on rewards; health and fitness: get fit vs. lose weight). Study 1a-b results reveal that in one specific food decision, different groups perceive the same labels vastly differently in terms of loss. This research begins to uncover how framing affects non-financial decisions, but there is much more to explore in terms of individual and group differences and the broad applicability of prospect theory to various domains.

The prospect theory implications are strengthened by including the health halo effect. The finding that the plant-based label was associated with less loss and potentially more of a health halo effect compared to the vegan label in the omnivorous sample presents an important connection between the two concepts. While the loss measure used in Chapter 2 did not incorporate health attributes, the premise of the halo effect supports the idea that if a product is perceived as healthy, it may also be associated with other positive but unrelated attributes.

Both of these frameworks posit that how something is framed impacts how it is perceived. Prospect theory focuses on framing that induces loss aversion, while the halo effect focuses on framing that amplifies positive impressions (Kahneman & Tversky, 1979; Thorndike, 1920). Prior research that has explicitly connected prospect theory and the halo effect proposes that the halo effect essentially broadens the gap between two differently-framed (i.e., one loss- and one gain-framed) options (Sultan, 2019).

Specifically, this work suggests that if one option is believed to have multiple positive attributes (i.e., halo effect), if the consumer finds out that option does not in fact embody those positive attributes, those product attributes become losses, disproportionately affecting the overall perception of the option—more than if they had never ascribed those positive attributes to the option in the first place. This may warn of a potential rebound effect of the halo effect, suggesting that if the plant-based-labeled product inflates expectations, it may end up being disliked and lead to stronger negative reactions compared to the vegan label when expectations are not met. This underscores the need for careful labeling strategies that build positive associations without overinflating expectations, which could backfire if unmet.

5.2.2 Cognitive Dissonance and Construal Level Theory

Studies 1c and 3a-b individually and collectively expand upon cognitive dissonance theory and construal level theory by incorporating herbivorous alternatives into an animal product choice scenario, and differentiating between specific animals used for food on social closeness and other attribute measures.

Most existing research on meat-related cognitive dissonance focuses only on a small subset of animal products (e.g., terrestrial animal meat) and alters its labeling or presentation (Kunst & Hohle, 2016). Participants in this research indicate their willingness to eat the animal, but the assumption is that there is no alternative option. Incorporating an herbivorous alternative as an additional option provides a superior choice set where it is even harder to make a choice that is inconsistent with the common belief of omnivores that animals should be treated kindly (i.e., the meat paradox [Bastian

& Loughnan, 2017]). Providing a viable alternative could increase dissonance by increasing the difficulty of choosing the animal product, and limiting the ability to reduce dissonance. Further, real-world decision scenarios increasingly offer alternative options that a person can choose over an animal-based product, so research including these alternatives better simulates realistic situations.

Study 3a-b indirectly contributes to cognitive dissonance theory by revealing perceived discrepancies between animals on a number of attributes, as well as experienced social closeness towards them. While the results cannot be definitively interpreted as indicative of experienced dissonance or dissonance reduction strategies, the differences in experienced social closeness between humans and the different nonhuman animals used for food paired with the fact that all participants reported meat as a part of their diets suggests there may be differing levels of experienced dissonance depending on the animal. For instance, cow and pig were rated as socially closest in Study 3a, and prior research on dissonance in this context has primarily involved these animals (Kunst & Hohle, 2016). Perhaps the level of experienced dissonance dwindles as animals are perceived as socially further, which the Study 3a and prior work indicate are generally marine animals (Cullen et al., 2024).

Cognitive dissonance and construal level theory have been connected in prior research on meat consumption by highlighting that psychological distance (spatially and hypothetically) between humans and animal agriculture practices fuels dissonance reduction strategies, and is in fact a reduction strategy itself (Earle et al., 2019; Kunst & Palacios Haugestad, 2018). I would offer that decreasing psychological distance

decreases one's ability to use dissonance reduction strategies. This is evidenced by prior research finding that changing the name of a meat product from "pork" to the actual animal name of the animal (i.e., "pig") decreased willingness to consume the animal (Kunst & Hohle, 2016). This suggests that stimulating concrete thinking makes dissonance reduction more difficult.

Cognitive dissonance is also highly relevant to the octopus findings in Study 3a. Among all marine animals examined, octopus was rated as socially closest, but least sustainable, least healthy, and least morally permissible to consume. Given that octopus consumption is relatively rare in America (Fleck, 2023a, 2023b), these greater social closeness and lower attribute ratings may reflect a lack of dissonance, and thus, a lack in reduction strategies. In other words, because most participants likely do not eat octopus regularly, they do not experience a conflict between their believe and actions—they can acknowledge the perceived ethical and environmental drawbacks of octopus consumption without experiencing dissonance. In contrast, for more commonly consumed marine animals, individuals may be motivated to inflate positive attributes (e.g., health, sustainability) as a way to reduce dissonance about their consumption. This may be indicative that higher ratings on those attributes are dissonance reduction strategies. However, other variables such as lack of knowledge and objective variation between the marine animals on these attributes may have contributed to these differences. Nevertheless, it introduces an intriguing avenue for future exploration.

5.3 Practical Implications

While Chapters 2 and 3 concerned herbivorous alternatives to non-meat animal products and Chapter 4 focused on understanding relational differences between humans and the different animals used for food, all of this research contributes towards building a path to effectively decrease animal product consumption. Understanding which herbivorous labels are most predictive of willingness to try alternatives for non-meat animal products, and investigating potential tools for decreasing marine animal consumption both continue building on research seeking to increase pro-environmental eating decisions.

Results from Studies 1-2 can be used by food producers and marketers as well as policy makers to maximize consumer acceptance of products or programs. Among omnivores, results of both studies favor the plant-based label in choice scenarios and several product perceptions compared to the vegan label. While the herbivorous sample in Study 1b favored the vegan label, I recommend the plant-based label be used in most situations in the Unites States for two main reasons. First, the majority of the population follows an omnivorous diet. Second, in real situations where consumers have access to ingredient labels, the herbivores will likely find and be willing to purchase a product with no animal products in it regardless of label. Their dietary restrictions likely increase their diligence to find products suitable for consumption, whereas omnivores may tend to write off something due to its primary label since they have a world of other options to consider.

Results from Study 3a-b can inform policies and conservation professionals intending to increase ocean conservation behaviors or decrease meat consumption. Study 3a provides crucial information on how several of the most common animals used for food are viewed relationally, and Study 3b shows that both collaborative and anthropomorphism messaging interventions can increase social closeness to the most distant animals. The 3a results give a foundation upon which advocacy groups seeking to decrease meat consumption may determine on which animals they may place their focus. For example, the social closeness observed between humans and cows and pigs may suggest those animals are ideal to focus on for meat-reducing strategies. Or perhaps they will choose to place more of an emphasis on animals like salmon, shrimp, and oysters so as to encourage people to view them more equivalently to the socially closer animals used for food. The collaborative and anthropomorphism messages used in Study 3b may be used and improved upon in the future to accomplish this. Even though the results do not overwhelmingly support collaboration and anthropomorphism as effective in reducing meat consumption, other versions of these intervention approaches may be successful in doing so. Aside from meat consumption behavior, social closeness is a well-supported mechanism for increasing pro-environmental behaviors in general (Berenguer, 2007; Schultz, 2000), so the messaging strategies used in Study 3b should be successful in other contexts.

Further, these findings can be used to increase ocean conservation behaviors such as reducing single-use plastic use, not littering, and considering the source of the marine animals consumed if not decreasing consumption of them as a whole. For example,

materials (e.g., flyers, posters) distributed in coastal regions could focus on one animal, provide a brief collaborative message similar to what was used in Study 3b, and prompt the desired behavior.

5.4 Limitations

All of these studies should be interpreted in light of several limitations. First, all studies except Study 2 were hypothetical in nature, limiting the generalizability of results to real behaviors. Further, all of the studies collected self-reported data, increasing the propensity for self-report bias and inaccuracy of results. Beyond this, Study 2 had an added element of inadvertent social observation that may have increased reputational concern and, in turn, increased deontological judgements (M. Lee et al., 2018).

While Study 3a-b had more representative samples of the Unites States than the other studies, comparisons with national averages indicate that even they were unrepresentative on a number of demographics. This limits the external validity of the findings, and the comparability of findings between the studies. For instance, connections or contrasts drawn between Study 1a-c and Study 2 should be interpreted cautiously since the samples are not directly comparable as Study 2 only included college students from one university. Further, Study 1a-c included two other English-speaking countries in addition to the United States, and had specific quotas of dietary groups, making it quite different from the U.S. American samples in Study 3a-b.

An additional limitation primarily pertinent to Study 3b concerns the short data collection process. For most people, animal product consumption is an option multiple times per day, and even if this intervention immediately decreases willingness to

consume an animal, the effect may diminish as time passes. The effects of intervention research for increasing curtailment behaviors like food choice are maximized by understanding behavioral persistence in the weeks, months, or years following an intervention.

Finally, some of the measures used throughout this research have not been psychometrically validated as adequately capturing the desired construct. The use of such scales in this dissertation derived from an absence of appropriate scales in existing research, and a limited capacity within this project to psychometrically validate them myself. As such, discretion is advised when interpreting results.

5.5 Future Research Directions

This dissertation yielded valuable insights, yet highlights the need for additional research on a number of topics.

First, research comparing herbivorous labeling should include more labels and compare them in a similar way as in Studies 1-2, perhaps also incorporating multiple products. Prior research typically only includes two herbivorous labels, and rarely compares them to one another within-subjects. Study 1a-c illustrates the importance of doing so, and comparing different pairs of herbivorous labels in multiple subsets of people will provide far more insight into how certain herbivorous labels are perceived when the other option is seen as better or worse. Additionally, a potential backfire effect due to the halo effect should be investigated depending on label with the goal of maximizing positive perceptions while reducing ultimate disappointment with it.

Considering dissonance, Study 1c suggests dissonance may be present among omnivores when considering non-meat animal products, and when there is an herbivorous alternative available. Future research should investigate if removal of the herbivorous alternative eliminates dissonance, and how robust this dissonance finding is. Perhaps providing visuals of cows or chickens with the products, or anthropomorphizing the animals will induce dissonance. In fact, this would be an excellent opportunity to incorporate psychological distance interventions as a means for manipulating dissonance. Further, Study 1c did not touch on dissonance reduction strategies, so future work should prioritize this when designing a study as well.

Social closeness should be further probed as a mechanism for decreasing willingness to consume an animal, and research doing so should also investigate other drivers for decreasing willingness to consume. The exploratory regression models in Appendix H indicate that health perceptions, moral permissibility perceptions, and sustainability perceptions explain more of the variance in willingness to consume, so those attributes should be further tested and manipulated to alter willingness to consume. Further, additional collaborative and anthropomorphism strategies should be tested for their efficacy in increasing empathy and social closeness, and their comparability to one another. Both messages were empirically-crafted to convey supported strategies for increasing empathy or social closeness, but it is unlikely they cannot be strengthened in the future. I can only conjecture that it is appropriate to compare them to one another, as I did in Study 3b, but more attention should be given to this aspect of the messages. Particularly in the case of the anthropomorphism condition, other approaches should be

tested against reading a passage, as prior work using this strategy has primarily incorporated cartoon images and other visual personifications of animals. While certainly not directly comparable to a collaboration message with no visual, perhaps this approach would be more successful at increasing empathy and social closeness, as well as decreasing intention to consume the animal.

5.6 Concluding Remarks

In sum, this dissertation exposed a significant impact of herbivorous labeling on consumer choice and product perceptions, an effect of animal product health ratings on attribute ratings of herbivorous alternatives for them, and identified two successful mechanisms for increasing social closeness between humans and several nonhuman animals used for food. This research advances several theoretical frameworks by incorporating new elements and perspectives, and it provides substantial information practitioners can use to build toolkits for increasing pro-environmental behaviors including decreasing meat consumption. By bridging psychological insights with practical applications, this work lays the groundwork for future interventions that foster more sustainable and compassionate food choices.

Bibliography

Abdellaoui, M., Bleichrodt, H., & Paraschiv, C. (2007). Loss Aversion Under Prospect Theory: A Parameter-Free Measurement. *Management Science*, *53*(10), 1659–1674. https://doi.org/10.1287/mnsc.1070.0711

Aggarwal, A., Rehm, C. D., Monsivais, P., & Drewnowski, A. (2016). Importance of taste, nutrition, cost and convenience in relation to diet quality: Evidence of nutrition resilience among US adults using National Health and Nutrition Examination Survey (NHANES) 2007–2010. *Preventive Medicine*, *90*, 184–192. https://doi.org/10.1016/j.ypmed.2016.06.030

Al Farisi, R., Ferdiana, R., & Adji, T. B. (2022). The Effect of Anthropomorphic Design Cues on Increasing Chatbot Empathy. *2022 1st International Conference on Information System & Information Technology (ICISIT)*, 370–375. https://doi.org/10.1109/ICISIT54091.2022.9873008

Al Ramiah, A., & Hewstone, M. (2013). Intergroup contact as a tool for reducing, resolving, and preventing intergroup conflict: Evidence, limitations, and potential. *American Psychologist*, *68*(7), 527–542. https://doi.org/10.1037/a0032603

Amiot, C. E., & Bastian, B. (2015). Toward a psychology of human–animal relations. *Psychological Bulletin*, *141*(1), 6–47. https://doi.org/10.1037/a0038147

Amyoony, J., Moss, R., Dabas, T., Gorman, M., Ritchie, C., LeBlanc, J., & McSweeney, M. B. (2023). An investigation into consumer perception of the aftertaste of plant-based dairy alternatives using a word association task. *Applied Food Research*, *3*(2), 100320. https://doi.org/10.1016/j.afres.2023.100320

Anderson, J. (2019). What To Call Plant-Based Meat Alternatives: A Labeling Study. *Faunalytics*. https://faunalytics.org/what-to-call-plant-based-meat-alternatives-a-labelling-study/

Apaolaza, V., Hartmann, P., Echebarria, C., & Barrutia, J. M. (2017). Organic label's halo effect on sensory and hedonic experience of wine: A pilot study. *Journal of Sensory Studies*, *32*(1), e12243. https://doi.org/10.1111/joss.12243

Aschemann-Witzel, J., Gantriis, R. F., Fraga, P., & Perez-Cueto, F. J. A. (2021). Plant-based food and protein trend from a business perspective: Markets, consumers, and the challenges and opportunities in the future. *Critical Reviews in Food Science and Nutrition*, *61*(18), 3119–3128. https://doi.org/10.1080/10408398.2020.1793730

Bartram, A. (2023, May 11). *Animals in the creative process: Embracing interspecies collaboration and learning from others within creativity* [Conference Presentation]. https://repository.derby.ac.uk/item/9y8w3/animals-in-the-creative-process-embracing-interspecies-collaboration-and-learning-from-others-within-creativity

Bastian, B., & Loughnan, S. (2017). Resolving the Meat-Paradox: A Motivational Account of Morally Troublesome Behavior and Its Maintenance. *Personality and*

Social Psychology Review, *21*(3), 278–299. https://doi.org/10.1177/1088868316647562

Bastounis, A., Buckell, J., Hartmann-Boyce, J., Cook, B., King, S., Potter, C., Bianchi, F., Rayner, M., & Jebb, S. A. (2021). The Impact of Environmental Sustainability Labels on Willingness-to-Pay for Foods: A Systematic Review and Meta-Analysis of Discrete Choice Experiments. *Nutrients*, *13*(8), Article 8. https://doi.org/10.3390/nu13082677

Beardsworth, A., & Keil, T. (1992). The Vegetarian Option: Varieties, Conversions, Motives and Careers. *The Sociological Review*, *40*(2), 253–293. https://doi.org/10.1111/j.1467-954X.1992.tb00889.x

Benningstad, N. C. G., & Kunst, J. R. (2020). Dissociating meat from its animal origins_ A systematic literature review. *Appetite*, *147*. https://doi.org/10.1016/j.appet.2019.104554

Berenguer, J. (2007). The Effect of Empathy in Proenvironmental Attitudes and Behaviors. *Environment and Behavior*, *39*(2), 269–283. https://doi.org/10.1177/0013916506292937

Berry, C., & Romero, M. (2021). The fair trade food labeling health halo: Effects of fair trade labeling on consumption and perceived healthfulness. *Food Quality and Preference*, *94*, 104321. https://doi.org/10.1016/j.foodqual.2021.104321

Besson, T., Bouxom, H., & Jaubert, T. (2020). Halo It's Meat! The Effect of the Vegetarian Label on Calorie Perception and Food Choices. *Ecology of Food and Nutrition*, *59*(1), 3–20. https://doi.org/10.1080/03670244.2019.1652820

Borgi, M., & Cirulli, F. (2015). Attitudes toward Animals among Kindergarten Children: Species Preferences. *Anthrozoös*, *28*(1), 45–59. https://doi.org/10.2752/089279315X14129350721939

Bouwman, E. P., Bolderdijk, J. W., Onwezen, M. C., & Taufik, D. (2022). "Do you consider animal welfare to be important?" activating cognitive dissonance via value activation can promote vegetarian choices. *Journal of Environmental Psychology*, *83*, 101871. https://doi.org/10.1016/j.jenvp.2022.101871

Branković, M., Budžak, A., Đurašković, I., & Vlajin, B. (2025). What is in a label: Effects of labeling on the preference for plant-based products. *Appetite*, *206*, 107837. https://doi.org/10.1016/j.appet.2024.107837

Brügger, A., Morton, T. A., & Dessai, S. (2016). "Proximising" climate change reconsidered: A construal level theory perspective. *Journal of Environmental Psychology*, *46*, 125–142. https://doi.org/10.1016/j.jenvp.2016.04.004

Bruno, M., Thomsen, M., Pulselli, F. M., Patrizi, N., Marini, M., & Caro, D. (2019). The carbon footprint of Danish diets. *Climatic Change*, *156*(4), 489–507. https://doi.org/10.1007/s10584-019-02508-4

Bucher, T., Müller, B., & Siegrist, M. (2015). What is healthy food? Objective nutrient profile scores and subjective lay evaluations in comparison. *Appetite*, *95*, 408–414. https://doi.org/10.1016/j.appet.2015.08.005

Bullock, K., Lahne, J., & Pope, L. (2020). Investigating the role of health halos and reactance in ice cream choice. *Food Quality and Preference*, *80*, 103826. https://doi.org/10.1016/j.foodqual.2019.103826

Bushkin-Bedient, S., & Carpenter, D. O. (2010). Benefits versus Risks Associated with Consumption of Fish and other Seafood. *Reviews on Environmental Health*, *25*(3), 161–192. https://doi.org/10.1515/REVEH.2010.25.3.161

Cai, Z., Xie, Y., & Aguilar, F. X. (2017). Eco-label credibility and retailer effects on green product purchasing intentions. *Forest Policy and Economics*, *80*, 200–208. https://doi.org/10.1016/j.forpol.2017.04.001

Caputo, V., Sogari, G., & Van Loo, E. J. (2023). Do plant-based and blend meat alternatives taste like meat? A combined sensory and choice experiment study. *Applied Economic Perspectives and Policy*, *45*(1), 86–105. https://doi.org/10.1002/aepp.13247

Carvalho, A. S. M., Godinho, C. I. A., & Graça, J. (2022). Gain framing increases support for measures promoting plant-based eating in university settings. *Food Quality and Preference*, *97*, 104500. https://doi.org/10.1016/j.foodqual.2021.104500

Castañé, S., & Antón, A. (2017). Assessment of the nutritional quality and environmental impact of two food diets: A Mediterranean and a vegan diet. *Journal of Cleaner Production*, *167*, 929–937. https://doi.org/10.1016/j.jclepro.2017.04.121

Chen, M.-F. (2020). Effects of psychological distance perception and psychological factors on pro-environmental behaviors in Taiwan: Application of construal level theory. *International Sociology*, *35*(1), 70–89. https://doi.org/10.1177/0268580919881870

Chen, T., Razzaq, A., Qing, P., & Cao, B. (2021). Do you bear to reject them? The effect of anthropomorphism on empathy and consumer preference for unattractive produce. *Journal of Retailing and Consumer Services*, *61*, 102556. https://doi.org/10.1016/j.jretconser.2021.102556

Christner, N., Pletti, C., & Paulus, M. (2022). How does the moral self-concept relate to prosocial behaviour? Investigating the role of emotions and consistency preference. *Cognition and Emotion*, *36*(5), 894–911. https://doi.org/10.1080/02699931.2022.2067133

Clement, G. (2011). *"Pets or Meat"? Ethics and Domestic Animals*.

Cole, M., & Morgan, K. (2011). Vegaphobia: Derogatory discourses of veganism and the reproduction of speciesism in UK national newspapers. *The British Journal of Sociology*, *62*(1), 134–153. https://doi.org/10.1111/j.1468-4446.2010.01348.x

Craig, W. J., Messina, V., Rowland, I., Frankowska, A., Bradbury, J., Smetana, S., & Medici, E. (2023). Plant-Based Dairy Alternatives Contribute to a Healthy and Sustainable Diet. *Nutrients*, *15*(15), Article 15. https://doi.org/10.3390/nu15153393

Cullen, M., Docherty, D., & Jasper, C. (2024). Out of sight, out of mind: How pescetarians manage dissonance by creating distance. *Qualitative Research in Psychology*, *0*(0), 1–26. https://doi.org/10.1080/14780887.2024.2328037

Dana, L. M., Chapman, K., Dixon, H., Miller, C., Neal, B., Kelly, B., Ball, K., & Pettigrew, S. (2021). The relative importance of primary food choice factors

among different consumer groups: A latent profile analysis. *Food Quality and Preference*, *94*, 104199. https://doi.org/10.1016/j.foodqual.2021.104199

Davies, C. A., & Stanley, S. K. (2024). Untangling the dairy paradox: How vegetarians experience and navigate the cognitive dissonance aroused by their dairy consumption. *Appetite*, *203*, 107692. https://doi.org/10.1016/j.appet.2024.107692

De Backer, C. J. S., & Hudders, L. (2014). From Meatless Mondays to Meatless Sundays: Motivations for Meat Reduction among Vegetarians and Semi-vegetarians Who Mildly or Significantly Reduce Their Meat Intake. *Ecology of Food and Nutrition*, *53*(6), 639–657. https://doi.org/10.1080/03670244.2014.896797

De Groot, J. I. M. (2022). The effectiveness of normative messages to decrease meat consumption: The superiority of dynamic normative messages framed as a loss. *Frontiers in Sustainability*, *3*. https://doi.org/10.3389/frsus.2022.968201

Definition of PLANT-BASED. (2025, February 4). https://www.merriam-webster.com/dictionary/plant-based

Definition of VEGAN. (2025, January 31). https://www.merriam-webster.com/dictionary/vegan

Demartini, E., Vecchiato, D., Finos, L., Mattavelli, S., & Gaviglio, A. (2022). Would you buy vegan meatballs? The policy issues around vegan and meat-sounding labelling of plant-based meat alternatives. *Food Policy*, *111*, 102310. https://doi.org/10.1016/j.foodpol.2022.102310

Dhont, K., & Ioannidou, M. (2021). Vegan for the Animals. *Kent Academic Repository*.

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2010). New Well-being Measures: Short Scales to Assess Flourishing and Positive and Negative Feelings. *Social Indicators Research*, *97*(2), 143–156. https://doi.org/10.1007/s11205-009-9493-y

Docherty, D., & Jasper, C. (2023). The cheese paradox: How do vegetarians justify consuming non-meat animal products? *Appetite*, *188*, 106976. https://doi.org/10.1016/j.appet.2023.106976

dos Santos Freitas, D., de Oliveira, T. E., & Gianezini, M. (2017). Consumer's perception on beef sustainability in Porto Alegre, southern Brazil. *Business Management Dynamics*, *7*(2), 7–19.

Douglas, B. D., Ewell, P. J., & Brauer, M. (2023). Data quality in online human-subjects research: Comparisons between MTurk, Prolific, CloudResearch, Qualtrics, and SONA. *PLOS ONE*, *18*(3), e0279720. https://doi.org/10.1371/journal.pone.0279720

Dresner, M., Handelman, C., Braun, S., & Rollwagen-Bollens, G. (2015). Environmental identity, pro-environmental behaviors, and civic engagement of volunteer stewards in Portland area parks. *Environmental Education Research*, *21*(7), 991–1010. https://doi.org/10.1080/13504622.2014.964188

Dunn, C., House, L., & Shelnutt, K. P. (2014). Consumer Perceptions of Gluten-Free Products and the Healthfulness of Gluten-Free Diets. *Journal of Nutrition Education and Behavior*, *46*(4), S184–S185. https://doi.org/10.1016/j.jneb.2014.04.280

Earle, M., Hodson, G., Dhont, K., & MacInnis, C. (2019). Eating with our eyes (closed): Effects of visually associating animals with meat on antivegan/vegetarian attitudes and meat consumption willingness. *Group Processes & Intergroup Relations*, *22*(6), 818–835. https://doi.org/10.1177/1368430219861848

Ekberg, K., Forchtner, B., Hultman, M., & Jylhä, K. M. (2022). *Climate Obstruction: How Denial, Delay and Inaction are Heating the Planet*. Routledge. https://doi.org/10.4324/9781003181132

Elliot, A. J., & Davine, P. G. (1994). On the Motivational Nature of Cognitive Dissonance: Dissonance as Psychological Discomfort. *Journal of Personality and Social Psychology*, *67*(3), 382–294.

Emel, J., Johnston, C. L., & Stoddard, E. (Lisa). (2015). Livelier livelihoods: Animal and human collaboration on the farm. In *Critical Animal Geographies*. Routledge.

Estévez-Moreno, L. X., Villarroel, M., & Miranda-de la Lama, G. C. (2025). Do Mexican consumers really care about hen welfare? Understanding their attitudes, constraints and willingness to pay for cage-free eggs. *Food Quality and Preference*, *122*, 105292. https://doi.org/10.1016/j.foodqual.2024.105292

Feiertag, N., Tawfik, M.-M., Loloi, J., Patel, R. D., Green, B., Zhu, M., Klyde, D., Small, A. C., & Watts, K. L. (2023). Should Men Eat More Plants? A Systematic Review of the Literature on the Effect of Plant-Forward Diets on Men's Health. *Urology*, *176*, 7–15. https://doi.org/10.1016/j.urology.2023.03.012

Fenko, A., Lotterman, H., & Galetzka, M. (2016). What's in a name? The effects of sound symbolism and package shape on consumer responses to food products.

Food Quality and Preference, *51*, 100–108. https://doi.org/10.1016/j.foodqual.2016.02.021

Fernan, C., Schuldt, J. P., & Niederdeppe, J. (2018). Health Halo Effects from Product Titles and Nutrient Content Claims in the Context of "Protein" Bars. *Health Communication*, *33*(12), 1425–1433. https://doi.org/10.1080/10410236.2017.1358240

Filippi, M., Riccitelli, G., Falini, A., Salle, F. D., Vuilleumier, P., Comi, G., & Rocca, M. A. (2010). The Brain Functional Networks Associated to Human and Animal Suffering Differ among Omnivores, Vegetarians and Vegans. *PLOS ONE*, *5*(5), e10847. https://doi.org/10.1371/journal.pone.0010847

Fix, A. J., Burnam, H., & Gutteriez, R. (2019). Toward Interspecies Thinking as a Collaborative Concept: Autoethnographies at the Intersection of Traditional Ecological Knowledge and Animal Studies. *Humanimalia*, *10*(2), Article 2. https://doi.org/10.52537/humanimalia.9504

Fleck, A. (2023a, June 29). *Infographic: One in Four Americans Say It's Wrong To Eat an Octopus*. Statista Daily Data. https://www.statista.com/chart/30299/us-survey-on-ethics-of-eating-animals

Fleck, A. (2023b, June 29). *Infographic: The Key Players in Octopus Trade*. Statista Daily Data. https://www.statista.com/chart/30303/top-importers-and-exporters-of-octopus

Food and Agriculture Organization of the United Nations. (2023). *Food Outlook – Biannual report on global food markets*. FAO. https://doi.org/10.4060/cc3020en

Food and Agriculture Organization of the United Nations. (n.d.). *Production | Gateway to poultry production and products | Food and Agriculture Organization of the United Nations*. https://www.fao.org/poultry-production-products/production/en/

Fujita, K., Eyal, T., Chaiken, S., Trope, Y., & Liberman, N. (2008). Influencing Attitudes Toward Near and Distant Objects. *Journal of Experimental Social Psychology*, *227*(21), 9044–9062. https://doi.org/10.1016/j.jesp.2007.10.005

Gaertner, S. L., Dovidio, J. F., Anastasio, P. A., Bachman, B. A., & Rust, M. C. (1993). The Common Ingroup Identity Model: Recategorization and the Reduction of Intergroup Bias. *European Review of Social Psychology*, *4*(1), 1–26. https://doi.org/10.1080/14792779343000004

Gaertner, S. L., Dovidio, J. F., Banker, B. S., Houlette, M., Johnson, K. M., & McGlynn, E. A. (2000). Reducing intergroup conflict: From superordinate goals to decategorization, recategorization, and mutual differentiation. *Group Dynamics: Theory, Research, and Practice*, *4*(1), 98–114. https://doi.org/10.1037/1089-2699.4.1.98

Gaertner, S. L., Mann, J. A., Dovidio, J. F., Murrell, A. J., & Pomare, M. (1990). How does cooperation reduce intergroup bias? *Journal of Personality and Social Psychology*, *59*(4), 692–704. https://doi.org/10.1037/0022-3514.59.4.692

Gao, Y., Baisch, P., Mirlean, N., Rodrigues da Silva Júnior, F. M., Van Larebeke, N., Baeyens, W., & Leermakers, M. (2018). Arsenic speciation in fish and shellfish from the North Sea (Southern bight) and Açu Port area (Brazil) and health risks

related to seafood consumption. *Chemosphere*, *191*, 89–96. https://doi.org/10.1016/j.chemosphere.2017.10.031

Gershoff, A. D., & Frels, J. K. (2015). What Makes It Green? The Role of Centrality of Green Attributes in Evaluations of the Greenness of Products. *Journal of Marketing*, *79*(1), 97–110. https://doi.org/10.1509/jm.13.0303

Gheihman, N. (2021). Veganism as a lifestyle movement. *Sociology Compass*, *15*(5), e12877. https://doi.org/10.1111/soc4.12877

Giacoman, C., Alfaro, J., Joustra, C., & Aguilera, I. M. (2023). Vegan on a low budget: Enacting identity through cuisine in an internet community. *Food, Culture & Society*, *0*(0), 1–19. https://doi.org/10.1080/15528014.2023.2191102

Goff, H. D., & Hartel, R. W. (2013). The Ice Cream Industry. In H. D. Goff & R. W. Hartel (Eds.), *Ice Cream* (pp. 1–17). Springer US. https://doi.org/10.1007/978-1-4614-6096-1_1

González-García, S., Esteve-Llorens, X., Moreira, M. T., & Feijoo, G. (2018). Carbon footprint and nutritional quality of different human dietary choices. *Science of The Total Environment*, *644*, 77–94. https://doi.org/10.1016/j.scitotenv.2018.06.339

Gremmen, B., Bruijnis, M. R. N., Blok, V., & Stassen, E. N. (2018). A Public Survey on Handling Male Chicks in the Dutch Egg Sector. *Journal of Agricultural and Environmental Ethics*, *31*(1), 93–107. https://doi.org/10.1007/s10806-018-9712-0

Grimshaw, K. E. (2013). *Consumer Perception of Beef, Pork, Lamb, Chicken, and Fish [Master's thesis, Texas A&M University]*. https://core.ac.uk/reader/147237960

Grunert, K. G., Hieke, S., & Wills, J. (2014). Sustainability labels on food products: Consumer motivation, understanding and use. *Food Policy*, *44*, 177–189. https://doi.org/10.1016/j.foodpol.2013.12.001

Hahnel, U. J. J., Arnold, O., Waschto, M., Korcaj, L., Hillmann, K., Roser, D., & Spada, H. (2015). The power of putting a label on it: Green labels weigh heavier than contradicting product information for consumers' purchase decisions and post-purchase behavior. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.01392

Halabi, N., Hristova, V., & Vlaev, I. (2024). Milking the Alternatives: Understanding Coffee Consumers' Preferences for Non-Dairy Milk. *Behavioral Sciences*, *14*(7), Article 7. https://doi.org/10.3390/bs14070569

Harmon-Jones, E. (2000). Cognitive Dissonance and Experienced Negative Affect: Evidence that Dissonance Increases Experienced Negative Affect Even in the Absence of Aversive Consequences. *Personality and Social Psychology Bulletin*, *26*(12), 1490–1501. https://doi.org/10.1177/01461672002612004

Harper, A. B. (2009). *Sistah Vegan: Black Female Vegans Speak on Food, Identity, Health, and Society*. Lantern Books.

Harris, J. L., Haraghey, K. S., Lodolce, M., & Semenza, N. L. (2018). Teaching children about good health? Halo effects in child-directed advertisements for unhealthy food. *Pediatric Obesity*, *13*(4), 256–264. https://doi.org/10.1111/ijpo.12257

Harrison, M. A., & Hall, A. E. (2010). Anthropomorphism, empathy, and perceived communicative ability vary with phylogenetic relatedness to humans. *Journal of*

Social, Evolutionary, and Cultural Psychology, *4*(1), 34–48. https://doi.org/10.1037/h0099303

Hausknecht, D. R., Sweeney, J. C., Soutar, G. N., & Johnson, L. W. (1998). "After I Had Made the Decision, I...: " Toward a Scale to Measure Cognitive Dissonance. *Journal of Consumer Satisfaction, Dissatisfaction, and Complaining Behavior*, *11*.

Hawkins, R. D., & Williams, J. M. (2016). Children's Beliefs about Animal Minds (Child-BAM): Associations with Positive and Negative Child–Animal Interactions. *Anthrozoös*, *29*(3), 503–519. https://doi.org/10.1080/08927936.2016.1189749

Hayes, A. F. (2017). *Introduction to Mediation, Moderation, and Conditional Process Analysis, Second Edition: A Regression-Based Approach*. Guilford Publications.

Hebden, L., Chan, H. N., Louie, J. C., Rangan, A., & Allman-Farinelli, M. (2015). You are what you choose to eat: Factors influencing young adults' food selection behaviour. *Journal of Human Nutrition and Dietetics*, *28*(4), 401–408. https://doi.org/10.1111/jhn.12312

Hemsworth, P. H., Coleman, G. J., Barnett, J. L., & Borg, S. (2000). Relationships between human-animal interactions and productivity of commercial dairy cows. *Journal of Animal Science*, *78*(11), 2821–2831. https://doi.org/10.2527/2000.78112821x

Henchion, M., Moloney, A. P., Hyland, J., Zimmermann, J., & McCarthy, S. (2021). Review: Trends for meat, milk and egg consumption for the next decades and the

role played by livestock systems in the global production of proteins. *Animal*, *15*, 100287. https://doi.org/10.1016/j.animal.2021.100287

Hielkema, M. H., & Lund, T. B. (2022). A “vegetarian curry stew” or just a “curry stew”? - The effect of neutral labeling of vegetarian dishes on food choice among meat-reducers and non-reducers. *Journal of Environmental Psychology*, *84*, 101877. https://doi.org/10.1016/j.jenvp.2022.101877

Horta, O. (2010). What is Speciesism? *Journal of Agricultural and Environmental Ethics*, *23*(3), 243–266. https://doi.org/10.1007/s10806-009-9205-2

Huth-Stöckle, N., & Heizmann, B. (2025). Are there limits to empathy? A survey experiment on empathic concern and perspective-taking as bases for attitudes towards different groups of refugees. *European Societies*, 1–40. https://doi.org/10.1162/euso_a_00022

International Food Information Council. (2020, January 30). *Consumer Survey on Plant Alternatives to Meat Shows That Nutrition Facts Are More Influential Than the Ingredients List*. https://ific.org/media-information/press-releases/consumer-survey-on-plant-alternatives-to-meat-shows-that-nutrition-facts-are-more-influential-than-the-ingredients-list/

Ioannidou, M., Lesk, V., Stewart-Knox, B., & Francis, K. B. (2023). Feeling morally troubled about meat, dairy, egg, and fish consumption: Dissonance reduction strategies among different dietary groups. *Appetite*, *190*, 107024. https://doi.org/10.1016/j.appet.2023.107024

Ipsos. (2018, August). *An Exploration into Diets Around the World*. https://www.ipsos.com/sites/default/files/ct/news/documents/2018-09/an_exploration_into_diets_around_the_world.pdf

Islam, N., Shafiee, M., & Vatanparast, H. (2021). Trends in the consumption of conventional dairy milk and plant-based beverages and their contribution to nutrient intake among Canadians. *Journal of Human Nutrition and Dietetics*, *34*(6), 1022–1034. https://doi.org/10.1111/jhn.12910

Iue, M., Makino, M., & Asari, M. (2022). The development of "Blue Seafood Guide," a sustainable seafood rating program, and its implication in Japan. *Marine Policy*, *137*, 104945. https://doi.org/10.1016/j.marpol.2021.104945

Jiang, L. (Alice), Feng, Y., Zhou, W., Yang, Z., & Su, X. (2024). Too anthropomorphized to keep distance: The role of social psychological distance on meat inclinations. *Appetite*, *196*, 107272. https://doi.org/10.1016/j.appet.2024.107272

Jo, J., & Lusk, J. L. (2018). If it's healthy, it's tasty and expensive: Effects of nutritional labels on price and taste expectations. *Food Quality and Preference*, *68*, 332–341. https://doi.org/10.1016/j.foodqual.2018.04.002

Jordan, J., Leliveld, M. C., & Tenbrunsel, A. E. (2015). The Moral Self-Image Scale: Measuring and Understanding the Malleability of the Moral Self. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.01878

Joy, M. (2020). *Why We Love Dogs, Eat Pigs, and Wear Cows: An Introduction to Carnism, 10th Anniversary Edition*. Red Wheel/Weiser.

Judge, M., Fernando, J. W., & Begeny, C. T. (2022). Dietary behaviour as a form of collective action: A social identity model of vegan activism. *Appetite*, *168*, 105730. https://doi.org/10.1016/j.appet.2021.105730

Kabisch, S., Wenschuh, S., Buccellato, P., Spranger, J., & Pfeiffer, A. F. H. (2021). Affordability of Different Isocaloric Healthy Diets in Germany—An Assessment of Food Prices for Seven Distinct Food Patterns. *Nutrients*, *13*(9), Article 9. https://doi.org/10.3390/nu13093037

Kahneman & Tversky. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*(2), 263–292.

Kazi, O., Miller, S. R., Malone, T., & Wolf, C. A. (Eds.). (2022). The Changing Role of Fat Perceptions in Fluid Milk Labeling: Would the Dairy Industry Sell More if 2% Milk Was Called "98% Fat Free"? *Journal of Food Distribution Research*. https://doi.org/10.22004/ag.econ.339683

Kemp, L., Xu, C., Depledge, J., Ebi, K. L., Gibbins, G., Kohler, T. A., Rockström, J., Scheffer, M., Schellnhuber, H. J., Steffen, W., & Lenton, T. M. (2022). Climate Endgame: Exploring catastrophic climate change scenarios. *Proceedings of the National Academy of Sciences*, *119*(34), e2108146119. https://doi.org/10.1073/pnas.2108146119

Kim, D. J., & Yoon, S. (2021). Guilt of the Meat-Eating Consumer: When Animal Anthropomorphism Leads to Healthy Meat Dish Choices. *Journal of Consumer Psychology*, *31*(4), 665–683. https://doi.org/10.1002/jcpy.1215

Koaik, F. (2024). *Examining the Effect of Norms on Moral Self- Image and Behavioural Spillovers*.

Krpan, D., & Houtsma, N. (2020). To veg or not to veg? The impact of framing on vegetarian food choice. *Journal of Environmental Psychology*, *67*, 101391. https://doi.org/10.1016/j.jenvp.2020.101391

Kubberød, E., Ueland, Ø., Tronstad, Å., & Risvik, E. (2002). Attitudes towards meat and meat-eating among adolescents in Norway: A qualitative study. *Appetite*, *38*(1), 53–62. https://doi.org/10.1006/appe.2002.0458

Kunst, J. R., & Hohle, S. M. (2016). Meat eaters by dissociation: How we present, prepare and talk about meat increases willingness to eat meat by reducing empathy and disgust. *Appetite*, *105*, 758–774. https://doi.org/10.1016/j.appet.2016.07.009

Kunst, J. R., & Palacios Haugestad, C. A. (2018). The effects of dissociation on willingness to eat meat are moderated by exposure to unprocessed meat: A cross-cultural demonstration. *Appetite*, *120*, 356–366. https://doi.org/10.1016/j.appet.2017.09.016

Küst, P. (2019). The Impact of the Organic Label Halo Effect on Consumers' Quality Perceptions, Value-in-Use and Well-Being. *Junior Management Science*, 241-264 Seiten. https://doi.org/10.5282/JUMS/V4I2PP241-264

Lafollette, H., & Shanks, N. (1996). The Origin of Speciesism. *Philosophy*, *71*(275), 41–61.

Lando, A. M., & Lo, S. C. (2013). Single-Larger-Portion-Size and Dual-Column Nutrition Labeling May Help Consumers Make More Healthful Food Choices. *Journal of the Academy of Nutrition and Dietetics*, *113*(2), 241–250. https://doi.org/10.1016/j.jand.2012.11.006

Lee, H., Lee, D., & Moon, J. (2024). *Purchasing vegan latte or plant-based latte: Label communications toward sustainability*. https://doi.org/10.22434/ifamr2023.0088

Lee, K., Jang, Y.-K., Jung, J., Kim, D. H., Lee, H. J., & Lee, S. A. (2022). EuglPollock: Rethinking Interspecies Collaboration through Art Making. *Proceedings of the 30th ACM International Conference on Multimedia*, 1077–1084. https://doi.org/10.1145/3503161.3548151

Lee, M., Sul, S., & Kim, H. (2018). Social observation increases deontological judgments in moral dilemmas. *Evolution and Human Behavior*, *39*(6), 611–621. https://doi.org/10.1016/j.evolhumbehav.2018.06.004

Leenstra, F., Munnichs, G., Beekman, V., Heuvel-Vromans, E. van den, Aramyan, L., & Woelders, H. (2011). Killing day-old chicks? Public opinion regarding potential alternatives. *Animal Welfare*, *20*(1), 37–45. https://doi.org/10.1017/S0962728600002414

Liviatan, I., Trope, Y., & Liberman, N. (2008). Interpersonal similarity as a social distance dimension: Implications for perception of others' actions. *Journal of Experimental Social Psychology*, *44*(5), 1256–1269. https://doi.org/10.1016/j.jesp.2008.04.007

Loughnan, S., Haslam, N., & Bastian, B. (2010). The role of meat consumption in the denial of moral status and mind to meat animals. *Appetite*, *55*(1), 156–159. https://doi.org/10.1016/j.appet.2010.05.043

Lusk, J. L. (2019). Consumer beliefs about healthy foods and diets. *PLOS ONE*, *14*(10), e0223098. https://doi.org/10.1371/journal.pone.0223098

MacInnis, C. C., & Hodson, G. (2017). It ain't easy eating greens: Evidence of bias toward vegetarians and vegans from both source and target. *Group Processes & Intergroup Relations*, *20*(6), 721–744. https://doi.org/10.1177/1368430215618253

MacLeod, M. J., Hasan, M. R., Robb, D. H. F., & Mamun-Ur-Rashid, M. (2020). Quantifying greenhouse gas emissions from global aquaculture. *Scientific Reports*, *10*(1), 11679. https://doi.org/10.1038/s41598-020-68231-8

Malek, L., & Umberger, W. J. (2021). Distinguishing meat reducers from unrestricted omnivores, vegetarians and vegans: A comprehensive comparison of Australian consumers. *Food Quality and Preference*, *88*, 104081. https://doi.org/10.1016/j.foodqual.2020.104081

Markowski, K. L., & Roxburgh, S. (2019). "If I became a vegan, my family and friends would hate me:" Anticipating vegan stigma as a barrier to plant-based diets. *Appetite*, *135*, 1–9. https://doi.org/10.1016/j.appet.2018.12.040

Marrone, G., Guerriero, C., Palazzetti, D., Lido, P., Marolla, A., Di Daniele, F., & Noce, A. (2021). Vegan Diet Health Benefits in Metabolic Syndrome. *Nutrients*, *13*(3), Article 3. https://doi.org/10.3390/nu13030817

Martyn. (2023, October 23). *Animal Cruelty In Factory Farm Statistics—Dreadful Numbers*. https://worldanimalfoundation.org/advocate/factory-farming-statistics/

Mee, J. F. (2013). Why Do So Many Calves Die on Modern Dairy Farms and What Can We Do about Calf Welfare in the Future? *Animals*, *3*(4), Article 4. https://doi.org/10.3390/ani3041036

Meijers, M. H. C., Torfadóttir, R. "Heather," Wonneberger, A., & Maslowska, E. (2023). Experiencing Climate Change Virtually: The Effects of Virtual Reality on Climate Change Related Cognitions, Emotions, and Behavior. *Environmental Communication*, *17*(6), 581–601. https://doi.org/10.1080/17524032.2023.2229043

Michel, F., Hartmann, C., & Siegrist, M. (2021). Consumers' associations, perceptions and acceptance of meat and plant-based meat alternatives. *Food Quality and Preference*, *87*, 104063. https://doi.org/10.1016/j.foodqual.2020.104063

Michel, F., Knaapila, A., Hartmann, C., & Siegrist, M. (2021). A multi-national comparison of meat eaters' attitudes and expectations for burgers containing beef, pea or algae protein. *Food Quality and Preference*, *91*, 104195. https://doi.org/10.1016/j.foodqual.2021.104195

Miki, A. J., Livingston, K. A., Karlsen, M. C., Folta, S. C., & McKeown, N. M. (2020). Using Evidence Mapping to Examine Motivations for Following Plant-Based Diets. *Current Developments in Nutrition*, *4*(3), nzaa013. https://doi.org/10.1093/cdn/nzaa013

Muskavage, B. A. (2016). *Exploring the Effects of Psychological Distance and Action-Related Knowledge on Wildlife Conservation*.

National Aeronautics and Space Association. (2023, February 28). *Scientific consensus: Earth's climate is warming*. https://science.nasa.gov/climate-change/scientific-consensus/

Nguyen, T., & Fujita, K. (2024). On Psychological Distance and Construal Level: A Regulatory Perspective. In *The Oxford Handbook of Social Cognition* (Second). Oxford University Press.

Nguyen-Viet, B. (2022). Understanding the Influence of Eco-label, and Green Advertising on Green Purchase Intention: The Mediating Role of Green Brand Equity. *Journal of Food Products Marketing*, *28*(2), 87–103. https://doi.org/10.1080/10454446.2022.2043212

Ni Mhurchu, C., Eyles, H., Jiang, Y., & Blakely, T. (2018). Do nutrition labels influence healthier food choices? Analysis of label viewing behaviour and subsequent food purchases in a labelling intervention trial. *Appetite*, *121*, 360–365. https://doi.org/10.1016/j.appet.2017.11.105

Niemyjska, A., Cantarero, K., Byrka, K., & Bilewicz, M. (2018). Too humanlike to increase my appetite: Disposition to anthropomorphize animals relates to decreased meat consumption through empathic concern. *Appetite*, *127*, 21–27. https://doi.org/10.1016/j.appet.2018.04.012

Nisbett, R. E., & Wilson, T. D. (1977). The halo effect: Evidence for unconscious alteration of judgments. *Journal of Personality and Social Psychology*, *35*(4), 250–256. https://doi.org/10.1037/0022-3514.35.4.250

NORC. (2022). *The General Social Survey* [Dataset]. https://gss.norc.org/us/en/gss/get-the-data.html

Oostenbach, L. H., Slits, E., Robinson, E., & Sacks, G. (2019). Systematic review of the impact of nutrition claims related to fat, sugar and energy content on food choices and energy intake. *BMC Public Health*, *19*(1), 1296. https://doi.org/10.1186/s12889-019-7622-3

Pahl, S., & Bauer, J. (2013). Overcoming the Distance: Perspective Taking With Future Humans Improves Environmental Engagement. *Environment and Behavior*, *45*(2), 155–169. https://doi.org/10.1177/0013916511417618

Palmer, S. (2021, April 15). *What do Plant-Based Food Labels Mean?* Sharon Palmer, The Plant Powered Dietitian. https://sharonpalmer.com/what-do-plant-based-food-labels-mean/

Pawlicka, P., Kazmierczak, M., & Jagiello-Rusilowski, A. (2019). Empathy and social closeness toward refugees from Syria: The mediating role of cultural intelligence. *Journal of Community Psychology*, *47*(5), 1014–1031. https://doi.org/10.1002/jcop.22169

Peer, E., Brandimarte, L., Samat, S., & Acquisti, A. (2017). Beyond the Turk: Alternative platforms for crowdsourcing behavioral research. *Journal of Experimental Social Psychology*, *70*, 153–163. https://doi.org/10.1016/j.jesp.2017.01.006

Peloza, J., Ye, C., & Montford, W. J. (2015). When Companies Do Good, Are Their Products Good for You? How Corporate Social Responsibility Creates a Health

Halo. *Journal of Public Policy & Marketing*, *34*(1), 19–31. https://doi.org/10.1509/jppm.13.037

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, *90*(5), 751–783. https://doi.org/10.1037/0022-3514.90.5.751

Plasek, B., Lakner, Z., & Temesi, Á. (2020). Factors that Influence the Perceived Healthiness of Food—Review. *Nutrients*, *12*(6), Article 6. https://doi.org/10.3390/nu12061881

Plechatá, A., Hielkema, M. H., Merkl, L.-M., Makransky, G., & Frøst, M. B. (2024). Shifting from Information- to Experience-Based Climate Change Communication Increases Pro-Environmental Behavior Via Efficacy Beliefs. *Environmental Communication*, *18*(5), 589–609. https://doi.org/10.1080/17524032.2024.2334727

Plous, S. (1993). Psychological Mechanisms in the Human Use of Animals. *Journal of Social Issues*, *49*(1), 11–52. https://doi.org/10.1111/j.1540-4560.1993.tb00907.x

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, *360*(6392), 987–992. https://doi.org/10.1126/science.aaq0216

Potter, C., Bastounis, A., Hartmann-Boyce, J., Stewart, C., Frie, K., Tudor, K., Bianchi, F., Cartwright, E., Cook, B., Rayner, M., & Jebb, S. A. (2021). The Effects of Environmental Sustainability Labels on Selection, Purchase, and Consumption of Food and Drink Products: A Systematic Review. *Environment and Behavior*, *53*(8), 891–925. https://doi.org/10.1177/0013916521995473

Provencher, V., Polivy, J., & Herman, C. P. (2009). Perceived healthiness of food. If it's healthy, you can eat more! *Appetite*, *52*(2), 340–344. https://doi.org/10.1016/j.appet.2008.11.005

Raghunathan, R., Naylor, R. W., & Hoyer, W. D. (2006). The Unhealthy = Tasty Intuition and Its Effects on Taste Inferences, Enjoyment, and Choice of Food Products. *Journal of Marketing*, *70*(4), 170–184. https://doi.org/10.1509/jmkg.70.4.170

Raheem, A. R., Nawaz, A., Vishnu, P., & Imamuddin, K. (2014). *ROLE OF PACKAGING AND LABELING ON PAKISTANI CONSUMERS PURCHASE DECISION*.

Rao, G., Bauer, V., Kuchta, K., Inman, J., & Solomonides, A. (2017). Yogurt, Its Relationship to Cardiometabolic Outcomes, and Patterns of Consumption. *Current Cardiovascular Risk Reports*, *11*(12), 34. https://doi.org/10.1007/s12170-017-0561-6

Reese, J. (2018). *The End of Animal Farming: How Scientists, Entrepreneurs, and Activists Are Building an Animal-Free Food System*. Beacon Press.

Reimer, N. K., Love, A., Wölfer, R., & Hewstone, M. (2021). Building Social Cohesion Through Intergroup Contact: Evaluation of a Large-Scale Intervention to Improve Intergroup Relations Among Adolescents. *Journal of Youth and Adolescence*, *50*(6), 1049–1067. https://doi.org/10.1007/s10964-021-01400-8

Rib, W. J. (2022). *Beyond Health and Animal Rights: A Study in Black Veganism* [Ph.D., University of South Florida].

https://www.proquest.com/docview/2747545409/abstract/30BE385676714092PQ/1

Rigg, R. (2001). *Livestock guarding dogs: Their current use world wide* (Vol. 1). Canid Specialist Group.

Roberto, C. A., Larsen, P. D., Agnew, H., Baik, J., & Brownell, K. D. (2010). Evaluating the Impact of Menu Labeling on Food Choices and Intake. *American Journal of Public Health*, *100*(2), 312–318. https://doi.org/10.2105/AJPH.2009.160226

Romani, A., Casnati, F., & Ianniello, A. (2022). Codesign with more-than-humans: Toward a meta co-design tool for human-non-human collaborations. *European Journal of Futures Research*, *10*(1), 17. https://doi.org/10.1186/s40309-022-00205-7

Rombach, M., Dean, D. L., & Bitsch, V. (2023). "Got Milk Alternatives?" Understanding Key Factors Determining US Consumers' Willingness to Pay for Plant-Based Milk Alternatives. *Foods*, *12*(6), 1277.

Rosenfeld, D. L. (2019). Why some choose the vegetarian option: Are all ethical motivations the same? *Motivation and Emotion*, *43*(3), 400–411. https://doi.org/10.1007/s11031-018-9747-6

Rosenfeld, D. L., Bartolotto, C., & Tomiyama, A. J. (2022). Promoting plant-based food choices: Findings from a field experiment with over 150,000 consumer decisions. *Journal of Environmental Psychology*, *81*, 101825. https://doi.org/10.1016/j.jenvp.2022.101825

Rosenfeld, D. L., Rothgerber, H., & Tomiyama, A. J. (2024). When meat-eaters expect vegan food to taste bad: Veganism as a symbolic threat. *Group Processes & Intergroup Relations*, *27*(2), 453–468. https://doi.org/10.1177/13684302231153788

Rosenfeld, D. L., & Tomiyama, A. J. (2021). How proximal are pescatarians to vegetarians? An investigation of dietary identity, motivation, and attitudes toward animals. *Journal of Health Psychology*, *26*(5), 713–727. https://doi.org/10.1177/1359105319842933

Rothgerber, H. (2014). Efforts to overcome vegetarian-induced dissonance among meat eaters. *Appetite*, *79*, 32–41. https://doi.org/10.1016/j.appet.2014.04.003

Rothgerber, H. (2020). Meat-related cognitive dissonance: A conceptual framework for understanding how meat eaters reduce negative arousal from eating animals. *Appetite*, *146*, 104511. https://doi.org/10.1016/j.appet.2019.104511

Rothgerber, H., & Rosenfeld, D. L. (2021). Meat-related cognitive dissonance: The social psychology of eating animals. *Social & Personality Psychology Compass*, *15*(5), 1–16. https://doi.org/10.1111/spc3.12592

Rothman, J. (2014). From Intragroup Conflict to Intergroup Cooperation. *Research in Social Movements, Conflicts and Change*, *37*, 107–123.

Ruby, M. B., Graça, J., & Olli, E. (2024). Vegetarian, vegan, or plant-based? Comparing how different labels influence consumer evaluations of plant-based foods. *Appetite*, *197*, 107288. https://doi.org/10.1016/j.appet.2024.107288

Sakkas, H., Bozidis, P., Touzios, C., Kolios, D., Athanasiou, G., Athanasopoulou, E., Gerou, I., & Gartzonika, C. (2020). Nutritional Status and the Influence of the Vegan Diet on the Gut Microbiota and Human Health. *Medicina*, *56*(2), Article 2. https://doi.org/10.3390/medicina56020088

Scarborough, P., Appleby, P. N., Mizdrak, A., Briggs, A. D. M., Travis, R. C., Bradbury, K. E., & Key, T. J. (2014). Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. *Climatic Change*, *125*(2), 179–192. https://doi.org/10.1007/s10584-014-1169-1

Schiano, A. N., Harwood, W. S., Gerard, P. D., & Drake, M. A. (2020). Consumer perception of the sustainability of dairy products and plant-based dairy alternatives. *Journal of Dairy Science*, *103*(12), 11228–11243. https://doi.org/10.3168/jds.2020-18406

Schultz, P. W. (2000). New Environmental Theories: Empathizing With Nature: The Effects ofPerspective Taking on Concern for Environmental Issues. *Journal of Social Issues*, *56*(3), 391–406. https://doi.org/10.1111/0022-4537.00174

Selinger, E., Neuenschwander, M., Koller, A., Gojda, J., Kühn, T., Schwingshackl, L., Barbaresko, J., & Schlesinger, S. (2023). Evidence of a vegan diet for health benefits and risks – an umbrella review of meta-analyses of observational and clinical studies. *Critical Reviews in Food Science and Nutrition*, *63*(29), 9926–9936. https://doi.org/10.1080/10408398.2022.2075311

Sevillano, V., Aragonés, J. I., & Schultz, P. W. (2007). Perspective Taking, Environmental Concern, and the Moderating Role of Dispositional Empathy.

Environment and Behavior, *39*(5), 685–705. https://doi.org/10.1177/0013916506292334

Shalvi, S., Gino, F., Barkan, R., & Ayal, S. (2015). Self-Serving Justifications: Doing Wrong and Feeling Moral. *Current Directions in Psychological Science*, *24*(2), 125–130. https://doi.org/10.1177/0963721414553264

Shiu, P. P. K. (2024). *Anthropomorphism for wildlife: The effects of anthropomorphic cues and phylogenetic closeness on perceived animal-human similarity, conservation intention, and donation behavior*. https://doi.org/10.32657/10356/179662

Silverman. (2020). *The FDA Should Regulate to End the Plant-Based Meat Labeling Controversy—Megan Silverman*. https://law.lclark.edu/live/blogs/136-the-fda-should-regulate-to-end-the-plant-based

Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). *p* -Curve and Effect Size: Correcting for Publication Bias Using Only Significant Results. *Perspectives on Psychological Science*, *9*(6), 666–681. https://doi.org/10.1177/1745691614553988

Singer, P. (2009). Speciesism and Moral Status. *Metaphilosophy*, *40*(3–4), 567–581. https://doi.org/10.1111/j.1467-9973.2009.01608.x

Sip, K. E., Smith, D. V., Porcelli, A. J., Kar, K., & Delgado, M. R. (2015). Social closeness and feedback modulate susceptibility to the framing effect. *Social Neuroscience*, *10*(1), 35–45. https://doi.org/10.1080/17470919.2014.944316

Skirtun, M., Sandra, M., Strietman, W. J., van den Burg, S. W. K., De Raedemaecker, F., & Devriese, L. I. (2022). Plastic pollution pathways from marine aquaculture practices and potential solutions for the North-East Atlantic region. *Marine Pollution Bulletin*, *174*, 113178. https://doi.org/10.1016/j.marpolbul.2021.113178

Sleboda, P., Bruine de Bruin, W., Gutsche, T., & Arvai, J. (2024). Don't say "vegan" or "plant-based": Food without meat and dairy is more likely to be chosen when labeled as "healthy" and "sustainable." *Journal of Environmental Psychology*, *93*, 102217. https://doi.org/10.1016/j.jenvp.2023.102217

Spence, A., Poortinga, W., & Pidgeon, N. (2012). The Psychological Distance of Climate Change. *Risk Analysis*, *32*(6), 957–972. https://doi.org/10.1111/j.1539-6924.2011.01695.x

Stephan, E., Liberman, N., & Trope, Y. (2011). The effects of time perspective and level of construal on social distance. *Journal of Experimental Social Psychology*, *47*(2), 397–402. https://doi.org/10.1016/j.jesp.2010.11.001

Stewart, K., & Cole, M. (2009). The Conceptual Separation of Food and Animals in Childhood. *Food, Culture & Society*, *12*(4), 457–476. https://doi.org/10.2752/175174409X456746

Stremmel, G., Elshiewy, O., Boztug, Y., & Carneiro-Otto, F. (2022). Vegan labeling for what is already vegan: Product perceptions and consumption intentions. *Appetite*, *175*, 106048. https://doi.org/10.1016/j.appet.2022.106048

Sucapane, D. (2020). *Plant-based or meat alternative? How the naming and packaging of plant-based meat alternatives [Master's thesis, Concordia University]*. https://spectrum.library.concordia.ca/id/eprint/987338/

Sucapane, D., Roux, C., & Sobol, K. (2021). Exploring how product descriptors and packaging colors impact consumers' perceptions of plant-based meat alternative products. *Appetite*, *167*, 105590. https://doi.org/10.1016/j.appet.2021.105590

Sullivan, V. K., Martínez-Steele, E., Garcia-Larsen, V., & Rebholz, C. M. (2024). Trends in Plant-Based Diets among United States Adults, 1999–March 2020. *The Journal of Nutrition*, *154*(12), 3575–3584. https://doi.org/10.1016/j.tjnut.2024.08.004

Sultan, M. (2019). *Baby, I Can See Your Halo: How the Halo Effect, Loss Aversion, and Strategic Attribute Disclosure Neglect Can Inform Negative Advertising*. Bryn Mawr College.

Szenderák, J., Fróna, D., & Rákos, M. (2022). Consumer Acceptance of Plant-Based Meat Substitutes: A Narrative Review. *Foods*, *11*(9), 1274. https://doi.org/10.3390/foods11091274

Tam, K.-P. (2015). Mind Attribution to Nature and Proenvironmental Behavior. *Ecopsychology*, *7*(2), 87–95. https://doi.org/10.1089/eco.2014.0054

Thorndike, E. L. (1920). A Constant Error in Psychological Ratings. In *Journal of Applied Psychology* (Vol. 4, pp. 25–29).

Tisdell, C., Wilson, C., & Swarna Nantha, H. (2006). Public choice of species for the 'Ark': Phylogenetic similarity and preferred wildlife species for survival. *Journal for Nature Conservation*, *14*(2), 97–105. https://doi.org/10.1016/j.jnc.2005.11.001

Trope, Y., Ledgerwood, A., Liberman, N., & Fujita, K. (2021). Regulatory Scope and Its Mental and Social Supports. *Perspectives on Psychological Science*, *16*(2), 204–224. https://doi.org/10.1177/1745691620950691

Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, *110*(3), 403–421. https://doi.org/10.1037/0033-295X.110.3.403

Tulloch, L., & Judge, P. (2018). *Bringing the calf back from the dead: Video activism, the politics of sight and the New Zealand dairy industry*. https://doi.org/10.1186/s40990-018-0021-3

Tunç, A. (2023). *VEGAN IDENTITIES AND THE VEGAN MOVEMENT IN TURKEY* [Master Thesis, Middle East Technical University]. https://open.metu.edu.tr/handle/11511/102785

Tversky, A., & Kahneman, D. (1992). *Advances in prospect theory: Cumulative representation of uncertainty*. *5*, 297–323.

Tversky, A., & Simonson, I. (1993). Context-Dependent Preferences. *Management Science*, *39*(10), 1179–1189. https://doi.org/10.1287/mnsc.39.10.1179

Twine, R. (2021). Emissions from Animal Agriculture—16.5% Is the New Minimum Figure. *Sustainability*, *13*(11), Article 11. https://doi.org/10.3390/su13116276

Ullrich, M., & Trump, S. (2023). Sonic Collaborations between Humans, Non-human Animals and Artificial Intelligences: Contemporary and future aesthetics in more-than-human worlds. *Organised Sound*, *28*(1), 35–42. https://doi.org/10.1017/S1355771822000097

United States Census Bureau. (2023). *2023 American Community Survey*. https://data.census.gov/profile/United_States?g=010XX00US

United States Environmental Protection Agency. (2021). *From Farm to Kitchen: The Environmental Impacts of U.S. Food Waste*.

United States Food and Drug Administration. (2023). FDA Reopens Comment Period for the Draft Guidance on Labeling of Plant-Based Milk Alternatives. *FDA*. https://www.fda.gov/food/cfsan-constituent-updates/fda-reopens-comment-period-draft-guidance-labeling-plant-based-milk-alternatives

Vadiveloo, M., Morwitz, V., & Chandon, P. (2013). The interplay of health claims and taste importance on food consumption and self-reported satiety. *Appetite*, *71*, 349–356. https://doi.org/10.1016/j.appet.2013.09.005

van den Bos, W., Crone, E. A., Meuwese, R., & Güroğlu, B. (2018). Social network cohesion in school classes promotes prosocial behavior. *PLOS ONE*, *13*(4), e0194656. https://doi.org/10.1371/journal.pone.0194656

van der Heijden, A., te Molder, H., de Graaf, C., & Jager, G. (2020). Healthy is (not) tasty? Implicit and explicit associations between food healthiness and tastiness in primary school-aged children and parents with a lower socioeconomic position. *Food Quality and Preference*, *84*, 103939. https://doi.org/10.1016/j.foodqual.2020.103939

Van der Werff, E., Steg, L., & Keizer, K. (2014). I Am What I Am, by Looking Past the Present: The Influence of Biospheric Values and Past Behavior on Environmental

Self-Identity. *Environment and Behavior*, *46*(5), 626–657. https://doi.org/10.1177/0013916512475209

Van Loo, E. J., Hoefkens, C., & Verbeke, W. (2017). Healthy, sustainable and plant-based eating: Perceived (mis)match and involvement-based consumer segments as targets for future policy. *Food Policy*, *69*, 46–57. https://doi.org/10.1016/j.foodpol.2017.03.001

Vezzali, L., Hewstone, M., Capozza, D., Trifiletti, E., & Bernardo, G. A. D. (2017). Improving Intergroup Relations with Extended Contact among Young Children: Mediation by Intergroup Empathy and Moderation by Direct Intergroup Contact. *Journal of Community & Applied Social Psychology*, *27*(1), 35–49. https://doi.org/10.1002/casp.2292

Vlaeminck, P., Jiang, T., & Vranken, L. (2014). Food labeling and eco-friendly consumption: Experimental evidence from a Belgian supermarket. *Ecological Economics*, *108*, 180–190. https://doi.org/10.1016/j.ecolecon.2014.10.019

Vural, Y., Ferriday, D., & Rogers, P. J. (2023). Consumers' attitudes towards alternatives to conventional meat products: Expectations about taste and satisfaction, and the role of disgust. *Appetite*, *181*, 106394. https://doi.org/10.1016/j.appet.2022.106394

Wadiwel, D. J. (2016). Do fish resist? *Cultural Studies Review*, *22*(1), 196–242. https://doi.org/10.3316/informit.947695681113380

Wang, S., Hurlstone, M. J., Leviston, Z., Walker, I., & Lawrence, C. (2019). Climate Change From a Distance: An Analysis of Construal Level and Psychological

Distance From Climate Change. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.00230

Webster, A. (2021, January 26). IFIC Survey: Consumer Viewpoints and Purchasing Behaviors Regarding Plant and Animal Protein. *Food Insight*. https://foodinsight.org/plant-and-animal-protein-consumer-survey/

Werle, C. O. C., Trendel, O., & Ardito, G. (2013). Unhealthy food is not tastier for everybody: The "healthy = tasty" French intuition. *Food Quality and Preference*, *28*(1), 116–121. https://doi.org/10.1016/j.foodqual.2012.07.007

Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology*, *30*(3), 305–314. https://doi.org/10.1016/j.jenvp.2010.01.003

Wilkins, A. M., McCrae, L. S., & McBride, E. A. (2015). Factors affecting the Human Attribution of Emotions toward Animals. *Anthrozoös*, *28*(3), 357–369. https://doi.org/10.1080/08927936.2015.1052270

Wirnitzer, K. (2020). Vegan Diet in Sports and Exercise – Health Benefits and Advantages to Athletes and Physically Active People: A Narrative Review. *International Journal of Sports and Exercise Medicine*, *6*(3). https://doi.org/10.23937/2469-5718/1510165

Woodside, J. V., Sun, Q., Roos, B. de, Rimm, E. B., Hu, F. B., Heinen, M. M., McEvoy, C. T., Piernas, C., Scheelbeek, P. F. D., Rushton, J., Ensaff, H., Brennan, S. F., & Brennan, L. (2022). Meeting report: Plant-rich dietary patterns and health.

Proceedings of the Nutrition Society, *81*(4), 288–305. https://doi.org/10.1017/S002966512200266X

Wrenn, C. (2017). Trump Veganism: A Political Survey of American Vegans in the Era of Identity Politics. *Societies*, *7*(4), 32. https://doi.org/10.3390/soc7040032

Xu, X., Sharma, P., Shu, S., Lin, T.-S., Ciais, P., Tubiello, F. N., Smith, P., Campbell, N., & Jain, A. K. (2021). Global greenhouse gas emissions from animal-based foods are twice those of plant-based foods. *Nature Food*, *2*(9), 724–732. https://doi.org/10.1038/s43016-021-00358-x

Yu, S., & Lee, J. (2019). The Effects of Consumers' Perceived Values on Intention to Purchase Upcycled Products. *Sustainability*, *11*(4), Article 4. https://doi.org/10.3390/su11041034

Yue, D., Tong, Z., Tian, J., Li, Y., Zhang, L., & Sun, Y. (2021). Anthropomorphic Strategies Promote Wildlife Conservation through Empathy: The Moderation Role of the Public Epidemic Situation. *International Journal of Environmental Research and Public Health*, *18*(7), Article 7. https://doi.org/10.3390/ijerph18073565

Zamir, T. (2004). Veganism. *Journal of Social Philosophy*, *35*(3), 367–379. https://doi.org/10.1111/j.1467-9833.2004.00238.x

Zickfeld, J. H., Kunst, J. R., & Hohle, S. M. (2018). Too sweet to eat: Exploring the effects of cuteness on meat consumption. *Appetite*, *120*, 181–195. https://doi.org/10.1016/j.appet.2017.08.038

Zingone, F., Bucci, C., Iovino, P., & Ciacci, C. (2017). Consumption of milk and dairy products: Facts and figures. *Nutrition*, *33*, 322–325.

Study 1a-c Additional Measures and Results

Pre-registered Hypothesis in Study 1a, not Reported in Main Text

Participants in the vegan vs. plant-based condition will rate the plant-based-labeled quiche as healthier, more sustainable, and less associated with liberal values than participants in the plant-based vs. animal-based condition will rate the plant-based-labeled quiche.

Table A1. Pairwise Comparisons of Health, Sustainability, and Political Affiliation Ratings of Plant-based Quiche Depending on Condition

Measure	Condition Comparison	Mean Difference	*t*	95% CI	*p*-value
Plant-based Health	Vegan vs. Plant-based & Plant-based vs. Animal-based	0.151	1.33	[-0.072, 0.374]	0.184
Plant-based Sustainability	Vegan vs. Plant-based & Plant-based vs. Animal-based	0.085	0.489	[-0.251, 0.421]	0.619
Plant-based Political Affiliation	Vegan vs. Plant-based & Plant-based vs. Animal-based	0.358	1.563	[-0.092, 0.808]	0.119

Motivation for Food Choice. The importance of several attributes when purchasing a product was measured using an adapted version of a scale by Grunert and colleagues (2014). For this, participants read "When choosing a food product such as a quiche, how concerned are you personally about each of these issues?" and rated the following three items on a scale of 1 = *not at all concerned*, to 7 = *extremely concerned*: "The environmental impact caused by the ingredients and production of the product," The health properties of the product," and "The impact of the ingredients and production of the product on animal welfare."

Because the vegan and plant-based quiches were intended to be the same product, all 1a participants in condition one (vegan/plant-based), and all 1b participants, were asked to provide a response for why they chose one product over the other.

Appendix B. Pre-test Measuring Health Perceptions

To determine a primarily egg and dairy product that was viewed as nutritionally-neutral for Study 1a-c, and to determine a pair of either primarily dairy-based products or primarily egg-based products, the health perceptions of the eight most common products fitting these criteria were tested. A total of $N = 308$ student participants responded to "Please rate how healthy you think each of these foods are:" on a scale of 1 = *very unhealthy,* to 7 = *very healthy*.

The quiche was rated almost exactly nutritionally-neutral (i.e., 3.50) and was rated more nutritionally-neutral than the other egg and dairy product—the egg and cheese breakfast burrito.

Study 2 required either two primarily egg products or two primarily dairy products. While the egg white omelet got the highest health rating overall, the deviled eggs were rated above the neutral point on health. The Greek yogurt was rated as the second highest on health, and the ice cream was rated as the lowest on health compared to all other products.

Table B1. Ratings of Eight Egg and Dairy Items on Health

Product	Mean health rating	Standard Deviation
Quiche	3.643	1.272
Egg and Cheese Breakfast Burrito	3.370	1.309

Greek Yogurt	5.659	1.097
Ice Cream	1.270	0.889
Milk Chocolate Bar	1.429	1.026
Cottage Cheese	4.562	1.457
Egg While Omelet	5.812	1.272
Deviled Eggs	3.565	1.343

Appendix C. Study 1a-b Models with Covariates

The covariates gender, age, income, education, political beliefs, environmental identity, origin, and race (Black or not Black)[3] were all tested on the outcome variables for each hypothesis. The only covariates that were significant ($p < 0.05$) in any of the models were environmental identity, gender, race (Black or not Black), political beliefs, and origin. These five covariates were added into the full models for each MANOVA and *t*-test.

Table C1. MANCOVA Within-Subjects Contrasts Table Comparing Attributes in Condition 1 Sample 1a

Covariate	Dependent Variable	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Environmental Identity*label	Health	0.012	1	0.108	0.743	0.001
	Sustainability	0.422	1	1.336	0.250	0.010
	Animal Welfare Intent	0.823	1	1.280	0.260	0.010
Gender*label	Health	0.004	1	0.041	0.840	0.000
	Sustainability	0.043	1	0.136	0.713	0.001
	Animal Welfare Intent	1.128	1	1.752	0.188	0.014
Black*label	Health	0.016	1	0.152	0.697	0.001
	Sustainability	0.310	1	0.983	0.323	0.008
	Animal Welfare Intent	0.687	1	1.068	0.303	0.008
	Health	0.011	1	0.104	0.748	0.001

[3] Black veganism is a distinct subset of Black culture, with deeper roots in social justice and culture than Euro-centric veganism, leading Black Americans to engage with veganism differently than other races (Harper, 2009; Rib, 2022).

Political Beliefs*label	Sustainability	0.145	1	0.458	0.500	0.004
	Animal Welfare Intent	0.077	1	0.120	0.730	0.001
Origin*label	Health	0.077	1	0.727	0.396	0.006
	Sustainability	0.005	1	0.015	0.904	0.000
	Animal Welfare Intent	0.413	1	0.642	0.425	0.005

Table C2. MANCOVA Within-Subjects Contrasts Table Comparing Attributes in Condition 2 Sample 1a

Covariate	Dependent Variable	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Environmental Identity*label	Health	4.385	1	8.719	0.004	0.065
	Sustainability	4.764	1	3.897	0.051	0.030
	Animal Welfare Intent	0.415	1	0.207	0.650	0.002
Gender*label	Health	0.087	1	0.173	0.678	0.001
	Sustainability	3.921	1	3.208	0.076	0.025
	Animal Welfare Intent	0.497	1	0.247	0.620	0.002
Black*label	Health	0.514	1	1.023	0.314	0.008
	Sustainability	0.139	1	0.114	0.736	0.001
	Animal Welfare Intent	0.670	1	0.334	0.564	0.003
Political Beliefs*label	Health	0.454	1	0.903	0.344	0.007
	Sustainability	1.958	1	1.602	0.208	0.013
	Animal Welfare Intent	0.420	1	0.209	0.648	0.002
Origin*label	Health	0.283	1	0.562	0.455	0.004
	Sustainability	2.218	1	1.815	0.180	0.014
	Animal Welfare Intent	0.074	1	0.037	0.848	0.000

Table C3. MANCOVA Within-Subjects Contrasts Table Comparing Attributes in Condition 3 Sample 1a

Covariate	Dependent Variable	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2

Environmental Identity*label	Health	0.197	1	0.294	0.589	0.002
	Sustainability	0.642	1	0.537	0.465	0.004
	Animal Welfare Intent	2.610	1	1.441	0.232	0.011
Gender*label	Health	5.137	1	7.636	0.007	0.055
	Sustainability	0.091	1	0.076	0.783	0.001
	Animal Welfare Intent	1.768	1	0.976	0.325	0.007
Black*label	Health	0.025	1	0.038	0.847	0.000
	Sustainability	0.018	1	0.015	0.903	0.000
	Animal Welfare Intent	0.534	1	0.295	0.588	0.002
Political Beliefs*label	Health	0.000	1	0.000	0.986	0.000
	Sustainability	0.094	1	0.078	0.780	0.001
	Animal Welfare Intent	2.897	1	1.599	0.208	0.012
Origin*label	Health	2.002	1	2.976	0.087	0.022
	Sustainability	15.870	1	13.281	<0.001	0.091
	Animal Welfare Intent	28.114	1	15.519	<0.001	0.105

Table C5. Within-Subjects Contrasts Table Comparing Loss in Condition 1 Sample 1a

Covariate	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Environmental Identity*label	0.265	1	3.261	0.073	0.025
Gender*label	0.001	1	0.011	0.916	0.000
Black*label	0.888	1	10.909	0.001	0.079
Political Beliefs*label	0.002	1	0.026	0.872	0.000
Origin*label	0.015	1	0.185	0.668	0.001

Table C4. Within-Subjects Contrasts Table Comparing Loss in Sample 1b

Covariate	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2

Environmental Identity*label	0.003	1	0.097	0.756	0.001
Gender*label	0.050	1	1.780	0.184	0.013
Black*label	0.000	1	0.002	0.967	0.000
Political Beliefs*label	0.017	1	0.607	0.437	0.005
Origin*label	0.064	1	2.296	0.132	0.017

Appendix D. Study 1c Model with Covariates

Table D1. MANCOVA Between-Subjects Effects Table Comparing Dissonance and Negative Affect Depending on Quiche Choice (Herbivorous or Animal-based)

Source	Dependent Variable	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Intercept	Dissonance	352.830	1	649.426	<0.001	0.508
	Negative Affect	1988.230	1	105.360	<0.001	0.144
Choice	Dissonance	7.156	1	13.171	<0.001	0.021
	Negative Affect	59.212	1	3.138	0.077	0.005
Environmental Identity	Dissonance	10.715	1	19.723	<0.001	0.030
	Negative Affect	60.640	1	3.213	0.074	0.005
Gender	Dissonance	5.212	1	9.594	0.002	0.015
	Negative Affect	0.668	1	0.035	0.851	0.000
Black	Dissonance	59.374	1	109.284	<0.001	0.148
	Negative Affect	32.090	1	1.701	0.193	0.003
Political Beliefs	Dissonance	19.866	1	36.566	<0.001	0.055
	Negative Affect	58.114	1	3.080	0.080	0.005
Age	Dissonance	1.992	1	3.667	0.056	0.006
	Negative Affect	85.297	1	4.520	0.034	0.007
Education	Dissonance	1.305	1	2.401	0.122	0.004
	Negative Affect	19.806	1	1.050	0.306	0.002

Appendix E. Study 1a-b Exploratory Loss Comparisons

Table E1. Conditions Two and Three Loss Paired-samples *t*-tests in Sample 1a

Comparison	*n*	Mean Difference	*SD*	Standard Error of the Mean	*t*	95% CI	*p*-value
Vegan vs. Animal-based	131	0.531	1.030	0.090	5.905	[0.353, 0.709]	<0.001
Plant-based vs. Animal-based	139	0.657	0.955	0.081	8.111	[0.497, 0.817]	<0.001

Appendix F. Study 2 Stimuli

Figure F1. Stop Sign for Greek Yogurt Condition

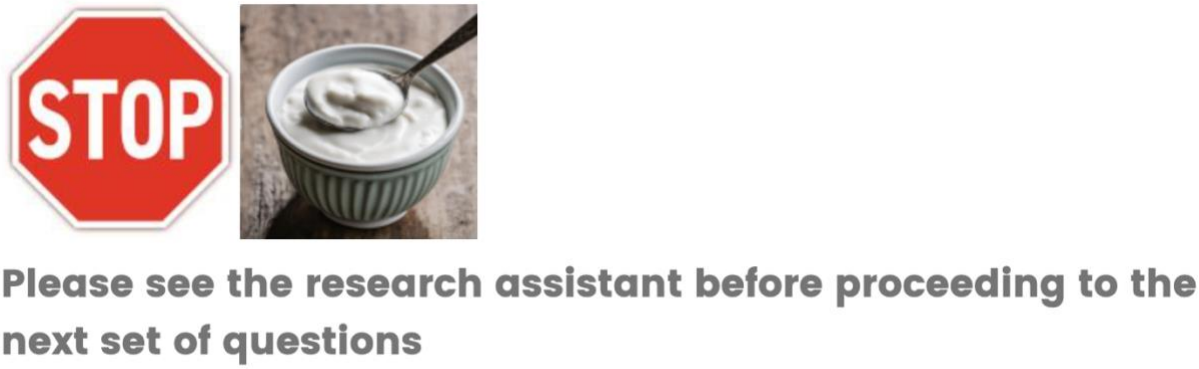


Figure F2. Stop Sign for Ice Cream Condition

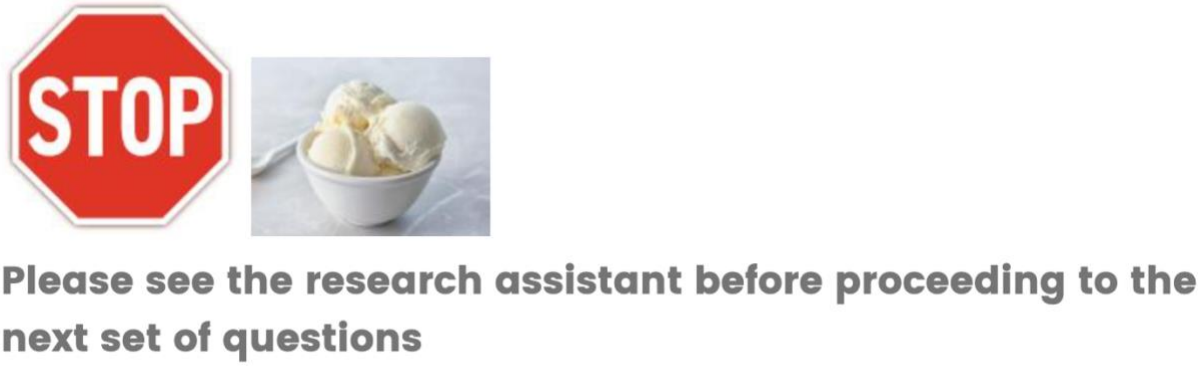


Figure F3. Greek Yogurt Options

Figure F4. Ice Cream Options

Appendix G. Study 2 Additional Measures

Appearance. *Pre-taste.* To measure pre-taste appearance of the dairy, vegan, and plant-based versions of Greek yogurt or ice cream, participants responded to, "I expect [dairy/vegan/plant-based] [Greek yogurt/ice cream] to look appetizing" on a five-point scale ranging from 1 = *fully disagree*, to 5 = *fully agree*.

Post-taste. The same item was used with slightly different wording to measure appearance of the participant's chosen product following consumption. The item read, "The [dairy/vegan/plant-based] [Greek yogurt/ice cream] looked appetizing."

Appendix H. Study 2 Models with Covariates

The covariates gender, age, income, education, political beliefs, environmental identity, origin, and race (Black or not Black) were all tested on the outcome variables for all models except the amount eaten models. The only covariates that were significant ($p < 0.05$) in any of the models were gender and political beliefs. These two covariates were added into each model.

Table H1. Logistic Regression Model Testing H2.1 With Covariates

Variable	*β*	Standard Error	Wald Chi Square	*df*	*p*-value	Odds Ratio
Health Difference	-0.694	0.281	6.084	1	0.014	0.500
Gender	-1.422	0.416	11.673	1	<0.001	0.241
Political Beliefs	-0.355	0.154	5.289	1	0.021	0.701
Constant	4.361	1.100	15.723	1	<0.001	78.323

Table H2. Moderation Analysis Testing H2.2 With Covariates

Variable	β	Standard Error	*t*	*p*-value	95% CI
(Constant)	0.654	0.570	1.149	0.253	[-0.472, 1.781]
Post-Taste Health	0.674	0.145	4.643	<0.001	[0.387, 0.960]
Post-Taste Taste	0.786	0.291	2.699	0.008	[0.210, 1.362]

Post-Taste Health*Taste	-0.142	0.079	-1.807	0.073	[-0.297, 0.013]
Gender	0.026	0.105	0.245	0.807	[-0.183, 0.234]
Political Beliefs	-0.009	0.038	-0.246	0.806	[-0.085, 0.066]
$F(5, 139)$		15.513		<0.001	
R^2		**0.343**			

Table H3. MANCOVA Within-Subjects Contrasts Table Comparing Health and Sustainability Ratings in Greek Yogurt Condition

Covariate	Dependent Variable	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Gender*label	Health	2.138	1	3.385	0.068	0.023
	Sustainability	2.914	1	3.135	0.079	0.022
Political Beliefs*label	Health	0.260	1	0.411	0.522	0.003
	Sustainability	0.009	1	3.888	0.051	0.027

Table H4. MANCOVA Within-Subjects Contrasts Table Comparing Health and Sustainability Ratings in Ice Cream Condition

Covariate	Dependent Variable	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Gender*label	Health	1.986	1	2.441	0.120	0.016
	Sustainability	0.210	1	0.152	0.697	0.001
Political Beliefs*label	Health	6.415	1	7.883	0.006	0.051
	Sustainability	16.816	1	12.184	<0.001	0.076

Appendix I. Study 3a-b Additional Measures and Analyses

Anthropomorphism. To measure anthropomorphism in Study 3a, participants responded to a five-item scale developed by Jiang and colleagues (2024). For each animal, participants read "To what extent does a/an [animal]..." and responded to, "Have intentions?," Experience emotion?," "Have free will?," "Have consciousness?," and "Have a mind of its own?" These items were rated on a seven-point scale ranging from -3 = *not at all*, to +3 = *very much*. For each animal, the mean of these items was taken to form a scale score ($0.91 \leq \alpha \leq 0.96$).

Empathy. To measure empathy in Study 3a, participants answered three items from a short-form animal empathy scale developed by Okutan (2023). For each animal, participants read, "Please respond to the following statements with your level of agreement" and responded to, "It would make me sad to see a/an [animal] on its own in a small enclosure," "I would get very angry if I saw a/an [animal] being mistreated," and "Seeing a/an [animal] in pain would upset me." They responded on an eleven-point scale of -5 = *strongly disagree*, to +5 = *strongly agree*. For each animal, the mean of these items was taken to form a scale score ($0.91 \leq \alpha \leq 0.94$).

Meat-Eating Behavior. To measure consumption behavior in Study 3a, participants read, "Please view the list of animals below, and sort each of them into the boxes "would eat" and "would not eat" based on how morally comfortable you are eating

them. Do not take taste preferences into account. Once you have sorted them into the two boxes, rank the animals that you placed in the "would eat" category based on your estimate of how much of each animal you eat annually, by volume. The animal you eat the most amount of should go at the top of the box, and the animal you eat the least amount of should go at the bottom of the box." They then dragged the name of each animal to one of the boxes and ranked them.

3b Manipulation Checks. To measure anthropomorphism as a manipulation check for the anthropomorphism messaging condition, participants responded to the same scale used in Study 3a, but only for their assigned animal. For each animal, the mean of the five items was taken to form a scale score (0.90 [salmon] $\leq \alpha \leq$ 0.93 [oyster]).

To measure collaborative perceptions as a manipulation check for the collaboration messaging condition, participants read, "Please respond to the following statements with your level of agreement," and rated three items on a scale of -3 = *strongly disagree*, to +3 = *strongly agree*. The items were, "Humans and [assigned animal]s rely on each other to take care of the waterways," "Both humans and [assigned animal]s play important roles in keeping the aquatic environment clean," and "Humans and [assigned animal]s work together to protect future generations of many species." For each animal, the mean of these items was taken to form a scale score (0.89 [shrimp] $\leq \alpha \leq$ 0.92 [salmon]).

Pre-registered Hypothesis in Study 3b, not Reported in Main Text

Empathy will mediate the relationship between animal type and social closeness regardless of messaging condition.

Table I.1 PROCESS Output Testing Empathy as a Mediator Between Animal Type and Social Closeness

Variable	β	Standard Error	*t*	*p*-value	95% CI
(Constant)	2.256	0.210	10.739	<0.001	[1.844, 2.669]
Animal Condition	-0.097	0.075	-1.304	0.192	[-0.243, 0.049]
Empathy	0.445	0.021	21.576	<0.001	[0.404, 0.485]
$F(2, 1553)$		232.754		<0.001	
R^2		**0.231**			

Appendix J. Study 3a Covariate Models

The covariates of gender, age, income, education, political beliefs, environmental identity, origin, and race (Black or not Black) were all tested on the outcome variables for each hypothesis. The only covariates that were significant ($p < 0.05$) in any of the models were environmental identity, gender, race (Black or not Black), and political beliefs. These four covariates were added into the full models for each MANOVA that contained all eight animals.

Table J1. MANCOVA Within-Subjects Contrasts Table Comparing Social Closeness by Animal

Covariate	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Environmental Identity*animal	7.860	1	2.089	0.150	0.008
Gender*animal	19.689	1	5.232	0.023	0.019
Black*animal	28.495	1	7.572	0.006	0.028
Political Beliefs*animal	0.508	1	0.135	0.714	0.01

Table J2. MANCOVA Within-Subjects Contrasts Table Comparing Health Ratings by Animal

Covariate	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Environmental Identity*animal	4.867	1	2.429	0.120	0.009

Gender*animal	2.179	1	1.087	0.298	0.004
Black*animal	0.068	1	0.034	0.854	0.000
Political Beliefs*animal	32.050	1	15.995	<0.001	0.057

Table J3. MANCOVA Within-Subjects Contrasts Table Comparing Sustainability Ratings by Animal

Covariate	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Environmental Identity*animal	2.723	1	1.507	0.221	0.006
Gender*animal	0.907	1	0.502	0.479	0.002
Black*animal	0.624	1	0.345	0.557	0.001
Political Beliefs*animal	28.433	1	15.732	<0.001	0.056

Table J4. MANCOVA Within-Subjects Contrasts Table Comparing Moral Permissibility Ratings by Animal

Covariate	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Environmental Identity*animal	1.801	1	1.651	0.200	0.006
Gender*animal	0.530	1	0.486	0.486	0.002
Black*animal	2.410	1	2.210	0.138	0.008
Political Beliefs*animal	2.564	1	2.351	0.126	0.009

Appendix K. Study 3b Messaging Passages for Collaborative and Anthropomorphism Conditions for Each Animal

Salmon Collaborative

"Consider a salmon in the wild. You and the salmon share a crucial goal: maintaining healthy waterways and preserving aquatic biodiversity, which are critical for both your species' survival. The salmon contributes to this goal by bringing essential nutrients to freshwater from the ocean, fertilizing the entire river system, and nourishing plants and other smaller species. You contribute to this goal by supporting conservation efforts, keeping litter out of waterways, and making sustainable choices when you shop. This collaboration between you and the salmon demonstrates a mutual commitment to aquatic stewardship. By working together, both of your species enhance the health of our waterways and ensure the wellbeing of future generations—both human and aquatic."

Salmon Anthropomorphism

"Similar to many people, Emma the salmon has a life goal that is very important to her: to ensure the well-being of her community, which she holds dear. As an individual, Emma has her own ideas about how to use her skills to reach this goal. Some days, she decides to spend time cleaning the waterways, whereas on other days, she chooses to help out her neighbors by tending to plants, or bravely gathering essential nutrients from afar and bringing them back to her community. Day after day, Emma

makes her own decisions, striving to make each day a little better than the day before. Like many salmon, Emma cares deeply about her beloved community, and her goodwill and kindliness propel her efforts to care for it."

Shrimp Collaborative

"Consider a shrimp in the wild. You and the shrimp share a crucial goal: maintaining healthy waterways and preserving aquatic biodiversity, which are critical for both your species' survival. The shrimp contributes to this goal by recycling nutrients, cleaning coral reef systems, and removing parasites from nearby fish. You contribute to this goal by supporting conservation efforts, keeping litter out of waterways, and making sustainable choices when you shop. This collaboration between you and the shrimp demonstrates a mutual commitment to aquatic stewardship. By working together, both of your species enhance the health of our waterways and ensure the wellbeing of future generations—both human and aquatic."

Shrimp Anthropomorphism

"Similar to many people, Emma the shrimp has a life goal that is very important to her: to ensure the well-being of her community, which she holds dear. As an individual, Emma has her own ideas about how to use her skills to reach this goal. Some days, she decides to spend time removing debris from the coral reef, whereas on other days, she chooses to help out her neighbors by recycling nutrients or bravely removing parasites from other species. Generally, she strives to keep the delicate balance of aquatic life in check by creating a clean and healthy environment for everyone. Day after day, Emma makes her own decisions, striving to make each day a little better than the day

before. Like many shrimp, Emma cares deeply about her beloved community, and her goodwill and kindliness propel her efforts to care for it."

Appendix L. Study 3b Covariate Models

The covariates of gender, age, income, education, political beliefs, environmental identity, origin, and race (Black or not Black) were all tested on the outcome variables for each hypothesis. The covariates that were significant ($p < 0.05$) in any of the models were environmental identity, gender, race (Black or not Black), age, education, and income. These six covariates were added into the full models for each ANOVA and linear regression model.

Table L1. ANCOVA Between-Subjects Effects Table Comparing Social Closeness Ratings

Source	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Intercept	158.769	1	31.259	<0.001	0.021
Animal Condition	59.569	2	5.864	0.003	0.008
Message Condition	2236.332	2	220.150	<0.001	0.231
Animal*Message	22.957	4	1.130	0.341	0.003
Environmental Identity	882.846	1	173.819	<0.001	0.106
Gender	50.914	1	10.024	0.002	0.007
Black	34.097	1	6.800	0.009	0.005
Age	13.412	1	2.641	0.104	0.002
Education	0.124	1	0.024	0.876	0.000
Income	34.539	1	6.800	0.009	0.005

Table L2. ANCOVA Between-Subjects Effects Table Comparing Social Closeness Ratings by Messaging Condition in Oyster Group

Source	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Intercept	24.183	1	4.632	0.032	0.010
Message Condition	705.022	2	67.514	<0.001	0.224
Environmental Identity	301.231	1	57.693	<0.001	0.110
Gender	31.662	1	6.064	0.014	0.013
Black	20.872	1	3.998	0.046	0.008
Age	21.476	1	4.113	0.043	0.009
Education	7.630	1	1.461	0.227	0.003
Income	1.824	1	0.349	0.555	0.001

Table L3. ANCOVA Between-Subjects Effects Table Comparing Social Closeness Ratings by Messaging Condition in Salmon Group

Source	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Intercept	52.521	1	11.650	<0.001	0.023
Message Condition	579.998	2	64.328	<0.001	0.208
Environmental Identity	443.100	1	98.289	<0.001	0.167
Gender	3.771	1	0.836	0.361	0.002
Black	9.522	1	2.112	0.147	0.004
Age	0.083	1	0.018	0.892	0.000
Education	3.490	1	0.774	0.379	0.002
Income	9.767	1	2.167	0.142	0.004

Table L4. ANCOVA Between-Subjects Effects Table Comparing Social Closeness Ratings by Messaging Condition in Shrimp Group

Source	Type III Sum of Squares	*df*	*F*	*p*-value	ηp2
Intercept	107.469	1	19.734	<0.001	0.038
Message Condition	947.571	2	86.998	<0.001	0.260
Environmental Identity	165.967	1	30.475	<0.001	0.058
Gender	28.742	1	5.278	0.022	0.011
Black	2.409	1	0.442	0.506	0.001
Age	11.342	1	2.083	0.150	0.004
Education	0.001	1	0.000	0.992	0.000
Income	33.054	1	6.070	0.014	0.012

Table L5. Social Closeness Regression Model with Covariates

Coefficient	β	Standard Error	Standardized β	*t*	*p*-value
(Constant)	0.845	0.360	-	2.349	0.019
Empathy	0.402	0.023	0.432	17.619	<0.001
Environmental Identity	0.358	0.053	0.163	6.767	<0.001
Gender	-0.131	0.112	-0.027	-1.176	0.240
Black	0.692	0.179	0.088	3.855	<0.001
Age	-0.002	0.002	-0.027	-1.176	0.225
Education	0.012	0.050	0.006	0.247	0.805
Income	-0.016	0.019	-0.020	-0.822	0.411
$F(7)$			73.645		<0.001
R^2			**0.260**		

Table L6. Salmon Social Closeness Regression Model with Covariates

Coefficient	β	Standard Error	Standardized β	*t*	*p*-value
(Constant)	6.293	0.455	-	13.828	<0.001
Social Closeness	-0.050	0.032	-0.077	-1.591	<0.112
Environmental Identity	-0.070	0.066	-0.052	-1.059	0.290
Gender	-0.225	0.133	-0.076	-1.689	0.092
Black	0.215	0.218	0.044	0.984	0.325
Age	0.000	0.002	-0.007	-0.159	0.874
Education	0.137	0.061	0.108	2.261	0.024
Income	-0.020	0.023	-0.041	-0.870	0.385
$F(7)$		1.997			0.054
R^2		**0.014**			

Table L7. Shrimp Social Closeness Regression Model with Covariates

Coefficient	β	Standard Error	Standardized β	*t*	*p*-value
(Constant)	6.815	0.504	-	13.529	<0.001
Social Closeness	-0.064	0.032	-0.090	-1.987	0.047
Environmental Identity	-0.128	0.072	-0.081	-1.767	0.078
Gender	-0.378	0.167	-0.101	-2.271	0.024
Black	0.043	0.257	0.008	0.169	0.866
Age	0.001	0.002	0.028	0.621	0.535
Education	-0.055	0.071	-0.038	-0.780	0.436
Income	0.058	0.028	0.102	2.104	0.036
$F(7)$		2.842			0.006
R^2		**0.025**			

Appendix M. Study 3b Exploratory Multiple Linear Regression Models in Each Animal Condition Testing Empathy and Social Closeness as Predictors for Willingness to Consume the Animal

Table M1. Willingness to Consume Oyster Regression Model

Variable	β	Standard Error	Standardized β	*t*	*p*-value
(Constant)	4.919	0.239	-	20.613	<0.001
Social closeness	0.134	0.040	0.164	3.328	<0.001
Empathy	-0.196	0.035	-0.268	-5.425	<0.001
$F(2)$			15.030		<0.001
R^2			**0.056**		

Table M2. Willingness to Consume Salmon Regression Model

Variable	β	Standard Error	Standardized β	*t*	*p*-value
(Constant)	6.760	0.241	-	28.053	<0.001
Social closeness	-0.029	0.031	-0.045	-0.939	0.348
Empathy	-0.104	0.031	-0.160	-3.324	<0.001
$F(2)$			9.223		<0.001
R^2			**0.034**		

Table M2. Willingness to Consume Shrimp Regression Model

Variable	β	Standard Error	Standardized β	*t*	*p*-value
(Constant)	6.375	0.222	-	28.701	<0.001
Social closeness	-0.044	0.035	-0.062	-1.253	0.210
Empathy	-0.097	0.033	-0.144	-2.906	0.004
$F(2)$			8.901		<0.001
R^2			**0.033**		

Appendix N. Study 3b Exploratory Regression Models Testing Health, Sustainability, and Moral Perceptions as Drivers for Willingness to Consume for Each Animal Condition

Table N1. Willingness to Consume Oyster Regression Model

Variable	β	Standard Error	Standardized β	*t*	*p*-value
(Constant)	-1.136	0.361	-	-3.151	0.002
Healthy	0.799	0.073	0.477	10.990	<0.001
Sustainable	0.148	0.076	0.092	1.940	0.053
Morally Permissible	0.175	0.075	0.108	2.350	0.019
$F(3)$		92.956			<0.001
R^2		**0.355**			

Table N2. Willingness to Consume Salmon Regression Model

Variable	β	Standard Error	Standardized β	*t*	*p*-value
(Constant)	0.468	0.445	-	1.051	0.294
Healthy	0.539	0.084	0.299	6.430	<0.001
Sustainable	0.085	0.059	0.068	1.423	0.155
Morally Permissible	0.274	0.071	0.191	3.861	<0.001
$F(3)$		50.026			<0.001
R^2		**0.223**			

Table N3. Willingness to Consume Shrimp Regression Model

Variable	β	Standard Error	Standardized β	*t*	*p*-value
(Constant)	0.455	0.357	-	1.273	0.204
Healthy	0.570	0.066	0.386	8.597	<0.001
Sustainable	0.079	0.067	0.055	1.166	0.244
Morally Permissible	0.308	0.064	0.210	4.822	<0.001
$F(3)$		72.748			<0.001
R^2		**0.298**			

Appendix O. Study 3b Exploratory *t*-test Comparing Empathy Between Experimental Messaging Conditions

Table O1. Independent Samples *t*-test Comparing Empathy Between Experimental Messaging Conditions

Comparison	*n*	Mean Difference	*t*	Standard Error Difference	95% CI	p-value
Collab vs. Anthro	C = 506 A = 517	0.552	3.168	0.174	[0.210, 0.893]	0.002