

Danger Ahead! How Canadians Respond to Information About the Risks of Eating Meat

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Previous research has demonstrated that animal-based diets are harmful to planetary and human health, accounting for a significant portion of global greenhouse gas emissions and increasing the risk of non-communicable diseases. In contrast, vegan and vegetarian diets have much lower environmental impacts and are associated with reduced risk of many illnesses, offering compelling opportunities to mitigate global warming and lower nutrition-related deaths worldwide. However, effectively communicating the risks of meat-based diets has proven difficult, as previous research has found that when engaging with meat-related risk communication, individuals exhibit selective exposure, the tendency to prefer attitude-confirming over attitude-challenging information. Literature has suggested that this selective exposure bias may be mitigated by information utility, the degree to which material can benefit future decision-making. Therefore, this research examines the relationship between dietary preferences and selective exposure for Canadian omnivore participants using information utility as a moderator. Additionally, this research identifies the level of knowledge consumers have about the environmental impact of meat production and how this level of knowledge may influence and be influenced by the selective exposure bias. The study recruited a sample of 361 Canadian participants who completed an online baseline survey, an experiment, and a post-experiment survey. The baseline survey results revealed that the majority of participants had a poor understanding of the relationship between meat and the environment. The experiment results demonstrated that although most participants engaged in the selective exposure bias, information utility influenced engagement with meat-related risk information for a small number of participants. The post-experiment survey results found that health risk messages framed using information utility influenced dietary decisions and decreased positive attitudes toward meat consumption. Overall, the findings have implications for persons interested in strategies for communicating sustainable diets, including practitioners, not-for-profit organizations, policymakers, the media, and academics.

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Chapter 1: Introduction

1.1 Background & Research Problem

1.1.1 Meat Production & Consumption Risks

According to the United Nations Intergovernmental Panel on Climate Change (IPCC), the global community has until 2030 to stop the rapid advancement of climate change and avoid increased threats of extreme heat, drought, flooding, and biodiversity loss (IPCC, 2018). If Earth's temperatures rise by more than 1.5°C above pre-industrial levels, billions of people will be exposed to risks related to health, safety, employment, food security, and water supply (IPCC, 2018; 2022a). However, if anthropogenic warming continues at its current rate, 1.5°C will likely be reached before 2030 (IPCC, 2022b). Food systems account for approximately 34% of the world's greenhouse gas (GHG) emissions (Crippa et al., 2021), a significant portion of which is due specifically to animal agriculture (Gerber, 2013; Romanello et al., 2022; Xu et al., 2021). Current levels of GHG emissions from the food sector alone make limiting warming to 1.5°C impossible, even if all other fossil fuel emissions are eliminated (Clark et al., 2020; Ivanovich et al., 2023). Due predominantly to land use and livestock emissions, meat-based meals have a 14 times higher environmental impact than vegan meals, while vegetarian meals have a three times higher environmental impact than vegan meals (Takacs et al., 2022). Accordingly, decreasing meat-based diets worldwide provides a compelling opportunity to counteract global warming.

In addition to its negative environmental impact, excessive consumption of meat is one of the major risk factors for non-communicable diseases (NCDs), which are the leading cause of death globally (WHO, 2023). In particular, consumption of red and processed meat is associated with an increased risk of cardiovascular disease (Chen et al., 2013; Cui et al., 2019; Papier et al., 2021) and diabetes (Du et al., 2020; Feskens et al., 2013; Papier et al., 2021). Furthermore, red meat has been deemed “probably

carcinogenic to humans,” while processed meat has been confirmed as “carcinogenic to humans” (IARC, 2015). Due to these health risks, many dietary guidelines recommend a plant-forward diet and limiting consumption of red and processed meat (European Commission, 2024; Health Canada, 2019; USDA & HHS, 2020).

1.1.2 Dietary Trends

According to data from the Food and Agriculture Organization (FAO) of the United Nations, over the past 50 years, global meat production has more than tripled (Ritchie et al., 2023). This upsurge in consumption is due to wealth and the fact that meat consumption tends to gain popularity as countries become more prosperous (Ritchie et al., 2023). As such, meat-based diets are most prominent in high-income countries, including Australia, the United States, and Canada (Ritchie et al., 2023). In Canada, the average person consumes almost 90 kg of meat per year compared to a world average of 43 kg (Ritchie et al., 2023). Approximately 40% of Canadians eat meat once or twice a week, while 48% eat meat daily (Charlebois et al., 2018). Additionally, the country’s protein intake from animal-source foods is more than double that contributed by plant-based foods (Auclair & Burgos, 2021a; Fabek et al., 2021). Canada’s largest source (22%) of dietary protein comes from red and processed meat, while among the smallest sources are nuts, seeds, and legumes (5%) (Auclair & Burgos, 2021a). These consumption habits call for effective intervention measures to foster sustainable diets among consumers in Canada and other high-income countries.

1.1.3 Consumer Knowledge About Meat & Climate Change

Though research has explored drivers of meat consumption and barriers to its reduction, there is a need for further insights into measures that initiate behaviour change (Grundy et al., 2022; Harguess et al., 2020; Kwasny et al., 2022). One barrier to sustainable diets may be a lack of knowledge about the environmental impact of meat consumption. Research on awareness of the environmental toll of meat has

been explored in Finland (Pohjolainen et al., 2016), Switzerland (Hartmann et al., 2021), Germany (Hartmann et al., 2021), the Netherlands (de Boer et al., 2016), and the United States (de Boer et al., 2016; Slotnick et al., 2022), finding that, in general, consumers tend to underestimate or ignore the negative impact that meat has on the environment. Individuals in high-income countries also perceive reducing plastic use, saving energy at home, and driving less as more effective at combatting climate change than plant-based diets (Campbell-Arvai, 2015; Slotnick et al., 2022). However, following a vegan diet is four times more effective than recycling and eight times more effective than changing household lightbulbs (Wynes & Nicholas, 2017). Furthermore, switching from plastic to reusable shopping bags is less than 1% as effective as a year without eating meat (Wynes & Nicholas, 2017). These findings indicate that, in general, consumers do not have a good understanding of the relationship between meat and climate change and are unaware of the positive impact a meat-less diet can have on the environment. Few studies have explored food-related environmental knowledge in Canada. However, investigating Canada's awareness of the impact of meat on the planet is important as the agriculture sector significantly contributes to the economy (AAFC, 2021).

1.1.4 Promoting Sustainable Diets Through Communication

While the literature has investigated interventions related to information and messaging, prior beliefs often hinder the effectiveness of these education strategies on consumption intentions (Kwasny et al., 2022). Attitudes, for instance, are a strong predictor of an individual's intentions to follow a plant-based diet (Çoker & Van Der Linden, 2022; Wolstenholme et al., 2021; Wyker & Davison, 2010). Previous research has found that when engaging with meat-related risk communication, individuals exhibit selective exposure, the tendency to prefer attitude-confirming over attitude-challenging information (Festinger, 1957; Gaspar et al., 2016; Lueders et al., 2022). The selective exposure bias is a defensive response to being confronted by the negative impacts of one's actions (Festinger, 1957). For example, to avoid the

discomfort caused when forced to think about the drawbacks of eating meat, an omnivorous eater may avoid information that challenges their dietary preferences and instead engage with information that confirms their dietary preferences (Festinger, 1957; Gaspar et al., 2016; Lueders et al., 2022). This is problematic since meat-related risk communication has the potential to influence attitudes and behaviour, but only if it reaches and is processed by its target audience (Gaspar et al., 2016; Mrkva et al., 2021). Furthermore, biased information-seeking can facilitate attitude extremity and social fragmentation, strengthening individual attitudes toward meat and increasing the spread of misinformation (Cinelli et al., 2021; Del Vicario et al., 2016; Lueders et al., 2022; Stroud, 2008). Therefore, more research is needed on how the promotion of vegan and vegetarian diets should be communicated to reach audiences with solid attachments to meat (Lueders et al., 2022; Vainio et al., 2018). Relatedly, information utility has been suggested as a moderator of selective exposure effects (D'Alessio, 2015; Kim, 2015; Knobloch-Westerwick & Kleinman, 2012; Wagner, 2017). Information utility refers to the degree to which material can benefit future decision-making.

While several studies have explored selective exposure (Parmelee & Roman, 2020; Schmuck et al., 2020; Smith et al., 2008), few have investigated the bias in relation to meat consumption, indicating a need for further research on selective exposure within the field of risk communication. Additionally, the moderating effect of information utility has yet to be applied to informational approaches for promoting plant-forward diets, providing a gap for this study to investigate.

1.2 Statement of Purpose

The purpose of this study is to examine the relationship between meat-related attitudes, attachment, and beliefs (independent variables) and selective exposure (dependent variable) for Canadian omnivore participants in an online information environment using information utility as a moderator. *Selective*

exposure is defined as an individual's tendency to prefer attitude-confirming over attitude-challenging information (Festinger, 1957). *Meat-related attitudes* refer to how a person feels about eating meat. *Meat attachment* is defined as an individual's positive bond toward meat consumption (Graça et al., 2015). *Meat-related beliefs* here refer to how informed a person is about the risks of meat consumption and production. *Information utility* is defined as the degree to which material can benefit future decision-making.

This research aims to understand selective exposure as a driver of positive attitudes and bonds toward meat consumption. Additionally, this study seeks to identify the level of knowledge consumers have about the environmental impact of meat production and how this level of knowledge may influence and be influenced by the selective exposure bias. Furthermore, the research strives to determine whether information utility framing can override the selective exposure effect by comparing decision-making under two conditions: with messages applying information utility and without messages applying information utility.

1.3 Theoretical Framework

This study uses the selective exposure theory to explore the research questions presented below. The theory of selective exposure arose from the theory of cognitive dissonance developed by Leon Festinger in the 1950s. The theory of cognitive dissonance was originally developed to explain why some individuals resist changing their beliefs despite contradictory evidence (Festinger, 1957). Festinger (1957) proposed that once people have established attitudes or made decisions, they are motivated to maintain those attitudes and decisions. Cognitive dissonance will motivate a person to reduce psychological discomfort by actively avoiding situations and information which may worsen the experience (Festinger, 1957). In other words, a person with conflicting beliefs, values, or attitudes will experience uncomfortable

feelings such as stress, anxiety, or guilt. To avoid this distress, one might engage in selective exposure, the tendency to engage with attitude-confirming over attitude-challenging information (Festinger, 1957).

In applying the theory of selective exposure to this study, individuals' meat-related attitudes, attachments, and beliefs (independent variables) are expected to influence their self-selected exposure to information (dependent variable). If an omnivore holds strong positive attitudes toward eating meat, they will avoid exposure to information that challenges these attitudes and selectively expose themselves to information that confirms these attitudes. For instance, cognitive dissonance might occur when a meat eater encounters information about animal agriculture's negative environmental impact. Confronting this information may result in stress, guilt, or anxiety. To evade these negative feelings, the individual will expose themselves to information that tells them their dietary preferences are healthy or suitable while avoiding information that tells them their dietary preferences are harmful or wrong. Furthermore, as demonstrated in previous research (D'Alessio, 2015; Kim, 2015; Knobloch-Westerwick & Kleinman, 2012; Wagner, 2017), information utility is expected to moderate the selective exposure effect by overriding cognitive dissonance. If information is assumed to benefit individuals, they will be less concerned with whether it is attitude-consistent and more willing to engage with attitude-discrepant messages (Knobloch-Westerwick & Kleinman, 2012).

1.4 Research Questions

The following research questions were developed to address the research problem and fulfill the study's purpose:

1. What level of knowledge do consumers in Canada have about the impacts of meat on the environment?

2. How do meat-related attitudes, attachments, and beliefs influence selective exposure to meat-related risk information for consumers in Canada?
3. How does information utility influence patterns of selective exposure to meat-related risk information for consumers in Canada?
4. Can information utility framing decrease positive attitudes toward meat consumption among Canadian consumers?

1.5 Contribution of Research

Effectively communicating the risks of meat consumption and facilitating sustainable behavioural change among meat eaters is often a complex and challenging task. Many consumers lack knowledge about the negative environmental impacts of meat consumption and are unwilling to listen to communications that encourage plant-forward diets. Accordingly, further research is needed on:

1. Food-related environmental knowledge in Canada,
2. Meat-less diet communication that targets individuals who tend to avoid information related to vegetarianism or veganism,
3. Effective strategies for decreasing positive attitudes toward meat consumption, and
4. Information utility as a moderator for selective exposure to meat-related risk information.

Investigating these research gaps is important in improving communication and the promotion of sustainable diets. Additionally, a better understanding of how sustainable diet information can be communicated to counteract psychological defensiveness may lead to effective interventions for reducing meat consumption (Lueders et al., 2022). Therefore, the study addresses these literature gaps through the research questions listed earlier in this chapter. This research contributes to the literature on strategies for encouraging consumer adoption of meat-less diets, dietary selective exposure, and risk communication.

Insights from this study can be used by practitioners to better tailor sustainable diet information to consumers attached to eating meat and/or to improve the competitiveness of messaging under high choice conditions, such as in an online environment. Insights from this research can also be used by policymakers to frame communication that dissuades heavy meat consumption. Overall, it is hoped that the results of this study will be beneficial for combatting climate change through enhanced vegetarian and vegan diet communication and promotion.

1.6 Thesis Structure

This thesis is divided into five sections, which include a review of the research problem and study purpose (Chapter One), an overview of the current literature surrounding omnivore diets and promoting plant-forward eating (Chapter Two), details of the study's methodology (Chapter Three), a presentation of the data analysis (Chapter Four), and a discussion of the findings within the context of sustainable diet communication (Chapter Five). Specifically, Chapter Two provides an overview of the history of meat consumption, the risks of predominately meat-based diets, current dietary trends, consumer knowledge about meat and climate change, plant-based diet drivers and barriers, and promoting sustainable diets through communication. By reviewing and synthesizing existing literature on the adoption of meat-free diets, this section establishes the literature gap, demonstrating the need for effective communication strategies that promote plant-forward eating. Chapter Three details the study's methodology, covering the research approach and design, participant selection, data collection, data analysis, and validity and reliability. This section also discusses the methodological approaches used in similar work, which were built upon to develop the current study's research methods and design. Chapter Four presents the study's data analysis and its results. Lastly, Chapter Five discusses the study's findings and how they fit within the current literature on meat-less diets, dietary selective exposure, and environmental risk

communication. This section also suggests implications for practice and recommendations for future research.

Chapter 2: Literature Review

2.1 Introduction to Literature Review

The following literature review will provide an overview of the history of meat consumption, the risks of predominately meat-based diets, current dietary trends, consumer knowledge about meat and climate change, plant-based diet drivers and barriers, and promoting sustainable diets through communication. By reviewing and synthesizing existing literature on the adoption of meat-free diets, this section will establish a literature gap, demonstrating the need for effective communication strategies that promote plant-forward eating.

This review uses “plant-based” and “vegan” to refer to diets that avoid all animal products. The terms “vegetarian” and “meat abstainer” describe individuals whose diets do not include meat products but may include other animal products such as dairy, eggs, and fish. “Plant-forward diets” refer to those low in animal products and high in vegan foods such as fruits, vegetables, nuts, and seeds. Lastly, “protein alternatives” describe foods made without animal products that can replace traditional protein sources.

2.2 The History of Meat Consumption

2.2.1 The Pleistocene Era

The earliest humans lived during the Pleistocene era, which began about 2.6 million years ago and ended 12,000 years ago (Groeneveld, 2016). Across Europe, Africa, and Asia, the human diet was determined by the availability of plants, animals, and freshwater in their immediate vicinity, as well as the seasons and climatic conditions (Andrews & Johnson, 2020; Groeneveld, 2016; Hublin & Richards, 2009; Southgate et al., 1997). Due to the higher energy obtained from meat and fish than from wild fruits and vegetables, hunter-gatherers ate an animal-rich diet (Andrews & Johnson, 2020; Southgate et al., 1997),

with researchers estimating that between 56 and 65% of their energy was derived from animal sources (Cordain et al., 2000). Some scholars have argued that the hunting and roasting of meat were jobs performed traditionally by men (Buscemi, 2018; Fiddes, 1989), while others have challenged this belief (Haas et al., 2020). Regardless, today, meat is associated with masculinity (Rozin et al., 2012; Velzeboer et al., 2024), whether this is rooted in historical fact or has been discursively constructed and reinforced. Complementary to these associations, animals were sometimes hunted in groups, and the hunt was shared among tribe members, building stronger ties within communities (Groeneveld, 2016; Leroy & Praet, 2015). This sharing laid the foundation for meat's strong association with gatherings and festivities that have lasted into the twenty-first century (Aboelenien & Arsel, 2022).

2.2.2 The Neolithic Era

Beginning around 10,000 BCE, in the Neolithic era, early settlements were formed where crop cultivation and animal husbandry gradually replaced hunting and gathering (Britannica, 2024b). Characterized by higher yields and relative independence from nature, the Neolithic diet included a high proportion of cultivated plants, supplemented by gathered plants, with few animal products (Andrews & Johnson, 2020; Mann, 2018). At this time, farming populations ate a largely high-carbohydrate, low-protein diet, which caused malnutrition and deficiency symptoms (Cohen, 1989; Nicklisch et al., 2016; Ulijaszek, 1991). In the late stages of the Neolithic era and into the Medieval times, meat and dairy consumption became a symbol of wealth, mainly within Europe (Aboelenien & Arsel, 2022; Knipper et al., 2015; Yoder, 2012). It was during this time period that meat began to be butchered, allowing the food to be dissociated from its source (i.e. the dead animal), especially among the royals (Aboelenien & Arsel, 2022). In addition, the quantity and quality of meat one consumed became not only depended on class but on gender as well (Aboelenien & Arsel, 2022). High-quantity and good-quality cuts were reserved for the royals and men, while low-quantity and poor-quality cuts were for the masses and women (Aboelenien & Arsel, 2022).

2.2.3 The Industrial Revolution and Beyond

Starting in the 18th century, the Industrial Revolution spurred advancements in the agricultural sector, providing widespread access to meat and dissolving its association with wealth (Aboelenien & Arsel, 2022; Britannica, 2024a). In the 20th century, factory farming, combined with new marketing strategies from fast-food restaurants and supermarkets, facilitated the proliferation of meat as an everyday food for the middle class (Aboelenien & Arsel, 2022). During this time, the meatpacking industry helped eliminate the association between meat and the living animal as consumers no longer saw carcasses hanging at butcher shops and instead bought meat packaged in clean containers at grocery stores (Aboelenien & Arsel, 2022). An increase in cookbooks, television shows, and marketing campaigns further shaped how consumers thought about and interacted with meat, emphasizing abundance and convenience (Aboelenien & Arsel, 2022).

Today, technological advances in high-income societies allow for widespread access to alternative protein sources, supporting balanced vegetarian and vegan diets. However, throughout the majority of human history, meat and other animal products have been vital in maintaining the health and survival of populations. As a result, many consumers believe that meat is natural, normal, or necessary in their diet (Joy, 2010; Piazza et al., 2015; Šedová et al., 2016), making it difficult to shift normative eating habits toward more sustainable diets.

2.3 Risks Associated with Meat Production & Consumption

2.3.1 Meat Consumption & Climate Change

The world's food system is responsible for approximately one-third of global GHG emissions, with the most significant contribution coming from animal agriculture and its associated land-use activities (Crippa et al., 2021; Gerber et al., 2013; Romanello et al., 2022; Xu et al., 2021). To meet the central goal of the

Paris Agreement (i.e. to limit global warming to 2°C or less), worldwide agriculture emissions must be reduced considerably (Clark et al., 2020). Even if all other fossil fuel impacts are eliminated, emissions from the global food system alone make it impossible to limit warming to 1.5°C and challenging to realize the 2°C target (Clark et al., 2020; Ivanovich et al., 2023). Moreover, the world's population is expected to reach 9.1 billion by 2050, putting increased pressure on food production and planetary boundaries (FAO, 2019). Therefore, reducing GHG emissions from the food sector is essential for mitigating climate change.

The GHG emissions caused by animal agriculture and its associated land-use activities are driven primarily by enteric fermentation and feed production (Crippa et al., 2021; Gerber et al., 2013; Xu et al., 2021). Enteric fermentation is a natural part of the digestive process in ruminant animals (cattle, buffalo, sheep, and goats), where methane gas is produced and expelled as a by-product (Gerber et al., 2013). Additionally, feed production and pasture space require large amounts of forested areas to be cleared, reducing carbon sequestration potential and contributing to deforestation (Gerber et al., 2013). About 57% of global GHG emissions from food production come solely from animal-based foods (Poore & Nemecek, 2018; Xu et al., 2021), while 29% come from plant-based foods and 14% from other utilizations (Xu et al., 2021). Additionally, meat, aquaculture, eggs, and dairy use approximately 83% of the world's farmland while providing only 37% of protein intake and 18% of calories (Poore & Nemecek, 2018). Moving from current diets to those that exclude animal products could reduce food's land use by 76%, food's GHG emissions by 49%, acidification by 50%, eutrophication by 49%, and scarcity-weighted freshwater withdrawals by 19% for a 2010 reference year (Poore & Nemecek, 2018). Furthermore, the land no longer required for food production could remove about 8.1 billion metric tons of CO₂ from the atmosphere each year over 100 years as natural vegetation reestablishes and soil carbon re-accumulates (Poore & Nemecek, 2018).

Across the food supply chain, the agricultural or farm phase is the single biggest contributor to the environmental impacts of meals (Poore & Nemecek, 2018; Takacs et al., 2022). Other phases, such as transportation, processing, and preparation, have relatively small contributions to GHG emissions in comparison, highlighting the importance of responsible food choices (Poore & Nemecek, 2018; Takacs et al., 2022). Figure 2.1 provides a visual of GHG emissions across the food supply chain. Emission impacts may vary between regions; however, the figure below includes data from the largest meta-analysis of global food systems to date by Poor and Nemecek (2018), which examined more than 38,000 commercial farms in 119 countries.

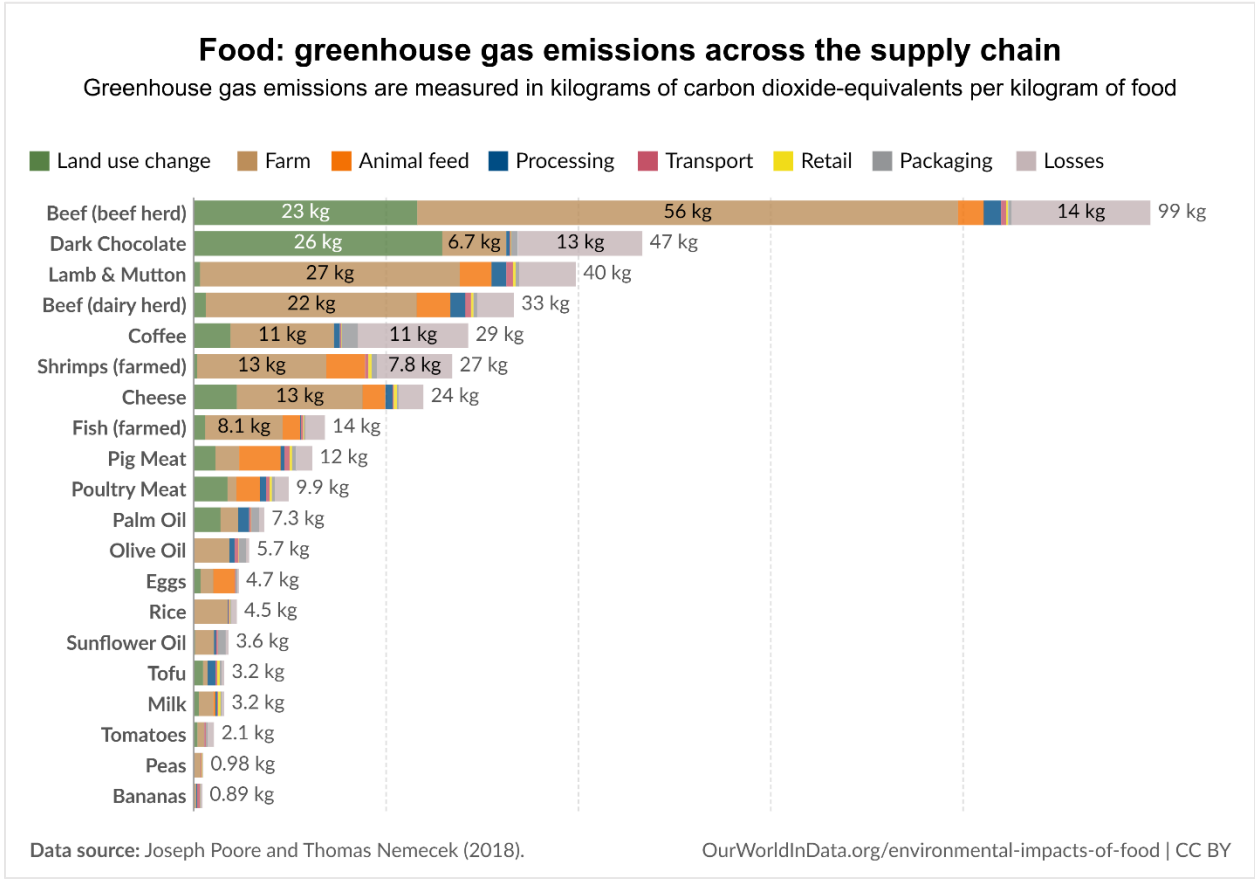


Figure 2.1: GHG emissions across the food supply chain (Poore & Nemecek, 2018; Ritchie, 2020).

Due to the negative environmental impact of animal products, the IPCC has identified eating patterns as a significant area for global warming mitigation (IPCC, 2022b). In particular, the IPCC recommends

shifting towards meat-less diets and increasing plant-based protein sources (IPCC, 2022b). On average, Takacs et al. (2022) found that meat-based meals have 14 times higher environmental impact than vegan meals (i.e., 14 times higher global warming potential, seven times higher freshwater eutrophication potential, 15 times higher terrestrial acidification potential, and 19 times higher freshwater depletion potential), while vegetarian meals have three times higher environmental impact than vegan meals (i.e., three times higher global warming potential, freshwater eutrophication potential, terrestrial acidification potential, and freshwater depletion potential). Therefore, reducing animal product consumption worldwide offers a compelling opportunity to counteract global warming and biodiversity loss.

2.3.2 Meat Consumption and Health

According to the World Health Organization (WHO, 2023), NCDs are responsible for 74% of all deaths worldwide. The most common NCD is cardiovascular disease, followed by cancers, chronic respiratory disease, and diabetes (WHO, 2023). An unhealthy diet is one of the major risk factors for NCDs (WHO, 2023). In particular, excessive consumption of red and processed meat is associated with an increased risk of cardiovascular disease (Chen et al., 2013; Cui et al., 2019; Papier et al., 2021) and diabetes (Du et al., 2020; Feskens et al., 2013; Papier et al., 2021). Additionally, the International Agency for Research on Cancer (IARC) has classified red meat as a Group 2A carcinogen, meaning that it is “probably carcinogenic to humans” (IARC, 2015). Red meat refers to unprocessed mammalian muscle meat such as beef, veal, pork, or lamb (IARC, 2018). Processed meat has been classified by the IARC as a Group 1 carcinogen, meaning that it is “carcinogenic to humans” (IARC, 2015). “Processed meat refers to meat that has been transformed through salting, curing, fermentation, smoking, or other processes to enhance flavour or improve preservation” (IARC, 2018, p. 34).

Though the mechanisms behind the relationship between meat and its associated health risks are not fully understood, some evidence points to the high levels of heme iron found in animal products, as

the element has been associated with cancer (Huang et al., 2023; IARC, 2018), cardiovascular disease (Fang et al., 2015; Feskens et al., 2013; Huang et al., 2023) and type 2 diabetes (Feskens et al., 2013; Huang et al., 2023). Grilling, barbequing, frying, and deep-frying red and processed meat have also been linked to health risks, as cooking at high temperatures produces compounds suspected of being carcinogenic (Flores et al., 2019; IARC, 2018). The association between processed meat and health risks is stronger than that of unprocessed red meat, as processed meat contains additional carcinogenic additives for preservation purposes (Chazelas et al., 2021; IARC, 2018). Moreover, processed meat is high in sodium, too much of which increases the risk of cardiovascular disease (Delgado et al., 2021; Feskens et al., 2013).

Due to these health risks, many dietary guidelines recommend a plant-forward diet and limiting consumption of red and processed meat (European Commission, 2024; Health Canada, 2019; USDA & HHS, 2020). Additionally, a 2020 umbrella review of systematic reviews and meta-analyses found that vegetarian diets are associated with reduced risk of diabetes, ischemic heart disease, and cancer (Oussalah et al.). Similarly, a 2023 literature review revealed that a vegan diet reduced the risk of cancer incidence and all-cause mortality for the general healthy population (Selinger et al., 2023).

Despite the aforementioned health risks, red meat also has a rich nutrient composition that is beneficial for providing key vitamins and minerals within the diet. Red meat is a good source of many important nutrients, including protein, iron, B12, and zinc (Libera et al., 2021; Pereira & Vicente, 2013). Additionally, the vitamins and minerals found in red meat are highly bioavailable, meaning they are easily absorbed and used by the body (Schonfeldt et al., 2016). Iron, for instance, can be found in plant-based foods but is absorbed by the body more efficiently when derived from animal sources such as red meat (Czerwonka & Tokarz, 2017). Further, vitamin B12 is generally not found in plant-based foods and must be obtained from animal products or fortified foods (Obeid et al., 2019). Lastly, red meat, along with other

animal products, is considered to be a high-quality protein as it contains all nine essential amino acids (Hoffman & Falvo, 2004). While some plant-based foods can provide all nine amino acids, most are considered incomplete proteins (Hoffman & Falvo, 2004). Therefore, while a diet high in red meat is associated with increased health risks, the food also holds a valuable nutritional profile that may benefit health when consumed in moderation.

2.4 Dietary Trends

2.4.1 Global Trends

Despite research outlining plant-based diets as a compelling solution to climate change and NCD deaths worldwide, this consumption pattern remains widely unpopular in practice (Stoll-Kleemann & Schmidt, 2017). Survey data from 28 countries, spanning North America, South America, Europe, Oceania, East Asia, South Asia, the Middle East, and Southern Africa, indicates that an omnivorous diet is the most common eating pattern globally, with 73% of respondents stating that they consume animal products regularly (Bailey, 2018). This survey data further reveals that vegetarian and vegan diets are the least common eating patterns worldwide, with 5% of respondents reporting that they avoid meat but consume other animal products and only 3% reporting that they avoid all animal products (Bailey, 2018). According to data from the FAO, high-income countries such as Australia, the United States, and Canada disproportionately contribute to livestock demand, with meat consumption nearing or exceeding 100 kg per capita compared to a world average of 43 kg (Ritchie et al., 2023). As a result of economic growth and rising incomes, global per capita meat consumption has more than quadrupled since 1961, indicating that worldwide meat production has been increasing faster than the rate of population growth (Ritchie et al., 2023). However, in high-income countries, animal protein consumption is nearing saturation levels, as health and environmental concerns are expected to limit growth in demand in the coming decades

(OECD & FAO, 2021). Due to these concerns, consumers in high-income countries will likely begin replacing red meat with poultry, increasing demand for poultry and stabilizing beef, pig meat, sheep, and fish (OECD & FAO, 2021). In Canada, this increasing demand for poultry may also be driven by price, as 2023 marked the highest level of food bank use on record, signalling food affordability concerns throughout the country (Charlebois et al., 2023). Because red meat prices tend to increase at a higher rate than poultry (Statistics Canada, 2022c), Canadians may opt for chicken over beef or pork due to financial reasons as well as health and environmental concerns. In middle-income countries, per capita availability of animal protein is projected to increase, driven by growing incomes (OECD & FAO, 2021). China and Southeast Asia are expected to account for most of this increase in meat availability, while India will account for most of this increase in dairy products (OECD & FAO, 2021). Overall, global meat consumption is expected to rise by 14% by 2030 compared to the base period average of 2018-2020 (OECD & FAO, 2021). The majority of this growth (82%) is expected to originate in middle- and low-income countries; however, a few regions will continue to dominate global livestock and fish production, namely China, India, Brazil, the United States, and the European Union (OECD & FAO, 2021). Therefore, as meat consumption remains popular worldwide, developing practical solutions that promote plant-forward diets is an essential strategy for combating climate change.

2.4.2 Trends in Canada

Research by Charlebois et al. (2018) found that approximately 89% of Canadians eat meat at least once a week, with 48% eating it daily. Moreover, according to the 2015 Canadian Community Health Survey (CCHS), almost two-thirds of Canadian adults' protein intake comes from animal products, while the remaining comes from plant-based foods (Auclair & Burgos, 2021a; Fabek et al., 2021). The survey found that the country's top sources of protein are red and processed meat, poultry and eggs, grains, and dairy (Auclair & Burgos, 2021a). Diets high in red and processed meat and dairy have a carbon footprint five-

fold that of diets low in these foods (Auclair & Burgos, 2021b; Topcu et al., 2022). Per person, average Canadian dietary GHG emissions are 4 kg CO₂-eq per day (Auclair & Burgos, 2021b). This is equivalent to the emissions caused by driving 16 km in an average gasoline-powered vehicle (EPA, 2023).

The 2015 CCHS also reported that only 2.8% of the population exclude red meat, 1.3% identify as vegetarian, and 0.3% follow a plant-based diet (Valdes et al., 2021). These consumers who limit or avoid meat consumption tend to be female, younger, and highly educated (Charlebois et al., 2018; Clark & Bogdan, 2019a; Valdes et al., 2021). Though the majority of Canadians follow an omnivorous diet, Clark and Bogdan (2019a) found that most participants in their sample (78%) had eaten protein alternatives, such as beans or tofu, within the last year. However, only a third (32%) were actively attempting to reduce their meat purchases (Clark & Bogdan, 2019a). Charlebois et al. (2018) stated that 51% of Canadians are willing to reduce their meat consumption, although this leaves 49% unsure or resistant to change. Consequently, the country's low rates of vegetarianism and veganism and its high meat consumption indicate a need to encourage plant-forward diets among consumers.

2.5 Consumer Knowledge About Meat & Climate Change

Research on consumer awareness of the environmental toll of meat has been explored in Finland (Pohjolainen et al., 2016), Switzerland (Hartmann et al., 2021), Germany (Hartmann et al., 2021), the Netherlands (de Boer et al., 2016), and the United States (de Boer et al., 2016; Slotnick et al., 2022; Truelove & Parks, 2012), finding that, in general, consumers tend to underestimate or ignore the negative impact that meat has on the environment. Individuals in high-income countries tend to perceive reducing plastic use, saving energy at home, and driving less as more effective at combatting climate change than plant-based diets (Campbell-Arvai, 2015; Slotnick et al., 2022; Wynes & Nicholas, 2017). However, research has indicated that recycling is four times less effective than following a plant-based diet while

changing household lightbulbs is eight times less effective (Wynes & Nicholas, 2017). Additionally, switching from plastic to reusable shopping bags is less than 1% as effective as a year without eating meat (Wynes & Nicholas, 2017). Furthermore, while living car-free is similar in effectiveness to eating a vegan diet, driving less may not necessarily be as impactful (Wynes & Nicholas, 2017). In summary, it is apparent that many consumers in high-income countries do not understand the benefits of reducing meat consumption compared to other environmental management strategies.

Few studies have explored food-related environmental knowledge in Canada. Wynes and Nicholas (2017) examined Canadian education and government recommendations for individual climate change mitigation strategies and found that they largely fail to mention high-impact actions such as eating a plant-based diet, having fewer children, avoiding air travel, and living car-free. Instead, high school textbooks and government documents in Canada overwhelmingly focus on moderate or low-impact mitigation actions that require minimal effort on the part of individuals, such as conserving energy, conserving water, spreading awareness, and recycling (Wynes & Nicholas, 2017). These findings indicate that Canadians may not be aware of the environmental impact of meat due to a lack of education surrounding the topic. Additionally, Impact Canada (2022) reported that recycling and reducing food waste are the two most common pro-environmental actions among Canadians while eating a plant-based diet is the least common. This study did not explicitly explore consumer knowledge of the connection between climate change and meat, raising questions about whether Canadians know about the issue. Impact Canada (2023) also demonstrated that, in general, Canadians have a poor understanding of climate science and are unaware of effective energy-saving activities. Again, this research did not investigate consumer knowledge of the environmental impact of meat, but the results highlight insufficient awareness related to climate change mitigation strategies in Canada. Lastly, Mollaei et al. (2023) explored perceptions of sustainable eating behaviours among university students in Ontario, Canada, concluding that these students generally

understood that animal-based foods have a higher environmental impact than plant-based foods. While this study indicates that Canadian university students have some understanding of the environmental impact of meat, it did not look at the extent to which the students are aware of the issue.

Investigating Canada's awareness of the impact of meat on the planet is important as the agriculture sector significantly contributes to the economy, employing 2.1 million people, providing 1 in 9 jobs, and generating 6.8% of the country's gross domestic product (AAFC, 2021). Given Canada's reliance on agriculture and animal product production, understanding consumers' knowledge in this area is essential for developing strategies that effectively promote vegetarian and vegan diets and reduce meat consumption.

2.6 Plant-Based Diet Drivers

2.6.1 Personal Motivations

The top three personal motivations for adopting a meat-free diet are health, animal welfare, and environmental issues (Ghaffari et al., 2022; Verain & Dagevos, 2022; North et al., 2021; Janssen et al., 2016). Individuals who adopt a meat-less diet for health reasons are often concerned with reducing their risk of disease and cancer (North et al., 2021). Though health is frequently cited as a primary motivation for vegetarianism and veganism, some studies suggest that it may be a supporting factor to animal or environmental motivations rather than an individual driver (Hopwood et al., 2021; Janssen et al., 2016). Individuals who adopt a meat-less diet for animal welfare reasons are concerned with minimizing factory farming, exploitation, and cruelty toward living creatures (North et al., 2021). Animal welfare-motivated vegetarians and vegans experience greater "disgust" toward meat and tend to follow their diets more strictly than either health-motivated or environmentally-motivated eaters (Becker et al., 2022; Rosenfeld, 2019). Individuals who adopt a meat-less diet for environmental reasons are often concerned with

sustainability, climate change, and global food security (North et al., 2021). This motivational factor appears to be less influential than animal welfare (Verain & Dagevos, 2022; North et al., 2021; Janssen et al., 2016) and may be explained by the observation that most people underestimate the relative impact of eating meat on global warming (Hartmann et al., 2021; Pohjolainen et al., 2016; Slotnick et al., 2022). Therefore, providing information on the environmental consequences of meat consumption could be a promising strategy for increasing individual willingness to adopt vegetarian or vegan diets in high-income countries.

2.6.2 Personality, Values, & Identity

A growing body of research has begun exploring the characteristics distinguishing meat abstainers from omnivores. One robust finding is that most vegetarians and vegans are highly educated and female (Charlebois et al., 2018; Kalte, 2021; Pfeiler & Egloff, 2018; Verain & Dagevos, 2022). This aligns with research suggesting that meat abstainers are higher in openness and agreeableness (Tan et al., 2021; Pfeiler & Egloff, 2018; Keller & Siegrist, 2015), personality traits that women tend to score higher on than men¹ (Weisberg et al., 2011). The trait of openness refers to an individual's intellectual curiosity, imagination, and preference for variety (DeYoung, 2015; Digman, 1989). Because most people in developed countries are raised as meat eaters, this may explain vegetarians' and vegans' receptiveness to new information and willingness to try new plant-based foods (Tan et al., 2021; Pfeiler & Egloff, 2018). The trait of agreeableness refers to an individual's trusting, helpfulness, and affectionate nature (Graziano & Tobin, 2009; Digman, 1989). High levels of trust may influence a person to become vegetarian or vegan through the belief that others will cooperate in this collective action, thereby increasing the perceived efficacy of the diet (Tan et al., 2021).

¹ This thesis uses the terms "men" and "women" to describe individuals who identify as either gender and not necessarily in reference to a person's biological sex. It should be noted that, to date, there has been a paucity of studies that differentiate beyond "men" and "women" in their findings.

Only one study has examined the personal values of individuals who follow a plant-based diet. Ghaffari et al. (2022) found that individuals who follow a plant-based diet tend to have strong self-transcendence and self-enhancement values. Self-transcendence values are those concerned with the welfare and benefit of others (Schwartz et al., 2012). Vegans with strong self-transcendence values care about the well-being of animals and the environment, creating a sense of responsibility to be conscious of their behaviours and decisions (Ghaffari et al., 2022). Self-enhancement values, in contrast, refer to the consideration of one's self-interests and relative achievement over others (Schwartz et al., 2012). Vegans with strong self-enhancement values see their diet as a way to maintain their health and control their life (Ghaffari et al., 2022). Ghaffari et al. (2022) suggest that plant-based products provide vegans with psychological (i.e., feeling positive and guilt-free) and functional (i.e., health and financial security) benefits that allow their actions to align with their values. The study further indicates that veganism is more of a "philosophy of life," strongly linked with personal values and desired end goals (Ghaffari et al., 2022). This research aligns with other reports that meat abstainers take pride in their diet and see it as intertwined with their identity (Davis & Papies, 2022; Rosenfeld et al., 2019; Rosenfeld et al., 2020).

2.6.3 Lifestyle & Market Segmentation

According to America's Natural Marketing Institute (NMI), the majority of today's consumers can be classified as some shade of "green," signifying their involvement in sustainable values, activities, and purchasing (NMI, n.d.; Ottman, 2011). Specifically, the NMI has identified five market segments: Lifestyles of Health and Sustainability (LOHAS), Drifters, Conventionalists, Naturalists, and Unconcerned. Based on the commonly held personality traits and values of vegetarians and vegans described above, these consumers likely belong to the LOHAS segment. LOHAS consumers are considered environmentally and socially aware, with a view of the world that considers personal, community, and planetary outcomes (Emerich, 2011; NMI, n.d.; Ottman, 2011; Pícha & Navrátil, 2019).

Aligning with popular motivations for choosing a meat-free diet, this consumer segment cares deeply for the environment, prioritizes healthy and natural foods, and supports advocacy programs for various social causes (NMI, n.d; Ottman, 2011; Pícha & Navrátil, 2019). Additionally, LOHAS consumers may be considered “early adopters,” particularly of green products (NMI, n.d; Ottman, 2011; Pícha & Navrátil, 2019), reflecting the traits of openness and agreeableness associated with meat-less dieters. They also tend to be female (Ottman, 2011; Pícha & Navrátil, 2019) and well-educated (Ottman, 2011), demographics that align with vegetarians and vegans.

2.7 Plant-Based Diet Barriers

There are numerous barriers individuals may face in adopting a vegan or vegetarian diet, including those related to knowledge, health, convenience, social norms, personal preferences, accessibility, and personal ability (Rickerby & Green, 2024). This section focuses on psychological barriers: stigma, meat attachment, rationalization, and cognitive dissonance. These barriers are prioritized over others because they reflect the objective of this study: to contribute to the literature on effective strategies for improving the communication and promotion of sustainable diets in high-choice media environments. Reviewing the barriers below provides an important foundation for understanding how psychological defensiveness can impede the success of communication campaigns and hinder the adoption of meat-free diets. In addition, the psychological barriers discussed in this section are more malleable to change through targeted interventions than structural barriers such as accessibility, which might require broader systemic changes. Moreover, addressing psychological barriers may lead to sustainable and long-term dietary changes, whereas practical solutions still require overcoming cognitive obstacles such as meat attachment.

2.7.1 *Stigma*

The decision to give up meat and other animal food products can be controversial and is often subject to social stigma. Though vegans and vegetarians both experience social stigma, veganism tends to be perceived more negatively than vegetarianism (Nezlek et al., 2023; Paslakis et al., 2020; Reuber & Muschalla, 2022). Several studies have found that omnivores view plant-based eaters poorly, describing them as arrogant, overcommitted, opinionated, and annoying (Gregson et al., 2022; De Groeve et al., 2022; Markowski & Roxburgh, 2019; Weiper & Vonk, 2021). One explanation for these negative stereotypes may be that plant-based eaters threaten meat-eater's moral self-image, thus causing a defensive reaction to the threat of being morally judged (De Groeve & Rosenfeld, 2022; Minson & Monin, 2012; Weiper & Vonk, 2021). Another reason for these unfavourable descriptions of vegans may be that plant-based eaters do, in fact, describe their choices in confident, self-righteous, non-compromising ways (Weiper & Vonk, 2021). Nevertheless, Markowski and Roxburgh (2019) demonstrated that meat eaters often socially and behaviourally distance themselves from vegans in response to this stigmatization. Omnivores engage in physical and verbal distancing from vegans to preserve social membership in their non-stigmatized group (Markowski & Roxburgh, 2019). Additionally, as meat eaters anticipate social stigma in becoming vegan, they behaviourally distance themselves by continuing to eat meat and animal products (Markowski & Roxburgh, 2019).

Another area worth discussing is the connection between diet and gender. Meat is generally associated with masculinity and muscle, especially among men, while vegetarian and vegan diets are more often associated with femininity and thinness (Rozin et al., 2012; Velzeboer et al., 2024). The perception that plant-forward diets are less masculine than omnivore diets is a barrier to meat reduction for men (Mertens & Oberhoff, 2023; Peeters et al., 2022; Rothgerber, 2013; Stanley et al., 2023). Men who consider themselves more masculine (versus less) consume more meat, have a stronger attachment to

meat, and are less willing to reduce their meat consumption (Peeters et al., 2022; Stanley et al., 2023). One explanation for this may be that masculine norms of emotional restriction, strength, athleticism, and dominance facilitate unapologetic meat justification strategies such as denial of animal suffering, human-animal hierarchy, and human destiny/fate (Rothgerber, 2013). An alternative explanation for the association between masculinity and meat could stem from historical divisions of labour in which men are commonly believed to have been responsible for the hunting and roasting of meat (Buscemi, 2018; Fiddes, 1989).

2.7.2 Meat Attachment

Meat attachment refers to an individual's positive bond toward meat consumption (Graça et al., 2015). The construct consists of four dimensions: hedonism, affinity, entitlement, and dependence (Graça et al., 2015). *Hedonism* refers to the prioritization of pleasure in lifestyle choices, *affinity* denotes a natural liking towards something, *entitlement* involves a sense of having a right to something, and *dependence* describes the state of relying on or needing something. Therefore, a person with high meat attachment is likely to find pleasure in, have a liking towards, feel entitled to, and be dependent on eating meat. Accordingly, a higher attachment to meat results in a lower willingness to reduce meat consumption (Graça et al., 2015). Meat attachment is significantly positively correlated with meat rationalization and the 4Ns (Roozen & Raedts, 2022), concepts discussed in the following section.

2.7.3 Rationalization

Omnivores tend to rationalize or justify eating animal products with the 4Ns: the belief that eating meat is natural, normal, necessary, and nice (Joy, 2010; Piazza et al., 2015; Šedová et al., 2016). *Natural* refers to the idea that meat is what our species evolved to eat (Joy, 2010). *Normal* refers to the thinking that eating meat is normal, that it is what most people in civilized society do (Joy, 2010). *Necessary* refers to the belief that humans need meat to survive or be healthy (Joy, 2010). *Nice* refers to the enjoyment or

satisfaction derived from eating meat (Piazza et al., 2015). Hopwood and Bleidorn (2019) generated four psychological profiles to describe the types of individuals who use these rationalizations for eating meat. They found that viewing meat as natural was associated with valuing recognition, excitement, and being unconcerned with the negative impacts of eating meat on the environment or the well-being of animals (Hopwood & Bleidorn, 2019). This profile depicts a person who believes that being part of nature involves taking one's place at the top of the food chain (Hopwood & Bleidorn, 2019). Viewing meat as necessary was associated with valuing recognition, excitement, obedience, national security, and salvation (Hopwood & Bleidorn, 2019). This profile portrays a politically conservative individual who eats meat out of respect for traditional norms (Hopwood & Bleidorn, 2019). Viewing meat as normal was associated with high neuroticism, low agreeableness, and low conscientiousness (Hopwood & Bleidorn, 2019). Supporting other research, this profile describes a person characterized by low empathy, high social dominance orientation, and authoritarianism. (Gregson et al., 2022; Hopwood & Bleidorn, 2019; Vesper et al., 2015). Viewing meat as nice was associated with valuing comfort and pleasure and lower concern for the environment or animal rights (Hopwood & Bleidorn, 2019). This profile depicts an individual who favours excess over moderation and, in this regard, ignores the consequences of their behaviour (Hopwood & Bleidorn, 2019).

Necessity may be the most challenging of the 4Ns to overcome as it is most frequently offered in defence of eating meat (Piazza et al., 2015). This is likely because, throughout much of human history, meat and other animal products have been highly important for the health and survival of populations, as discussed earlier in this chapter. However, modern food production now allows widespread access to protein alternatives supporting vegetarian and vegan diets. Due to the historical prevalence of animal products, omnivores may believe that meat is necessary for a healthy diet when this is not the case.

2.7.4 Cognitive Dissonance

Many omnivore eaters experience meat-related cognitive dissonance, a mental discomfort due to inconsistencies among cognitions (Festinger, 1957). While omnivores may love animals and care about the environment, they simultaneously ignore the ethical and environmental consequences of eating meat (Bouwman et al., 2022; Rothgerber & Rosenfeld, 2021; Šedová et al., 2016). The existence of dissonance will motivate a person to reduce this psychological discomfort by actively avoiding situations and information which may worsen the experience (Festinger, 1957). Meat eaters use coping strategies to evade the negative feelings of dissonance, including detachment (Kunst & Hohle, 2016; Šedová et al., 2016), shifting the blame (Rothgerber et al., 2022; Šedová et al., 2016), and selective exposure (Gaspar et al., 2016; Lueders et al., 2022; Onwezen & van der Weele, 2016). Omnivores use the detachment strategy by not participating in raising or killing animals (Šedová et al., 2016). Most people also purchase highly processed meat in the supermarket, making it easier to mentally disengage from its animal origin (Kunst & Hohle, 2016). Another way that omnivores often avoid cognitive dissonance is by shifting the blame and arguing that they would not achieve anything by avoiding meat (Šedová et al., 2016). By displacing the responsibility onto third-party transgressors such as farmers or the government, meat eaters can reduce feelings of guilt and heighten their self-rated moral character (Rothgerber et al., 2022). Lastly, meat eaters can evade cognitive dissonance by selectively exposing themselves to information that aligns with their dietary preferences while avoiding information that may challenge them (Gaspar et al., 2016; Lueders et al., 2022). By strategically ignoring information that reminds omnivores of meat-related issues, they can reduce the negative feelings associated with this dietary confrontation (Onwezen & van der Weele, 2016).

2.8 The Selective Exposure Effect

2.8.1 Selective Exposure

Selective exposure refers to the tendency to prefer attitude-confirming over attitude-challenging information (Festinger, 1957). According to Hart et al. (2009), people are almost twice as likely to select information that aligns with their pre-existing attitudes, beliefs, and behaviours than information that does not. Additionally, a desire to defend one's existing attitudes, beliefs, and behaviours increases the likelihood that the bias will occur (Hart et al., 2009). The selective exposure effect has been used to explore a variety of constructs, including attitudes, personality, social stereotypes, and interpersonal relationships (Smith et al., 2008). More recently, the effect has been used to investigate decision-making in high-choice media environments, where individuals can consume information from a large pool of options. Using the internet, today's consumers have more opportunities than ever to select and avoid media content based on their interests and preferences. For instance, Parmelee and Roman (2020) found that nearly 80% of politically engaged Instagram users follow political leaders they support and agree with. Only 15.3% of these Instagram users (most being liberals) follow leaders whom they disagree with politically (Parmelee & Roman, 2020). Similarly, Schmuck et al. (2020) demonstrated that individuals give more visual attention to attitude-consistent political advertising when the alternative stimulus consists of unrelated, neutral political ads. Additionally, the study showed that conservative participants tended to spend less time looking at political ads that were inconsistent with their political views (Schmuck et al., 2020).

In the context of dietary preferences, Gaspar et al. (2016) observed participant interaction with red meat risk information. The study identified a positive relationship between information avoidance and the experience of dissonance and a positive relationship between information avoidance and attitudes toward red meat (Gaspar et al., 2016). The authors also found that following exposure to red meat risk information, participants decreased the positivity of their attitudes toward red meat and increased their

perceived knowledge of red meat risks (Gaspar et al., 2016). This indicates that individuals can be persuaded to change their opinions if risk information is viewed and processed. Furthermore, Lueders et al. (2022) found that people favourably seek information that endorses rather than challenges their preferred diets (Lueders et al., 2022). Participants in this study were presented with six different article headlines relating to meat reduction in the context of global warming and climate change (Lueders et al., 2022). Selective exposure was measured based on dietary preferences and the articles participants chose to read (Lueders et al., 2022). The study demonstrated that the more participants identified as meat consumers, the more likely they were to seek information that downplayed the environmental costs of meat consumption (Lueders et al., 2022). As limited research has been conducted on selective exposure and dietary preference, future literature should build on the findings of Gaspar et al. (2016) and Lueders et al. (2022) to develop effective meat-reduction communication strategies.

The problem with selective exposure is that this biased information-seeking can strengthen people's pre-existing attitudes and beliefs, making them resistant to counter-attitudinal information and contributing to group polarization (Knobloch-Westerwick et al., 2015; Lueders et al., 2022; Newman et al., 2018; Stroud, 2010). Today's free choice-media environments (i.e., social media) further this issue by creating echo chambers, that is, limiting users' exposure to diverse perspectives and favouring the formation of like-minded groups (Cinelli et al., 2021; Parmelee & Roman, 2020). These echo chambers can also spread misinformation, as users tend to aggregate in communities of interest, fostering biased narratives (Del Vicario et al., 2016; Xu, 2022). These issues highlight the importance of reducing the selective exposure bias in free-choice environments to prevent idea polarization, segregation, and widespread misinformation.

2.8.2 Information Utility

Previous research has explored several moderators of selective exposure, including mood (Bae et al., 2019; Jonas et al., 2006), environmental contexts (Prior, 2007; Steppat et al., 2022), images (Powell et al., 2019; Sargent, 2007), and information utility (Kim, 2015; D'Alessio, 2015; Knobloch-Westerwick & Kleinman, 2012; Wagner, 2017). Information utility refers to the degree to which material can benefit future decision-making. In other words, the more valuable a person perceives information to be, the more likely they are to engage with it, regardless of whether it is consistent with their pre-existing attitudes (Knobloch-Westerwick & Kleinman, 2012). Specifically, information relating to an individual's immediate and future threats has utility, the degree of which increases with the individual's perceived 1) magnitude of challenges, 2) likelihood of threat occurrence, 3) immediacy of threat occurrence, and 4) efficacy to influence outcomes (Atkin, 1973; Knobloch-Westerwick, 2008). The increased utility of messages results in longer exposure to information (Atkin, 1973; Knobloch-Westerwick, 2008). For instance, Knobloch-Westerwick and Kleinman (2012) found that information utility can override confirmation bias and motivate exposure related to political information. In this study, participants interacted with an online news website featuring eight articles based on political issues (Knobloch-Westerwick & Kleinman, 2012). Participants engaged with information related to their unfavoured party when government change was likely, and their favoured party was expected to lose the election (Knobloch-Westerwick & Kleinman, 2012). Other literature has demonstrated similar findings in politics (D'Alessio, 2015; Wagner, 2017), though information utility has also been explored in health communication (Kim, 2015). Information utility has not yet been investigated as a moderator of selective exposure for meat-related issues, providing a gap for future research.

2.9 Promoting Plant-Based Diets Through Communication

2.9.1 Communication & Behaviour Change

Communication is widely recognized as an important component of shifting unsustainable behaviours and promoting sustainable habits among consumers. Communication related to sustainability is critical because this information must be conveyed globally, encouraging individuals to change their behaviours or make relevant decisions (Godemann, 2021). Without adequate communication, sustainability initiatives will receive little public engagement and have little chance of becoming mainstream in society (Godemann, 2021). Information campaigns are commonly used to convey scientific facts to the public in an effort to change widespread behaviour. However, recipients are not passive receivers of messages but rather people who interpret information and form opinions based on their experiences, knowledge, expectations, and values (Heeren et al., 2016; Laininen, 2019). Although knowledge is important, a person's attitude towards a behaviour, perception of what others think about that behaviour, and ability to engage in that behaviour hold more weight (Çoker & Van Der Linden, 2022; Heeren et al., 2016; Wolstenholme et al., 2021; Wyker & Davison, 2010). These variables are the basis of the Theory of Planned Behaviour which assumes that behaviour is driven by an individual's intention, which is driven by one's attitudes, subjective norms, and perceived control (Ajzen, 1991). The theory is strongly linked to the Transtheoretical Model, which suggests five stages of behaviour change: pre-contemplation, contemplation, preparation, action, and maintenance (Prochaska & DiClemente, 1983). In the context of meat reduction, most individuals in high-income countries fall into the pre-contemplation or contemplation stages of behaviour change, meaning that they have not yet taken any action toward adopting a vegetarian or vegan diet (Bryant et al., 2023; Wolstenholme et al., 2021; Wyker & Davison, 2010). Furthermore, between attitudes, subjective norms, and perceived control, attitudes are the strongest predictor of an individual's intentions to follow a vegetarian or vegan diet across all stages of behaviour

change (Çoker & Van Der Linden, 2022; Wolstenholme et al., 2021; Wyker & Davison, 2010). These attitudes are determined by evaluations of the pros and cons of adopting such a diet or behavioural outcome beliefs (Ajzen, 1991). This suggests that communication focused on promoting the positives of eating less meat and explaining the negatives of overconsumption could be an effective strategy for encouraging behaviour change, regardless of a person's readiness to change (Çoker & Van Der Linden, 2022; Wolstenholme et al., 2021; Wyker & Davison, 2010).

2.9.2 Risk Communication

Risk communication is the exchange of information, advice, and opinions between experts and individuals who face a hazard or threat to their survival, health, or economic or social well-being (WHO, n.d.). Risk communication aims to enable informed decision-making and mitigate the effects of a threat by taking protective and preventive measures (WHO, n.d.). The research domain of risk communication is highly interdisciplinary and includes a broad range of topics spanning environment, health, physical safety, and technology (Goerlandt & Reniers, 2020). Examples of specific issues include natural disasters, epidemics, food regulation, and nuclear power (Goerlandt & Reniers, 2020).

An important, often-cited element of risk communication is risk perception, which directly affects a person's behaviour response to communication. Stronger risk perception increases attention to risk information, which encourages individual action and the corresponding behaviours that avoid negative outcomes (Cheng et al., 2022; Saari et al., 2021; Qi et al., 2022). Therefore, ensuring that consumers have an appropriate perception of the risks related to meat consumption is necessary for decreasing meat-based diets and encouraging plant-rich eating habits. Risk perception can be influenced by a variety of factors, including feelings of dread or worry, severity of consequences, and unfamiliarity (Fischhoff et al., 1978; Slovic, 1987). Additionally, recent research has demonstrated that attention and exposure to risk information can increase individual perceptions of risk (Mrkva et al., 2021). Attention increases the

severity of attended risks, making it more frightening and of higher priority to the individual (Mrkva et al., 2021). These findings indicate that if an individual is exposed to risk information long enough for them to interact with and process the message, then their risk perception should increase and, in turn, facilitate protective behaviour.

2.9.3 Plant-Based Diet Communication

Informational and educational strategies for promoting plant-forward diets generally include animal welfare, environmental, or health messaging. However, the effectiveness of information interventions on meat reduction is often moderated by individual values, beliefs, and attitudes. For instance, Vainio et al. (2018) found that personal attitudes were key in determining responses to information promoting protein alternatives. Participants in this study were shown one of five messages conveying recommendations about food consumption using either a climate or health frame (Vainio et al., 2018). Reading any message changed behavioural intentions among “meat-skeptics” but not among “meat believers” (Vainio et al., 2018).

Similarly, Isham et al. (2022) explored the influence of framing plant-based products in terms of their health versus environmental benefits. They found that neither framing condition was associated with a greater liking for plant-based products or a willingness to pay more (Isham et al., 2022). The study did, however, find that higher levels of personal well-being positively impacted liking and willingness to pay for plant-based products (Isham et al., 2022). In other words, the experience of positive emotions or greater life satisfaction was linked to favouring plant-based foods (Isham et al., 2022). Furthermore, Whitley et al. (2018) demonstrated no significant effects of environmental, health, or animal welfare appeals on receptiveness for vegan diet policies. The research found that values, environmental beliefs, attitudes about animal welfare, and normative eating behaviours were better predictors for policy support than rhetorical frames (Whitley et al., 2018). Whitley et al. (2018) argued that support for vegan diets cannot

be altered through brief information appeals due to deeply rooted social and personal factors. Lastly, Brunner et al. (2019) reported that providing environmental information through a colour-based labelling scheme did not decrease the sale of meat dishes. Although sales of dishes increased when labelled as low impact, the label did not cause a change in consumption patterns from one type of dish to another (e.g., from meat-based to vegetarian) (Brunner et al., 2019). These findings may be explained by the study participants' prior beliefs (Brunner et al., 2019). For example, a meat dish with a green label may have positively surprised environmentally conscious individuals, leading to increased sales (Brunner et al., 2019).

The research described above indicates that the effectiveness of information interventions on meat reduction intentions is better predicted by individual values, beliefs, and attitudes than by the explicit content of the message itself. These findings highlight the importance of understanding individuals' values, beliefs, and attitudes related to food and eating to devise effective communication campaigns that encourage sustainable diets.

2.10 Summary of Literature Review

Several key themes emerge from the above literature review:

1. Vegetarian and vegan diets are a minority in Canada, and most consumers are not actively trying to reduce their meat consumption

The review reveals that most Canadians consume meat regularly (Charlebois et al., 2018). Though approximately half of the population is willing to reduce their intake (Charlebois et al., 2018), most are not currently attempting to do so (Clark & Bogdan, 2019a).

2. In high-income countries, many individuals are unaware of or underestimate animal agriculture's impact on the environment

The literature review suggests that Canadian's resistance to vegetarian or vegan diets may be due to a lack of knowledge related to the impact of animal agriculture on the environment, as demonstrated in other high-income countries (de Boer et al., 2016; Hartmann et al., 2021; Pohjolainen et al., 2016; Slotnick et al., 2022; Truelove & Parks, 2012).

3. Meat attachment is a complex psychological barrier to vegetarian and vegan diet adoption

Because of agriculture's significant contribution to the Canadian economy and its impact on the country's culture (AAFC, 2021), the population's meat-centred diet may result from more than a lack of environmental information. Even when people are informed about the climate impact of animal products, they can be resistant to the idea of eating less meat (Pohjolainen et al., 2016), especially if this information conflicts with their prior beliefs (Vainio et al., 2018). These findings support research demonstrating that hesitance to give up meat stems from meat attachment (Graça et al., 2015), which results in psychological defence mechanisms such as rationalization (Joy, 2010; Piazza et al., 2015; Roozen & Raedts, 2022) and selective exposure (Festinger, 1957; Gaspar et al., 2016; Hart et al., 2009; Lueders et al., 2022; Onwezen & van der Weele, 2016).

4. The effectiveness of meat-less diet promotion depends heavily on an individual's attitudes and prior beliefs

In the context of this research, selective exposure refers to the way an omnivore may strategically ignore information that reminds them of meat-related issues (Festinger, 1957; Gaspar et al., 2016; Hart et al., 2009; Lueders et al., 2022; Onwezen & van der Weele, 2016). In today's free-choice media environments, consumers can access various media content, genres, and formats, making it easy to select and avoid meat-related risk information based on their preferences. Because people are more likely to select information

that aligns with their pre-existing attitudes and beliefs than information that does not, meat-related risk information is unlikely to reach those highly attached to the food (Festinger, 1957; Gaspar et al., 2016; Hart et al., 2009; Lueders et al., 2022; Onwezen & van der Weele, 2016). This is problematic as while risk information has the potential to decrease positive attitudes toward meat (Gaspar et al., 2016; Mrkva et al., 2021), it can not exert its desired impact if it fails to reach its target audience in the first place.

Furthermore, four main research gaps can be identified. The literature review outlines a need for research on:

1. Effective strategies for decreasing positive attitudes toward meat consumption

Canada's low rates of vegetarianism and veganism and high meat consumption indicate a need to encourage plant-forward diets among consumers. Accordingly, this study investigates messaging strategies for decreasing positive attitudes toward meat consumption among Canadians.

2. Food-related environmental knowledge in Canada

While research has demonstrated that consumers in high-income countries tend to underestimate or ignore the negative impact that meat has on the environment (de Boer et al., 2016; Hartmann et al., 2021; Pohjolainen et al., 2016; Slotnick et al., 2022; Truelove & Parks, 2012), few studies have been conducted regarding food-related environmental knowledge in Canada. Therefore, this study explores the level of knowledge Canadian consumers have related to meat and sustainability.

3. Meat-less diet communication that targets individuals who tend to avoid information related to sustainable diets

As limited research has been conducted on selective exposure and dietary preference, this study investigates the bias to better understand it as a psychological defence against meat-related risk information. In learning more about the selective exposure bias, this study aims to contribute to the

development of effective meat-reduction communication strategies for those highly attached to eating meat.

4. Information utility as a moderator for selective exposure to meat-related risk information

Previous research has found that information utility can motivate selective exposure in areas outside of meat-related risk communication (D'Alessio, 2015; Kim, 2015; Knobloch-Westerwick & Kleinman, 2012; Wagner, 2017). As information utility's effect on selective exposure has not yet been applied to meat-related risk information, this study explores these concepts in a free-choice environment, addressing this literature gap. Specifically, this research tests whether information utility can influence selective exposure to meat-related risk information, determining whether the framing technique can increase the likelihood of messages being reached by individuals who avoid content related to meat-free diets.

Chapter 3: Methodology

3.1 Introduction to Methodology

This chapter outlines the methodological steps undertaken to answer this study's research questions. This section begins by reviewing the study's theoretical framework (see also Section 1.4). Next, it provides an overview of similar work, which guided this study's research design. Following this is an explanation of the study's methodological considerations and processes, including the research approach and design, selection of participants, data collection, and data analysis. Lastly, this chapter addresses the validity and reliability of the study.

3.2 Theoretical Framework

This study uses the selective exposure theory to explore the research questions presented in Chapter One. The theory of selective exposure arose from the theory of cognitive dissonance developed by Leon Festinger in the 1950s. The theory of cognitive dissonance was originally developed to explain why some individuals resist changing their beliefs despite contradictory evidence (Festinger, 1957). Festinger (1957) proposed that once people have established attitudes or made decisions, they are motivated to maintain those attitudes and decisions. Cognitive dissonance will motivate a person to reduce psychological discomfort by actively avoiding situations and information which may worsen the experience (Festinger, 1957). In other words, a person with conflicting beliefs, values, or attitudes will experience uncomfortable feelings such as stress, anxiety, or guilt. To avoid this distress, one might engage in selective exposure, the tendency to prefer attitude-confirming over attitude-challenging information (Festinger, 1957).

In applying the theory of selective exposure to this study, individuals' meat-related attitudes, attachment, and beliefs (independent variables) are expected to influence their self-selected exposure to

information (dependent variable). If an omnivore holds strong positive attitudes toward eating meat, they will avoid exposure to information that challenges these attitudes and selectively expose themselves to information that confirms these attitudes. For instance, cognitive dissonance might occur when a meat eater encounters information about animal agriculture's negative environmental impact. Confronting this information may result in stress, guilt, or anxiety. To evade these negative feelings, the individual will expose themselves to information that tells them their dietary preferences are healthy or suitable while avoiding information that tells them their dietary preferences are harmful or wrong. Furthermore, as demonstrated in previous research (D'Alessio, 2015; Kim, 2015; Knobloch-Westerwick & Kleinman, 2012; Wagner, 2017), information utility is expected to moderate the selective exposure effect by overriding cognitive dissonance. If information is assumed to benefit individuals, they will be less concerned with whether it is attitude-consistent and more willing to engage with attitude-discrepant messages (Knobloch-Westerwick & Kleinman, 2012).

3.3 Review of Previous Work in Relation to the Current Study

3.3.1 Overview of Prior Research

This study's research design was based on similar work by Lueders et al. (2022), Gaspar et al. (2016), Jang (2014), and Knobloch-Westerwick and Kleinman (2012). Lueders et al. (2022) used Qualtrics survey software to examine the selective exposure effect in the context of meat reduction as a proposed strategy to combat climate change. The study recruited 351 French participants who were asked to review a set of news headlines and decide for each whether to access the full text (Lueders et al., 2022). The headlines either promoted or rejected meat reduction as an effective environmental strategy (Lueders et al., 2022). Selective exposure was measured based on dietary preferences (collected beforehand) and the articles participants chose to read (Lueders et al., 2022). Also related to dietary preference, Gaspar et al. (2016)

used the online deliberation tool Vizzata to explore attitudes toward red meat, perceived knowledge of red meat risks, and meat-related information exposure effects. Two hundred and forty-four European participants were recruited and presented with information about red meat risks and benefits related to its health, environmental, cultural, and socioeconomic impacts (Gaspar et al., 2016). Aspects of the content could be clicked on to access additional information on risks or benefits (Gaspar et al., 2016). Selective exposure was measured based on red meat attitudes (collected in a baseline survey) and participant clicks. Jang (2014) investigated how citizens select science information online based on their pre-existing attitudes. Two hundred and thirty-eight American participants completed a baseline survey and then browsed an online news magazine featuring divergent viewpoints about various controversial science topics (Jang, 2014). The online magazine was created specifically for the study and displayed 12 news leads featuring four science issues (Jang, 2014). Participant online activities, including article selection and the length of exposure, were measured by behaviour-tracking software (Jang, 2014). Lastly, Knobloch-Westerwick and Kleinman (2012) tested whether information utility drives selective exposure before an election. Two hundred and five American participants completed a baseline survey and then interacted with an online news magazine featuring eight articles about various political topics (Knobloch-Westerwick & Kleinman, 2012). The online magazine was programmed using Authorware and designed to look and feel like popular news magazines on the internet. Selective exposure to specific news reports was logged by Authorware software.

3.3.2 Comparison of Prior Work & The Current Study

The current study used aspects from the works described above to achieve a unique yet simple research design that reflects previous methods while also building upon them. For instance, this study used a similar format to the above research, all of which involved conducting a baseline survey to determine pre-existing

attitudes followed by an experiment to measure selective exposure. The current study also included a follow-up survey to examine changes in attitudes, as was done by Gaspar et al. (2016).

Similar to Lueders et al. (2022), this study used Qualtrics survey software, an online tool used for building and distributing surveys as well as collecting responses. However, in their experiment, Lueders et al. (2022) displayed article headlines individually, asking participants to decide for each whether to access the full article. In the current study, all statements were shown on the same screen, asking participants to select one to read more about. This approach is comparable to those by Jang (2014) and Knobloch-Westerwick and Kleinman (2012), who created online magazines which tracked participants' topic engagement. By displaying all statements to participants simultaneously rather than one by one, the researcher aimed to replicate the experience of being in a free-choice media environment, where users are provided with numerous articles or news pieces to engage with at any given moment. While creating an online news magazine may have better simulated real life, using Qualtrics allowed for inexpensive and simple data collection, which would not have been possible through other platforms.

Furthermore, the statements used in this study drew from the above works in that they contained divergent viewpoints. Most similarly, the current study used statements that discussed the risks and benefits of meat consumption in terms of health and the environment, akin to Lueders et al. (2022) and Gaspar et al. (2016).

Lastly, this study builds off the article by Knobloch-Westerwick and Kleinman (2012), which is the only one of those above that examines information utility. Knobloch-Westerwick and Kleinman (2012) found that information utility can override a confirmation bias and motivate exposure if a government change is likely and the favoured party is expected to lose the election. In this research, Knobloch-Westerwick and Kleinman (2012) did not need to alter their news articles or headlines to produce information utility as it was embedded within the context of the political situation at the time. In contrast,

the current study produced four statements written without information utility (shown to the control and experimental groups) and two statements written using information utility (shown to only the experimental group). Therefore, while this study investigated whether information utility can influence selective exposure, it did so in a different context and with a different methodology than Knobloch-Westerwick and Kleinman (2012).

3.4 Research Approach & Design

The current study used a mixed methods research approach to examine the relationship between meat-related attitudes, attachment, and beliefs (independent variables) and selective exposure (dependent variable) using information utility as a moderator. Mixed methods research is an approach to inquiry involving collecting both quantitative and qualitative data and integrating the two (Creswell & Creswell, 2018). The approach is more comprehensive than quantitative or qualitative data collection alone (Creswell & Creswell, 2018) and best suits this study's research questions and style. However, while a mixed methods approach is used in this study, the research design is primarily quantitative, employing a survey and a true experiment. Open-ended questions were used at select points in the survey, allowing for additional insights and providing a qualitative aspect to this work. Quantitative procedures of inquiry were mainly selected for this study because they allow numerical data to be analyzed using statistical methods, providing the opportunity to determine statistical significance between variables (Creswell & Creswell, 2018). As this study examined the relationship between variables captured through primarily numerical measures, the research approach reflects a postpositive worldview, a deterministic perspective of science in which causes determine effects (Creswell & Creswell, 2018).

This study used Qualtrics survey software to conduct a baseline survey, an experiment, and a post-experiment survey. Prior to releasing the finalized study, a pilot test was used to evaluate its duration and

participant experience. All three parts of the study were conducted consecutively, and the entire process took participants approximately 10 to 15 minutes to complete. Figure 3.1 provides an overview of the research design. Participants began by completing the baseline survey, which collected information on their demographic variables, meat consumption behaviours, meat attitudes, meat attachments, beliefs about meat risks and benefits, and diet-related environmental beliefs. Next, participants completed the experiment, which used a pretest-posttest control-group between-subjects design. Participants were randomly assigned to either the control or experimental group, where they were provided with several statements related to the risks and benefits of meat consumption and asked to select one to learn more about. Participants in the control group were given four statements to choose from, none of which were framed using information utility. Participants in the experimental group were given the same four statements to choose from, plus two additional statements framed using information utility. After selecting a statement, participants were provided with information about their chosen topic. Finally, participants completed the post-experiment survey which collected further information on their demographic variables, reasons for their statement selection, attitudes toward meat, and willingness to reduce their meat consumption, as well as whether they learned anything new.

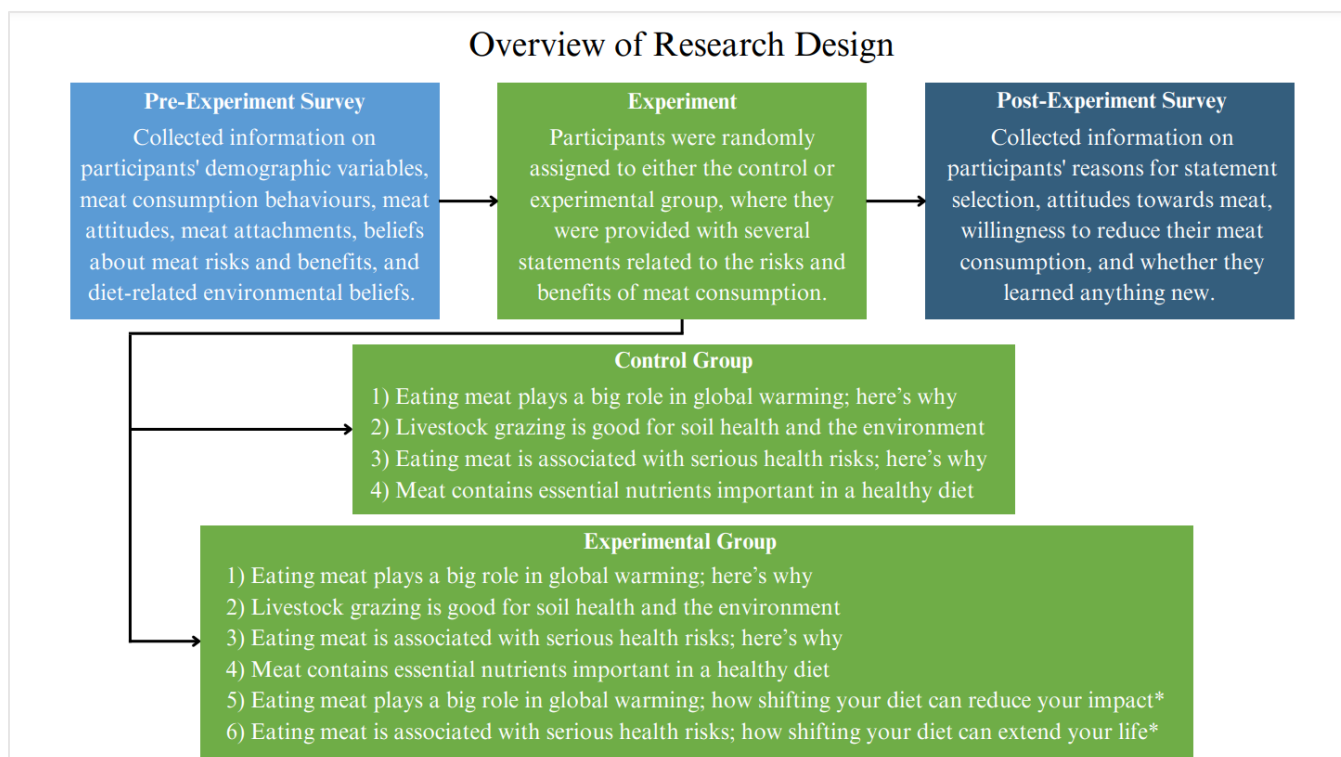


Figure 3.1: An overview of this study's research design. * = Statements using information utility framing.

3.5 Selection of Participants

Based on similar research² (Gaspar et al., 2016; Jang, 2014; Knobloch-Westerwick & Kleinman, 2012; Lueders et al., 2022), a sample of 361 Canadian omnivore adults were recruited for this study. This sample size is slightly larger than those used in previous research, the average of which was 260. To ensure comparability and robustness, OpenEpi, an online sample size calculator, was also employed. Based on the Canadian adult population, the calculator suggested a sample size of 385 to achieve a confidence level of 95% and a margin of error of 5%. Although the recruited sample size of 361 participants was slightly below the calculated recommendation, the difference is minimal and unlikely to significantly impact the study's validity or the generalizability of the results.

² Sample sizes for the studies were as follows: Gaspar et al. (2016) (N = 244); Jang (2014) (N = 238); Knobloch-Westerwick and Kleinman (2012) (N = 205); Lueders et al. (2022) (N = 351).

The participant sample was identified through Quest Mindshare, a global research group and recruitment platform. The researcher requested that Quest Mindshare recruit participants using quota sampling to ensure that the sample population reflected the Canadian adult population in terms of age, gender, location, and education level. Using a third party to recruit participants allowed for increased survey reach and faster data collection than the researcher could have achieved alone. To ensure that the sample included only meat eaters (as opposed to individuals who identified as vegan or vegetarian), participants completed a screening question at the beginning of the study. All participants also provided written informed consent before participating in the study and received remuneration through Quest Mindshare. All study procedures followed the Tri-Agency Framework on the Responsible Conduct of Research and were approved by the University of Waterloo Office of Research Ethics under approval number 45384.

3.6 Data Collection

The entire study contained a total of seven consecutive sections: 1) recruitment letter, 2) screening, 3) consent, 4) baseline survey, 5) experiment, 6) post-experiment survey, and 7) debriefing. The primary portions of the study were the baseline survey, experiment, and post-experiment survey. All study contents and materials can be found in Appendix A.

3.6.1 Baseline Survey (Pre-Test)

A variety of question types were used throughout the study to reduce respondent fatigue. The baseline survey had a total of 14 questions, including those in the form of multiple-choice, open-ended, rank-order, graphic slider, and Likert scale.

The first set of questions related to participant demographic information, including age and living location. The descriptions and ranges of demographic items followed those used by Statistics Canada in order to compare the study's sample to the Canadian adult population.

The second set of questions was related to participants' meat consumption behaviours, including how often they eat meat, the type of meat they eat most often, the reasons they eat meat, the number of close family and friends they have who eat meat, and their willingness to reduce the amount of meat they eat.

The third set of questions was related to participants' meat attitudes and attachment. To gauge general attitudes toward meat, participants were asked to indicate how they felt about the food using a five-point graphic slider. Graphic scales convey levels of a particular affective domain in a format that can be easier for participants to process and understand than text scales, making them especially beneficial for low-literacy participants (Stange et al., 2016; Toepoel et al., 2019). To determine participants' levels of meat attachment, this study used a shortened version of the Meat Attachment Questionnaire (MAQ) developed by Graça et al. (2015). The original MAQ includes 16 items across four dimensions: hedonism, affinity, entitlement, and dependence. The current study used only 12 items across the four dimensions to reduce survey fatigue. The 12 items were determined by their corresponding dimensions and factor loadings calculated by Graça et al. (2015), wherein the top three items from each dimension were selected.

Lastly, the fourth set of questions was related to participants' beliefs of meat-related risks and benefits within the health and environmental contexts.

3.6.2 Experiment

In the experiment portion of the study, participants were provided with a multiple-choice question that asked them to select one of several statements listed that they would be interested in learning more about

(Figures 3.2a and 3.2b). The statements were related to the risks and benefits of meat consumption within the health and environmental contexts.

Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose.

☐ Eating meat plays a big role in global warming; here's why	☐ Eating meat is associated with serious health risks; here's why
☐ Livestock grazing is good for soil health and the environment	☐ Meat contains essential nutrients important in a healthy diet

Figure 3.2a: Control group multiple choice questions related to statement selection.

Please select the statement you'd like to learn more about. On the following page you'll have the opportunity to learn more about the information you choose.

☐ Meat contains essential nutrients important in a healthy diet	☐ Livestock grazing is good for soil health and the environment
☐ Eating meat plays a big role in global warming; how shifting your diet can reduce your impact	☐ Eating meat is associated with serious health risks; how shifting your diet can extend your life
☐ Eating meat plays a big role in global warming; here's why	☐ Eating meat is associated with serious health risks; here's why

Figure 3.2b: Experimental group multiple choice questions related to statement selection.

Participants in the control group were given four statements to choose from, none of which were framed using information utility. The statements provided to the **control group** were:

1. Eating meat plays a big role in global warming; here's why,
2. Livestock grazing is good for soil health and the environment,
3. Eating meat is associated with serious health risks; here's why, and
4. Meat contains essential nutrients important in a healthy diet.

Participants in the **experimental group** were given the same four statements as the control group, plus two additional statements framed using information utility. The two additional statements provided to the experimental group were:

5. Eating meat plays a big role in global warming; how shifting your diet can reduce your impact and
6. Eating meat is associated with serious health risks; how shifting your diet can extend your life

Table 3.1: Summary of experiment statement options

	Title	Framing	Focus	Information Utility	Control/Experimental
1	Eating meat plays a big role in global warming; here's why	Risk	Environment	No	Control & experimental
2	Livestock grazing is good for soil health and the environment	Benefit	Environment	No	Control & experimental
3	Eating meat is associated with serious health risks; here's why	Risk	Health	No	Control & experimental
4	Meat contains essential nutrients important in a healthy diet	Benefit	Health	No	Control & experimental
5	Eating meat plays a big role in global warming; how shifting your diet can reduce your impact	Risk	Environment	Yes	Experimental group
6	Eating meat is associated with serious health risks; how shifting your diet can extend your life	Risk	Health	Yes	Experimental group

The four (control group) or six (experimental groups) statements listed above (Table 3.1) appeared in a randomized order for all participants. Additionally, all of the statements were presented in a plain, written format. Although visuals are often used along with words in the online media environment, this study did not include images or colours as a means to control for any factors that may influence statement selection outside of the statements themselves. After selecting the statement they were most interested in, participants were provided with a short article on the topic (see Appendix A for full articles).

The environment and individual health were selected as the focal topics for the statements above as they are two commonly cited reasons people choose to forgo meat in their diet (Ghaffari et al., 2022; Verain & Dagevos, 2022; North et al., 2021; Janssen et al., 2016). While there are other reasons individuals may choose not to eat meat, such as animal welfare, the topics of environment and health can be discussed from divergent viewpoints, which was an important characteristic needed in this study. For example, eating meat can be argued as a benefit or a risk to health. Because one objective of the study was to determine whether participants engage in selective exposure to meat-related information that aligns with their meat-related attitudes and beliefs, it was important that for each statement in the control group, another existed with an opposing view. This made it possible to explore whether participants selected a pro-meat or anti-meat statement and to what extent this selection aligned with their meat-related attitudes, attachment, and beliefs (collected in the baseline survey). In the experimental group, two additional statements were displayed, one related to environmental risks and one related to health risks, each of which was framed using information utility. As previously explained in the literature review, information utility refers to the degree to which material can benefit future decision-making. Information utility increases with the individual's perceived 1) magnitude of challenges, 2) likelihood of threat occurrence, 3) immediacy of threat occurrence, and 4) efficacy to influence outcomes (Atkin, 1973; Knobloch-Westerwick, 2008). To test whether information utility may be an effective strategy for encouraging meat-less diets, the framing technique was used on meat risk statements rather than meat benefit statements. In order to control for other influences in statement selection, such as sentence phrasing, the first half of each information utility statement remained the same as its meat risk counterpart, while the second half was changed. For example, "Eating meat plays a big role in global warming" stayed the same in both the information utility statement and the non-information utility statement. Information utility was produced by changing the second half of the statement from "here's why" to "how shifting your diet can reduce

your impact.” Taken together, information utility was employed by emphasizing the magnitude of the challenge (“Eating meat plays a *big* role in global warming”) as well as the reader’s efficacy in influencing outcomes (“how shifting your diet can reduce your impact”). The same format was used for the health topic framed using information utility.

The content associated with each of the statements included the information described. The control group articles provided accurate information on their given topics without explicit diet recommendations, while the information utility articles provided similar information with explicit diet recommendations. For example, the topic related to health risks framed without information utility discussed the link between meat and diseases as well as what causes this link. The topic related to health risks framed using information utility discussed the link between meat and diseases, but instead of explaining why, it reviewed the longevity benefits of meat-less diets. All articles were written by the researcher using academic sources, which were listed for participants to view if they were interested.

3.6.3 Post-Experiment Survey (Post-Test)

The post-experiment survey included multiple-choice and open-ended questions. There were eight questions in total. The first question asked participants why they selected the statement they did. The next set of questions asked participants whether they learned anything new, if what they read would change how they make dietary decisions in the future, if the information altered their attitudes toward eating meat, and how willing they were to reduce the amount of meat they eat. The last set of questions was related to participant demographic variables, including urban versus rural living locations, gender, and education. These demographic questions were collected at the end of the study instead of at the beginning as they gathered potentially sensitive information that may have influenced participants’ responses to later questions or motivated them to leave the study early. For example, urban versus rural living locations were collected at the end of the survey to avoid influencing participants’ responses to other questions

related to meat consumption and production. Additionally, gender and education were two questions that involved disclosing personal information, which some participants may have found uncomfortable. Leaving these questions until the end of the survey decreased potential study attrition, which may have resulted in participants leaving the study early due to feeling vulnerable. Collecting socio-demographic data is important in providing a detailed understanding of the study participants, which is necessary for determining whether the sample is representative of the study population and whether the findings can be generalized to adults across Canada.

3.7 Data Analysis

Using IBM SPSS Statistics 29, this study's data analysis was conducted in three parts: pre-experiment analysis, experiment analysis, and post-experiment analysis.

3.7.1 Pre-Experiment Analysis

The pre-experiment analysis used descriptive statistics to explore participant demographic information, meat consumption behaviours, attitudes toward meat, meat attachment, meat risk and benefit beliefs, and diet-related environmental beliefs. A Friedman test was also carried out to analyze the primary reasons participants eat meat as collected through a rank-order question. The Friedman test is a non-parametric statistical method used to compare ranked outcomes (IBM, 2021).

Furthermore, thematic analysis was used to examine an open-ended question which asked participants to specify the main reason they eat meat. All participants provided at least one reason for eating meat, while others listed two or three. A total of 514 reasons were coded into 24 groups based on common themes, including general taste, general health, overall enjoyment, and protein. For instance, if a participant answered "taste and protein," their response would be categorized into the groups of "General

taste” and “Protein.” The 24 codes were then grouped into the larger categories of taste, health, culture, social pressures, and other.

Lastly, to determine participants’ meat attachment levels, responses to the meat attachment questions were translated into scores using a methodology similar to that described by Dowsett et al. (2018). For each item, participants received a score out of five depending on their answer (with “strongly disagree” equaling a score of one and “strongly agree” equaling a score of five for all items except for those in the affinity dimension, which were reverse scored). Item scores were then added together to create a total score for each participant, with the lowest possible score being 12 (i.e. one point x 12 questions) and the highest possible score being 60 (i.e. five points x 12 questions). Individual scores were then grouped into the categories of low, medium, and high attachment. Scores 12 to 27 were categorized as low meat attachment, scores 28 to 44 were categorized as medium meat attachment, and scores 45 to 60 were categorized as high meat attachment.

3.7.2 Experiment Analysis

In the experiment analysis, descriptive statistics were used to explore statement selection in both the control and experimental groups. Furthermore, crosstabulations (crosstabs) were used to compare participants’ statement selection to the following pre-experiment variables: demographics, meat consumption behaviours, willingness to reduce, attitudes, meat attachment levels, meat risk and benefit beliefs, and diet-related environmental beliefs. A crosstab procedure creates tables which display the relationship between multiple variables and offers various tests and measures to understand how these variables are associated (IBM, 2024). As can be seen in Appendix B, several cells in the contingency tables had low frequencies or empty cells, violating the chi-square test expected frequency assumption. For this reason, Monte Carlo method tests were conducted for crosstab many analyses, utilizing Fisher-Freeman-Halton exact tests to determine statistical significance. The Monte Carlo method allows for

estimates of exact significance in cases where traditional chi-square tests may be unreliable due to sparse data (Mehta & Patel, 1989). This method is useful when the data set is too large to compute exact significance, as in this case (Mehta & Patel, 1989). Chi-square tests were used to analyze crosstabs that did not violate the chi-square test expected frequency assumption. Additionally, for variables found to be statistically significant, the effect size was measured using Cramer's V, which quantifies the strength of the relationship between two variables (Rea & Parker, 2014). Symbolized by V, Cramer's V provides measures of association from zero to one, with higher numbers indicating a stronger relationship (Rea & Parker, 2014).

3.7.3 Post-Experiment Analysis

In the post-experiment analysis, descriptive statistics were used to explore participants' reasons for their statement selection, whether they learned anything new, whether the information changed how they will make future dietary decisions, their attitudes toward meat, and their willingness to reduce their meat consumption. Crosstabs were also used to compare these variables with participants' statement selection.

Additionally, thematic analysis was used to examine open-ended questions related to participants' reasons for their statement selection, what they learned, and future dietary decisions. For each open-ended question, codes were decided based on common answers. Responses received a code that best represented the content of their answer, allowing answers to be grouped by theme. For the question related to participants' reasons for their statement selection, responses were coded into the categories of "general interest in topic/statement," "lack of knowledge/interested in learning more," "confirmation of prior knowledge attitudes, and/or beliefs," "skeptical of information," "topic appeared legitimate, scientific, or convincing," "chose randomly/no specific reason," and "reason unclear." "Reason unclear" often included responses that summarized the information provided for a specific statement, making it difficult to decipher whether participants were giving a reason for their selection or summarizing what they learned.

3.8 Validity & Reliability

3.7.1 Construct Validity

Construct validity refers to the degree to which items measure hypothetical concepts or constructs (Creswell & Creswell, 2018). This study's construct validity was assured through a pilot test, a small-scale study conducted to confirm that a procedure works as planned (Jhangiani et al., 2020). Forty-five participants completed the pilot study and were asked to provide feedback on the survey questions and experiment in terms of clarity and experience. None of the pilot study participants provided critical feedback on the study, and 10 provided positive feedback. Furthermore, construct validity was protected by assessing convergent validity, the extent to which two measures that theoretically should be related are, in fact, related (Jhangiani et al., 2020). The current study compared participants' willingness to reduce their meat consumption and their meat attachment level, two variables that were expected to have a strong correlation with one another. Spearman's Rho correlation coefficient found that the correlation between these two variables was significant at the 0.01 level, and crosstab analysis revealed a statistically significant relationship (Appendix B). The strong relationship between the variables provides evidence that the MAQ by Graça et al. (2015) accurately measured participants' willingness to reduce their meat consumption. Lastly, a manipulation check was used to ensure participants perceived, comprehended, and responded as expected to the statement selection process. Traditionally, a manipulation check is used to test whether an independent variable was successfully manipulated (Jhangiani et al., 2020). In this case, a manipulation check was used as a quality control measure to confirm that the experiment portion of the study had the intended effect. Following the experiment, an open-ended question asked participants why they chose the statement they did. Only 3% of participants said that they selected a statement randomly or did not have a specific reason for their decision, confirming that most participants were actively engaged in the task.

3.7.2 Internal Validity

Internal validity refers to the extent to which study procedures allow the researcher to draw correct inferences from the data (Creswell & Creswell, 2018). This study's internal validity was increased by randomly assigning participants between the control and experimental groups. This procedure allowed the experiment results to be attributed to the variables of interest rather than systematic characteristic differences between participants (Creswell & Creswell, 2018). Furthermore, internal validity was ensured by using a variety of question types throughout the baseline and follow-up surveys. Several different types of questions were used to help reduce respondent fatigue, which occurs when survey participants become tired or bored with the task, causing the quality of the data they provide to deteriorate (Jhangiani et al., 2019). Additionally, sensitive demographic information was collected at the end of the survey rather than the beginning to avoid influencing participant responses to later questions or motivating participants to leave the study early. Collecting this data at the end of the survey increased the quality of responses throughout and decreased study attrition, which occurs when participants drop out of a study (Creswell & Creswell, 2018). To assure internal validity, the study also controlled for confounding variables, those that systematically vary along with the variables under investigation and, therefore, provide an alternative explanation for the results (Jhangiani et al., 2020). As discussed above, the experiment portion of this study was developed to control for factors that could influence statement selection beyond the words themselves, such as visuals and sentence structure. Moreover, a cover story was created to minimize demand characteristics, subtle cues that reveal how the researcher expects participants to behave (Jhangiani et al., 2020). The cover story maintained that the research pertained to communicating the risks and benefits of meat consumption, which was necessary because knowing the experiment's true purpose may have affected participant responses and decision-making. Lastly, internal validity was prioritized by conducting the experiment in an online environment, allowing participants to react to stimuli in their

homes. This made the participants less vulnerable to systematic biases due to being in an unfamiliar setting or the experimenter's presence (Jang, 2014).

3.7.3 External Validity

External validity refers to whether the researcher can draw incorrect inferences from the data to other persons, other settings, and past or future situations (Creswell & Creswell, 2018). This study's external validity was increased by recruiting a diverse participant sample. As discussed previously, the sample was identified through a third-party recruitment service, which allowed for a wide reach of participants in terms of age, gender, location, and education level, increasing the generalizability of the findings to the Canadian adult population. Additionally, as mentioned above, the study procedures were designed to resemble online information environments to enhance ecological validity, the degree to which the results of a study can be generalized to real-world settings (Andrade, 2018). However, it is important to acknowledge that generalizability may be limited to similar populations and contexts.

3.7.4 Reliability

Reliability refers to the consistency of the researcher's approach across different studies (Creswell & Creswell, 2018). To increase the study's reliability, the research designs and methods, as well as survey questions, were based on similar research by Lueders et al. (2022), Gaspar et al. (2016), Jang (2014), Knobloch-Westerwick & Kleinman (2012), Graça et al. (2015), and Dowsett et al. (2018). This ensured that the study's instrumentation and measurement were consistent with the work of previous studies.

3.10 Summary of Methodology

This chapter outlined the methodological steps undertaken to answer this study's research questions. It began by reviewing the theory of selective exposure, which served as this study's theoretical framework. Next, it outlined similar research by Lueders et al. (2022), Gaspar et al. (2016), Jang (2014), and

Knobloch-Westerwick and Kleinman (2012). Following this, the study's mixed methods approach and postpositive lens were discussed. Subsequently, this chapter addressed the study's research design, which employed Qualtrics survey software to conduct a baseline, experiment, and post-experiment survey. Additionally, the selection of 361 participants through a third-party recruitment service was discussed, followed by a review of the study's data collection methods, which included multiple-choice, open-ended, rank-order, graphic slider, and Likert scale questions. Furthermore, this chapter presented the methods of data analysis used to address the research questions, employing IBM SPSS Statistics 29 to primarily gather descriptive statistics, analyze crosstabs, and conduct thematic analyses. Lastly, it explained the study's validity and reliability. The following chapter contains a presentation and analysis of data.

Chapter 4: Results

4.1 Introduction to Results

This chapter presents the analysis and findings from the baseline survey, experiment, and follow-up survey. The results are organized into four main sections: demographic analysis, pre-experiment analysis, experiment analysis, and post-experiment analysis.

Three hundred and sixty-one Canadians participated in the study. Two participants were removed because they did not complete the experiment portion of the study. One participant was excluded due to neutral response bias, meaning that they frequently selected middle options (i.e. “neither agree nor disagree”) whenever possible, making it difficult to determine whether this individual was actively engaged in the survey and providing their true attitudes and opinions. This left a total of 358 analyzed responses, of which 178 were assigned to the control group and 180 to the experimental group.

4.2 Demographic & Socio-Demographic Analysis

Descriptions and ranges of demographic items in the study followed those used by Statistics Canada. For a detailed overview of the participant demographic information, refer to Appendix B.

Participant ages ranged from the 18 – 24-year-old bracket to the 90 – 94-year-old bracket. Figure 4.1 displays the study’s age distribution compared to 2021 Canadian Census data (Statistics Canada, 2022d). As depicted, the age distribution observed in the current study generally mirrors the pattern seen in Canadian census data, although proportions differ between the two. In this study, 25 – 29-year-olds, 30 – 34-year-olds, 50 – 54-year-olds, and 65 – 69-year-olds are slightly overrepresented, while 40 – 44-year-olds and 80 – 84-year-olds are underrepresented.

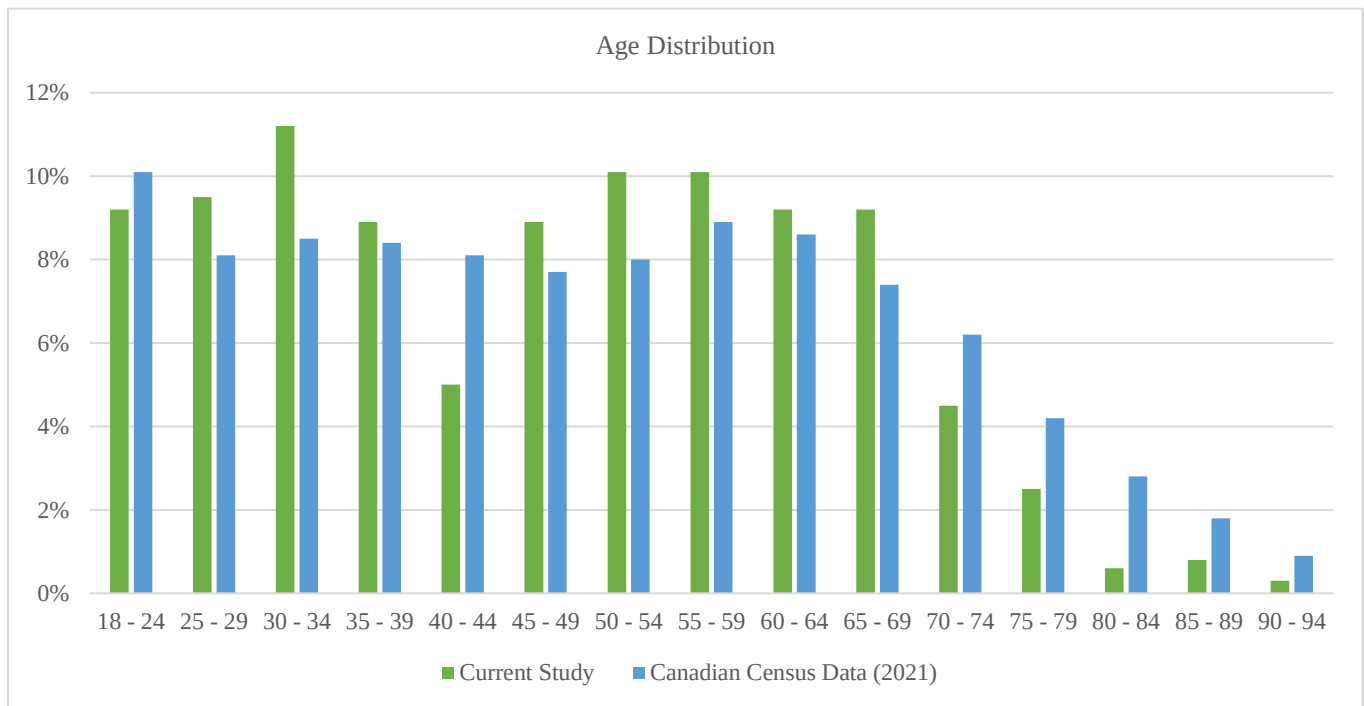


Figure 4.1: Age distribution of participants compared to 2021 Canadian Census data.

Figure 4.2 depicts the study’s age distribution grouped by generation: Generation Z (18 – 29-year-olds), Millennials (30 – 44-year-olds), Generation X (45 – 59-year-olds), Baby Boomers (60 – 79-year-olds), and the Silent Generation (80 – 94-year-olds). The ages within each cohort were selected based on generational boundaries defined by the Pew Research Center (Dimock, 2019). Grouping participant's ages in this way allows for easier data visualization and interpretation. Additionally, organizing participants by generation provides the opportunity to examine their responses by their place in the life cycle and their membership in a cohort of individuals who share common experiences, historical events, and values. Analyzing this study’s findings by generational groups may reveal trends or patterns across cohorts that can be compared to future research or applied to targeted meat-reduction campaigns.

Nineteen percent of participants were classified as Generation Z, 25% as Millennials, 29% as Generation X, 25% as Baby Boomers, and 2% as part of the Silent Generation. This generational age

distribution generally reflects the 2021 Canadian census data, although Generation X is slightly overrepresented, and the Silent Generation is underrepresented.

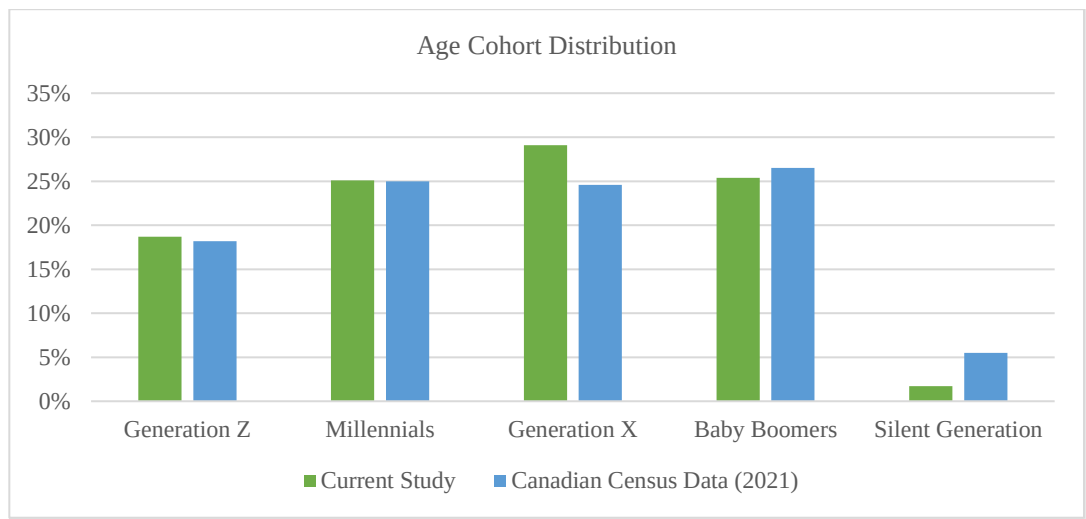


Figure 4.2: Age distribution of participants grouped into generations.

46% of participants identified as men, 52% identified as women, 0.8% identified as non-binary, 0.3% preferred to self-describe, and 0.3% preferred not to disclose their gender identity. Figure 4.3 illustrates this gender distribution compared to 2021 Canadian Census data (Statistics Canada, 2022a). This study’s gender distribution generally reflects that of the Canadian population.

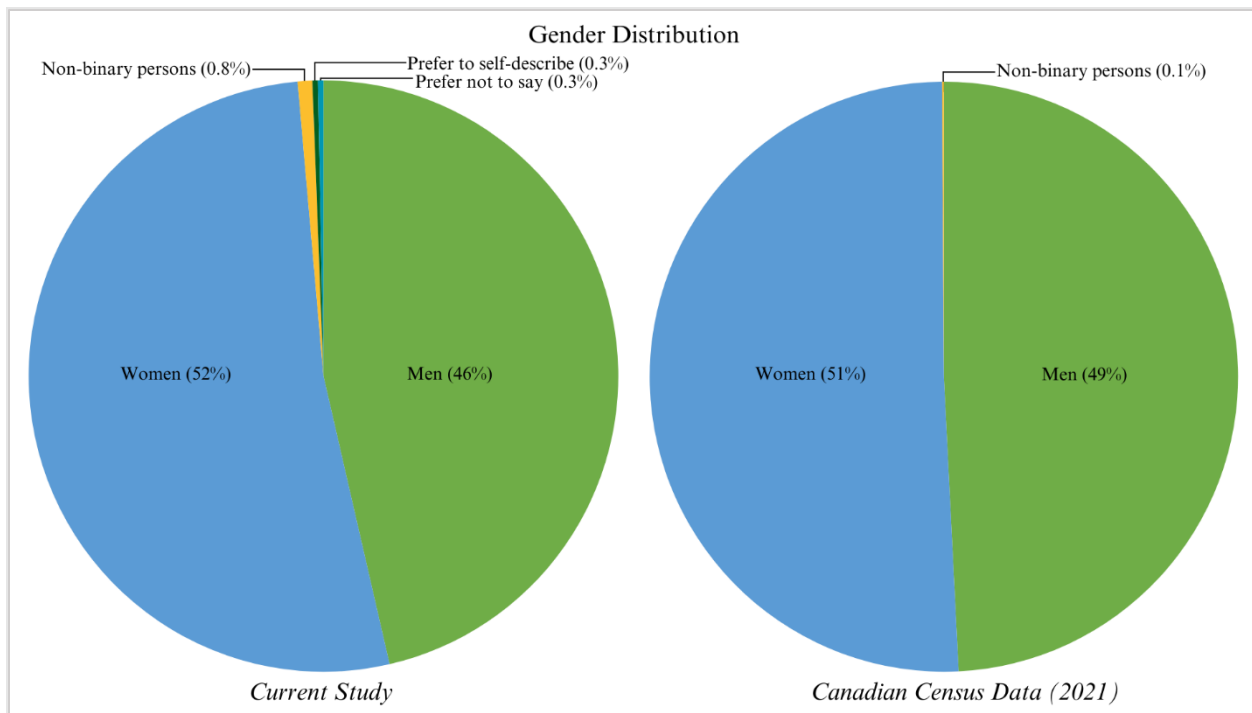


Figure 4.3: Participant gender distribution compared to 2021 Canadian Census data.

Forty-eight percent of participants reported living in Ontario, the highest proportion across all provinces, reflecting the 2021 Canadian population. Prince Edward Island had the smallest proportion of participants, as only 0.3% of individuals reported living in this province, again reflecting the 2021 Canadian population. Participation was open to Canadians from all provinces and territories; however, no individuals from the Yukon, the Northwest Territories, or Nunavut were a part of the study, likely due to small population sizes in those areas. Figure 4.4 shows the participants' location distribution compared to 2021 Canadian Census data (Statistics Canada, 2022d). In this study, British Columbia, Quebec, and the territories are underrepresented, while Nova Scotia and Ontario are overrepresented.

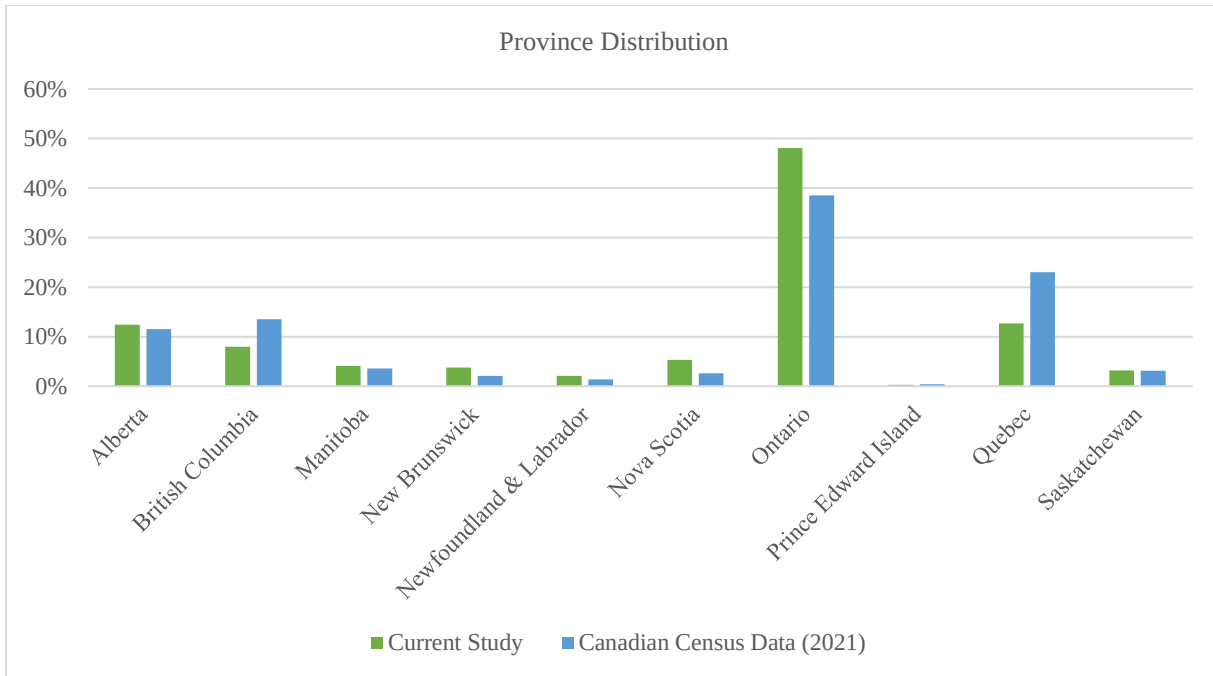


Figure 4.4: Participant location distribution compared to 2021 Canadian Census data.

Seventy-seven percent of participants reported living in an urban area, while 24% reported living in a rural area. This distribution, presented in Figure 4.5, is generally reflective of the Canadian population (Statistics Canada, 2022e). However, urban areas are slightly underrepresented and rural areas are slightly overrepresented.

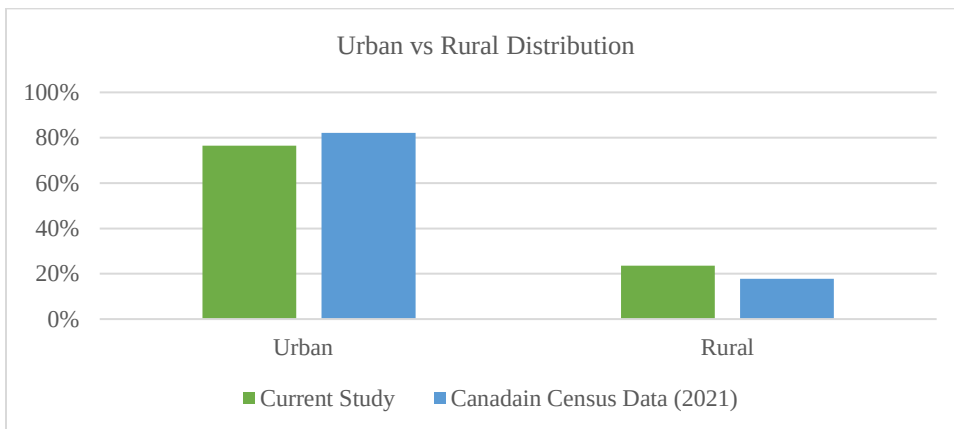


Figure 4.5: Participant urban vs rural distribution compared to 2021 Canadian Census data.

Thirty-six percent of participants held a bachelor's degree or higher, 34% held a postsecondary education or a diploma below the bachelor's level, 26% held a high school or equivalency certificate, 4% held no

education, and 0.3% preferred not to answer. Figure 4.6 portrays participants' education distribution compared to 2021 Canadian Census data (Statistics Canada, 2022b). In this study, individuals with no education are underrepresented, and individuals with postsecondary education are overrepresented.

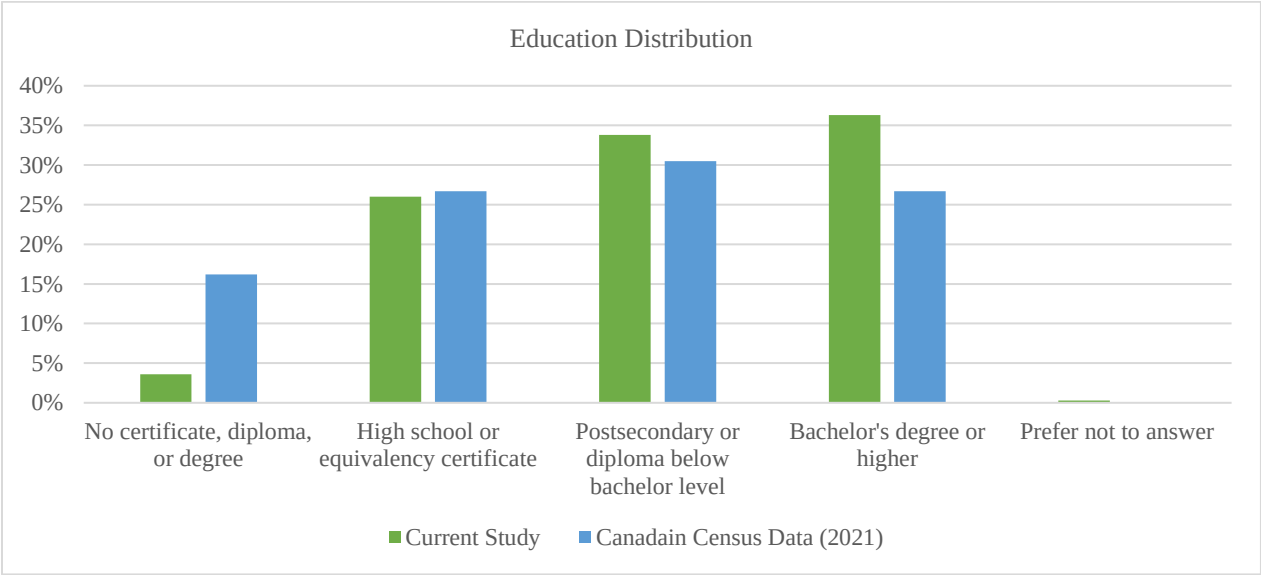


Figure 4.6: Participant education distribution compared to 2021 Canadian Census data.

4.3 Pre-Experiment Analysis

Prior to completing the experiment portion of the study, participants answered survey questions related to their meat consumption behaviours. Table 4.1 provides details of these questions, and associated figures can be found in Appendix B.

Table 4.1: Participant meat consumption behaviours (multiple choice)

“On average, how often do you eat meat or products that include meat?”							
	Daily	Once or twice a week		Once or twice a month		Less than once a month	
N = 357	58.8%	38.4%		2.2%		0.6%	
“Which type of meat do you eat most often?”							
	Chicken	Beef	Pork	Lamb	Veal	Turkey	Other
N = 358	61.2%	29.9%	7.5%	0.6%	0.3%	0.3%	0.3%
“How many of your close family members eat meat regularly?”							
	All of my close family members consume meat regularly	Many of my close family members consume meat regularly		A few of my close family members consume meat regularly		None of my close family members consume meat regularly	
N = 356	72.5%	24.2%		3.4%		0%	
“How many of your close friends eat meat regularly?”							
	All of my close friends consume meat regularly	Many of my close friends consume meat regularly		A few of my close friends consume meat regularly		None of my close friends consume meat regularly	
N = 354	55.4%	39.8%		4.8%		0%	
“How willing are you to reduce the amount of meat you eat?”							
	Very willing	Somewhat willing	Could go either way	Somewhat unwilling		Not willing at all	
N = 358	12.9%	33.8%	27.7%	12.6%		13.1%	

The majority of participants reported eating meat regularly, with 59% eating it daily and 38% eating it once or twice a week. Those with infrequent consumption habits were few and far between, with 2% eating meat once or twice a month and 1% eating it less than once a month. These numbers generally align with previous research by Charlebois et al. (2018), which found that approximately 49% of Canadians eat meat daily, while 40% eat it once or twice a week. The small discrepancy between the findings is likely because this study was limited to meat eaters, while the 2018 research did not exclude participants based on dietary preference.

The most popular type of meat among participants was chicken, with 61% reporting that they eat this type most often. Chicken was followed by beef, with 30% reporting that they eat this type most often. Behind beef were pork (8%), lamb (1%), veal (0.3%), turkey (0.3%), and other (0.3%).

When asked how willing they were to reduce their meat consumption, 13% of participants reported being very willing, 34% reported being somewhat willing, 28% said they could go either way, 13% reported being somewhat unwilling, and 13% reported not being willing at all. Overall, more participants indicated being willing to reduce the amount of meat they eat (47%) than those who indicated being unwilling (26%). These findings align with previous research by Charlebois et al. (2018), who found that about 51% of Canadian participants were willing to reduce their meat consumption, and 24% were unwilling to reduce their meat consumption.

To understand their primary reasons for meat consumption, participants completed a rank-order question, which asked them to rank four common reasons for eating meat in order of importance to them (one being most important and four being least important). The four rank options were taste, health, culture, and social pressures. Table 4.2 provides details of this question, and a visual representation can be viewed in Appendix B.

Table 4.2: Participant reasons for eating meat (ranked order)

“Below are four common reasons people eat meat. Please rank the options below in order of importance to you.” N = 296				
	Taste (I enjoy the taste of meat)	Health (I need meat in my diet to stay healthy)	Culture (meat is an important part of my culture's traditions)	Social Pressures (I would feel embarrassed if I didn't eat meat)
Mean rank	1.54	1.95	2.87	3.65
Rank 1	57.8%	32.4%	6.4%	3.4%
Rank 2	33.1%	47.3%	16.9%	2.7%
Rank 3	6.8%	13.5%	60.1%	19.6%
Rank 4	2.4%	6.8%	16.6%	74.3%

In terms of importance, taste was most often ranked first, health was most often ranked second, culture was most often ranked third, and social pressures were most often ranked fourth. A Friedman test was carried out to compare the rankings for each of the four options, the details of which can be seen in Appendix B. There was found to be a significant difference between the options ($\chi^2 (3, N = 296) = 477.572, p = <0.001$), indicating that participants did not view all four reasons as equally important.

Bonferroni post hoc tests were carried out, and these differences remained significant, suggesting that taste is the primary driver of meat consumption, followed by health, culture, and, finally, social pressures.

An open-ended question also asked participants to provide the main reason they eat meat, allowing for more specific answers than those listed in the rank-order question. A total of 514 reasons were each assigned one of 24 codes that best summarized the content of the response. These 24 codes were then grouped into the larger categories of taste, health, culture, social pressures, and other (Table 4.3). A visual description of this open-ended question and its findings is provided in Appendix B.

Table 4.3: Participant reasons for eating meat (open-ended)

“What is the main reason you eat meat?”		
Taste 42.8 % (<i>n</i> = 220)	General taste	28.4%
	Overall enjoyment	12.5%
	Sensory factors (e.g. smell, texture)	1.2%
	Cravings	0.8%
Health 46.7% (<i>n</i> = 240)	Protein	28.4%
	General health	6.6%
	Satiety	3.5%
	Balanced diet	1.8%
	Energy	1.6%
	Overall nutritional value	1.4%
	Strength/muscle development	1.2%
	Iron	0.8%
	Weight management	0.6%
	Vitamins	0.6%
	Minerals	0.4%
Culture 4.7% (<i>n</i> = 24)	Habit	4.3%
	General culture	0.4%
Social Pressures 1.4% (<i>n</i> = 7)	Household preferences	1.4%
Other 4.5% (<i>n</i> = 23)	Versatility	1.8%
	Convenience	1%
	No specific reason	0.8%
	Affordability	0.6%
	Don't know	0.2%
	Other	0.2%

Common reasons participants gave for eating meat included general taste (28%), protein (28%), overall enjoyment (13%), and general health (7%). When grouped into larger categories, it was found that 47%

of responses were related to health, while 43% were related to taste. These results differ from the rank-order question discussed above, where taste was most often ranked first, and health was ranked second. This is likely because, in the open-ended question, participants could provide multiple answers, giving them the opportunity to mention both taste and health. These results indicate that both taste and health were highly important reasons for eating meat among participants. Reasons related to culture (5%) and social pressures (1%) were much less frequent, the results of which align with those of the rank-order question.

To gauge general attitudes toward meat, participants were asked to indicate how they felt about the food using a five-point graphic slider (Table 4.4). The five-point scale was represented by a smiley face, allowing participants to choose one of five facial expressions that best represented their attitudes toward meat.

Table 4.4: Participant attitudes toward meat (graphic scale)

"Please use the smile to describe how you feel about meat"					
	Very happy face 	Happy face 	Neutral face 	Unhappy face 	Very unhappy face 
N = 347	60.5% (n = 210)	33.4% (n = 116)	4.3% (n = 15)	1.4% (n = 5)	0.3% (n = 1)

Results for the graphic scale question illustrate a hierarchical pattern in the distribution of responses. The majority of participants (61%) expressed a highly positive sentiment toward meat, selecting the “very happy” face on the graphic slider. Following this, a substantial portion (33%) expressed a generally favourable attitude, selecting the “happy” face on the slider. As the attitude options progressed toward the negative end of the spectrum, the percentage of participants selecting these options decreased

progressively, with 4% selecting the “neutral” face, 1% selecting the “unhappy” face, and 0.3% selecting the “very unhappy” face.

To understand participants’ attachment to meat, participants completed Likert scale questions based on the MAQ developed by Graça et al. (2015) (Table 4.5).

Table 4.5: Meat attachment questions (Likert scale)

"Please indicate the extent to which you agree or disagree with the following statements"					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
<i>Hedonism</i>					
To eat meat is one of the good pleasures in life N = 357	0.8%	3.1%	18.5%	49.9%	27.7%
I love meals with meat N = 358	0.6%	2.2%	13.4%	46.9%	36.9%
I'm a big fan of meat N = 355	1.1%	3.1%	21.4%	42.8%	31.5%
<i>Affinity</i>					
I feel bad when I think about eating meat* N = 358	30.5%	31.6%	21.8%	12.3%	3.9%
By eating meat I'm reminded of the death of animals* N = 356	35.4%	27.5%	18%	13.8%	5.3%
To eat meat is disrespectful to the environment* N = 357	33.6%	27.5%	23.2%	11.2%	4.5%
<i>Entitlement</i>					
To eat meat is a right of every person N = 358	2.2%	3.6%	23.2%	36.6%	34.4%
According to our position in the food chain, we have the right to eat meat N = 358	1.4%	7.3%	31%	37.4%	22.9%
Eating meat is a natural practice N = 357	1.4%	3.1%	16%	50.1%	29.4%
<i>Dependence</i>					
If I was forced to stop eating meat I would feel sad N = 356	5.3%	14%	18.3%	38.2%	24.2%
Meat is essential in my diet N = 356	2.8%	7.6%	16.9%	43.3%	29.5%
I can't picture myself not eating meat regularly N = 357	3.4%	13.7%	17.7%	36.7%	28.6%
* Reverse scored items					

The results of the meat attachment questions indicate that the majority of participants view meat consumption as a source of hedonism, have an affinity for meat, feel entitled to eating meat, and are dependent on meat. Looking specifically at the dimension of hedonism, 78% of participants regarded meat as “one of the good pleasures in life,” 84% said they “love meals with meat,” and 74% were “a big fan of meat.” Focusing on the dimension of affinity, 62% of participants disagreed with the statement “I feel bad when I think about eating meat,” 63% disagreed with the statement “By eating meat, I’m reminded of the death of animals,” and 61% disagreed with the statement “To eat meat is disrespectful to the environment.” Referring to the dimension of entitlement, 71% of participants said that “to eat meat is the right of every person,” 60% felt that “according to our position in the food chain, we have the right to eat meat,” and 80% agreed that “eating meat is a natural practice.” Regarding the dimension of dependence, 62% felt that “if [they were] forced to stop eating meat [they] would feel sad,” 73% said that “meat is essential in [their] diet,” and 65% “can’t picture [themselves] not eating meat regularly.” A visual representation of the meat attachment questions and participant responses can be viewed in Appendix B.

Responses to the meat attachment questions were translated into scores, the results of which can be seen in Appendix B. The highest possible score a participant could receive was 60, while the lowest was 12. Higher scores indicate a stronger attachment to meat, and lower scores indicate a weaker attachment. None of the participants scored less than 18 points, but several scored the full 60 points. Individual scores were grouped into the categories of low, medium, and high attachment (Table 4.6).

Table 4.6: Participant meat attachment scores grouped into low, medium, and high

Meat Attachment Levels	
Low (12 - 27 points)	1.7%
Medium (28 - 44 points)	44.1%
High (45 - 60 points)	54.2%

Over half of the participants (54%) were categorized as having high meat attachment, a substantial portion (44%) had medium attachment, and very few (2%) had low attachment. Prior research has found that the higher a person's meat attachment, the less inclined they are to change their eating habits (Graça et al., 2015). As expected, crosstab analysis revealed a statistically significant relationship between participants' willingness to reduce meat and their meat attachment level. More details of this association can be found in Appendix B.

After responding to questions regarding meat attachment, participants completed Likert scale questions related to the risks and benefits of meat production and consumption (Table 4.7).

Table 4.7: Participant beliefs about meat-related risks and benefits (Likert scale)

"Please indicate the extent to which you agree or disagree with the following statements"					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Meat production is harmful to the environment N = 356	11%	17.7%	39.6%	24.7%	7%
Meat production is beneficial to the environment N = 357	7%	19.3%	47.6%	17.1%	9%
Meat-rich diets increase risk of disease N = 358	11.5%	17.9%	37.2%	28.2%	5.3%
Meat is an important part of a healthy diet N = 356	2.3%	3.4%	20.5%	52%	21.9%

The primary objective of these Likert scale questions was to understand participants' meat-related environmental beliefs and gauge their level of knowledge based on these beliefs. However, to distract from the main purpose of the research and prevent participants from guessing the aim of the study, questions related to health were added. Regardless, the results from both types of questions are interesting and can be seen visually in Appendix B. Participants appeared to have a much greater understanding of the health benefits of meat than the health risks, environmental risks, or environmental benefits. Seventy-four percent of participants agreed that "meat is an important part of a healthy diet." No other risk-benefit statement received a consensus one way or another. Looking specifically at the statement related to environmental risks, 32% of participants agreed that "meat production is harmful to the environment," while 29% disagreed, and 40% neither agreed nor disagreed. The large portion of participants who remained neutral indicates that many did not have enough information on the subject to form a definitive opinion. Referring to the statement related to environmental benefits, 26% of participants agreed that "meat production is beneficial to the environment," while 26% disagreed, and 48% neither agreed nor disagreed.

To further understand participants' knowledge of the relationship between meat and the environment, participants were asked to indicate the effectiveness of eating less meat and eating a vegan diet in mitigating climate change (Table 4.8). To distract from the main purpose of the research and prevent participants from guessing the aim of the study, participants were also asked about the effectiveness of several other lifestyle changes, the results of which can be viewed in Appendix B.

Table 4.8: Participant diet-related environmental beliefs (Likert scale)

“For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change”					
	Not effective at all	Not very effective	Don't know	Somewhat effective	Highly effective
Eating less meat N = 357	13.4%	18.5%	25.5%	34.2%	8.4%
Eating a vegan diet (no meat, dairy, fish, or eggs) N = 357	18.5%	18.2%	28.9%	26.3%	8.1%

According to Wynes and Nicholas (2017), eating less meat is a “moderate-impact” individual action for mitigating climate change, while eating a vegan diet is a “high-impact” action. Thirty-four percent of participants correctly indicated that eating less meat is a somewhat effective lifestyle change for fighting climate change; however, only 8% knew that a vegan diet is highly effective. Furthermore, 57% of participants selected “not effective at all,” “not very effective,” or “don’t know” when asked about the strategy of eating less meat. 66% of participants selected “not effective at all,” “not very effective,” or “don’t know” when asked about eating a vegan diet. A visual representation of these findings can be viewed in Appendix B.

4.4 Experiment Analysis

In the experiment portion of the study, participants were asked to select a statement from the choices given to learn more about. Participants in the control group were given four statements to choose from, none of which were framed using information utility. Participants in the experimental group were given six

statements to choose from, two of which used information utility. Tables 4.9a and 4.9b provide an overview of the statement options and participant responses.

Table 4.9a: Control group statement selection (multiple choice)

“Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose.”				
	Eating meat plays a big role in global warming; here's why	Livestock grazing is good for soil health and the environment	Eating meat is associated with serious health risks; here's why	Meat contains essential nutrients important in a healthy diet
<i>n</i> = 178	12.9%	12.9%	20.8%	53.4%

Table 4.9b: Experimental group statement selection (multiple choice)

“Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose.”						
	Eating meat plays a big role in global warming; here's why	Livestock grazing is good for soil health and the environment	Eating meat is associated with serious health risks; here's why	Meat contains essential nutrients important in a healthy diet	Eating meat plays a big role in global warming; how shifting your diet can reduce your impact*	Eating meat is associated with serious health risks; how shifting your diet can extend your life*
<i>n</i> = 180	7.8%	12.8%	15.6%	36.1%	10.6%	17.2%
* Statements using information utility						

It was expected that participants in the control group would be more likely to engage with statements related to meat benefits than risks. This held true for health topics but not environmental topics. Fifty-three percent of participants read about the health benefits of meat, while 21% read about the health risks, indicating a preference for health benefit information over health risk information. This preference was not seen for environmental statements, as an equal number of participants (13%) read about the environmental benefits and the environmental risks.

In the experimental group, it was expected that participants would be more likely to engage with information related to meat risks when the statement used information utility. This held true for both environmental and health topics. Eleven percent of participants chose to read about environmental risks

framed using information utility, while 8% chose to read about environmental risks without information utility framing. Seventeen percent of participants selected the health risks statement framed using information utility, while 16% selected the statement without information utility framing.

In comparing risk statements between the control and experimental groups, it was expected that those framed using information utility would perform better than those without. This was consistent for both environmental and health statements. Given that the control and experimental groups each had a different number of options to choose from, statement selection cannot be directly compared between the two. Therefore, to compare the popularity of statements between the control and experimental groups, Table 4.10 outlines the differences between the observed proportion of responses and the expected proportion of responses for statements in each group, using the deviation to determine whether one statement was selected more than another. As there were four statements to choose from in the control group, the expected proportion of participants selecting any given option was 25%. Because there were six statements to choose from in the experimental group, the expected proportion of participants selecting any given option was 16.7%. The observed proportion of participants who selected the environmental risk statement in the control group was 12.9%, which is 12.1% less than the expected proportion of 25%. The observed proportion for the environmental risk statement using information utility framing in the experimental group was 10.6%, which is 6.1% less than the expected proportion of 16.7%. Given that there is a smaller difference between the observed proportion and the expected proportion in the experimental group (-6.1%) compared to the control group (-12.1%), it can be concluded that the

environmental risk statement framed using information utility in the experimental group was relatively more popular than that without information utility in the control group. Furthermore, the observed proportion of participants who selected the health risk statement in the control group was 20.8%, which is 4.2% less than the expected proportion of 25%. The observed proportion for the health risk statement using information utility framing in the experimental group was 17.2%, which is 0.5% greater than the expected proportion of 16.7%. As the observed proportion was greater than the expected proportion for the experimental group (+0.5%), while the observed proportion was less than the expected proportion for the control group (-4.2%), it can be concluded that participants were more likely to choose the health statement framed using information utility in the experimental group than that without information utility in the control group.

Table 4.10: Statement selections' deviation from expected proportions

Statement	Observed proportion	Expected proportion	Deviation from expected
<i>Control group</i>			
Eating meat plays a big role in global warming; here's why	12.9%	25%	-12.1%
Livestock grazing is good for soil health and the environment	12.9%	25%	-12.1%
Eating meat is associated with serious health risks; here's why	20.8%	25%	-4.2%
Meat contains essential nutrients important in a healthy diet	53.4%	25%	+28.4%
<i>Experimental group</i>			
Eating meat plays a big role in global warming; here's why	7.8%	16.7%	-8.9%
Livestock grazing is good for soil health and the environment	12.80%	16.7%	-3.9%
Eating meat is associated with serious health risks; here's why	15.6%	16.7%	-1.1%
Meat contains essential nutrients important in a healthy diet	36.1%	16.7%	+19.4%
Eating meat plays a big role in global warming; how shifting your diet can reduce your impact	10.6%	16.7%	-6.1%
Eating meat is associated with serious health risks; how shifting your diet can extend your life	17.2%	16.7%	+0.5%

To better understand which participants selected which statements and why, crosstabs were used to compare participants' statement selection to the following pre-experiment variables: demographics, meat consumption behaviours, willingness to reduce, attitudes, meat attachment levels, meat risk and benefit

beliefs, and diet-related environmental beliefs (Tables 4.11 and 4.12). To determine statistical significance, Monte Carlo method tests were conducted for most crosstab analyses, utilizing Fisher-Freeman-Halton exact tests. Additionally, for variables found to be statistically significant, the effect size was measured using Cramer's V.

In the control group, a crosstab analysis revealed a statistically significant relationship between willingness to reduce meat consumption and statement choice, meat attachment level and statement choice, and diet-related environmental beliefs and statement choice. Details of this crosstab analysis can be found in Appendix B.

Table 4.11: Control group crosstabs summary

Control group crosstab analysis summary		
Crosstab	P-Value	Cramer's V
Age cohort * Statement selection	0.171	N/A
Where do you live? * Statement selection	0.780	N/A
Would you consider yourself living in an urban or rural area? * Statement selection	0.632	N/A
How do you identify? * Statement selection	0.204	N/A
What is the highest level of education you have completed? * Statement selection	0.055	N/A
On average how often do you eat meat or products that include meat? * Statement selection	0.461	N/A
Which type of meat do you eat most often? * Statement selection	0.257	N/A
How many of your close family members eat meat regularly? * statement selection	0.398	N/A
How many of your close friends eat meat regularly? * Statement selection	0.367	N/A
How willing are you to reduce the amount of meat you eat? * Statement selection	0.030	0.206
Meat attachment level * Statement selection	0.024	0.195

Please use the smile to describe how you feel about meat * Statement selection	0.399	N/A
Please indicate the extent to which you agree or disagree with the following statement - Meat production is harmful to the environment * Statement selection	0.145	N/A
Please indicate the extent to which you agree or disagree with the following statement - Meat production is beneficial to the environment * Statement selection	0.083	N/A
Please indicate the extent to which you agree or disagree with the following statement - Meat rich diets increase risk of disease * Statement selection	0.960	N/A
Please indicate the extent to which you agree or disagree with the following statement - Meat is an important part of a healthy diet * Statement selection	0.352	N/A
For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change - Eating less meat * Statement selection	<0.001	0.248
For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change - Eating a vegan diet * Statement selection	<0.001	0.239

The crosstab analysis revealed a statistically significant relationship between participants' willingness to reduce meat consumption and their control group statement selection, $p=0.03$. Cramer's V described a moderate association between the two variables, $V=0.206$. Participants across all willingness levels, except for those who said they were "very willing," demonstrated a preference for information related to health benefits. Participants who were "very willing" to reduce their meat consumption preferred the statement related to environmental risks. Additionally, among participants who were "somewhat unwilling" or "not

willing at all” to reduce, the second most common statement selected was that related to environmental benefits. However, this trend was much less pronounced than the preference for health benefit information among these individuals.

The crosstab analysis revealed a statistically significant relationship between participants’ level of meat attachment and their control group statement selection, $p=0.024$. However, Cramer’s V described a weak association between the two variables, $V=0.195$. This weak association may be due to the small number of participants with a low meat attachment level, as only three individuals fell into this category. Participants with high and medium meat attachment demonstrated a preference for health benefit information, while those with low meat attachment demonstrated a preference for health risk information. Additionally, although there does not appear to be a risk-benefit statement selection pattern for participants with high or medium attachment to meat, those with low attachment exclusively chose statements about meat risks. These findings should be accepted with caution due to the weak association and low cell counts.

A statistically significant relationship was found between how effective control group participants believed eating less meat to be in fighting climate change and their statement selection, $p<0.001$. Further analysis revealed a moderate association between the two variables, $V=0.248$. Participants across all response categories, except for “highly effective,” demonstrated a preference for health benefit information. Those who said eating less meat is “highly effective” showed a preference for environmental and health risk information. Additionally, among participants who said eating less meat is “not very effective” or “not effective at all,” the second most common statement selected was that related to environmental benefits. However, this trend was much less pronounced than the preference for health benefit information among these individuals.

The crosstab analysis revealed a statistically significant relationship between how effective control group participants believed eating a vegan diet to be in fighting climate change and their statement

selection, $p < 0.001$. Further analysis found a moderate association between the two variables, $V = 0.237$. Participants across all response categories, except “highly effective,” demonstrated a preference for health benefit information. Those who said eating a vegan diet is “highly effective” exhibited a preference for environmental and health risk information. Additionally, among participants who said following a vegan diet is “not very effective” or “not effective at all,” the second most common statement selected was that related to environmental benefits. However, this trend was much less pronounced than the preference for health benefit information among these individuals.

In the experimental group, a crosstabs analysis revealed a statistically significant relationship between close family members who eat meat regularly and statement choice, willingness to reduce meat consumption and statement choice, meat risk and benefit beliefs and statement choice, and diet-related environmental beliefs and statement choice. Details of this crosstab analysis can be found in Appendix B.

Table 4.12: Experimental group crosstab summary

Control group crosstab analysis summary		
Crosstab	P-Value	Cramer's V
Age cohort * Statement selection	0.742	N/A
Where do you live? * Statement selection	0.584	N/A
Would you consider yourself living in an urban or rural area? * Statement selection	0.124	N/A
How do you identify? * Statement selection	0.236	N/A
What is the highest level of education you have completed? * Statement selection	0.535	N/A
On average how often do you eat meat or products that include meat? * Statement selection	0.287	N/A
Which type of meat do you eat most often? * Statement selection	0.735	N/A
How many of your close family members eat meat regularly? * statement selection	0.029	0.209

How many of your close friends eat meat regularly? * Statement selection	0.230	N/A
How willing are you to reduce the amount of meat you eat? * Statement selection	0.030	0.214
Meat attachment level * Statement selection	0.141	N/A
Please use the smile to describe how you feel about meat * Statement selection	0.103	N/A
Please indicate the extent to which you agree or disagree with the following statement - Meat production is harmful to the environment * Statement selection	0.002	0.232
Please indicate the extent to which you agree or disagree with the following statement - Meat production is beneficial to the environment * Statement selection	0.047	0.211
Please indicate the extent to which you agree or disagree with the following statement - Meat rich diets increase risk of disease * Statement selection	0.226	N/A
Please indicate the extent to which you agree or disagree with the following statement - Meat is an important part of a healthy diet * Statement selection	0.019	0.201
For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change - Eating less meat * Statement selection	0.124	N/A
For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change - Eating a vegan diet * Statement selection	0.002	0.241

The crosstab analysis revealed a statistically significant relationship between the degree to which participants' close family members eat meat regularly and their statement choice in the experimental

group, $p=0.029$. Cramer's V described a moderate association between the two variables, $V=0.209$. Participants who said that "all" of their close family members eat meat regularly demonstrated a strong preference for information related to the health benefits of meat. Participants who said "many" or "a few" of their close family members eat meat regularly displayed a preference for the health risks statement framed using information utility.

The crosstab analysis revealed a statistically significant relationship between participants' willingness to reduce meat consumption and their statement selection in the experimental group, $p=0.03$. Cramer's V described a moderate association between the two variables, $V=0.214$. Similar to the control group, participants across all willingness levels, except for those who said they were "very willing," demonstrated a preference for information related to health benefits. Those who were "very willing" to reduce the amount of meat they eat preferred the statement related to health risks using information utility framing. This differs slightly from the control group, where participants "very willing" most frequently read about environmental risks. As seen in the control group, among participants who were "somewhat unwilling" or "not willing at all" to reduce, the second most common statement selected was that related to environmental benefits.

A statistically significant relationship was found between whether participants in the experimental group believed meat production to be harmful to the environment and their statement selection, $p=0.002$. Further analysis revealed a moderate association between the two variables, $V=0.232$. Participants who said they "neither agree nor disagree," "disagree," or "strongly disagree" that meat production is harmful to the environment demonstrated a preference for information related to health benefits. Those who said they "agree" showed an equal interest in all health-related topics, regardless of whether they focused on risks or benefits. Participants who said they "strongly agree" preferred the health risks statement using information utility.

The crosstab analysis revealed a statistically significant relationship between whether participants in the experimental group believed meat production to be beneficial to the environment and their statement selection, $p=0.047$. Further analysis found a moderate association between the two variables, $V=0.211$. Participants who said they “strongly disagree” that meat production benefits the environment demonstrated a preference for health risk information. Participants who said they “disagree” that meat production benefits the environment showed a preference for health risk information framed using information utility. Those who said they “neither agree nor disagree” exhibited a preference for health benefit information. Participants who said they “agree” that meat production benefits the environment also displayed a preference for health benefit information. Participants who said they “strongly agree” that meat production benefits the environment were most interested in health and environmental benefit information.

A statistically significant relationship was found between whether participants believed meat to be an important part of a healthy diet and their statement selection in the experimental group, $p=0.019$. Further analysis revealed a moderate association between the two variables, $V=0.201$. Participants who said they “agree” or “strongly agree” that meat is an important part of a healthy diet demonstrated a preference for information related to health benefits. Those who said they “neither agree nor disagree” exhibited a preference for the health risk topic framed using information utility. Participants who said they “disagree” that meat is an important part of a healthy diet displayed a preference for the environmental risk topic using information utility. Participants who said they “strongly disagree” that meat is an important part of a healthy diet showed a preference for the health risk topic using information utility.

The experimental group crosstab analysis revealed a statistically significant relationship between how effective participants believed eating a vegan diet to be in fighting climate change and their statement selection, $p=0.002$. Further analysis found a moderate association between the two variables, $V=0.241$.

Participants who said eating a vegan diet is “not very effective” or “not effective at all” demonstrated a preference for health benefit information. Those who said they “don’t know” also exhibited a preference for health benefit information. Participants who said eating a vegan diet is “somewhat effective” showed interest in several topics but appeared least interested in the environmental benefit statement and the environmental risk statement. Participants who said eating a vegan diet is “highly effective” displayed a preference for the health risk topic framed using information utility.

4.5 Post-Experiment Analysis

Following the experiment portion of the study, participants were asked why they selected the statement they did, if they learned anything new, if what they read changed how they would make future dietary decisions, if the information influenced their attitude toward meat, and how willing they were to reduce their meat consumption post-experiment. Table 4.13 provides an overview of why participants chose to read about the information they did, and related figures can be found in Appendix B.

Table 4.13: Participants reasons for their statement selection (open-ended)

“Why did you choose this statement over the others listed?”							
N = 351							
	All statements	Environmental risk ^a n = 36	Environmental benefit ^b n = 45	Health risk ^c n = 64	Health benefit ^d n = 158	Environmental risk + information utility ^e n = 17	Health risk + information utility ^f n = 31
General interest in topic or statement	20.5%	16.7%	31.1%	18.8%	14.6%	29.4%	38.7%
Lack of knowledge or interested in learning more	25.4%	44.4%	22.2%	48.4%	12%	17.6%	32.3%
Confirmation of prior knowledge, attitudes, and/or beliefs	31.9%	8.3%	37.8%	14.1%	48.7%	5.9%	16.1%
Skeptical of information	0.6%	0%	0%	1.6%	0%	0%	3.2%
Topic appeared legitimate, scientific, or convincing	1.7%	2.8%	0%	0%	1.9%	5.9%	3.2%
Chose randomly or no specific reason	3.4%	8.3%	2.2%	4.7%	2.5%	5.9%	0%
Reason unclear	16.5%	19.4%	6.7%	12.5%	20.3%	35.3%	6.5%
a) Eating meat plays a big role in global warming; here's why b) Livestock grazing is good for soil health and the environment c) Eating meat is associated with serious health risks; here's why d) Meat contains essential nutrients important in a healthy diet e) Eating meat plays a big role in global warming; how shifting your diet can reduce your impact f) Eating meat is associated with serious health risks; how shifting your diet can extend your life							

The most common reason participants gave for selecting the statement they did was to confirm prior knowledge, attitudes, or beliefs. Examples of this reason included believing the statement to be true or preferring to read about information that supported their eating habits. The second most common reason for statement selection was to learn more. Responses coded into this category ranged from those who stated having no prior knowledge of the topic to those who wanted to be reminded of specific details or facts.

A crosstab analysis using a Monte Carlo method test and employing a Fisher-Freeman-Halton exact test revealed a statistically significant relationship between participants' statement selection and their reason for choosing the topic they did, $p < 0.001$. Cramer's V described a moderate association between the two variables, $V = 0.240$. More details of this relationship can be found in Appendix B.

The most frequently cited reason for choosing to read about information related to meat benefits was to confirm prior knowledge, attitudes, or beliefs. The most common reason for choosing to read about information related to meat risks framed without information utility was the desire to learn more. The predominant reason for choosing to read about information related to meat risks framed using information utility was having a general interest in the topic. As this reason differs from the most common reason for selecting the meat risks topics without information utility framing, it may suggest that the framing technique influenced participants to choose these topics out of curiosity rather than an explicit desire to learn more.

Table 4.14 provides an overview of the remaining post-experiment follow-up questions. The majority of participants (61%) did not learn anything new from the information they read in the experiment portion of the study. Crosstab analysis did not find a statistically significant association between whether participants learned something new and the statement they selected, indicating that no topic was more informative than another. Details of this crosstab analysis can be viewed in Appendix B. Participants who said that they learned something new from the information provided were asked to specify what they learned in an open-ended question. These responses can be found in Appendix B.

Table 4.14: Post-experiment follow-up questions (multiple choice)

“Thinking about the information you just read about meat, did you learn anything new?”					
	Yes		No		
N = 358	38.8% (n = 139)		61.2% (n = 219)		
“Reflecting on what you just read about meat, did any of the information change how you will make dietary decisions in the future?”					
	Yes		No		
N = 358	21.8% (n = 78)		78.2% (n = 280)		
“Did the information you read change your attitude toward eating meat?”					
	Yes, the information I read made me more favourable toward eating meat		Yes, the information I read made me less favourable toward eating meat	No, the information I read did not change my attitude toward eating meat	
N = 358	16.2% (n = 58)		26.8% (n = 96)	57% (n = 204)	
“Reflecting on the information you read, how willing are you to reduce the amount of meat you eat?”					
	Very willing	Somewhat willing	Could go either way	Somewhat unwilling	Not willing at all
N = 358	14.8% (n = 53)	25% (n = 93)	29.3% (n = 105)	9.8% (n = 35)	20.1% (n = 72)

Most participants (78%) said that the information they read in the experiment portion of the study would not influence their future dietary decisions. Participants who *did* say that the information changed how they will make future dietary decisions were asked to specify these changes in an open-ended question. These responses can also be found in Appendix B.

A crosstab analysis using a Monte Carlo method test and employing a Fisher-Freeman-Halton exact test found a statistically significant relationship between participants’ statement selection in the control group and whether they said the information provided changed how they will make future dietary decisions, $p < 0.001$. Cramer’s V described a moderate association between these two variables, $V = 0.398$. A statistically significant relationship was also found between participants’ statement selection in the experimental group and whether they said the information provided changed how they will make future dietary decisions, $p < 0.001$. Further analysis found a relatively strong association between these two

variables, $V=0.428$. Tables 4.15a and 4.15b provide an overview of this relationship. Crosstab details and visual descriptions can be viewed in Appendix B.

Table 4.15a: Control group responses for whether the information they read changed how they will make future dietary decisions organized by statement selection

“Did any of the information change how you will make dietary decisions in the future?”				
	Environmental risk ^a <i>n</i> = 23	Environmental benefit ^b <i>n</i> = 23	Health risk ^c <i>n</i> = 37	Health benefit ^d <i>n</i> = 95
Yes	43.5%	13%	43.2%	8.4%
No	56.5%	87%	56.8%	91.6%
a) Eating meat plays a big role in global warming; here’s why b) Livestock grazing is good for soil health and the environment c) Eating meat is associated with serious health risks; here’s why d) Meat contains essential nutrients important in a healthy diet				

Table 4.15b: Experimental group responses for whether the information they read changed how they will make future dietary decisions organized by statement selection

“Did any of the information change how you will make dietary decisions in the future?”						
	Environmental risk ^a <i>n</i> = 14	Environmental benefit ^b <i>n</i> = 23	Health risk ^c <i>n</i> = 28	Health benefit ^d <i>n</i> = 65	Environmental risk + information utility ^e <i>n</i> = 19	Health risk + information utility ^f <i>n</i> = 31
Yes	21.4%	0%	35.7%	10.8%	21.1%	54.8%
No	78.6%	100%	64.3%	89.2%	78.9%	45.2%
a) Eating meat plays a big role in global warming; here’s why b) Livestock grazing is good for soil health and the environment c) Eating meat is associated with serious health risks; here’s why d) Meat contains essential nutrients important in a healthy diet e) Eating meat plays a big role in global warming; how shifting your diet can reduce your impact f) Eating meat is associated with serious health risks; how shifting your diet can extend your life						

In the control group (Table 4.15a), most participants said that the information provided did not change how they would make future dietary decisions, regardless of their statement selection. However, those who read about meat-related risks were more likely to say that the information changed how they would make future dietary decisions compared to those who read about meat benefits.

In the experimental group (Table 4.15b), most participants said that the information provided did not change how they would make future dietary decisions, regardless of their statement selection, except for those who read about health risks framed using information utility. Just over half of participants (55%)

who read about health risks framed using information utility said that information *did* change how they would make future dietary decisions.

For 57% of participants, the information they read did not change their attitude toward eating meat. 27% said that the information made them less favourable toward eating meat, and 16% said the information made them more favourable toward eating meat (Table 4.16a). A Monte Carlo method test employing a Fisher-Freeman-Halton exact test found a statistically significant relationship between participants' statement selection in the control group and whether the information provided changed their attitude toward meat, $p < 0.001$. Further analysis found a relatively strong association between these two variables, $V = 0.405$. A statistically significant relationship was also found between participants' statement selection in the experimental group and whether the information provided changed their attitude toward meat, $p < 0.001$. Further analysis found a relatively strong association between these two variables, $V = 0.408$. Tables 4.16a and 4.16b provide an overview of this relationship. Crosstab details and visual descriptions can be viewed in Appendix B.

Table 4.16a: Control group responses for whether the information they read changed their attitude toward meat organized by statement selection

“Did the information you read change your attitude toward eating meat?”				
	Environmental risk ^a <i>n</i> = 23	Environmental benefit ^b <i>n</i> = 23	Health risk ^c <i>n</i> = 37	Health benefit ^d <i>n</i> = 95
Yes, the information I read made me more favourable toward eating meat	17.4%	17.4%	8.1%	24.2%
Yes, the information I read made me less favourable toward eating meat	56.5%	0%	62.2%	10.5%
No, the information I read did not change my attitude toward eating meat	26.1%	82.6%	29.7%	65.3%
a) Eating meat plays a big role in global warming; here's why b) Livestock grazing is good for soil health and the environment c) Eating meat is associated with serious health risks; here's why d) Meat contains essential nutrients important in a healthy diet				

Table 4.16b: Experimental group responses for whether the information they read changed their attitude toward meat organized by statement selection

“Did the information you read change your attitude toward eating meat?”						
	Environmental risk ^a <i>n</i> = 14	Environmental benefit ^b <i>n</i> = 23	Health risk ^c <i>n</i> = 28	Health benefit ^d <i>n</i> = 65	Environmental risk + information utility ^e <i>n</i> = 19	Health risk + information utility ^f <i>n</i> = 31
Yes, the information I read made me more favourable toward eating meat	21.4%	8.7%	7.1%	23.1%	0%	6.5%
Yes, the information I read made me less favourable toward eating meat	35.7%	4.3%	50%	4.6%	36.8%	64.5%
No, the information I read did not change my attitude toward eating meat	42.9%	87%	42.9%	72.3%	63.2%	29%
a) Eating meat plays a big role in global warming; here’s why b) Livestock grazing is good for soil health and the environment c) Eating meat is associated with serious health risks; here’s why d) Meat contains essential nutrients important in a healthy diet e) Eating meat plays a big role in global warming; how shifting your diet can reduce your impact f) Eating meat is associated with serious health risks; how shifting your diet can extend your life						

In the control group, the majority of participants who read about meat-related risks said that the information provided made them less favourable toward eating meat. Conversely, most participants who read about meat-related benefits said that the information did not change their attitudes toward meat.

In the experimental group, again, the majority of participants who read about meat-related benefits said that the information did not change their attitudes toward meat. However, participants who read about environmental risks (either framed with information utility or without) were most likely to say that the information provided did not change their attitudes toward meat. In contrast, participants who read about health risks (either framed with information utility or without) were most likely to say that the information made them less favourable toward eating meat. Additionally, a greater proportion of participants decreased their positive attitudes toward meat after reading about health risks with information utility framing than health risks without information utility framing.

A Monte Carlo method test employing a Fisher-Freeman-Halton exact test found a statistically significant relationship between control group participants' statement selection and their willingness to eat less meat post-experiment, $p < 0.001$. Further analysis found a moderate association between these two variables, $V = 0.312$. Crosstab analysis also found a statistically significant relationship between experimental group participants' statement selection and their willingness to eat less meat post-experiment, $p < 0.001$. Further analysis found a moderate association between these two variables, $V = 0.263$. Details of this relationship can be found in Appendix B.

To better understand whether participants' willingness to reduce their meat consumption changed based on the information they read, post-experiment willingness was compared with statement selection filtered by pre-experiment willingness (Appendix B). For many participants in both the control and experimental groups, the information provided did not change their willingness to eat less meat. For instance, those who were "very willing" pre-experiment generally remained "very willing" post-experiment. Similar findings were found for all willingness levels. More often than not, individuals who moved willingness levels post-experiment reduced their willingness to eat less meat after reading about the benefits of meat.

4.6 Summary of Results

This chapter presented and analyzed this study's findings organized into four main sections: demographic analysis, pre-experiment analysis, experiment analysis, and post-experiment analysis. The demographic analysis found that the sample was generally representative of the Canadian adult population in terms of age, gender, geographic location, and education level.

In the pre-experiment analysis, 59% of participants reported eating meat daily, with 38% eating it once or twice a week. Chicken was the type of meat eaten most often, followed by beef. Additionally, taste

and health were revealed as the two most important reasons for eating meat. Furthermore, 61% of participants expressed having very positive attitudes toward meat, and 54% were found to be highly attached to meat. Despite these favourable attitudes, more indicated being willing to reduce the amount of meat they eat (47%) than those who indicated being unwilling (26%). However, very few participants had a strong understanding of the relationship between meat and the environment. Approximately one-third had moderate knowledge of the subject, while one-fourth harboured misconceptions, believing that meat production benefits the environment.

The experiment analysis concluded that, in general, participants showed a greater preference for meat-related health information than meat-related environmental information. Additionally, in both the control and experimental groups, participants showed a stronger interest in health benefit information than health risk information. In the control group, participants were more likely to select statements related to meat benefits if they were unwilling to reduce their meat consumption, did not believe eating less meat to be an effective strategy for fighting climate change, or did not believe eating a vegan diet to be an effective strategy for fighting climate change. Participants were more likely to select statements related to meat risks if they had a low attachment to meat, believed eating less meat to be “highly effective” in fighting climate change, or believed eating a vegan diet to be “highly effective” in fighting climate change. In the experimental group, information utility framing appeared to be successful in increasing engagement with health risk information but only for those with one or more family members who do not eat meat regularly, those who were “very willing” to reduce their meat consumption, those who “strongly agree[d]” that meat production is harmful to the environment, those who “disagree[d]” that meat production is beneficial to the environment, those who “strongly disagree[d]” that meat is an important part of a healthy diet, those who “neither agree[d] nor disagree[d]” that meat is an important part of a healthy diet, or those who believed that eating a vegan diet is “highly effective” in fighting climate change. Information utility

appeared to be successful in increasing engagement with environmental risk information for only those who “disagree[d]” that meat is an important part of a healthy diet. Table 4.15 provides a summary of which statements participants were likely to select across both the control and experimental groups based on their prior attitudes and beliefs.

The post-experiment analysis established that the most frequently cited reason for choosing to read about meat benefits was to confirm prior knowledge, attitudes, and beliefs. The primary reason for choosing to read about meat risks was the desire to learn more, aligning with the finding that few participants had a strong understanding of the environmental impact of meat. The predominant reason for choosing to read about meat risks framed using information utility was having a general interest in the topic. The most common reason for statement selection overall was to confirm prior knowledge, attitudes, and beliefs, aligning with the finding that 61% of participants did not learn anything new from the information they read. Additionally, for the majority of participants, the information did not influence their future dietary decisions, except among those who read about health risks framed using information utility. Of these participants, 55% said that information *did* change how they would make future dietary decisions. Furthermore, for almost all participants who read about meat benefits, the information provided did not change their attitudes toward meat. Conversely, participants who read about health risks (either framed with information utility or without) were most likely to report that the information provided made them less favourable toward eating meat. Lastly, in general, the information provided did not change participants’ willingness to eat less meat.

Table 4.15: Summary of which statements participants were likely to select in the experiment based on their prior attitudes and beliefs

Experiment Analysis Summary			
<i>Control Group</i>		<i>Experimental Group</i>	
Participants who were more likely to select statements related to meat benefits: • Were unwilling to reduce their meat consumption • Did not believe eating less meat to be an effective strategy in fighting climate change • Did not believe eating a vegan diet to be an effective strategy in fighting climate change	Participants who were more likely to select statements related to meat risks: • Had a low attachment to meat • Believed eating less meat to be “highly effective” in fighting climate change • Believed eating a vegan diet to be “highly effective” in fighting climate change	Participants who were more likely to select health risk statements using information utility framing: • Had one or more family members who did not eat meat regularly • Were “very willing” to reduce their meat consumption • “Strongly agree[d]” that meat production is harmful to the environment • “Disagree[d]” that meat production is beneficial to the environment • “Strongly disagree[d]” that meat is an important part of a healthy diet • “Neither agree[d] nor disagree[d]” that meat is an important part of a healthy diet • Believed eating a vegan diet to be “highly effective” in fighting climate change	Participants who were more likely to select environmental risk statements using information utility framing: • “Disagree[d]” that meat is an important part of a healthy diet

Chapter 5: Discussion & Conclusions

5.1 Introduction to Discussion & Conclusions

The preceding chapter presented the analysis and findings from this study's baseline survey, experiment, and follow-up survey. This chapter will provide a summary of the study, a discussion of the findings, implications for practice, recommendations for future research, and conclusions.

5.2 Summary of the Study

The purpose of this study was to examine the relationship between meat-related attitudes, attachment, and beliefs (independent variables) and selective exposure (dependent variable) for Canadian participants in an online information environment using information utility as a moderator. The research aimed to understand selective exposure as an enabler of people's attachment to meat consumption. To fulfill the study's purpose, the following research questions were explored:

1. What level of knowledge do consumers in Canada have about the impacts of meat on the environment?
2. How do meat-related attitudes, attachments, and beliefs influence selective exposure to meat-related risk information for Canadian consumers?
3. How does information utility influence patterns of selective exposure to meat-related risk information for consumers in Canada?
4. Can information utility framing decrease positive attitudes toward meat consumption among Canadian consumers?

The theory of selective exposure, which refers to the tendency to prefer attitude-confirming over attitude-challenging information (Festinger, 1957), was used to explore these research questions. In applying the

theory of selective exposure to this study, participants' meat-related attitudes, attachment, and beliefs independent variables) were expected to influence their self-selected exposure to information (dependent variable). Furthermore, information utility, which refers to whether material can benefit future decision-making, was expected to moderate the selective exposure effect. It was assumed that if the information presented was useful or beneficial, participants would be more willing to engage with attitude-discrepant messages (Knobloch-Westerwick & Kleinman, 2012). A sample of 361 Canadian adults participated in the study, completing a baseline survey, experiment, and follow-up survey. Multiple-choice, open-ended, rank-order, graphic slider, and Likert scale questions were used to collect data on participants' attitudes and attachment toward meat consumption (baseline survey), selective exposure biases for information related to meat risks (experiment), and attitudes towards meat post-experiment (follow-up survey). The following section will provide a discussion of this study's findings.

5.3 Discussion of the Findings

5.3.1 Canadian Consumers' Knowledge of the Environmental Impact of Meat

This study's first research question asked, "What level of knowledge do consumers in Canada have about the impacts of meat on the environment?" The study's results indicate that, in general, Canadian adults have a poor understanding of the environmental impact of meat production. Overall, the findings suggest that approximately one-third of participants had at least a moderate level of knowledge related to the environmental impact of meat production; however, very few had a strong understanding of the subject. Additionally, about one-fourth of participants harboured misconceptions about the topic, believing that meat production benefits the environment. These findings align with previous research, which has found that consumers in high-income countries tend to underestimate or ignore the negative impact that meat has on the environment (de Boer et al., 2016; Hartmann et al., 2021; Pohjolainen et al., 2016; Slotnick et

al., 2022; Truelove & Parks, 2012). Specifically, this study's findings reflect those reported by Pohjolainen et al. (2016), who found that approximately a third of Finnish participants were aware of the environmental issues of the meat sector, almost half were unsure, and close to a quarter opposed the idea that meat production is harmful to the environment.

5.3.2 Influence of Dietary Attitudes on Selective Exposure to Meat-Related Risk Information

This study's second research question asked, "How do meat-related attitudes, attachments, and beliefs influence selective exposure to meat-related risk information for consumers in Canada?" The study's results indicate that Canadian consumers engage in selective exposure to meat-related information in that they prefer material that aligns with their pre-existing dietary attitudes, knowledge, and beliefs. This conclusion is particularly supported by the finding that the most common reason for participants' statement selection was to confirm their prior knowledge, attitudes, or beliefs. Additionally, willingness to reduce meat consumption, meat attachment, and diet-related environmental beliefs were found to be predictors of selective exposure to meat-related information. Participants were more likely to select statements related to meat benefits if they were unwilling to reduce their meat consumption, did not believe eating less meat to be an effective strategy for fighting climate change, or did not believe eating a vegan diet to be an effective strategy for fighting climate change. Participants were likelier to select statements related to meat risks if they had a low attachment to meat, believed eating less meat to be "highly effective" in fighting climate change, or believed eating a vegan diet to be "highly effective" in fighting climate change. These findings align with those found in previous studies (Gaspar et al., 2016; Lueders et al., 2022) as well as what was expected based on the theory of selective exposure.

However, it was also expected that participants' selective exposure to information would be influenced by their general attitudes toward meat, which was not the case. One reason for this discrepancy could be that because the study's attitude question asked participants to describe how they feel about meat,

participants may have interpreted the question to mean how they feel about the taste of meat, which was found to be one of the primary reasons for eating the food. As a result, the majority of participants may not have taken into consideration their willingness to reduce the amount of meat they eat or their knowledge about the drawbacks of meat. Therefore, this question could have collected inaccurate data about participants' true attitudes toward meat, influencing the study's results.

Other variables that were not correlated with selective exposure included age, gender, living location, and education level. No statistical significance was found between any demographic variable and statement selection, even though it could be anticipated that demographics may play a role in topic choice. Gender, for instance, could be expected to influence participants' statement selection as women tend to be higher in the traits of openness and agreeableness than men (Weisberg et al., 2011), making women more likely to engage with information that challenges their pre-existing dietary patterns. However, the influence of pre-existing attitudes, beliefs, or meat attachment could explain the lack of a statistically significant relationship between these two variables. It is possible that attitudes, beliefs, and meat attachment are stronger predictors of selective exposure than demographic variables.

5.3.3 Influence of Information Utility on Patterns of Selective Exposure

Research question three asked, "How does information utility influence patterns of selective exposure to meat-related risk information for consumers in Canada?" The study's results suggest that information utility can influence selective exposure to meat-related risk information, but only for individuals with one or more family members who do not eat meat regularly, those who are very willing to reduce their meat consumption, those who "strongly agree" that meat production is harmful to the environment, those who do not believe eating meat to be an important part of a healthy diet, or those who believe that eating a vegan diet is "highly effective" in fighting climate change. In other words, information utility may be useful for encouraging engagement with meat-related risk material among those already open to messaging which counters their dietary patterns. The framing strategy may act as the final "push" some

consumers need to interact with attitude-discrepant meat-related risk communication. In the context of meat reduction, these consumers may fall into the contemplation stage of behaviour change (Prochaska & DiClemente, 1983), meaning they are considering adopting a vegetarian or vegan diet. Information utility is unlikely to convince a person strongly attached to meat to read about the risks of meat consumption. These individuals who are unwilling to read about the risks of meat consumption likely fall into the pre-contemplation stage of behaviour change, aligning with previous research, which suggests the majority of consumers are at this stage (Bryant et al., 2023; Wolstenholme et al., 2021; Wyker & Davison, 2010).

The study's results also indicate that information utility framing is likely to be more effective in encouraging engagement with meat-related risk material when the messaging is related to personal health rather than the environment. The same result was found for messages framed without information utility. These findings align with those of previous research, which has found that individuals tend to favour information that is related to the self over information that is not (Cosme et al., 2023; Green & Peloza, 2014; Kwong, 2021). Although both information utility messages in this study were designed to have personal relevance, it is possible that this study's participants found the health statements to be more personally relevant than the environmental statements overall. As global warming is largely an "invisible" issue in high-income countries, participants may have better understood the magnitude and likelihood of health-related threats, thereby increasing the utility of this information.

5.3.4 Decreasing Positive Attitudes Toward Meat Consumption Through Information Utility

This study's final research question asked, "Can information utility framing decrease positive attitudes toward meat consumption among Canadian consumers?" The study's results suggest that information utility can influence dietary decisions and decrease positive attitudes toward meat consumption for those willing to engage with the material. These findings held true only for information related to health risks. However, health risk messaging framed using information utility appears to be more effective in

influencing dietary decisions and decreasing positive attitudes toward meat than health risk messaging framed without information utility. Using information utility to frame messages related to the environmental risks of meat production is unlikely to be effective in changing consumer behaviours and attitudes. Additionally, while information utility framing may be a useful strategy for encouraging sustainable diets and decreasing positive attitudes toward meat, risk communication alone is unlikely to influence the majority's dietary decisions, attitudes, or willingness to decrease their meat consumption.

5.3.5 Meat Consumption Habits in Canada

Beyond those associated with this study's research questions, several other findings provide valuable additions to the literature on meat consumption in Canada. For instance, the study's results indicate that Canadians hold strong positive attitudes toward meat and are highly attached to the food. Despite their favourable attitudes toward meat, more are willing to reduce the amount of meat they eat than those who are unwilling, which aligns with research by Charlebois et al. (2018). However, the majority of Canadians eat meat daily, and those with infrequent consumption habits are few and far between, again reflecting research by Charlebois et al. (2018). Chicken was found to be the type of meat eaten most often, followed by beef. While less popular than chicken, beef is the largest contributor to food-system GHG emissions globally (Poore & Nemecek, 2018) and has an estimated protein-based emissions intensity over 11 times that of chicken (Dyer et al., 2010). These findings indicate a need to discourage meat consumption among Canadian consumers. As taste was a primary reason for eating meat among participants in this study, strategies aimed at addressing this concern may be beneficial in promoting sustainable diets. Health was another main reason for eating meat, providing support for why health messages performed better than environmental messages in this research.

5.4 Implications for Practice

The findings of this study have implications for persons interested in strategies for communicating sustainable diets, including practitioners, not-for-profit organizations, policymakers, the media, and academics. For practitioners, not-for-profit organizations, policymakers, and the media, the study offers insights on how to better communicate the risks of meat consumption to target audiences. This research confirms that Canadian consumers engage in selective exposure to meat-related risk information, preferring material that reinforces their meat attachment or aligns with their beliefs. Therefore, marketers may find it beneficial to know that information campaigns designed to reduce meat consumption are not likely to reach those unwilling to reduce the amount of meat they eat. Additionally, the study identifies information utility as a tool for promoting meat-less diets in high-choice online environments, in which consumers can access a variety of media content, easily selecting and avoiding information based on their preferences. Utilizing information utility in communications aimed at consumers open to changing their dietary habits may enhance professional practice, allowing marketers to better reach their target audiences in these high-choice information environments.

For the academic sector, this study provides added findings and discourse on selective exposure, meat-less diet communication, and environmental risk communication. Specifically, the study explored the selective exposure bias related to meat risk information, an area which only a few previous studies have investigated. Additionally, this research addressed research gaps related to Canadians' meat-related environmental knowledge and the use of information utility as a moderator for selective exposure. Examining these literature gaps generated insights for further research, which may be valuable to academics in the field. For instance, the research found that information utility framing may influence selective exposure tendencies only for those open to changing their diet, indicating that further work is needed in developing communication strategies aimed at consumers strongly attached to eating meat.

5.5 Limitations & Recommendations for Future Research

The researcher acknowledges that every study has benefits and restrictions related to its boundaries and methodology. The following section will address the limitations of the current study, giving way to recommendations for future research. The study had limitations concerning its boundaries, recruitment process, instrumentation, and overall research design.

5.5.1 Boundaries & Scope

To keep within the length requirements of this thesis, the current study was limited to exploring meat-related message framing and did not explicitly explore plant-based diet communication strategies. However, vegan diet messaging is an equally important area of investigation, as encouraging these diets is crucial for mitigating global warming (Gerber et al., 2013; IPCC, 2022b; Xu et al., 2021). This study confined its scope to examining meat-related communication techniques because previous research has demonstrated that the majority of Canadians eat meat regularly (Charlebois et al., 2018) and only about a third are actively attempting to reduce their consumption (Clark & Bogdan, 2019), indicating a need to encourage meat-less diets within the country. Additionally, because veganism is subject to a higher degree of social stigma than vegetarianism (Nezlek et al., 2023; Paslakis et al., 2020; Reuber & Muschalla, 2022), Canadians may interact with and respond to plant-based messaging differently than they do meat-less diet messaging. Therefore, future research should consider conducting a similar study focused on the communication of vegan diets.

Future research might also explore alternative ways of framing meat-related risk communication that reduce psychological defensiveness and selective exposure bias. For instance, while there are several reasons individuals may choose not to eat meat, this study focused only on health and environmental motivations. Future research could examine whether using information utility to frame the financial or

animal welfare benefits of sustainable diets may motivate selective exposure. Additionally, this study found that taste and health are the two primary reasons Canadians eat meat. The research demonstrated that health messaging can help override selective exposure tendencies for some individuals, suggesting that taste messaging may also be useful in achieving this goal. No studies have been conducted investigating framing meat-less diets as tasty as a strategy for influencing selective exposure, indicating a gap for future research.

Lastly, to keep within the boundaries and scope of its objectives, the current study limited participants to only those who eat meat. Because the research aimed to understand selective exposure as a driver of positive bonds toward meat consumption and information utility as a strategy for mitigating this selection bias, individuals who identified as vegan or vegetarian were excluded from this study. The results, therefore, do not provide insights into the extent to which meat abstainers engage in selective exposure. Future research might conduct a similar experiment using statements focused on the risks and benefits of meat-free diets with vegan or vegetarian participants. As previous studies have found that people who eat a meat-less diet are higher in openness and agreeableness than meat eaters (Tan et al., 2021; Pfeiler & Egloff, 2018; Keller & Siegrist, 2015), it is possible that these individuals would not engage in selective exposure to the same degree that omnivores do. These findings would add to the literature on the personalities and behaviours of vegans and vegetarians, providing additional understanding as to why these individuals choose to follow meat-less diets.

5.5.2 Recruitment Process

Another limitation of this study relates to its recruitment process. Using a third-party recruitment service to identify participants for this study allowed for a broad range of participants in terms of age, gender, location, and education level. However, this approach limited participants to only registered clients of the platform, narrowing participants to those with lifestyles or personalities likely to complete online studies in their spare time. This limitation was accepted as a trade-off for a diverse scope of participants and quicker data collection.

5.5.3 Instrumentation

While valuable for capturing personal insights and experiences, this study's use of self-reported data may have unintentionally limited the collection of accurate information due to memory recall issues, social desirability bias, or misunderstandings of the questions. Social desirability bias can lead participants to answer in ways they perceive as more favourable or acceptable rather than truthfully. Moreover, the subjective nature of self-reporting means that responses can be influenced by individual perceptions and interpretations, which may not accurately reflect objective reality. These factors can compromise the reliability and validity of self-reported data, necessitating caution in its interpretation and use in research conclusions.

Furthermore, the instrument used in this study to measure general meat attitudes may have lacked construct validity. As the study's results did not reveal a relationship between general meat attitudes and selective exposure bias as expected, it is assumed that the attitude question did not collect the data it was intended to. In an effort to make the study accessible for all participants, a five-point graphic slider was used to collect information on participants' attitudes toward meat. Although graphic scales can be easier to process and understand than text scales (Stange et al., 2016; Toepoel et al., 2019), a semantic differential scale may have allowed for more nuanced and accurate responses from participants. Further research related to meat consumption attitudes should use semantic differential scales rather than graphic sliders to ensure data is collected accurately and as intended.

5.5.4 Research Design

The final limitations of this study relate to elements of the experiment design as well as its overall research design. In the experiment, participants in the experimental group were provided with two sets of statements related to meat risks: two framed with information utility and two framed without information utility. This allowed the researcher to observe whether participants preferred risk statements using

information utility or risk statements that did not use information utility when presented with both options. To ensure that sentence phrasing did not influence statement selection between groups, the first half of each information utility statement remained the same as its meat risk counterpart, while the second half was changed. Additionally, information utility was created by emphasizing both the magnitude of the risk (first half of all risk statements) and the reader's efficacy in reducing the risk (second half of information utility statements). This meant that participants in the experimental group were presented with two sets of very similar risk statements. For example, the environmental risk statements shown in the experimental group were: "Eating meat plays a big role in global warming; here's why" and "Eating meat plays a big role in global warming; how shifting your diet can reduce your impact." Having these closely related statement options in the experimental group may have indicated to participants the true purpose of the study and, therefore, influenced their topic choice. However, including these mirrored statements in the experimental group was necessary for creating information utility without significantly changing sentence phrasing.

Lastly, regarding limitations, the study's overall research design may prevent the findings from being fully generalizable to all individuals in all situations. This study's experiment asks participants to select one of several statements in a multiple-choice format. However, in the real world, a host of other factors, such as personalized or targeted messaging, associated images, or website recognition, may influence the content that individuals interact with. As mentioned previously, while creating an online news magazine may have better simulated real life, such as was done by similar studies, using Qualtrics allowed for inexpensive and simple data collection, which would not have been possible through other platforms.

5.6 Conclusions

The findings of this study expanded the work of previous researchers in the areas of selective exposure, meat-less diet communication, and environmental risk communication. The research revealed that Canadian consumers have a poor understanding of the relationship between meat production and the environment. Furthermore, Canadians engage in selective exposure to meat-related risk information, preferring to read information that reinforces their meat attachment and aligns with their beliefs rather than information that challenges this attachment or these beliefs. Information utility framing can influence this selective exposure bias, but only for those already open to changing their eating habits. Additionally, meat-related health risk messages framed using information utility can motivate dietary decisions and decrease positive attitudes toward meat consumption for those willing to engage with the material.

Taken together, the results indicate that Canadians' weak knowledge surrounding the environmental impact of meat may be due to more than a lack of information. It is likely that consumers actively avoid information discussing the drawbacks of meat consumption, as demonstrated in this study by the theory of selective exposure. This aligns with findings from previous research, which have found that individual attitudes, values, and beliefs often moderate the effectiveness of information interventions on meat reduction (Brunner et al., 2019; Isham et al., 2022; Vainio et al., 2018; Whitley et al., 2018). While information utility was found to influence selective exposure tendencies, this held true only for a small number of individuals. For the majority of Canadians, information utility framing is likely to be ineffective in persuading them to interact with meat-related risk messaging. Accordingly, there is a need for further research related to communication strategies that can effectively motivate selective exposure biases and encourage the adoption of sustainable diets in Canada and other high-income countries.

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Appendix A: Study Materials

Recruitment Letter

This study aims to explore communication strategies related to the risks and benefits of meat consumption. You will first be asked about your attitudes toward and knowledge of the risks and benefits of meat consumption. Next, you will be asked to view information surrounding meat consumption risks or benefits. After viewing information about meat consumption risks or benefits, you will again be asked about your attitudes toward meat consumption. The entire process should take about 15 minutes.

This study is anonymous in that identifying information will not be linked to your responses. Data collected for this study will be securely stored for at least one year in password-protected cloud storage to which only authorized researchers have access.

When information is transmitted over the internet, privacy cannot be guaranteed. There is always a risk that a third party may intercept your responses (e.g., government agencies, hackers). University of Waterloo researchers will only collect or use internet protocol (IP) addresses or other information which could link your participation to your computer or electronic device after first informing you.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board. However, the final decision about participation is yours.

If you have any questions about the study details, please contact the researcher at repottag@uwaterloo.ca.

Screening Question

The following research study relates to meat consumption and communication. Therefore, individuals who do not eat meat (those who identify as vegan, vegetarian, pescetarian, etc.) are ineligible to participate. This information will not be stored.

Do you eat meat? (Meat includes beef, veal, lamb, mutton, pork, goat, venison, chicken, turkey, goose, duck, and/or game).

- ☐ Yes
- ☐ No

Consent

Information Letter

Study Title: Communicating Risks and Benefits of Meat Consumption

Student Investigator: Rebecca Pottage, repottag@uwaterloo.ca

Faculty Supervisor: Dr. Jennifer Lynes, jklynes@uwaterloo.ca

Date: August 6, 2023

This letter explains the study, possible risks and benefits, and your rights as a research participant. You may print/save a copy for your records. If you do not understand something in the letter, please ask one of the investigators before consenting to participate.

Study Overview

I am a master's student in the Department of Environment at the University of Waterloo located in Ontario, Canada. I am conducting research under the supervision of Dr. Jennifer Lynes. You are invited to participate in a study exploring communication strategies related to meat consumption risks and benefits. Past research has demonstrated that effectively communicating information to target audiences on the internet and social media can be difficult. Because of the large amount of content shared online, it can be challenging to ensure that the right messages reach the right people. This research aims to investigate how meat-related risks and benefits should be communicated to reach desired audiences. In this study, you will be asked to provide demographic information such as your gender, age, and education level.

Study Procedure

As a participant in this study, you will first be asked about your attitudes toward and knowledge of the risks and benefits of meat consumption. Next, you will be asked to view information surrounding meat consumption risks or benefits. After viewing information about meat consumption risks or benefits, you will again be asked about your attitudes toward meat consumption.

Participation and Remuneration

Participation in this study is voluntary and will take approximately 15 minutes. Upon completion of the study, you will receive your standard remuneration as per your participation in Quest Mindshare. You may decline to answer any questions presented during the study if you so wish. This study is anonymous in that identifying information will not be linked to your responses. Once you have submitted your responses, it will not be possible to remove your data because we have no way of knowing which responses are yours. If you change your mind about participating after starting, please be sure to click through to the end of the study to receive your remuneration.

Benefits of This Study

The benefits of participation in this study include learning about the risks and benefits of meat consumption.

Risks to Participation

We want you to know the possible risks/side effects associated with participating in this research. Reading about the risks or negative aspects related to meat consumption may result in feelings of anxiety or stress. You may skip any questions you do not feel comfortable answering and may exit the study at any time.

Confidentiality

Your identity will be confidential. Furthermore, because the interest of this study is in the average responses of the entire group of participants, you will not be identified individually in any way in any written reports of this research. Collected data will be securely stored for at least one year in password-protected cloud storage.

Questions and Research Ethics Clearance

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #45384). If you have questions for the Board, contact the Office of Research Ethics toll-free at 1-833-643-2379 (Canada and USA), 1-519-888-4440, or reb@uwaterloo.ca. For all other questions after receiving this letter, or if you would like additional information to assist you in deciding on participation, please ask the student investigator or a faculty supervisor listed at the top of this letter. Thank you for your interest in our research and assistance with this project.

- I have read and understood the above and give my consent to take part in this study in full knowledge that data is being recorded

Survey Questions (Pre-Experiment)

Q1 In what age group do you fit in?

- 18 – 24 years old
- 25 – 29 years old
- 30 – 34 years old
- 35 – 39 years old
- 40 – 44 years old
- 45 – 49 years old
- 50 – 54 years old
- 55 – 59 years old
- 60 – 64 years old
- 65 – 69 years old
- 70 – 74 years old
- 75 – 79 years old
- 80 – 84 years old
- 85 – 89 years old
- 90 – 94 years old
- 95 – 99 years old
- 100+

Q2 Where do you live?

- Alberta
- British Columbia
- Manitoba
- New Brunswick
- Newfoundland and Labrador
- Northwest Territories
- Nova Scotia
- Nunavut
- Ontario
- Prince Edward Island
- Quebec
- Saskatchewan

- Yukon

Q3 On average, how often do you eat meat or products that include meat? (Meat includes beef, veal, lamb, mutton, pork, goat, venison, chicken, turkey, goose, duck, and/or game)

- Daily
- Once or twice a week
- Once or twice a month
- Less than once a month

Q4 Which type of meat do you eat most often?

- Beef
- Veal
- Lamb
- Pork
- Chicken
- Turkey
- Duck
- Other (*allow text entry*)

Q5 What is the main reason you eat meat? (*Text entry*)

Q6 Below are four common reasons people eat meat. Please rank the options below in order of importance to you (number 1 being your **most important** reason for eating meat and number 4 being your **least important** reason)

- Taste (I enjoy the taste of meat)
- Health (I need meat in my diet to stay healthy)
- Culture (meat is an important part of my culture's traditions)
- Social Pressures (I would feel embarrassed if I didn't eat meat)

Q7 How many of your close **family members** eat meat regularly?

- All of my close family members consume meat regularly
- Many of my close family members consume meat regularly
- A few of my close family members consume meat regularly
- None of my close family members consume meat regularly

Q8 How many of your close **friends** eat meat regularly?

- All of my close friends consume meat regularly
- Many of my close friends consume meat regularly
- A few of my close friends consume meat regularly
- None of my close friends consume meat regularly

Q9 How willing are you to reduce the amount of meat you eat?

- Very willing
- Somewhat willing
- Could go either way
- Somewhat unwilling

- Not willing at all

Q10 Please use the smile to describe how you feel about meat (*five-point graphic scale*)

- Very happy face
- Happy face
- Neutral face
- Unhappy face
- Very unhappy face

Q11 Please indicate the extent to which you agree or disagree with the following statements

	Strongly disagree (1)		Strongly agree (5)		
To eat meat is one of the good pleasures in life	1	2	3	4	5
I love meals with meat	1	2	3	4	5
I'm a big fan of meat	1	2	3	4	5
I feel bad when I think about eating meat	1	2	3	4	5
By eating meat, I'm reminded of the death of animals	1	2	3	4	5
To eat meat is disrespectful to the environment	1	2	3	4	5
To eat meat is a right of every person	1	2	3	4	5
According to our position in the food chain, we have the right to eat meat	1	2	3	4	5
Eating meat is a natural practice	1	2	3	4	5
If I was forced to stop eating meat, I would feel sad	1	2	3	4	5
Meat is essential in my diet	1	2	3	4	5
I can't picture myself not eating meat regularly	1	2	3	4	5

Q12 Please indicate the extent to which you agree or disagree with the following statements

	Strongly disagree (1)		Strongly agree (5)		
Meat production is harmful to the environment	1	2	3	4	5
Meat production is beneficial to the environment	1	2	3	4	5
Meat-rich diets increase risk of disease	1	2	3	4	5
Meat is an important part of a healthy diet	1	2	3	4	5

Q13 For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change

	Not effective at all (1)		Highly effective (5)		
Eating less meat	1	2	3	4	5
Eating a vegan diet (no meat, dairy, fish, or eggs)	1	2	3	4	5

Buying local, seasonal foods (e.g., by going to farmer's markets)	1	2	3	4	5
Buying more organic foods	1	2	3	4	5
Using renewable energy to power my house	1	2	3	4	5
Saving energy at home (e.g. use energy-saving light bulbs)	1	2	3	4	5
Using public transit, biking, or walking instead of driving	1	2	3	4	5
Composting	1	2	3	4	5
Recycling	1	2	3	4	5

Q14 For each of the following food items, please indicate how healthy you think it is

	Not healthy at all (1)		Highly healthy (5)		
Beef	1	2	3	4	5
Chicken	1	2	3	4	5
Pork	1	2	3	4	5
Turkey	1	2	3	4	5
Meat alternatives (e.g. Beyond Meat)	1	2	3	4	5
Tofu	1	2	3	4	5

Experiment

Control Group

Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose.

- Eating meat plays a big role in global warming; here's why
- Livestock grazing is good for soil health and the environment
- Eating meat is associated with serious health risks; here's why
- Meat contains essential nutrients important in a healthy diet

Experimental Group

Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose.

- Eating meat plays a big role in global warming; here's why
- Livestock grazing is good for soil health and the environment
- Eating meat is associated with serious health risks; here's why
- Meat contains essential nutrients important in a healthy diet
- Eating meat plays a big role in global warming; how shifting your diet can reduce your impact
- Eating meat is associated with serious health risks; how shifting your diet can extend your life

Eating meat plays a big role in global warming; here's why

Meat Consumption Is Responsible for a Large Share of Greenhouse Gas Emissions and Contributes Greatly to Global Warming

Food systems account for approximately 34% of the world's greenhouse gas (GHG) emissions, a significant portion of which comes from animal farming. A 2022 study published in the *Journal of Cleaner Production* found that meat-based meals have an environmental impact that is three times higher than vegetarian meals and 14 times higher than vegan meals.

The environmental harm from animal agriculture mostly comes from emissions caused by animal digestion processes and feed production. Cattle, buffalo, sheep, and goats naturally produce methane gas as part of their digestive process and expel it through their burps. Additionally, carbon dioxide is emitted when forested areas are cut down for feed crops or pasture space. Beyond GHG emissions, animal farming also uses large amounts of fresh water, contributes to deforestation, and drives much of the world's biodiversity loss.

According to a 2021 study published in *Nature Food*, animal-based foods contribute to 57% of global GHG emissions in food production, while plant-based foods contribute only 29%. What's more, the agricultural stage is the biggest contributor to the environmental impacts of meals. Transportation, processing, and preparation have relatively small contributions to GHG emissions in comparison. This means that shifting away from meat is far better for the environment than buying local or organic ingredients.

Sources

Crippa, M., Solazzo, E., Guizzardi, D., Monforti-Ferrario, F., Tubiello, F. N., & Leip, A. (2021). Food systems are responsible for a third of global anthropogenic GHG emissions. *Nature Food*, 2(3), 198–209. <https://doi.org/10.1038/s43016-021-00225-9>

Gerber, P.J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falcucci, A. & Tempio, G. (2013). *Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities*. Food and Agriculture Organization of the United Nations (FAO). <https://www.fao.org/3/i3437e/i3437e.pdf>

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.aag0216>

Takacs, B., Stegemann, J. A., Kalea, A. Z., & Borrion, A. (2022). Comparison of environmental impacts of individual meals—Does it really make a difference to choose plant-based meals instead of meat-based ones? *Journal of Cleaner Production*, 379, 134782. <https://doi.org/10.1016/j.jclepro.2022.134782>

Xu, X., Sharma, P., Shu, S., Lin, T.-S., Ciaia, 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>

Livestock grazing is good for soil health and the environment

Livestock Grazing Benefits the Environment by Promoting Soil Health and Biodiversity

Holistic Management (HM), or regenerative agriculture, is a livestock management approach where animals graze on a specific piece of land for a short time before moving to another. This farming technique may be the key to improving farm productivity while restoring grasslands and addressing climate change.

While many scientists argue that animal agriculture should be reduced due to its negative environmental impacts, others support that livestock grazing benefits the planet. The main idea is that cattle and other animals stimulate grass growth through their movement, waste, and eating habits. If practiced correctly, increasing the density of grazing animals through HM can result in a number of positive ecological outcomes, including improved soil health. This means pastures need more livestock, not less.

Additionally, the improved soil conditions associated with HM indicate that the technique may be an effective approach to fighting climate change through increased carbon sequestration. Traditionally, there's been concern that too many livestock could overgraze land, causing irreversible damage and leading to deserts. However, those in support of HM argue that intensive grazing can regenerate grasslands and counter global desertification. Despite these potential benefits, HM remains controversial, and some researchers doubt its realistic ability to mitigate climate change.

Source

Gosnell, H., Grimm, K., & Goldstein, B.E. (2020). A half century of Holistic Management: what does the evidence reveal? *Agriculture and Human Values*. 37, 849–867. <https://doi-org.proxy.lib.uwaterloo.ca/10.1007/s10460-020-10016-w>

Eating meat is associated with serious health risks; here's why

Meat Consumption is Linked to Increased Health Risks, Including Cardiovascular Disease and Cancer

Eating a lot of red and processed meat over the long term raises the risk of heart disease, type 2 diabetes, cancer, and premature death. The exact amounts for safe consumption of red and processed meat are open to debate; however, the evidence shows that people with lower intake have lower health risks.

The problem with red meat is that it's high in saturated fat, too much of which can increase the risk of heart disease and stroke. Additionally, red meat is rich in heme iron (the kind of iron found in animal products), which has been linked to heart disease and type 2 diabetes. The issue with processed meat is that it's high in sodium, too much of which raises the risk of high blood pressure, stroke, heart disease, and total mortality. Processed meat also contains harmful chemicals, such as nitrates and nitrites, associated with cancer.

Because of these health risks, professionals generally recommend that individuals eat no more than two to three servings of red meat per week. As processed meat has a much stronger association with a higher risk of heart disease and cancer, intake should be kept at a minimum.

Red meat refers to beef, veal, lamb, mutton, pork, goat, and venison. Processed meat is preserved by smoking, curing, salting, or using preservatives and includes foods such as ham, sausage, hot dogs, and pepperoni.

Sources

Harvard Health. (2020). *What's the beef with red meat?* <https://www.health.harvard.edu/staying-healthy/whats-the-beef-with-red-meat>

World Health Organization. (2023). *Red and processed meat in the context of health and the environment: many shades of red and green: information brief*. <https://www.who.int/publications/i/item/9789240074828>

Meat contains essential nutrients important in a healthy diet

The Bioavailability of Nutrients Found in Meat Makes the Food Challenging to Replace in a Healthy Diet

While vegetables and other plant-based foods are important in a balanced diet, they lack the bioavailability of vital nutrients found readily in animal products. If meat and other animal-derived foods disappeared overnight, it would be difficult to find adequate supplementation from natural sources for many nutrients that keep our bodies healthy.

Before going further, we need to define bioavailability. Bioavailability refers to how much of a given nutrient found within a food source can be used by the body. Put simply, the higher a nutrient's bioavailability, the more of it will be sent to the parts of the body that need it. For example, if you consume a highly bioavailable form of calcium (such as cheese), you can be sure that lots of calcium is being absorbed by your body and put it to good use.

Animal-based foods often have higher bioavailability of important nutrients compared to plant-based foods. Iron, for instance, can be found in plant-based foods but is absorbed by the body much more efficiently when derived from animal sources such as meat and seafood. Protein is another example of a nutrient better absorbed from animal sources than plant sources. Additionally, animal proteins contain all the essential amino acids, while plant proteins do not.

Sources

Healthline. (2023). *Animal vs. Plant Protein — What's the Difference?* <https://www.healthline.com/nutrition/animal-vs-plant-protein>

Schonfeldt, H., Pretorius, B., & Hall, N. (2016). Bioavailability of Nutrients. *Encyclopedia of Food and Health*. <https://doi.org/10.1016/B978-0-12-384947-2.00068-4>

Eating meat plays a big role in global warming; how shifting your diet can reduce your impact

Meat Consumption Contributes Immensely to Global Warming; However, Dietary Changes Can Reduce Your Impact

Food systems account for approximately 34% of the world's greenhouse gas (GHG) emissions, a significant portion of which comes from animal farming. A 2022 study from the Journal of Cleaner Production found that meat-based meals have an environmental impact that is three times higher than vegetarian meals and 14 times higher than vegan meals.

The United Nations recommends shifting toward meatless diets and increasing plant-based protein sources as effective ways to help combat climate change and protect the environment. Moreover, a 2018 study published in Science found that a vegan diet can reduce your individual carbon footprint from food by 73%. This is because a plant-rich diet cuts down on not only GHG emissions but also wildlife loss and resource use. For these reasons, some scientists argue that a vegan diet is the single biggest way an individual can reduce their impact on Earth, making it better than cutting down on flights or buying an electric car.

The environmental harm from animal agriculture mostly comes from livestock emissions and land use. Cattle, buffalo, sheep, and goats naturally produce methane gas as part of their digestive process and expel it through their burps. Additionally, carbon dioxide is emitted when forested areas are cut down for feed crops or pasture space. Beyond GHG emissions, animal agriculture also uses large amounts of fresh water, contributes significantly to deforestation, and drives much of the world's biodiversity loss.

Sources

Crippa, M., Solazzo, E., Guizzardi, D., Monforti-Ferrario, F., Tubiello, F. N., & Leip, A. (2021). Food systems are responsible for a third of global anthropogenic GHG emissions. *Nature Food*, 2(3), 198–209. <https://doi.org/10.1038/s43016-021-00225-9>

Gerber, P.J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falcucci, A. & Tempio, G. (2013). *Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities*. Food and Agriculture Organization of the United Nations (FAO). <https://www.fao.org/3/i3437e/i3437e.pdf>

IPCC. (2022). *Climate Change 2022: Mitigation of Climate Change*. <https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/>

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Takacs, B., Stegemann, J. A., Kalea, A. Z., & Borrión, A. (2022). Comparison of environmental impacts of individual meals—Does it really make a difference to choose plant-based meals instead of meat-based ones? *Journal of Cleaner Production*, 379, 134782. <https://doi.org/10.1016/j.jclepro.2022.134782>

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>

Eating meat is associated with serious health risks; how shifting your diet can extend your life

Meat Consumption Dramatically Increases the Risk of Disease; Dietary Changes Can Add Years to Your Life

Switching from a typical Western diet to a plant-rich one can add years to your life, regardless of your age. The key is replacing red and processed meat with legumes, whole grains, and nuts.

Nutrition has a significant impact on individual health at all ages. A 2022 study published in PLOS Medicine found that switching from a typical omnivorous diet to a plant-rich one (one high in grains, legumes, fruits, and vegetables) at age 20 can increase life expectancy by over a decade in both men and women. Making the change at age 60 can add eight years to a person's life. At age 80, the diet can add three years.

Research has found that eating a lot of red and processed meat over the long term raises the risk of heart disease, cancer, diabetes, and premature death. The exact amounts for safe consumption of red and processed meat are open to debate; however, the evidence shows that people with lower intake have lower health risks. Red meat refers to beef, veal, lamb, mutton, pork, goat, and venison. Processed meat is preserved by smoking, curing, salting, or using preservatives and includes foods such as ham, sausage, hot dogs, and pepperoni.

Sources

Fadnes, L. T., Økland, J.-M., Haaland, Ø. A., & Johansson, K. A. (2022). Estimating impact of food choices on life expectancy: A modeling study. *PLOS Medicine*, 19(2), e1003889. <https://doi.org/10.1371/journal.pmed.1003889>

Harvard Health. (2020). *What's the beef with red meat?* <https://www.health.harvard.edu/staying-healthy/whats-the-beef-with-red-meat>

World Health Organization. (2023). *Red and processed meat in the context of health and the environment: many shades of red and green: information brief*. <https://www.who.int/publications/i/item/9789240074828>

Survey Questions (Post-Experiment)

Q1 A few minutes ago, you were asked to review several statements and select one to learn more about. You chose [statement selected]. Why did you choose this statement over the others listed? *(Text entry)*

Q2 Thinking about the information you just read about meat, did you learn anything new?

- ☐ Yes (please specify) *(allow text entry)*
- ☐ No

Q3 Reflecting on what you just read about meat, did any of the information change how you will make dietary decisions in the future?

- ☐ Yes (please specify) *(allow text entry)*
- ☐ No

Q4 Did the information you read change your attitude toward eating meat?

- ☐ Yes, the information I read made me more favourable toward eating meat
- ☐ Yes, the information I read made me less favourable toward eating meat
- ☐ No, the information I read did not change my attitude toward eating meat

Q5 Reflecting on the information you read, how willing are you to reduce the amount of meat you eat?

- ☐ Very willing
- ☐ Somewhat willing
- ☐ Could go either way
- ☐ Somewhat unwilling
- ☐ Not willing at all

Q6 Would you consider yourself living in an urban or rural area?

- ☐ Urban
- ☐ Rural

Q7 How do you identify

- ☐ Man
- ☐ Woman
- ☐ Non-binary
- ☐ I prefer to self-describe *(allow text entry)*
- ☐ Prefer not to answer

Q8 What is the highest level of education you have completed?

- ☐ No certificate, diploma, or degree
- ☐ High school (secondary) or equivalency certificate
- ☐ Postsecondary certificate or diploma below bachelor level
- ☐ Bachelor's degree or high
- ☐ Prefer not to answer

Debriefing

Control Group

The following post-study information page gives additional details about the study, which involved partial disclosure (or omission of information).

Post-Study Information Page

Title of Project: Selective Exposure & Environmental Risk Communication

Student Investigator: Rebecca Pottage, repottag@uwaterloo.ca

Faculty Supervisor: Dr. Jennifer Lynes, jklynes@uwaterloo.ca

We appreciate your participation in our study and thank you for spending the time helping us with our research. The purpose of this post-study information page is to provide additional details about the study you just participated in.

You were initially told that this study was designed to explore communication strategies related to the risks and benefits of meat consumption. While we were interested in studying meat consumption communication, the study objectives were more involved than what we originally explained.

In this study, we were interested in how a person's dietary preferences affect how they interact with meat-related information. In other words, we wanted to see whether meat eaters preferred information about meat risks or benefits. We predicted that meat eaters would avoid information on the risks of meat consumption and instead be more interested in the benefits of meat consumption. Based on this prediction, we also wanted to see whether altering the phrasing of the information could change this tendency, making meat eaters just as likely to read about the risks of meat consumption as the benefits.

This study is important because it contributes to the literature on sustainable diet communication and helps inform interventions to reduce meat consumption among consumers. Increasing sustainable diets (those low in animal products) in developed countries provides a compelling opportunity to mitigate global warming.

In this study, you were asked to review several statements about meat and select one to learn more about. In this portion of the study, some people were randomly assigned to the control group, while others were randomly assigned to the experimental group. You were in the control group. This means you were presented with information related to meat consumption risks and benefits without phrasing alterations. In other words, the information presented to you was written in plain language and not manipulated to make you more likely to click on it or read it.

Partial disclosure was necessary for this study because we needed participants' behaviour and attitudes to be as natural as possible. To summarize, this study aimed to explore the relationship between dietary preference and information preference with and without altering the way information was presented.

We apologize for not providing you with complete and accurate information about the purpose and objectives of this study, but we hope you understand why this was necessary.

This study is anonymous in that identifying information will not be linked to your responses. Collected data will be securely stored for at least one year in password-protected cloud storage. This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #45384). If you have questions for the Board, contact the Office of Research Ethics toll-free at 1-

833-643-2379 (Canada and USA), 1-519-888-4440, or reb@uwaterloo.ca. For all other questions, contact Rebecca Pottage at repottag@uwaterloo.ca.

Once all the data are collected and analyzed for this project, the information will be used in the student investigator's master's thesis, which, when complete, will be kept in the University of Waterloo's institutional repository for research (digital archives). If you are interested in receiving more information regarding the results of this study or would like a summary of the results, please contact the student investigator at the email listed above. The student investigator will send you the information when the study is completed, anticipated by September 2024. In the meantime, if you have any questions about the study, please do not hesitate to contact the student investigator by email, as noted above.

We appreciate your participation and hope this has been an interesting experience for you.

- I read the Post-Study Information page

Thank you for your time spent taking this survey.

Experimental Group

The following post-study information page gives additional details about the study, which involved partial disclosure (or omission of information).

Post-Study Information Page

Title of Project: Selective Exposure & Environmental Risk Communication

Student Investigator: Rebecca Pottage, repottag@uwaterloo.ca

Faculty Supervisor: Dr. Jennifer Lynes, jklynes@uwaterloo.ca

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This study is important because it contributes to the literature on sustainable diet communication and helps inform interventions to reduce meat consumption among consumers. Increasing sustainable diets (those low in animal products) in developed countries provides a compelling opportunity to mitigate global warming.

In this study, you were asked to review several statements about meat and select one to learn more about. In this portion of the study, some people were randomly assigned to the control group, while

others were randomly assigned to the experimental group. You were in the experimental group. This means that some of the information presented to you was intentionally altered to make you more likely to engage with it. Information related to meat risks was phrased in ways that we hoped would be beneficial to you, making you more likely to click on and read that information.

Partial disclosure was necessary for this study because we needed participants' behaviour and attitudes to be as natural as possible. To summarize, this study aimed to explore the relationship between dietary preference and information preference with and without altering the way information was presented.

We apologize for not providing you with complete and accurate information about the purpose and objectives of this study, but we hope you understand why this was necessary.

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We appreciate your participation and hope this has been an interesting experience for you.

- I read the Post-Study Information page

Thank you for your time spent taking this survey.

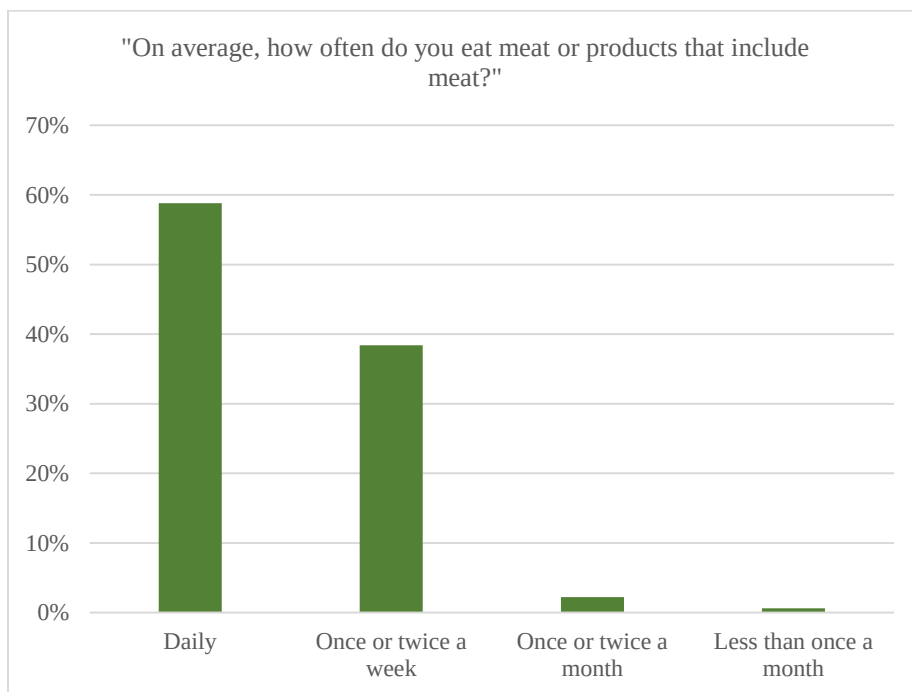
Appendix B: Results of Statistical Analyses

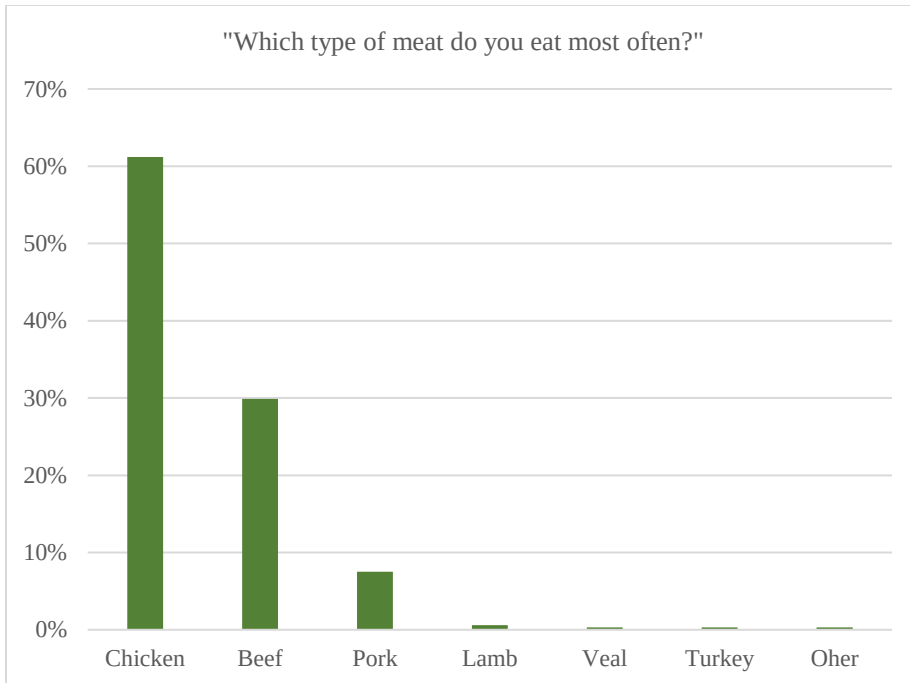
Demographic Analysis

Participant demographic and socio-demographic information	
Age	N = 358
18 - 24	9.2%
25 - 29	9.5%
30 - 34	11.2%
35 - 39	8.9%
40 - 44	5%
45 - 49	8.9%
50 - 54	10.1%
55 - 59	10.1%
60 - 64	9.2%
65 - 69	9.2%
70 - 74	4.5%
75 - 79	2.5%
80 - 84	0.6%
85 - 89	0.8%
90 - 94	0.3%
Age Cohorts	N = 358
Generation Z (18 - 29)	18.7%
Millennials (30 - 44)	25.1%
Generation X (45 - 59)	29.1%
Baby Boomers (60 - 79)	25.4%
Silent Generation (80 - 94)	1.7%
Gender	N = 358
Man	46.4%
Woman	52.2%
Non-binary	0.8%
Prefer to self-describe	0.3%
Prefer not to answer	0.3%
Province	N = 339
Alberta	12.4%
British Columbia	8%
Manitoba	4.1%
New Brunswick	3.8%
Newfoundland & Labrador	2.1%
Nova Scotia	5.3%
Ontario	48.1%

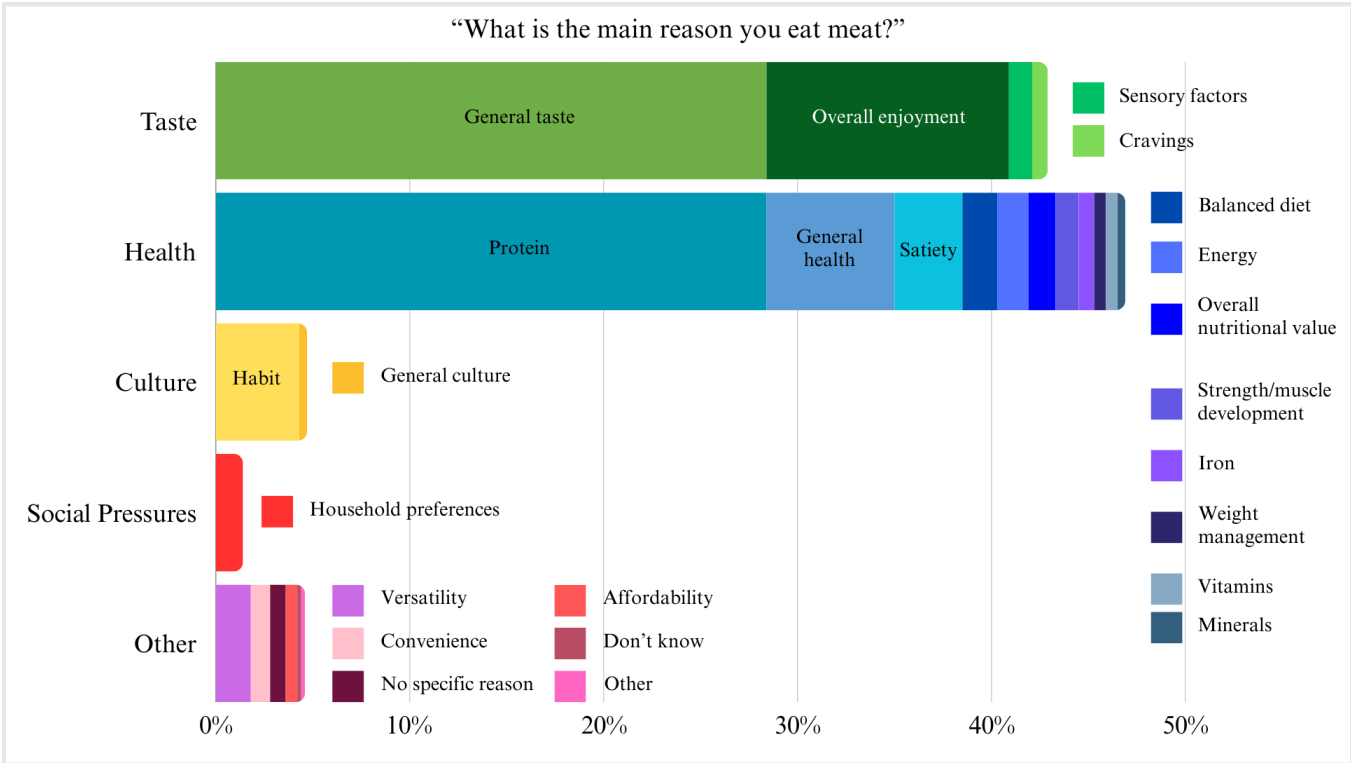
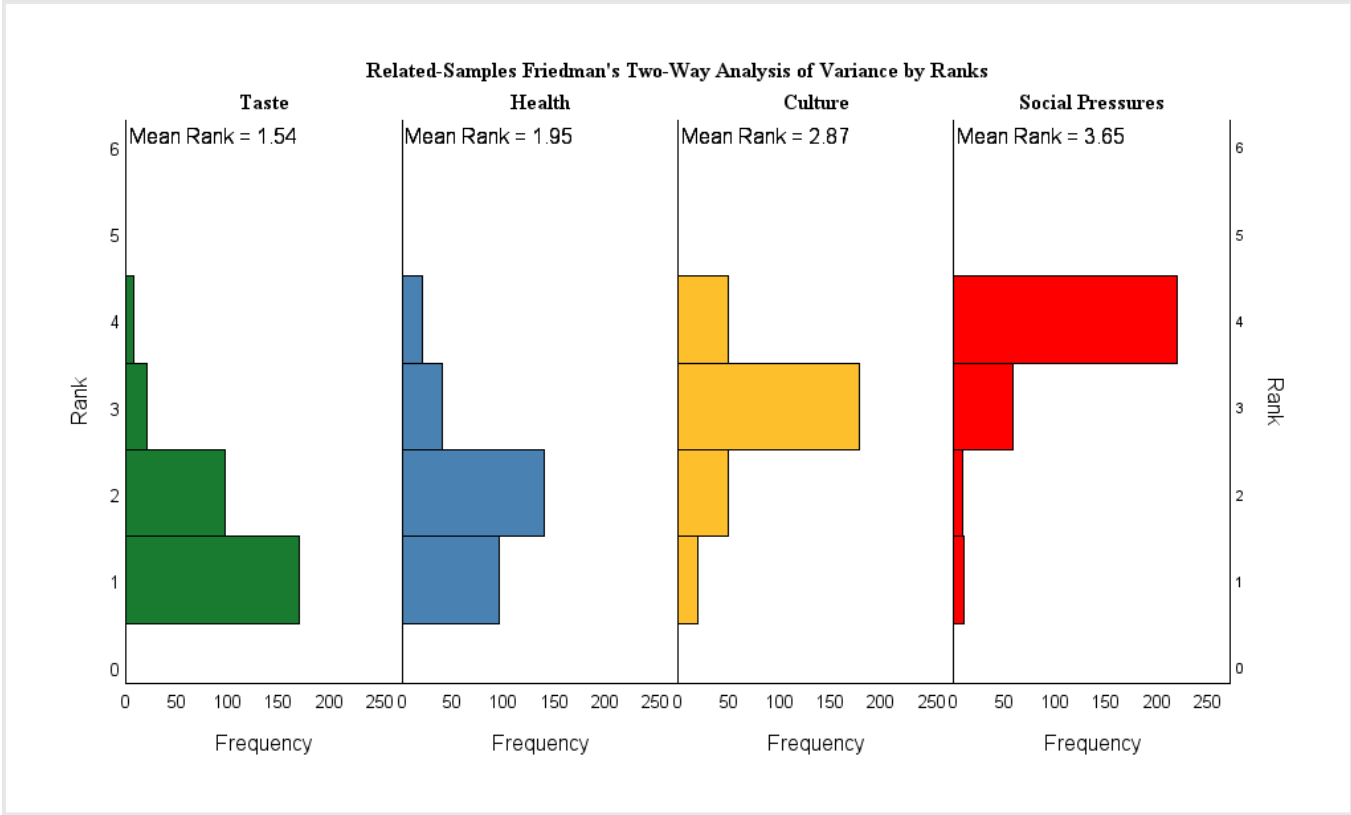
Prince Edward Island	0.3%
Quebec	12.7%
Saskatchewan	3.2%
Urban vs Rural	N = 358
Urban	76.5%
Rural	23.5%
Education	N = 358
No certificate, diploma, or degree	3.6%
High school or equivalency certificate	26%
Postsecondary certificate or diploma below bachelor level	33.8%
Bachelor's degree or higher	36.3%
Prefer not to answer	0.3%

Pre-Experiment Analysis

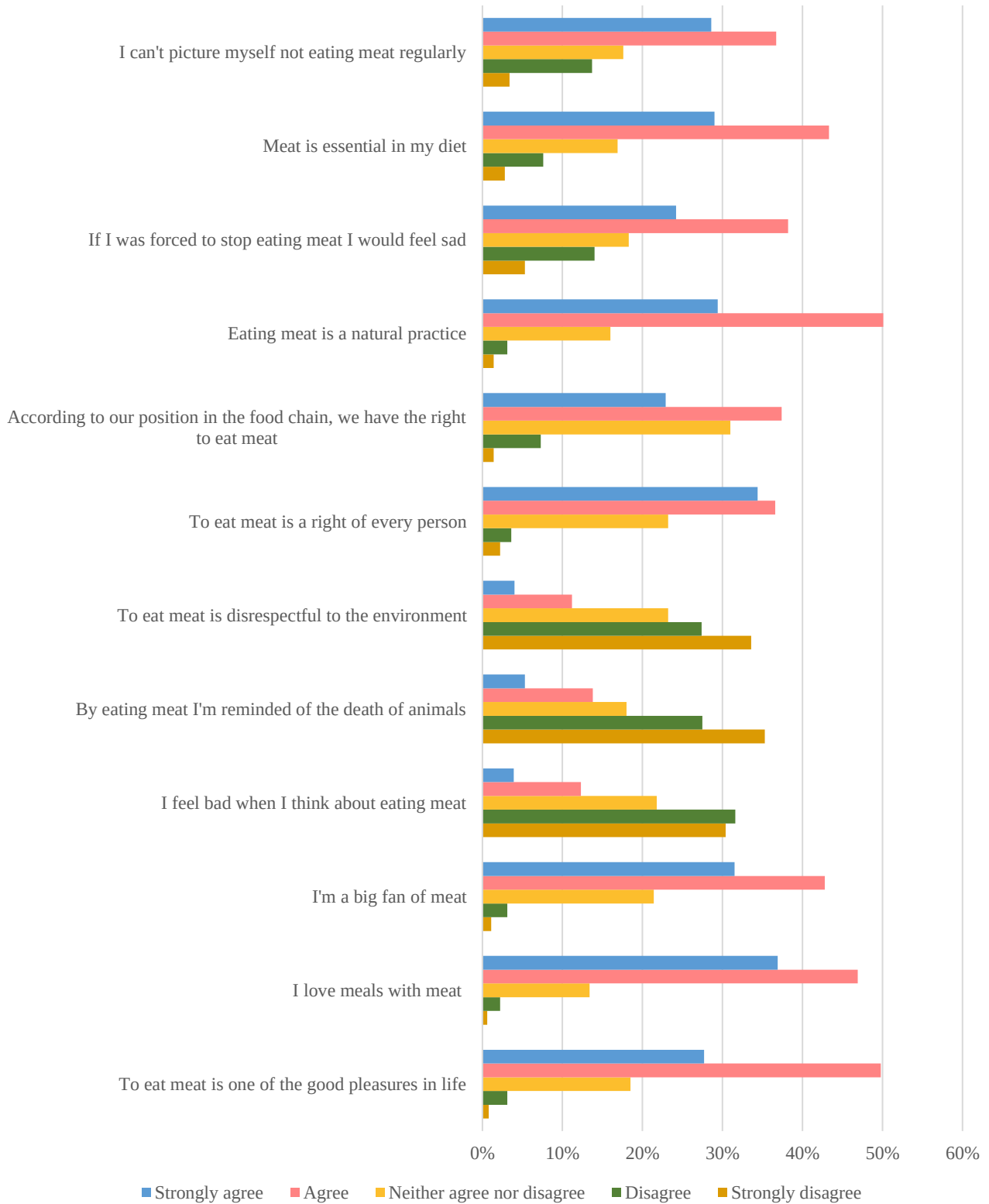




“Below are four common reasons people eat meat. Please rank the options below in order of importance to you (number 1 being your most important reason for eating meat and number 4 being your least important reason)” – Rank order					
<i>Related-Samples Friedman's Two-Way Analysis of Variance by Ranks Summary</i>					
Total N		296			
Test Statistic		477.572			
Degree Of Freedom		3			
Asymptotic Sig. (2-sided test)		<.001			
<i>Hypothesis Test Summary</i>					
Null Hypothesis		The distributions of rank options (taste, health, culture, and social pressures) are the same.			
Test		Related-Samples Friedman's Two-Way Analysis of Variance by Ranks			
Sig. ^{a,b}		<.001			
Decision		Reject the null hypothesis.			
a. The significance level is .050.					
b. Asymptotic significance is displayed.					
<i>Pairwise Comparisons</i>					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
<i>Taste-Health</i>	-0.409	0.106	-3.852	<.001	0.001
<i>Taste-Culture</i>	-1.331	0.106	-12.543	<.001	0
<i>Taste-Social Pressures</i>	-2.111	0.106	-19.897	<.001	0
<i>Health-Culture</i>	-0.922	0.106	-8.691	<.001	0
<i>Health-Social Pressures</i>	-1.703	0.106	-16.045	<.001	0
<i>Culture-Social Pressures</i>	-0.78	0.106	-7.354	<.001	0
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.					
Asymptotic significances (2-sided tests) are displayed. The significance level is .050.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					



"Please indicate the extent to which you agree or disagree with the following statements"

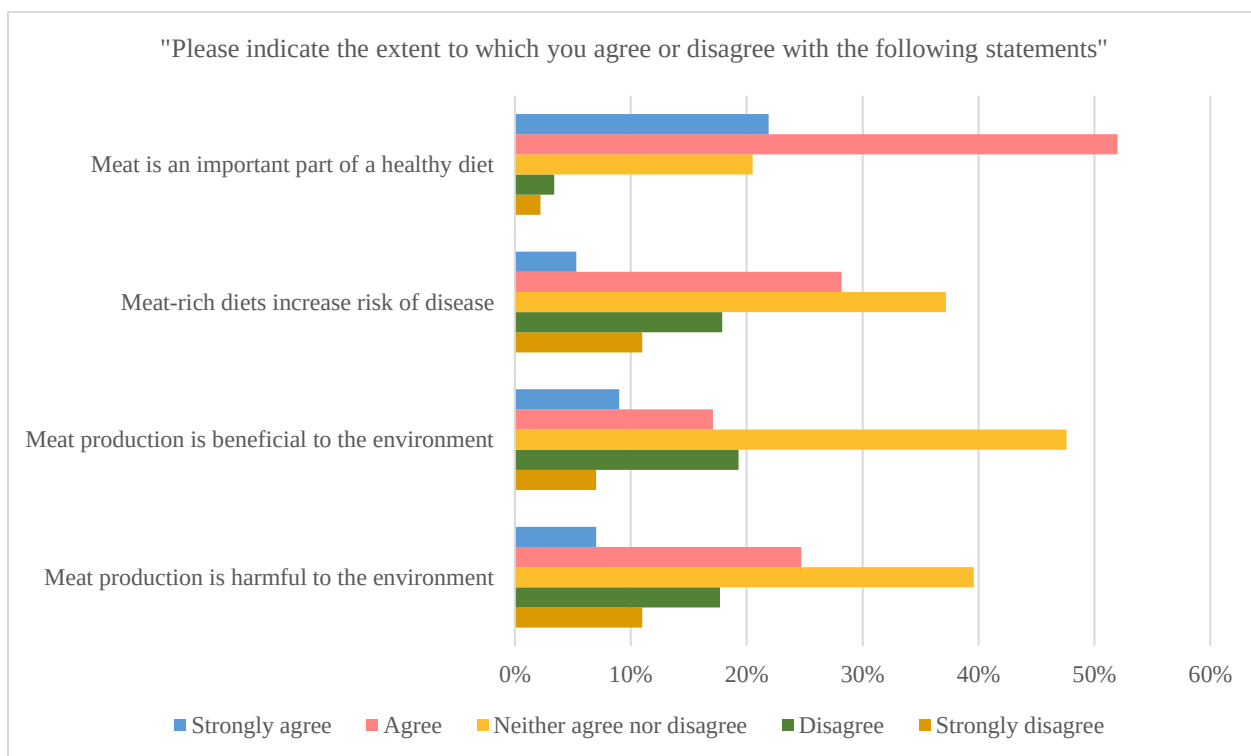


Meat Attachment Scores	
18	0.29%
22	0.29%
24	0.86%
25	0.29%
28	0.29%
31	1.43%
32	0.86%
33	0.86%
34	1.43%
35	1.43%
36	1.72%
37	4.01%
38	2.87%
39	2.87%
40	4.30%
41	3.15%
42	5.44%
43	6.02%
44	7.45%
45	4.01%
46	3.72%
47	2.01%
48	4.87%
49	5.73%
50	2.58%
51	4.30%
52	1.72%
53	2.87%
54	4.01%
55	1.72%
56	2.58%
57	1.72%
58	2.29%
59	2.58%
60	7.45%
Statistics	
N	349.00
Mean	46.30
Median	46.00
Std. Deviation	8.24
Minimum	18.00
Maximum	60.00

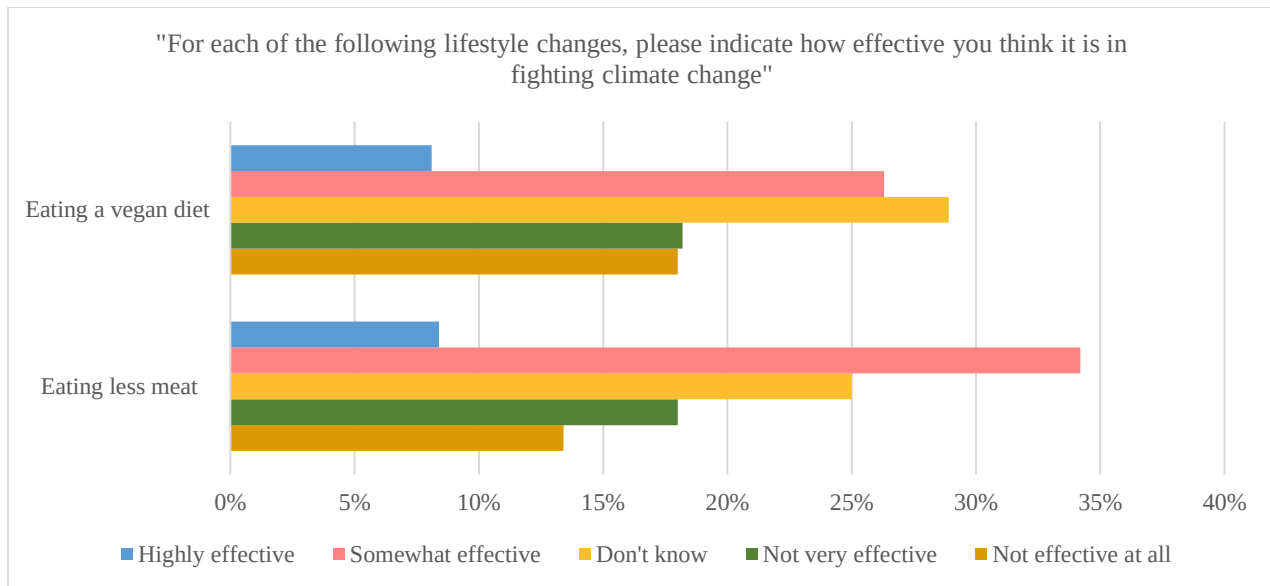
How willing are you to reduce the amount of meat you eat? * Meat attachment level			
	Low	Medium	High
Very willing <i>n</i> = 46	10.9%	67.4%	21.7%
Somewhat willing <i>n</i> = 118	0.8%	55.9%	43.2%
Could go either way <i>n</i> = 96	0%	43.8%	56.3%
Somewhat unwilling <i>n</i> = 44	0%	25%	75%
Not willing at all <i>n</i> = 45	0%	8.9%	91.1%

How willing are you to reduce the amount of meat you eat? * Meat attachment level									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	78.276 ^a	8	<.001	<.001 ^b	<.001	<.001			
Likelihood Ratio	75.532	8	<.001	<.001 ^b	<.001	<.001			
Fisher-Freeman-Halton Exact Test	69.670			<.001 ^b	<.001	<.001			
Linear-by-Linear Association	62.049 ^c	1	<.001	<.001 ^b	<.001	<.001	<.001 ^b	<.001	<.001
N of Valid Cases	349								
a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is .76.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is 7.877.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Nominal by Nominal	Cramer's V	.335	<.001	<.001 ^a	<.001			<.001	
N of Valid Cases		349							
a. Based on 10000 sampled tables with starting seed 2000000.									

Ordinal Variable Correlations (Spearman's Rho)		
		Meat attachment level
How willing are you to reduce the amount of meat you eat?	Correlation Coefficient	-.411*
	Sig. (2-tailed)	<.001
	N	349
* Correlation is significant at the .01 level (2-tailed)		

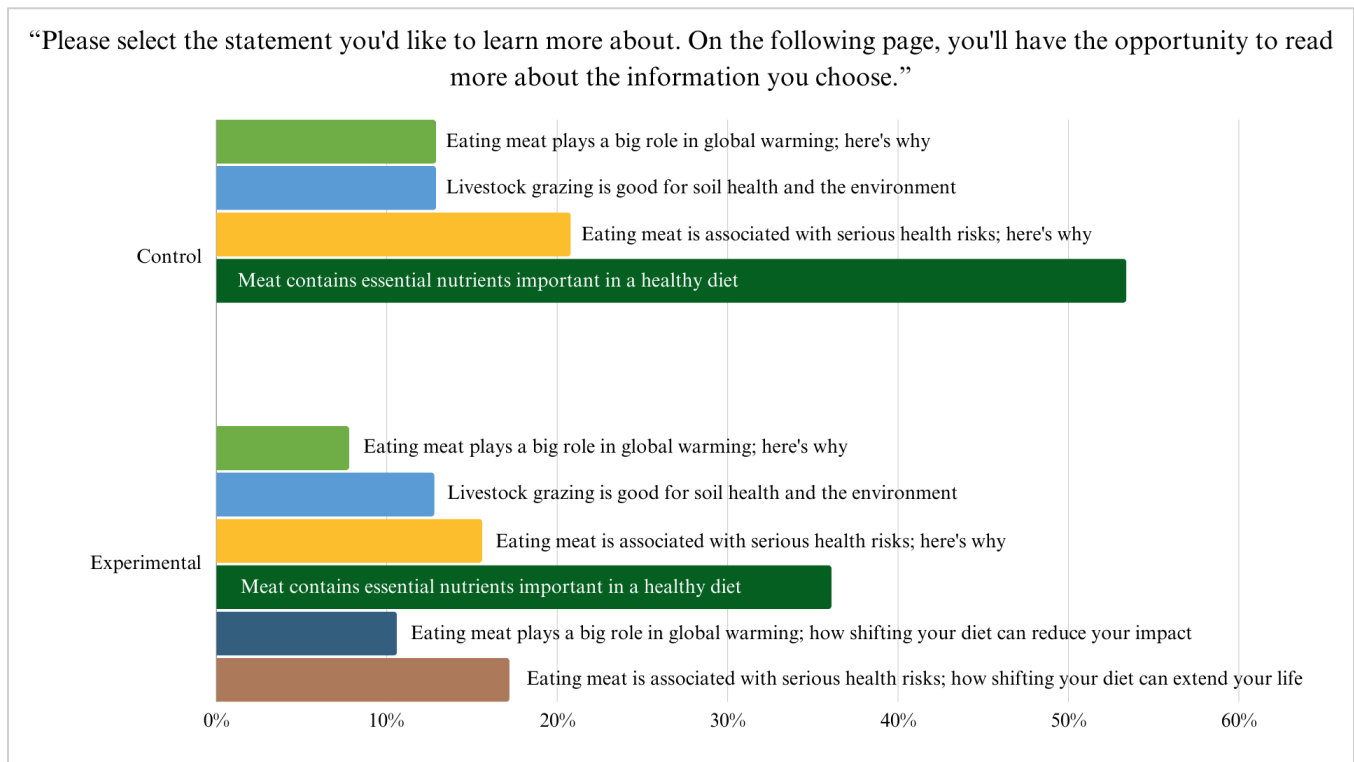


“For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change”					
	Not effective at all	Not very effective	Don't know	Somewhat effective	Highly effective
Eating less meat N = 357	13.5%	18.5%	25.5%	34.2%	8.4%
Eating a vegan diet (no meat, dairy, fish, or eggs) N = 357	18.5%	18.2%	28.9%	26.3%	8.1%
Buying local, seasonal foods (e.g. by going to farmer's markets) N = 358	2.8%	9.5%	18.7%	47.8%	21.2%
Buying more organic foods N = 357	11.8%	19.6%	28.6%	26.6%	13.5%
Using renewable energy to power my house N = 357	3.1%	7.8%	14.3%	38.4%	36.4%
Saving energy at home (e.g. use energy-saving light bulbs) N = 356	3.9%	5.9%	9.5%	44.9%	35.7%
Using public transit, biking, or walking instead of driving N = 358	3.6%	7.5%	9.2%	45.3%	34.4%
Composting N = 355	2.5%	4.8%	11.8%	47%	33.8%
Recycling N = 356	2.8%	5.9%	7.6%	39.3%	44.4%



“For each of the following food items, please indicate how healthy you think it is”					
	Not healthy at all	Not very healthy	Don't know	Somewhat healthy	Highly healthy
Beef N = 358	2.8%	14.5%	12.3%	47.2%	23.2%
Chicken N = 358	1.1%	3.6%	4.8%	46.4%	44.1%
Pork N = 357	7.3%	17.4%	16.8%	41.7%	16.8%
Turkey N = 356	0.8%	3.7%	11.5%	44.9%	39%
Meat alternatives (e.g. Beyond Meat) N = 357	14.3%	12%	43.2%	30%	9.5%
Tofu N = 358	5.9%	7%	31%	35.8%	20.4%

Experiment Analysis



Age cohort * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	17.702 ^a	12	.125	.123 ^b	.115	.132			
Likelihood Ratio	16.888	12	.154	.181 ^b	.171	.191			
Fisher-Freeman-Halton Exact Test	15.493			.171 ^b	.161	.180			
Linear-by-Linear Association	.018 ^c	1	.893	.901 ^b	.893	.908	.460 ^b	.447	.473
N of Valid Cases	178								
a. 6 cells (30%) have expected count less than 5. The minimum expected count is .39.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is -.135.									

Where do you live? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	17.530 ^a	24	.825	.847 ^b	.838	.856			
Likelihood Ratio	21.856	24	.588	.799 ^b	.788	.809			
Fisher-Freeman-Halton Exact Test	17.528			.780 ^b	.769	.791			
Linear-by-Linear Association	.672 ^c	1	.412	.410 ^b	.397	.423	.205 ^b	.195	.215
N of Valid Cases	172								
a. 27 cells (75%) have expected count less than 5. The minimum expected count is .67.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is .820.									

Would you consider yourself living in an urban or rural area?*			
Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)			
Chi-Square Tests			
	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	1.724 ^a	3	.632
Likelihood Ratio	1.886	3	.597
Linear-by-Linear Association	.983	1	.321
N of Valid Cases	178		
a. 0 cells (0%) have expected count less than 5. The minimum expected count is 5.30.			

How do you identify? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	10.008 ^a	6	.124	.132 ^b	.123	.141			
Likelihood Ratio	7.517	6	.276	.203 ^b	.193	.214			
Fisher-Freeman-Halton Exact Test	8.166			.204 ^b	.194	.215			
Linear-by-Linear Association	1.064 ^c	1	.302	.316 ^b	.304	.328	.171 ^b	.161	.180
N of Valid Cases	178								
a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .13.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is -1.031.									

What is the highest level of education you have completed?* Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose.									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	19.029 ^a	9	.025	.026 ^b	.022	.030			
Likelihood Ratio	18.818	9	.027	.036 ^b	.031	.040			
Fisher-Freeman-Halton Exact Test	15.586			.055 ^b	.049	.061			
Linear-by-Linear Association	.035 ^c	1	.852	.875 ^b	.866	.883	.441 ^b	.428	.453
N of Valid Cases	178								
a. 4 cells (25%) have expected count less than 5. The minimum expected count is 1.03.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is .186.									

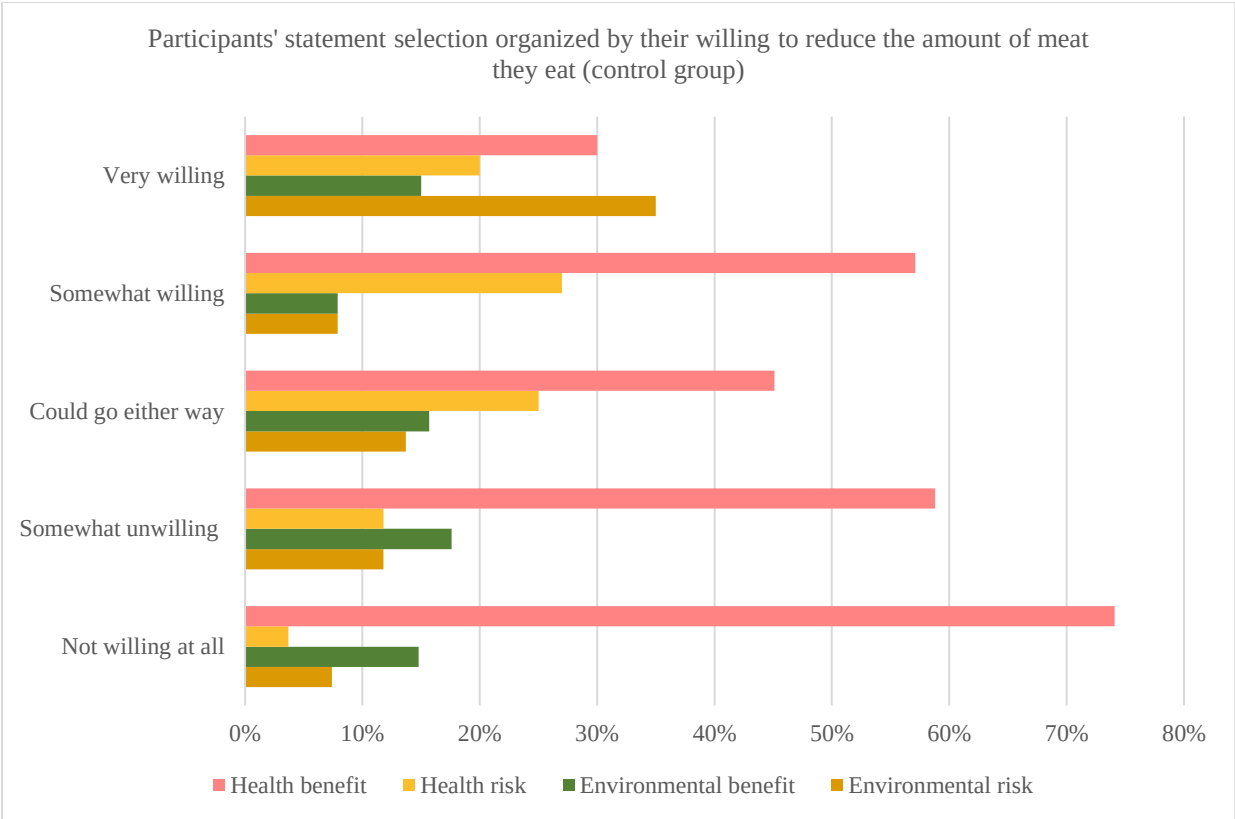
On average how often do you eat meat or products that include meat? (Meat includes beef, veal, lamb, mutton, pork, goat, venison, chicken, turkey, goose, duck, and/or game) * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	8.654 ^a	9	.470	.500 ^b	.487	.513			
Likelihood Ratio	10.063	9	.345	.296 ^b	.284	.308			
Fisher-Freeman-Halton Exact Test	8.501			.461 ^b	.448	.474			
Linear-by-Linear Association	.099 ^c	1	.753	.759 ^b	.748	.770	.396 ^b	.384	.409
N of Valid Cases	178								
a. 8 cells (50%) have expected count less than 5. The minimum expected count is .13.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is -.315.									

Which type of meat do you eat most often? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	18.752 ^a	15	.225	.232 ^b	.221	.242			
Likelihood Ratio	15.643	15	.406	.337 ^b	.324	.349			
Fisher-Freeman-Halton Exact Test	17.072			.257 ^b	.245	.268			
Linear-by-Linear Association	.027 ^c	1	.870	.872 ^b	.864	.881	.449 ^b	.436	.461
N of Valid Cases	178								
a. 15 cells (62.5%) have expected count less than 5. The minimum expected count is .13.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is -.163.									

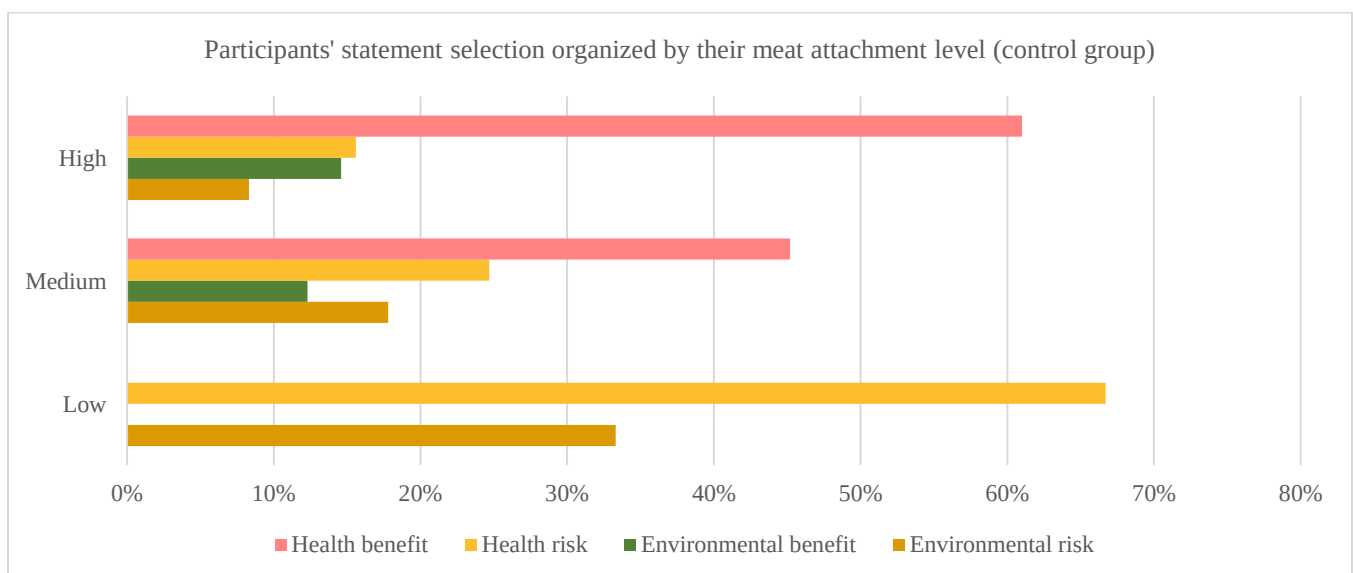
How many of your close family members eat meat regularly? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
<i>Chi-Square Tests</i>									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	5.964 ^a	6	.427	.417 ^b	.404	.430			
Likelihood Ratio	6.161	6	.405	.497 ^b	.484	.510			
Fisher-Freeman-Halton Exact Test	5.730			.398 ^b	.386	.411			
Linear-by-Linear Association	.317 ^c	1	.574	.605 ^b	.592	.618	.304 ^b	.292	.316
N of Valid Cases	178								
a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .78.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is -.563.									

How many of your close friends eat meat regularly? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
<i>Chi-Square Tests</i>									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	6.249 ^a	6	.396	.394 ^b	.381	.407			
Likelihood Ratio	5.522	6	.479	.569 ^b	.556	.582			
Fisher-Freeman-Halton Exact Test	6.150			.367 ^b	.354	.379			
Linear-by-Linear Association	1.387 ^c	1	.239	.266 ^b	.255	.278	.134 ^b	.125	.143
N of Valid Cases	175								
a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is 1.13.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is -1.178.									

How willing are you to reduce the amount of meat you eat? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	22.685 ^a	12	.031	.030 ^b	.025	.034			
Likelihood Ratio	22.863	12	.029	.050 ^b	.044	.056			
Fisher-Freeman-Halton Exact Test	21.744			.030 ^b	.026	.035			
Linear-by-Linear Association	3.494 ^c	1	.062	.068 ^b	.061	.074	.034 ^b	.030	.039
N of Valid Cases	178								
a. 8 cells (40%) have expected count less than 5. The minimum expected count is 2.20.									
b. Based on 10000 sampled tables with starting seed 957002199.									
c. The standardized statistic is 1.869.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound		Upper Bound		
Nominal by Nominal	Cramer's V	.206	.031	.030 ^a	.025		.034		
N of Valid Cases		178							
a. Based on 10000 sampled tables with starting seed 957002199.									



Meat attachment level * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	13.046 ^a	6	.042	.042 ^b	.036	.047			
Likelihood Ratio	13.652	6	.034	.029 ^b	.024	.033			
Fisher-Freeman-Halton Exact Test	12.625			.024 ^b	.020	.028			
Linear-by-Linear Association	5.381 ^c	1	.020	.022 ^b	.018	.026	.012 ^b	.009	.015
N of Valid Cases	172								
a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .38.									
b. Based on 10000 sampled tables with starting seed 698493861.									
c. The standardized statistic is 2.320.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval		Lower Bound	Upper Bound	
Nominal by Nominal	Cramer's V	.195	.042	.042 ^a			.036		.047
N of Valid Cases		172							
a. Based on 10000 sampled tables with starting seed 698493861.									



Please use the smile to describe how you feel about meat * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	10.499 ^a	12	.572	.586 ^b	.573	.598			
Likelihood Ratio	9.707	12	.642	.727 ^b	.715	.738			
Fisher-Freeman-Halton Exact Test	11.738			.399 ^b	.386	.412			
Linear-by-Linear Association	1.082 ^c	1	.298	.325 ^b	.313	.337	.166 ^b	.156	.175
N of Valid Cases	173								
a. 12 cells (60%) have expected count less than 5. The minimum expected count is .13.									
b. Based on 10000 sampled tables with starting seed 1335104164.									
c. The standardized statistic is 1.040.									

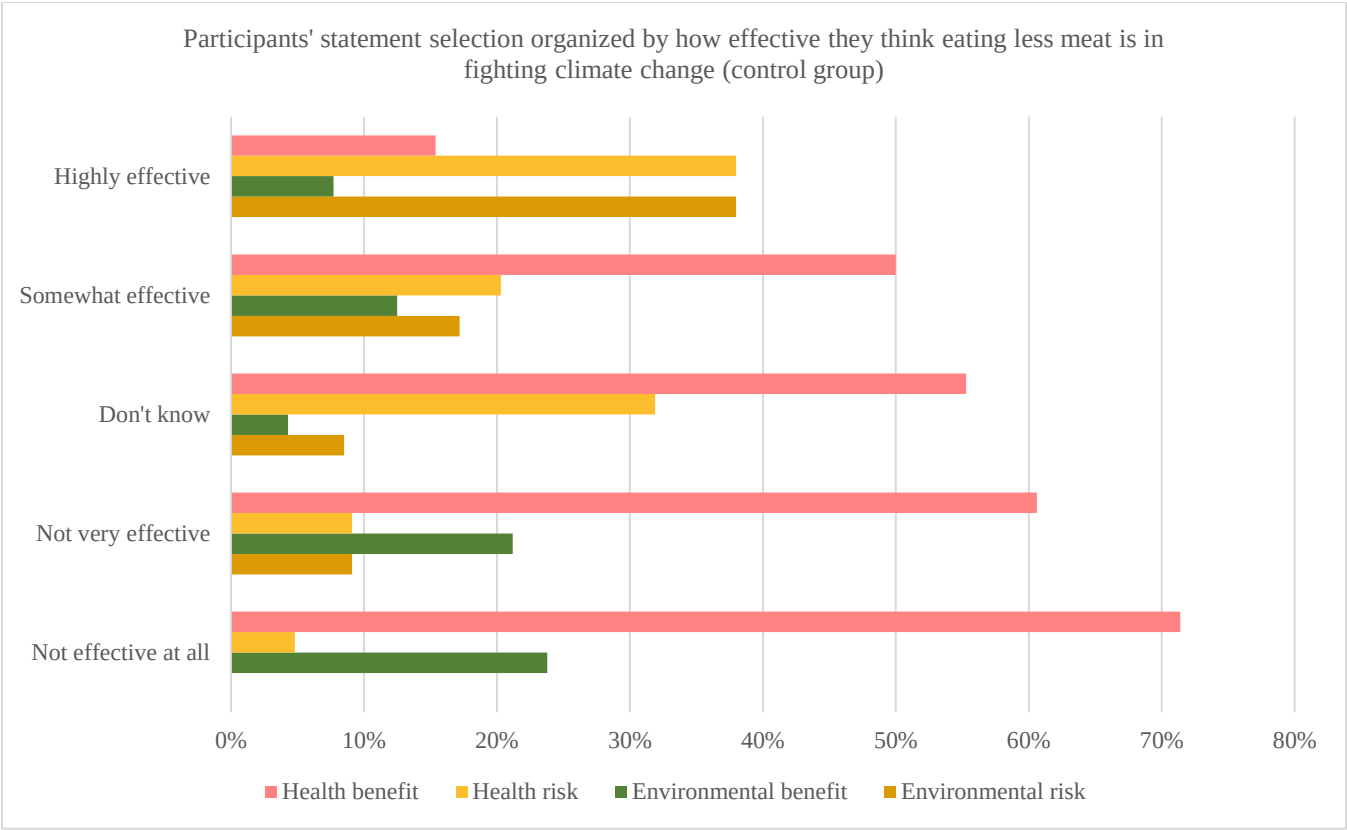
Please indicate the extent to which you agree or disagree with the following statements - Meat production is harmful to the environment * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	17.685 ^a	12	.126	.120 ^b	.112	.128			
Likelihood Ratio	16.677	12	.162	.221 ^b	.211	.232			
Fisher-Freeman-Halton Exact Test	16.168			.145 ^b	.135	.154			
Linear-by-Linear Association	2.527 ^c	1	.112	.118 ^b	.110	.127	.062 ^b	.055	.068
N of Valid Cases	178								
a. 8 cells (40%) have expected count less than 5. The minimum expected count is 1.42.									
b. Based on 10000 sampled tables with starting seed 484067124.									
c. The standardized statistic is -1.590.									

Please indicate the extent to which you agree or disagree with the following statements - Meat production is beneficial to the environment * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	18.186 ^a	12	.110	.100 ^b	.092	.108			
Likelihood Ratio	17.933	12	.118	.170 ^b	.160	.179			
Fisher-Freeman-Halton Exact Test	17.703			.083 ^b	.076	.090			
Linear-by-Linear Association	.651 ^c	1	.420	.445 ^b	.432	.458	.223 ^b	.212	.234
N of Valid Cases	178								
a. 10 cells (50%) have expected count less than 5. The minimum expected count is 1.68.									
b. Based on 10000 sampled tables with starting seed 484067124.									
c. The standardized statistic is .807.									

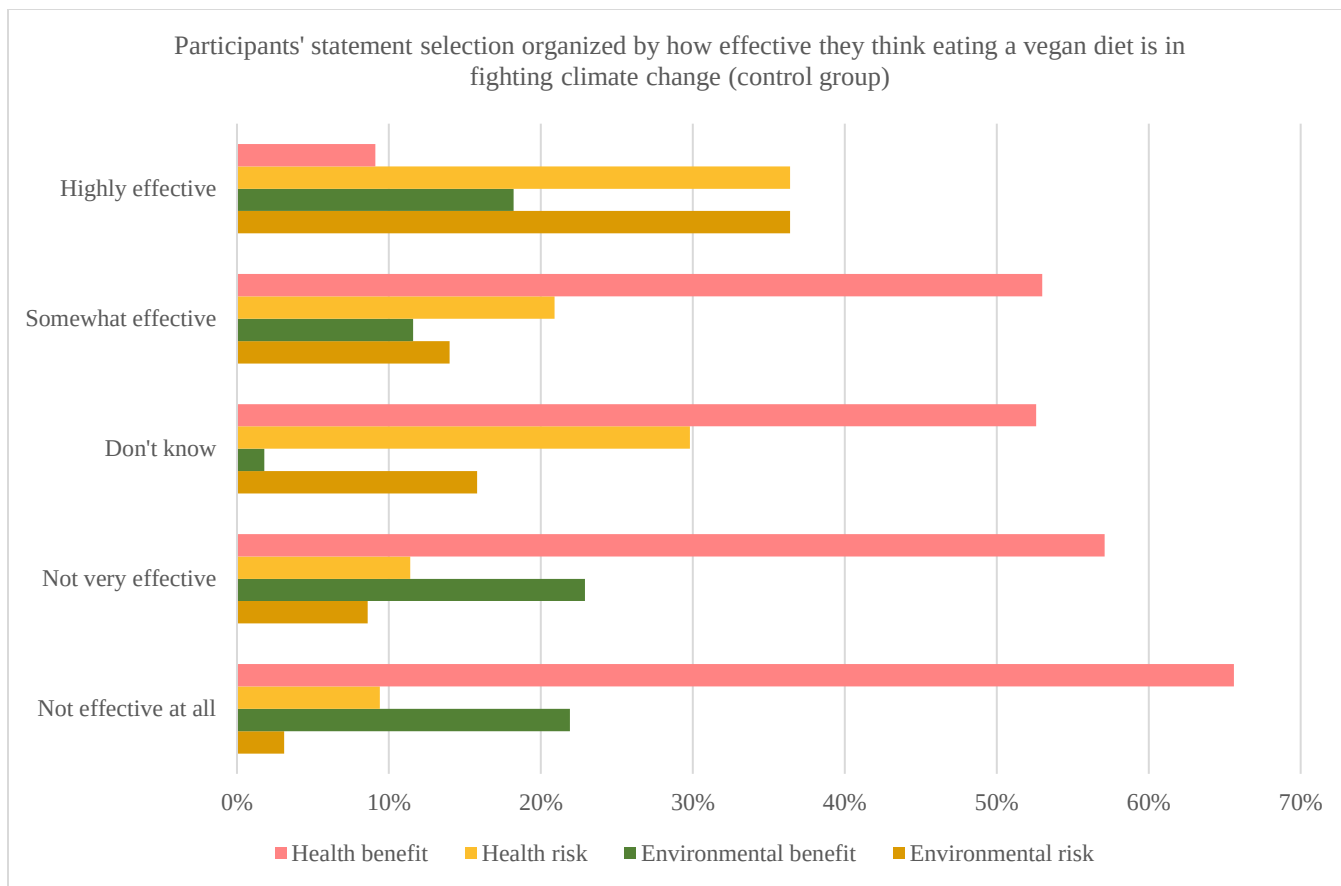
Please indicate the extent to which you agree or disagree with the following statements - Meat-rich diets increase risk of disease * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	16.905 ^a	12	.153	.144 ^b	.135	.153			
Likelihood Ratio	18.018	12	.115	.155 ^b	.146	.165			
Fisher-Freeman-Halton Exact Test	17.281			.096 ^b	.089	.104			
Linear-by-Linear Association	3.415 ^c	1	.065	.071 ^b	.064	.078	.036 ^b	.031	.041
N of Valid Cases	178								
a. 9 cells (45%) have expected count less than 5. The minimum expected count is 1.03.									
b. Based on 10000 sampled tables with starting seed 484067124.									
c. The standardized statistic is -1.848.									

Please indicate the extent to which you agree or disagree with the following statements - Meat is an important part of a healthy diet * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
<i>Chi-Square Tests</i>									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	12.250 ^a	12	.426	.413 ^b	.400	.426			
Likelihood Ratio	12.635	12	.396	.459 ^b	.446	.472			
Fisher-Freeman-Halton Exact Test	12.092			.352 ^b	.339	.364			
Linear-by-Linear Association	3.303 ^c	1	.069	.071 ^b	.064	.078	.040 ^b	.035	.045
N of Valid Cases	177								
a. 9 cells (45%) have expected count less than 5. The minimum expected count is .25.									
b. Based on 10000 sampled tables with starting seed 484067124.									
c. The standardized statistic is 1.817.									

For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change - Eating less meat * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	32.776 ^a	12	.001	<.001 ^b	<.001	.001			
Likelihood Ratio	35.825	12	<.001	<.001 ^b	<.001	<.001			
Fisher-Freeman-Halton Exact Test	31.710			<.001 ^b	<.001	<.001			
Linear-by-Linear Association	7.565 ^c	1	.006	.005 ^b	.003	.007	.002 ^b	.001	.004
N of Valid Cases	178								
a. 8 cells (40%) have expected count less than 5. The minimum expected count is 1.68.									
b. Based on 10000 sampled tables with starting seed 143709387.									
c. The standardized statistic is -2.750.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound	Upper Bound			
Nominal by Nominal	Cramer's V	.248	.001	<.001 ^a	<.001				.001
N of Valid Cases		178							
a. Based on 10000 sampled tables with starting seed 143709387.									



For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change - Eating a vegan diet (no meat, dairy, fish, or eggs) * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	30.462 ^a	12	.002	.002 ^b	<.001	.003			
Likelihood Ratio	34.768	12	<.001	<.001 ^b	<.001	.001			
Fisher-Freeman-Halton Exact Test	32.547			<.001 ^b	<.001	<.001			
Linear-by-Linear Association	4.835 ^c	1	.028	.029 ^b	.025	.033	.016 ^b	.013	.019
N of Valid Cases	178								
a. 7 cells (35%) have expected count less than 5. The minimum expected count is 1.42.									
b. Based on 10000 sampled tables with starting seed 143709387.									
c. The standardized statistic is -2.199.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound		Upper Bound		
Nominal by Nominal	Cramer's V	.239	.002	.002 ^a	<0.001				.003
N of Valid Cases		178							
a. Based on 10000 sampled tables with starting seed 143709387.									



Control Group Statistically Significant Crosstabs				
	Environmental risk	Environmental benefit	Health risk	Health benefit
<i>"How willing are you to reduce the amount of meat you eat?"</i>				
Not willing at all <i>n</i> = 27	7.4%	14.8%	3.7%	74.1%
Somewhat unwilling <i>n</i> = 17	11.8%	17.6%	11.8%	58.8%
Could go either way <i>n</i> = 51	13.7%	15.7%	25.5%	45.1%
Somewhat willing <i>n</i> = 63	7.9%	7.9%	27%	57.1%
Very willing <i>n</i> = 20	35%	15%	20%	30%
<i>Meat attachment levels</i>				
Low <i>n</i> = 3	33.3%	0%	66.7%	0%
Medium <i>n</i> = 73	17.8%	12.3%	24.7%	45.2%
High <i>n</i> = 96	8.3%	14.6%	15.6%	61.5%
<i>"For each of the following lifestyle changes please indicate how effective you think it is in fighting climate change - Eating less meat"</i>				
Not effective at all <i>n</i> = 21	0%	23.8%	4.8%	71.4%
Not very effective <i>n</i> = 33	9.1%	21.2%	9.1%	60.6%
Don't know <i>n</i> = 47	8.5%	4.3%	31.9%	55.3%
Somewhat effective <i>n</i> = 64	17.2%	12.5%	20.3%	50%
Highly effective <i>n</i> = 13	38.5%	7.7%	38.5%	15.4%
<i>"For each of the following lifestyle changes please indicate how effective you think it is in fighting climate change - Eating a vegan diet (no meat, dairy, eggs, or fish)"</i>				
Not effective at all <i>n</i> = 32	3.1%	21.9%	9.4%	65.6%
Not very effective <i>n</i> = 35	8.6%	22.9%	11.4%	57.1%
Don't know <i>n</i> = 57	15.8%	1.8%	29.8%	52.6%
Somewhat effective <i>n</i> = 43	14%	11.6%	20.9%	53.5%
Highly effective <i>n</i> = 11	36.4%	18.2%	36.4%	9.1%

Age cohort * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	14.246 ^a	20	.818	.832 ^b	.822	.841			
Likelihood Ratio	17.610	20	.613	.682 ^b	.670	.694			
Fisher-Freeman-Halton Exact Test	15.230			.742 ^b	.731	.753			
Linear-by-Linear Association	1.778 ^c	1	.182	.185 ^b	.175	.195	.095 ^b	.087	.102
N of Valid Cases	180								
a. 14 cells (46.7%) have expected count less than 5. The minimum expected count is .23.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is 1.334.									

Where do you live? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	44.357 ^a	45	.499	.503 ^b	.490	.516			
Likelihood Ratio	47.715	45	.363	.484 ^b	.471	.497			
Fisher-Freeman-Halton Exact Test	39.266			.584 ^b	.572	.597			
Linear-by-Linear Association	.117 ^c	1	.732	.728 ^b	.717	.740	.363 ^b	.351	.376
N of Valid Cases	167								
a. 51 cells (85%) have expected count less than 5. The minimum expected count is .08.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is .342.									

Would you consider yourself living in an urban or rural area? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)			
<i>Chi-Square Tests</i>			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.651 ^a	5	.124
Likelihood Ratio	12.893	5	.024
Linear-by-Linear Association	.189	1	.663
N of Valid Cases	180		
a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 3.34.			

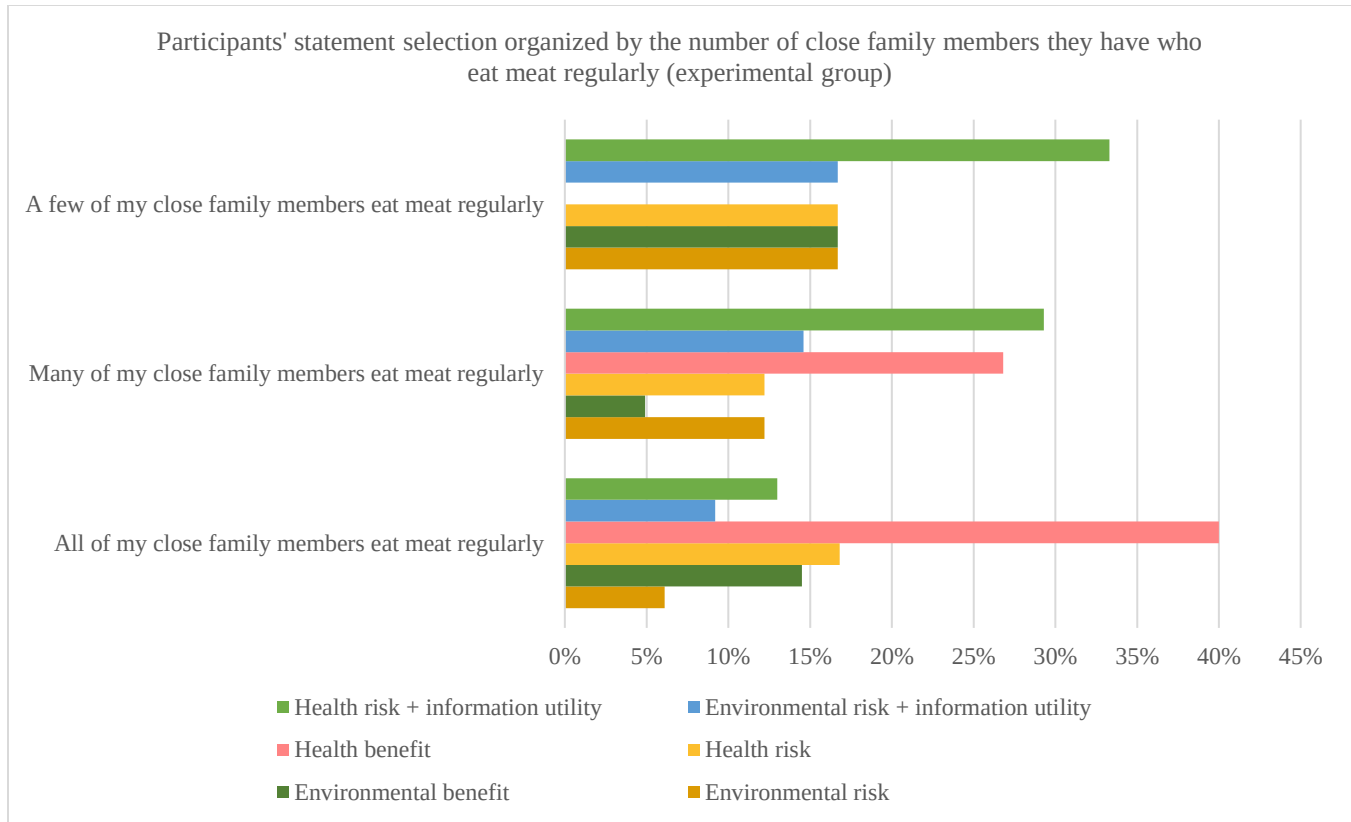
How do you identify? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
<i>Chi-Square Tests</i>									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	24.040 ^a	20	.241	.242 ^b	.231	.253			
Likelihood Ratio	18.402	20	.561	.264 ^b	.253	.275			
Fisher-Freeman-Halton Exact Test	23.075			.236 ^b	.225	.247			
Linear-by-Linear Association	2.418 ^c	1	.120	.124 ^b	.116	.132	.064 ^b	.058	.071
N of Valid Cases	180								
a. 18 cells (60%) have expected count less than 5. The minimum expected count is .08.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is 1.555.									

What is the highest level of education you have completed? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
<i>Chi-Square Tests</i>									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	19.216 ^a	20	.508	.518 ^b	.505	.531			
Likelihood Ratio	19.127	20	.514	.485 ^b	.472	.497			
Fisher-Freeman-Halton Exact Test	18.726			.535 ^b	.522	.548			
Linear-by-Linear Association	.129 ^c	1	.720	.733 ^b	.721	.744	.368 ^b	.356	.381
N of Valid Cases	180								
a. 15 cells (50%) have expected count less than 5. The minimum expected count is .08.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is .359.									

On average how often do you eat meat or products that include meat? (Meat includes beef, veal, lamb, mutton, pork, goat, venison, chicken, turkey, goose, duck, and/or game) * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
<i>Chi-Square Tests</i>									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	15.648 ^a	15	.406	.417 ^b	.404	.430			
Likelihood Ratio	15.020	15	.450	.371 ^b	.358	.383			
Fisher-Freeman-Halton Exact Test	16.385			.287 ^b	.275	.299			
Linear-by-Linear Association	7.458 ^c	1	.006	.007 ^b	.004	.009	.004 ^b	.002	.005
N of Valid Cases	179								
a. 12 cells (50%) have expected count less than 5. The minimum expected count is .08.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is 2.731.									

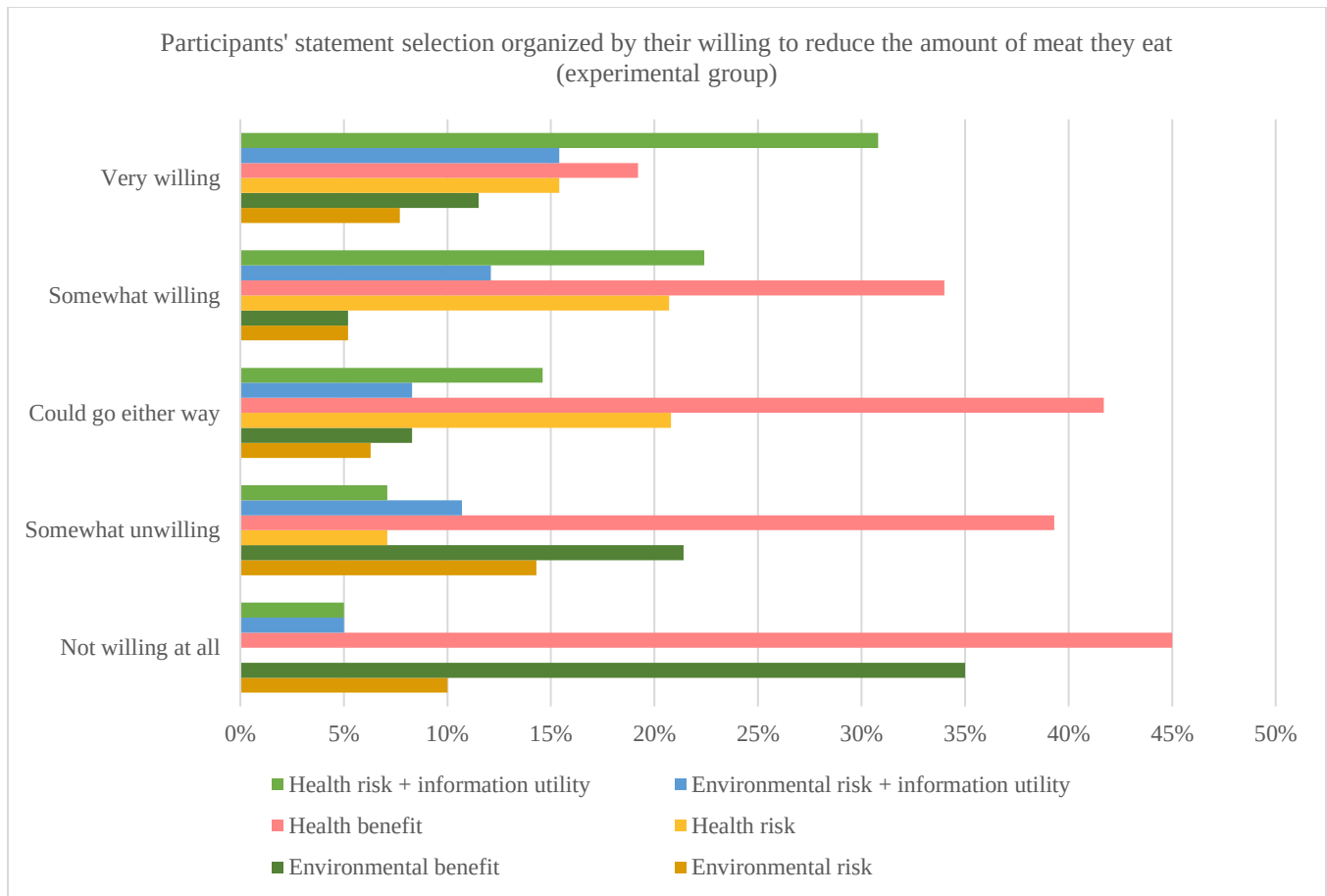
Which type of meat do you eat most often? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	16.559 ^a	15	.346	.359 ^b	.347	.371			
Likelihood Ratio	10.534	15	.785	.800 ^b	.789	.810			
Fisher-Freeman-Halton Exact Test	12.323			.735 ^b	.724	.747			
Linear-by-Linear Association	2.188 ^c	1	.139	.148 ^b	.139	.157	.073 ^b	.066	.079
N of Valid Cases	180								
a. 13 cells (54.2%) have expected count less than 5. The minimum expected count is .08.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is 1.479.									

How many of your close family members eat meat regularly? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	15.534 ^a	10	.114	.112 ^b	.104	.120			
Likelihood Ratio	17.373	10	.066	.084 ^b	.076	.091			
Fisher-Freeman-Halton Exact Test	17.336			.029 ^b	.025	.033			
Linear-by-Linear Association	1.814 ^c	1	.178	.188 ^b	.178	.198	.096 ^b	.089	.104
N of Valid Cases	178								
a. 8 cells (44.4%) have expected count less than 5. The minimum expected count is .47.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is 1.347.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound		Upper Bound		
Nominal by Nominal	Cramer's V	.209	.114	.112 ^c	.104		.12		
N of Valid Cases		178							
c. Based on 10000 sampled tables with starting seed 205597102.									



How many of your close friends eat meat regularly? * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	11.893 ^a	10	.292	.286 ^b	.275	.298			
Likelihood Ratio	12.235	10	.270	.344 ^b	.332	.356			
Fisher-Freeman-Halton Exact Test	11.662			.230 ^b	.219	.241			
Linear-by-Linear Association	1.351 ^c	1	.245	.255 ^b	.243	.266	.132 ^b	.124	.141
N of Valid Cases	179								
a. 6 cells (33.3%) have expected count less than 5. The minimum expected count is .63.									
b. Based on 10000 sampled tables with starting seed 205597102.									
c. The standardized statistic is 1.162.									

How willing are you to reduce the amount of meat you eat? * Please select the statement you'd like to learn more about. On the following page you'll have the opportunity to learn more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	33.088 ^a	20	.033	.030 ^b	.026	.035			
Likelihood Ratio	35.204	20	.019	.039 ^b	.034	.044			
Fisher-Freeman-Halton Exact Test	31.524			.030 ^b	.026	.035			
Linear-by-Linear Association	10.170 ^c	1	.001	.001 ^b	<.001	.002	<.001 ^b	<.001	.001
N of Valid Cases	180								
a. 17 cells (56.7%) have expected count less than 5. The minimum expected count is 1.56.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is -3.189.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound		Upper Bound		
Nominal by Nominal	Cramer's V	.214	.033	.03 ^a	.026		.035		
N of Valid Cases		180							
a. Based on 10000 sampled tables with starting seed 2000000.									



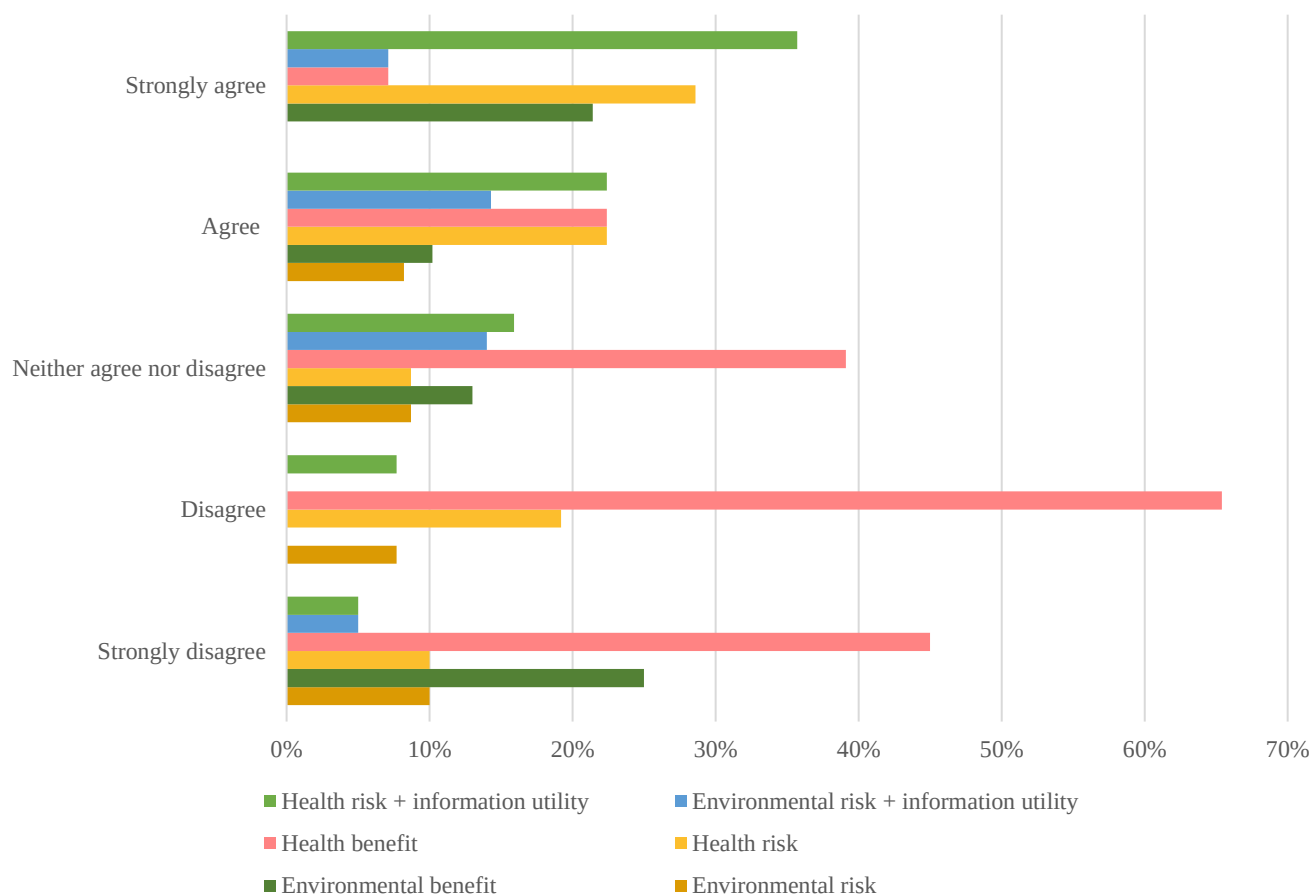
Meat attachment level * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	17.225 ^a	10	.070	.071 ^b	.064	.078			
Likelihood Ratio	14.507	10	.151	.134 ^b	.125	.143			
Fisher-Freeman-Halton Exact Test	12.845			.141 ^b	.132	.150			
Linear-by-Linear Association	1.381 ^c	1	.240	.256 ^b	.244	.267	.136 ^b	.127	.145
N of Valid Cases	177								
a. 6 cells (33.3%) have expected count less than 5. The minimum expected count is .24.									
b. Based on 10000 sampled tables with starting seed 272886377.									
c. The standardized statistic is -1.175.									

Please use the smile to describe how you feel about meat * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose.
(Experimental group)

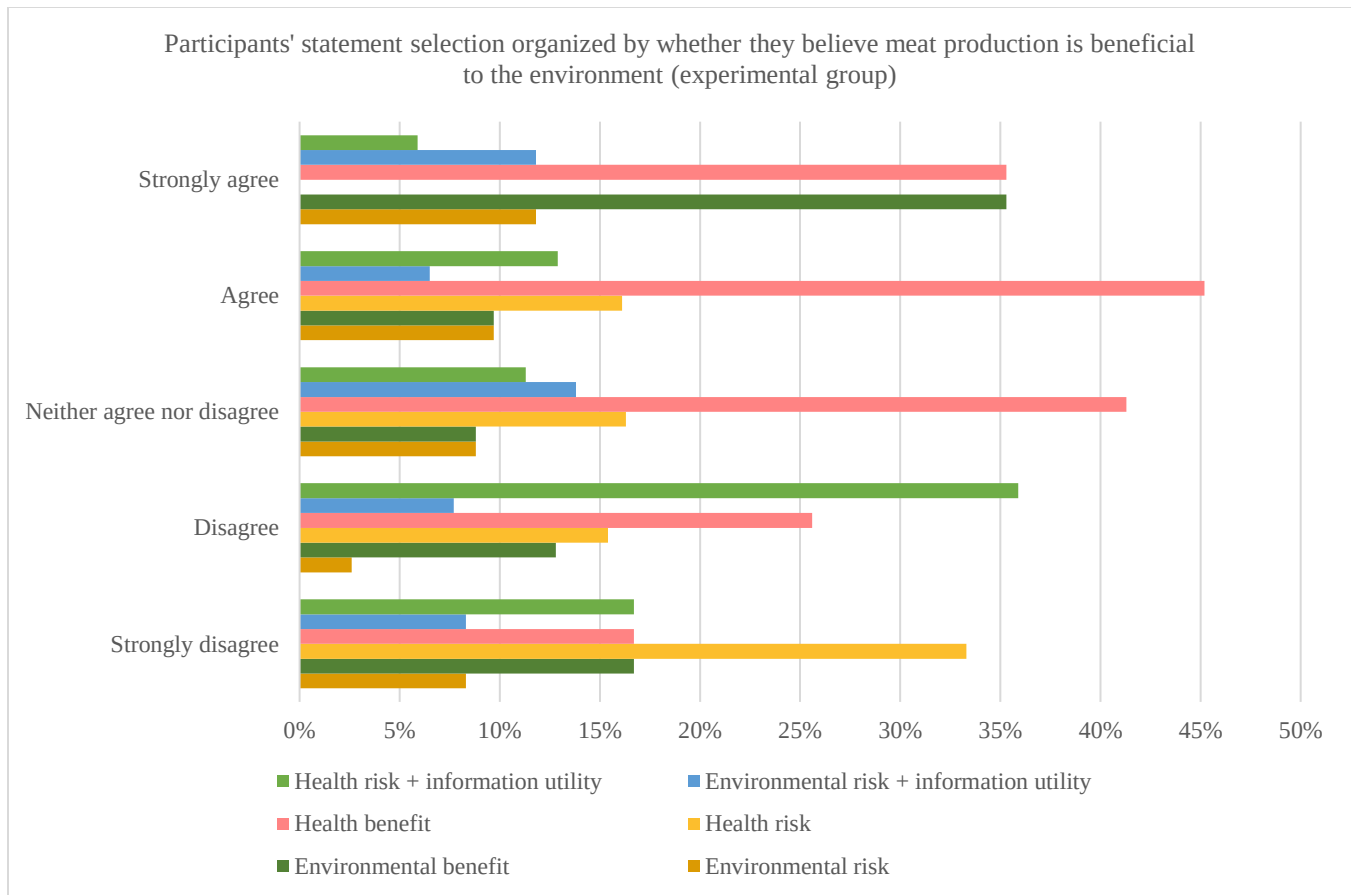
<i>Chi-Square Tests</i>									
	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	18.497 ^a	15	.237	.219 ^b	.208	.229			
Likelihood Ratio	20.489	15	.154	.134 ^b	.125	.143			
Fisher-Freeman-Halton Exact Test	18.730			.103 ^b	.095	.111			
Linear-by-Linear Association	.873 ^c	1	.350	.348 ^b	.335	.360	.180 ^b	.170	.190
N of Valid Cases	174								
a. 13 cells (54.2%) have expected count less than 5. The minimum expected count is .16.									
b. Based on 10000 sampled tables with starting seed 440131537.									
c. The standardized statistic is -.934.									

Please indicate the extent to which you agree or disagree with the following statements - Meat production is harmful to the environment * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	38.254 ^a	20	.008	.008 ^b	.005	.010			
Likelihood Ratio	45.688	20	<.001	.002 ^b	<.001	.003			
Fisher-Freeman-Halton Exact Test	38.019			.002 ^b	.001	.004			
Linear-by-Linear Association	3.107 ^c	1	.078	.078 ^b	.071	.084	.038 ^b	.033	.043
N of Valid Cases	178								
a. 16 cells (53.3%) have expected count less than 5. The minimum expected count is 1.10.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is 1.763.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound	Upper Bound			
Nominal by Nominal	Cramer's V	.232	.008	.008 ^a			.005		.010
N of Valid Cases		178							
a. Based on 10000 sampled tables with starting seed 2000000.									

Participants' statement selection organized by whether they believe meat production is harmful to the environment (experimental group)

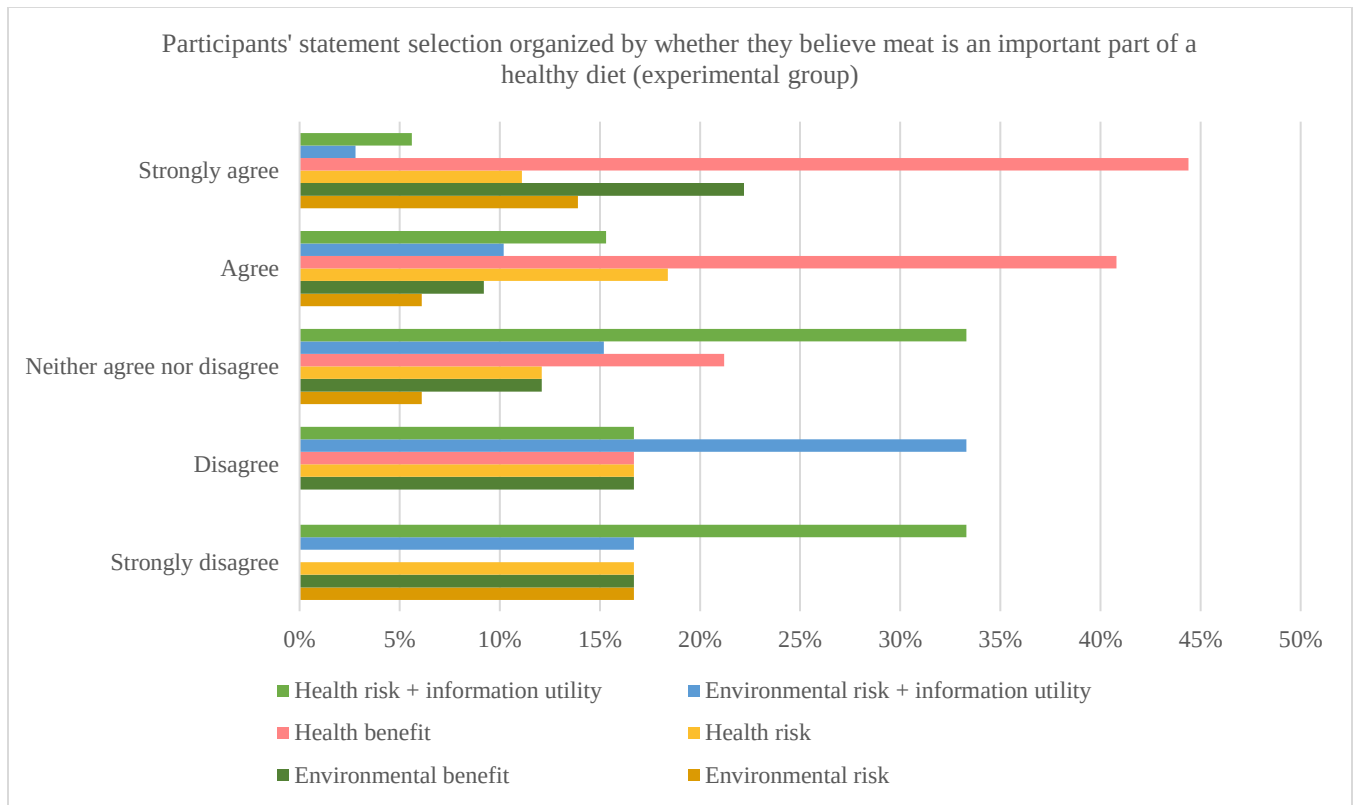


Please indicate the extent to which you agree or disagree with the following statements - Meat production is beneficial to the environment * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	31.917 ^a	20	.044	.041 ^b	.036	.046			
Likelihood Ratio	31.337	20	.051	.090 ^b	.082	.097			
Fisher-Freeman-Halton Exact Test	28.758			.047 ^b	.042	.053			
Linear-by-Linear Association	3.583 ^c	1	.058	.059 ^b	.053	.065	.032 ^b	.027	.036
N of Valid Cases	179								
a. 17 cells (56.7%) have expected count less than 5. The minimum expected count is .94.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is -1.893.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound		Upper Bound		
Nominal by Nominal	Cramer's V	.211	.044	.041 ^a	.036		.046		
N of Valid Cases		179							
a. Based on 10000 sampled tables with starting seed 2000000.									



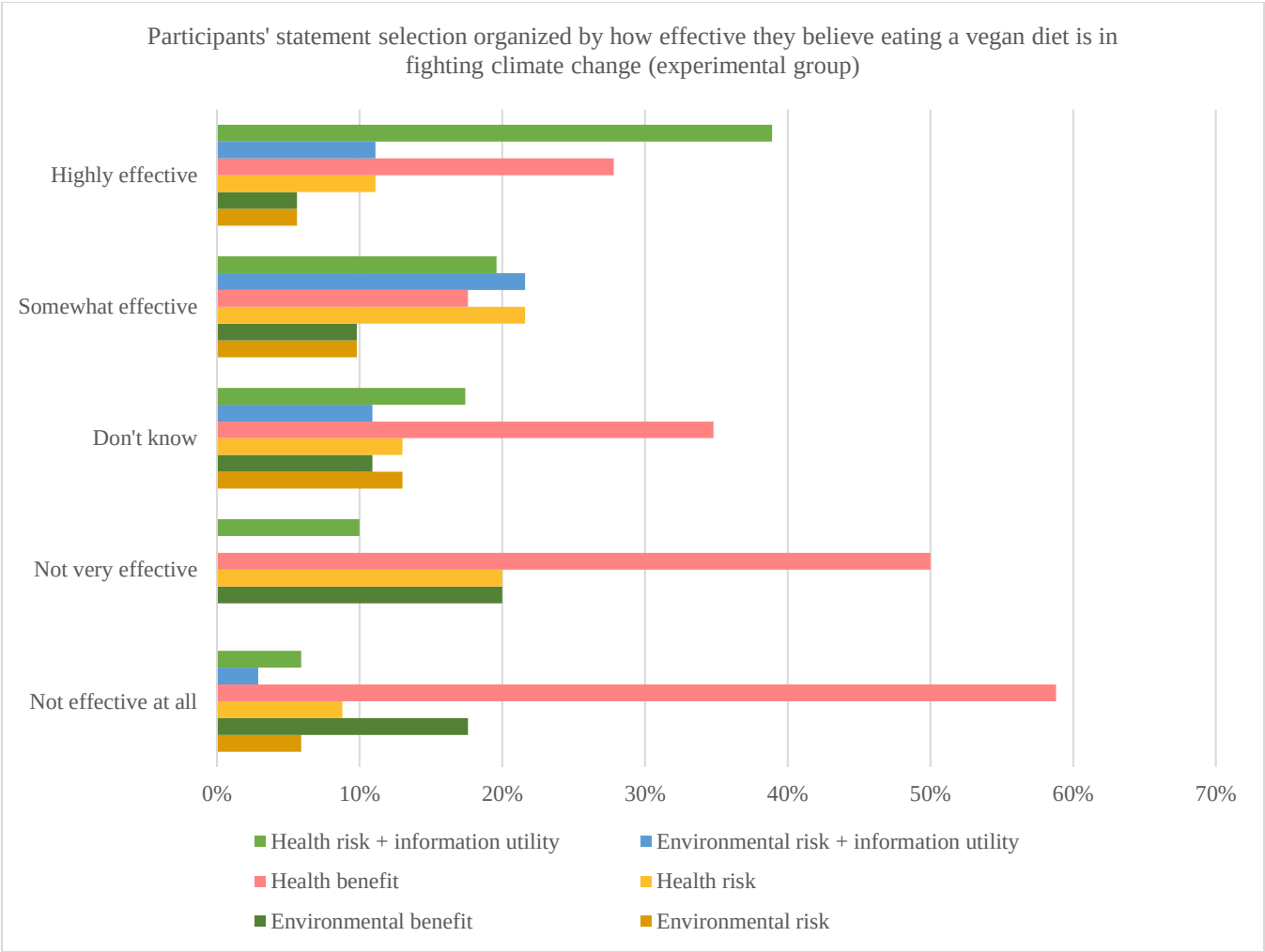
Please indicate the extent to which you agree or disagree with the following statements - Meat-rich diets increase risk of disease * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	20.851 ^a	20	.406	.410 ^b	.397	.423			
Likelihood Ratio	25.323	20	.189	.285 ^b	.273	.296			
Fisher-Freeman-Halton Exact Test	22.863			.226 ^b	.216	.237			
Linear-by-Linear Association	6.599 ^c	1	.010	.009 ^b	.007	.011	.005 ^b	.003	.006
N of Valid Cases	180								
a. 16 cells (53.3%) have expected count less than 5. The minimum expected count is .86.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is 2.569.									

Please indicate the extent to which you agree or disagree with the following statements - Meat is an important part of a healthy diet * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	29.017 ^a	20	.087	.080 ^b	.073	.087			
Likelihood Ratio	30.831	20	.057	.084 ^b	.077	.092			
Fisher-Freeman-Halton Exact Test	30.022			.019 ^b	.015	.022			
Linear-by-Linear Association	6.104 ^c	1	.013	.014 ^b	.011	.017	.008 ^b	.005	.010
N of Valid Cases	179								
a. 18 cells (60%) have expected count less than 5. The minimum expected count is .47.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is -2.471.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound		Upper Bound		
Nominal by Nominal	Cramer's V	.201	.087	.08 ^a	.073		.087		
N of Valid Cases		179							
a. Based on 10000 sampled tables with starting seed 2000000.									



For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change - Eating less meat * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	25.438 ^a	20	.185	.182 ^b	.172	.192			
Likelihood Ratio	29.691	20	.075	.123 ^b	.115	.132			
Fisher-Freeman-Halton Exact Test	26.003			.124 ^b	.115	.132			
Linear-by-Linear Association	5.973 ^c	1	.015	.013 ^b	.010	.016	.008 ^b	.006	.010
N of Valid Cases	179								
a. 16 cells (53.3%) have expected count less than 5. The minimum expected count is 1.23.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is 2.444.									

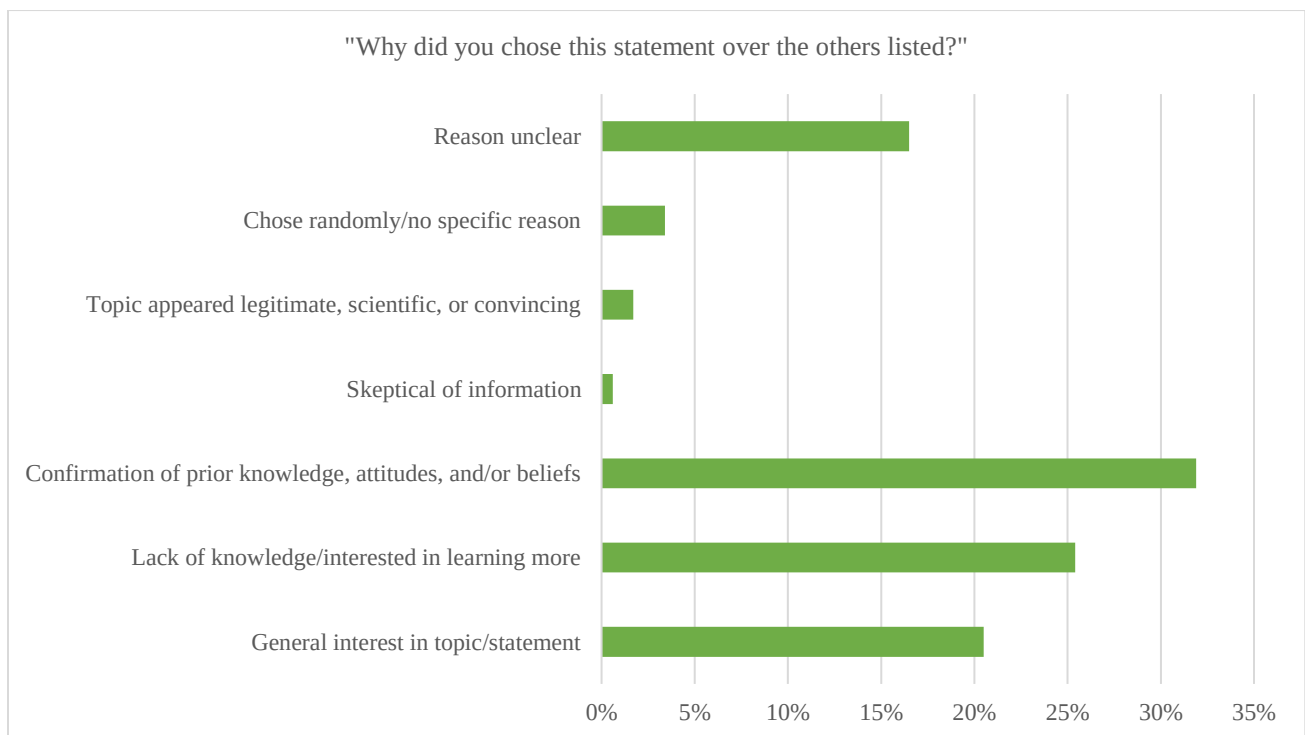
For each of the following lifestyle changes, please indicate how effective you think it is in fighting climate change - Eating a vegan diet (no meat, dairy, fish, or eggs) * Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group)									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	41.654 ^a	20	.003	.004 ^b	.002	.005			
Likelihood Ratio	46.192	20	<.001	.002 ^b	.001	.004			
Fisher-Freeman-Halton Exact Test	39.612			.002 ^b	.001	.004			
Linear-by-Linear Association	4.900 ^c	1	0.027	.028 ^b	.024	.032	.014 ^b	.011	.017
N of Valid Cases	179								
a. 15 cells (50%) have expected count less than 5. The minimum expected count is 1.41.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is 2.214.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound		Upper Bound		
Nominal by Nominal	Cramer's V	.241	.003	.004 ^a	.002		.005		
N of Valid Cases		179							
a. Based on 10000 sampled tables with starting seed 2000000.									



Experimental Group Statistically Significant Crosstabs						
	Environmental risk	Environmental benefit	Health risk	Health benefit	Environmental risk + information utility	Health risk + information utility
<i>“How many of your close family members eat meat regularly?”</i>						
All of my close family members eat meat regularly <i>n</i> = 131	6.1%	14.5%	16.8%	40.5%	9.2%	13%
Many of my close family members eat meat regularly <i>n</i> = 41	12.2%	4.9%	12.2%	26.8%	14.6%	29.3%
A few of my close family members eat meat regularly <i>n</i> = 6	16.7%	16.7%	16.7%	0%	16.7%	33.3%
<i>“How willing are you to reduce the amount of meat you eat?”</i>						
Not willing at all <i>n</i> = 20	10%	35%	0%	45%	5%	5%
Somewhat unwilling <i>n</i> = 28	14.3%	21.4%	7.1%	39.3%	10.7%	7.1%
Could go either way <i>n</i> = 48	6.3%	8.3%	20.8%	41.7%	8.3%	14.6%
Somewhat willing <i>n</i> = 58	5.2%	5.2%	20.7%	34.5%	12.1%	22.4%
Very willing <i>n</i> = 26	7.7%	11.5%	15.4%	19.2%	15.4%	30.8%
<i>“Please indicate the extent to which you agree or disagree with the following statements - Meat production is harmful to the environment”</i>						
Strongly disagree <i>n</i> = 20	10%	25%	10%	45%	5%	5%
Disagree <i>n</i> = 26	7.7%	0%	19.2%	65.4%	0%	7.7%
Neither agree nor disagree <i>n</i> = 69	8.7%	13%	8.7%	39.1%	14.5%	15.9%
Agree <i>n</i> = 49	8.2%	10.2%	22.4%	22.4%	14.3%	22.4%
Strongly agree <i>n</i> = 14	0%	21.4%	28.6%	7.1%	7.1%	35.7%
<i>“Please indicate the extent to which you agree or disagree with the following statements - Meat production is beneficial to the environment”</i>						
Strongly disagree <i>n</i> = 12	8.3%	16.7%	33.3%	16.7%	8.3%	16.7%
Disagree <i>n</i> = 39	2.6%	12.8%	15.4%	25.6%	7.7%	35.9%
Neither agree nor disagree <i>n</i> = 80	8.8%	8.8%	16.3%	41.3%	13.8%	11.3%
Agree <i>n</i> = 31	9.7%	9.7%	16.1%	45.2%	6.5%	12.9%
Strongly agree <i>n</i> = 17	11.8%	35.3%	0%	35.3%	11.8%	5.9%
<i>“Please indicate the extent to which you agree or disagree with the following statements - Meat is an important part of a healthy diet”</i>						
Strongly disagree <i>n</i> = 6	16.7%	16.7%	16.7%	0%	16.7%	33.3%
Disagree <i>n</i> = 6	0%	16.7%	16.7%	16.7%	33.3%	16.7%
Neither agree nor disagree <i>n</i> = 33	6.1%	12.1%	12.1%	21.2%	15.2%	33.3%
Agree <i>n</i> = 98	6.1%	9.2%	18.4%	40.8%	10.2%	15.3%

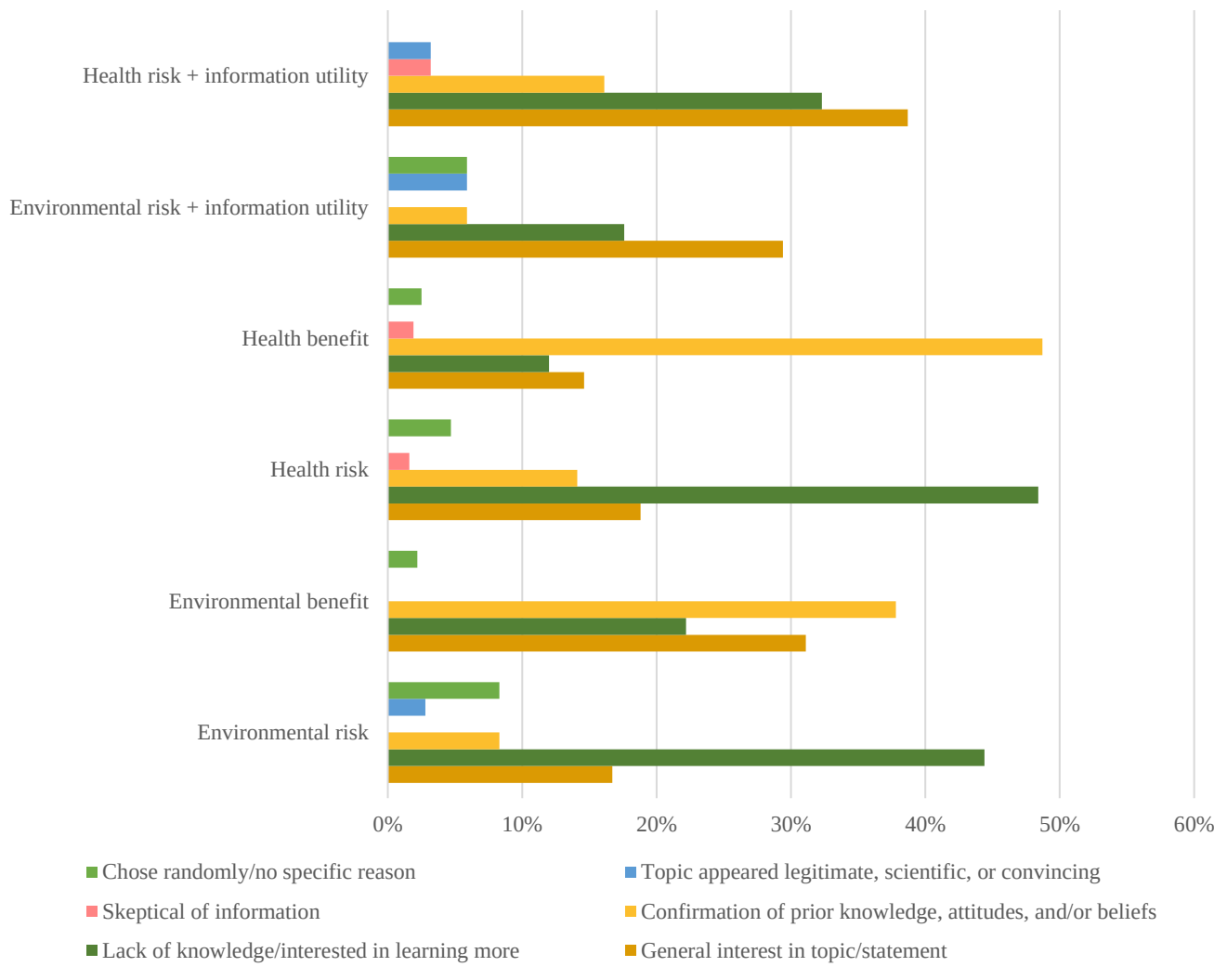
Strongly agree n = 36	13.9%	22.2%	11.1%	44.4%	2.8%	5.6%
<i>"For each of the following lifestyle changes please indicate how effective you think it is in fighting climate change - Eating a vegan diet (no meat, dairy, eggs, or fish)"</i>						
Not effective at all n = 34	5.9%	17.6%	8.8%	58.8%	2.9%	5.9%
Not very effective n = 30	0%	20%	20%	50%	0%	10%
Don't know n = 46	13%	10.9%	13%	34.8%	10.9%	17.4%
Somewhat effective n = 51	9.8%	9.8%	21.6%	17.7%	21.6%	19.6%
Highly effective n = 18	5.6%	5.6%	11.1%	27.8%	11.1%	38.9%

Post-Experiment Analysis



Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. * Why did you choose this statement over the others listed?									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	101.016 ^a	30	<.001	<.001 ^b	<.001	<.001			
Likelihood Ratio	104.396	30	<.001	<.001 ^b	<.001	<.001			
Fisher-Freeman-Halton Exact Test	101.188			<.001 ^b	<.001	<.001			
Linear-by-Linear Association	.114 ^c	1	.735	.730 ^b	.718	.741	.370 ^b	.357	.382
N of Valid Cases	351								
a. 20 cells (47.6%) have expected count less than 5. The minimum expected count is .10.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is .338.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound		Upper Bound		
Nominal by Nominal	Cramer's V	.240	<.001	<.001 ^a	<.001		<.001		
N of Valid Cases		351							
a. Based on 10000 sampled tables with starting seed 2000000.									

Participants' reason for topic choice organized by statement selection

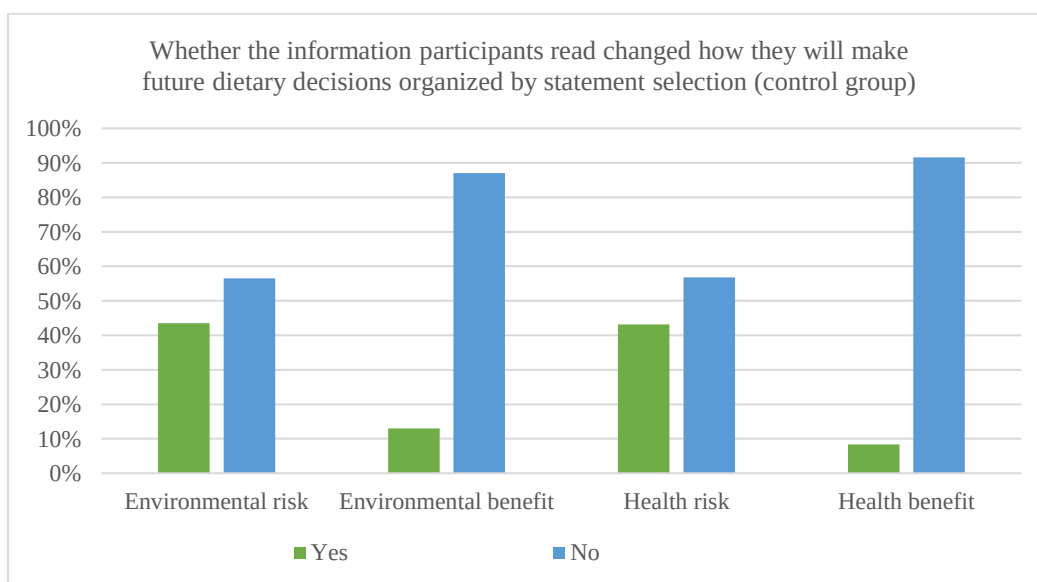


Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group) * Thinking about the information you just read about meat, did you learn anything new?			
Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.970 ^a	3	.174
Likelihood Ratio	4.926	3	.177
Linear-by-Linear Association	1.018	1	.313
N of Valid Cases	178		
a. 0 cells (0%) have expected count less than 5. The minimum expected count is 8.92.			

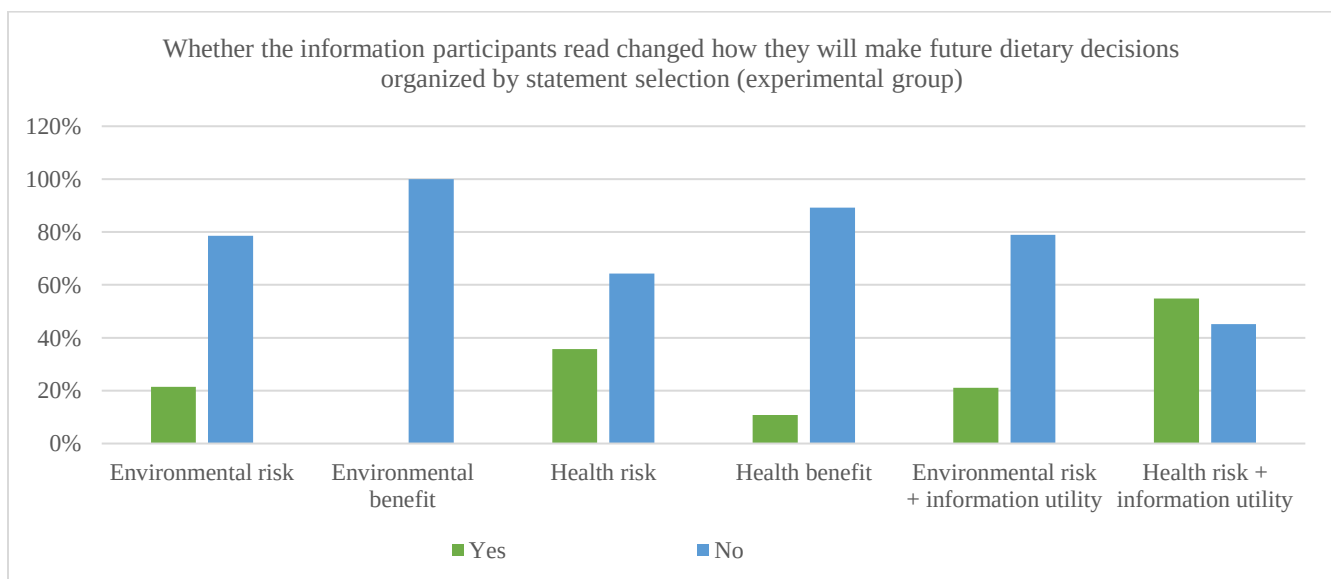
Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group) * Thinking about the information you just read about meat, did you learn anything new?			
<i>Chi-Square Tests</i>			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.989 ^a	5	.076
Likelihood Ratio	9.897	5	.078
Linear-by-Linear Association	.075	1	.785
N of Valid Cases	180		
a. 0 cells (0%) have expected count less than 5. The minimum expected count is 5.44.			

“Thinking about the information you just read about meat, did you learn anything new?” – Text entry allowed for “yes”		
Environmental risks of meat 19.61% (<i>n</i> = 20)	General environmental risks	18.6%
	Avoiding meat is more effective than eating local in fighting climate change	1%
Environmental benefits of meat 7.84% (<i>n</i> = 8)	General environmental benefits	7.8%
Health risks of meat 35.29% (<i>n</i> = 36)	General health risks	15.7%
	Drawbacks of red meat	7.8%
	Drawbacks of processed meat	1%
	Categorizations of red and processed meats	2.9%
	Recommended weekly servings of meat	2%
	Avoiding meat can increase life expectancy	5.9%
Health benefits of meat 31.37% (<i>n</i> = 32)	General health benefits	9.8%
	Bioavailability concept	12.8%
	Benefits of animal over plant proteins	5.9%
	Meat is difficult to substitute	2.9%
Other 5.88% (<i>n</i> = 6)	Increased awareness of personal meat consumption	1%
	Other	4.9%

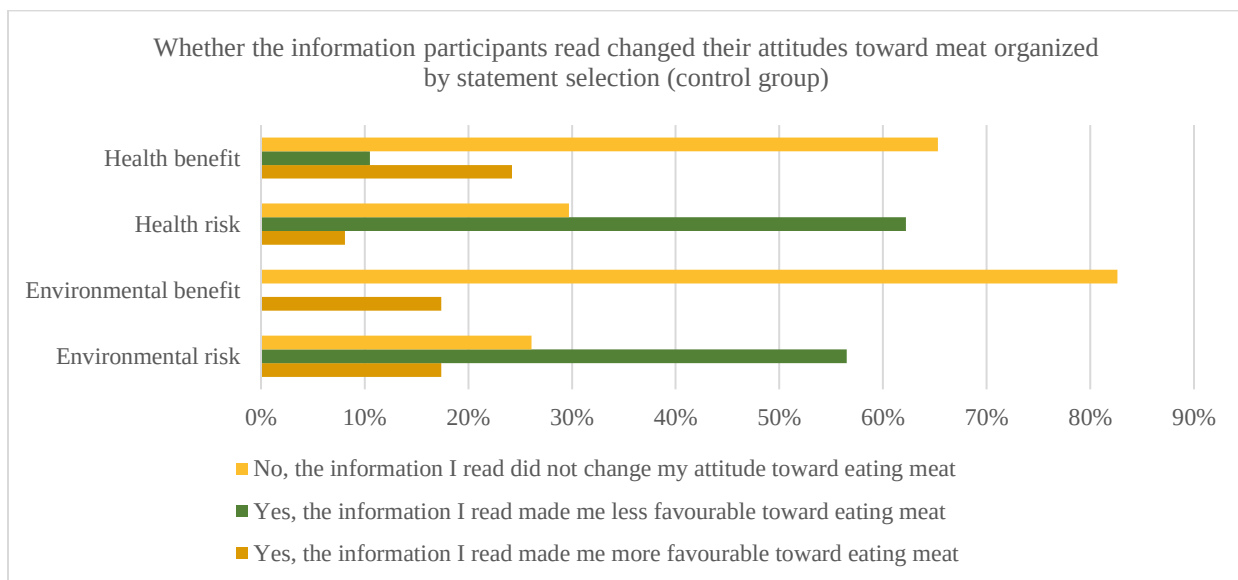
Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group) * Reflecting on what you just read about meat, did any of the information change how you will make dietary decisions in the future?										
Chi-Square Tests										
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)			
				Significance	99% Confidence Interval		Significance	99% Confidence Interval		
					Lower Bound	Upper Bound		Lower Bound	Upper Bound	
Pearson Chi-Square	28.184 ^a	3	<.001	<.001 ^b	<.001	<.001				
Likelihood Ratio	27.14	3	<.001	<.001 ^b	<.001	<.001				
Fisher-Freeman-Halton Exact Test	26.917			<.001 ^b	<.001	<.001				
Linear-by-Linear Association	12.194 ^c	1	<.001	<.001 ^b	<.001	.002	<.001b	<.001	.001	
N of Valid Cases	178									
a. 2 cells (25%) have expected count less than 5. The minimum expected count is 4.78.										
b. Based on 10000 sampled tables with starting seed 79654295.										
c. The standardized statistic is 3.492.										
Symmetric Measures										
		Value	Approximate Significance	Monte Carlo Significance						
				Significance	99% Confidence Interval					
					Lower Bound		Upper Bound			
Nominal by Nominal	Cramer's V	.398	<0.001	<.001 ^a	<.001		<.001			
N of Valid Cases		178								
a. Based on 10000 sampled tables with starting seed 79654295.										



Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group) * Reflecting on what you just read about meat, did any of the information change how you will make dietary decisions in the future?									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	32.940 ^a	5	<0.001	<.001 ^b	<0.001	<0.001			
Likelihood Ratio	35.464	5	<0.001	<.001 ^b	<0.001	<0.001			
Fisher-Freeman-Halton Exact Test	32.291			<.001 ^b	<0.001	<0.001			
Linear-by-Linear Association	10.762 ^c	1	.001	.001 ^b	<0.001	.002	<.001 ^b	<0.001	.001
N of Valid Cases	180								
a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 3.19.									
b. Based on 10000 sampled tables with starting seed 79654295.									
c. The standardized statistic is -3.280.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound	Upper Bound			
Nominal by Nominal	Cramer's V	.428	<.001	<.001 ^a	<.001	<.001			
N of Valid Cases		180							
a. Based on 10000 sampled tables with starting seed 79654295.									



Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group) * Did the information you read change your attitude toward eating meat?									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)			
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	58.326 ^a	6	<.001	<.001 ^b	<.001	<.001			
Likelihood Ratio	61.010	6	<.001	<.001 ^b	<.001	<.001			
Fisher-Freeman-Halton Exact Test	56.764			<.001 ^b	<.001	<.001			
Linear-by-Linear Association	.894 ^c	1	.345	.345 ^b	.333	.358	.178 ^b	.168	.188
N of Valid Cases	178								
a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 4.39.									
b. Based on 10000 sampled tables with starting seed 1585587178.									
c. The standardized statistic is .945.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval		Lower Bound	Upper Bound	
Nominal by Nominal	Cramer's V	.405	<.001	<.001 ^a	<.001	<.001	<.001	<.001	<.001
N of Valid Cases		178							
a. Based on 10000 sampled tables with starting seed 1585587178.									



Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group) * Did the information you read change your attitude toward eating meat?

Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	59.795 ^a	10	<.001	<.001 ^b	<.001	<.001			
Likelihood Ratio	66.743	10	<.001	<.001 ^b	<.001	<.001			
Fisher-Freeman-Halton Exact Test	61.501			<.001 ^b	<.001	<.001			
Linear-by-Linear Association	.862 ^c	1	.353	.361 ^b	.349	.373	.189 ^b	.179	.199
N of Valid Cases	180								

a. 6 cells (33.3%) have expected count less than 5. The minimum expected count is 1.87.

b. Based on 10000 sampled tables with starting seed 1585587178.

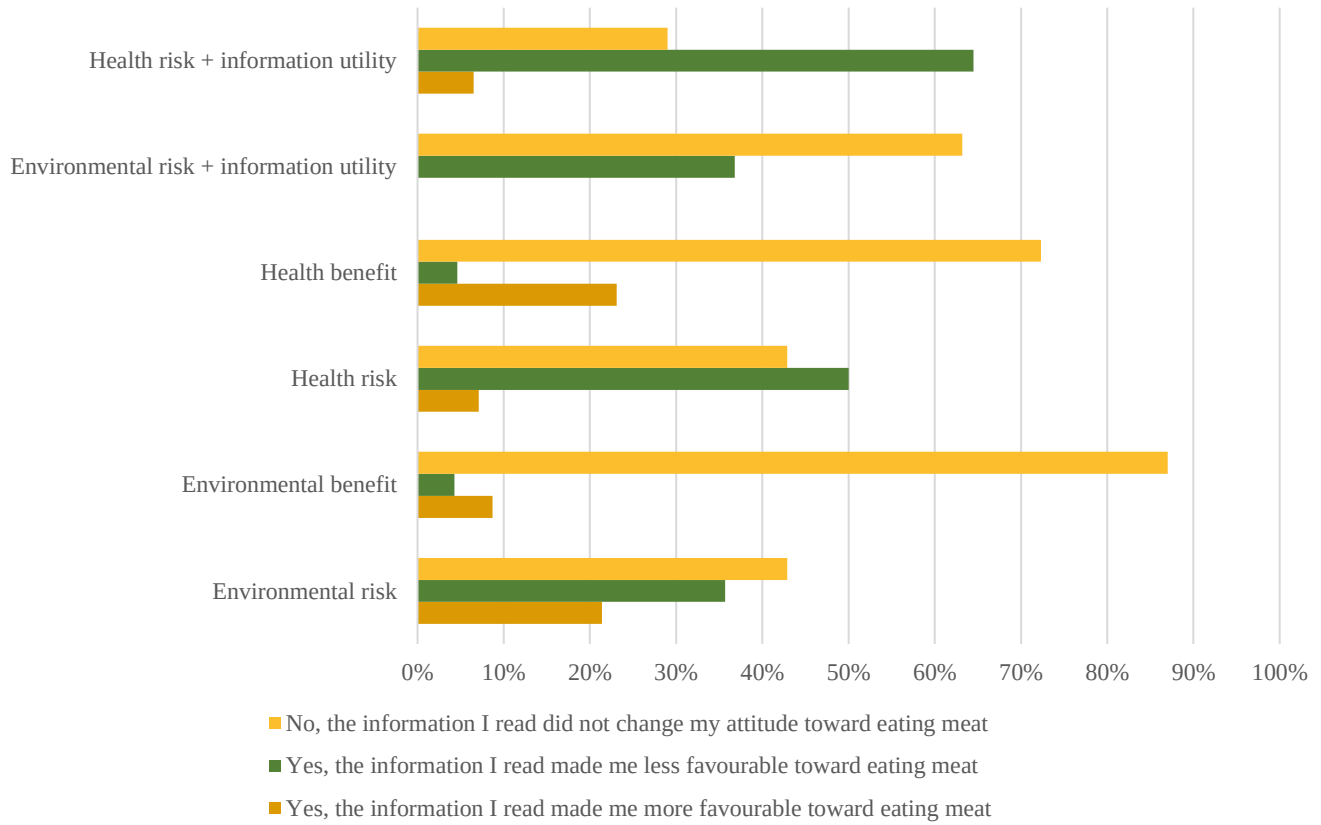
c. The standardized statistic is -.928.

Symmetric Measures

		Value	Approximate Significance	Monte Carlo Significance		
				Significance	99% Confidence Interval	
					Lower Bound	Upper Bound
Nominal by Nominal	Cramer's V	.408	<.001	<.001 ^a	<.001	<.001
N of Valid Cases		180				

a. Based on 10000 sampled tables with starting seed 1585587178.

Whether the information participants read changed their attitudes toward meat organized by statement selection (experimental group)



Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group) * Reflecting on the information you read, how willing are you to reduce the amount of meat you eat?									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	52.032 ^a	12	<.001	<.001 ^b	<.001	<.001			
Likelihood Ratio	56.417	12	<.001	<.001 ^b	<.001	<.001			
Fisher-Freeman-Halton Exact Test	52.662			<.001 ^b	<.001	<.001			
Linear-by-Linear Association	17.261 ^c	1	<.001	<.001 ^b	<.001	<.001	<.001 ^b	<.001	<.001
N of Valid Cases	178								
a. 8 cells (40%) have expected count less than 5. The minimum expected count is 1.68.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is 4.155.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound	Upper Bound			
Nominal by Nominal	Cramer's V	.312	<.001	<.001 ^a	<.001	<.001			
N of Valid Cases		178							
a. Based on 10000 sampled tables with starting seed 2000000.									

Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Control group) * Reflecting on the information you read, how willing are you to reduce the amount of meat you eat?				
	Environmental risk <i>n</i> = 23	Environmental benefit <i>n</i> = 23	Health risk <i>n</i> = 37	Health benefit <i>n</i> = 95
Very willing	30.4%	8.7%	35.1%	2.1%
Somewhat willing	39.1%	21.7%	37.8%	18.9%
Could go either way	21.7%	34.8%	18.9%	40%
Somewhat unwilling	4.3%	4.3%	5.4%	9.5%
Not willing at all	4.3%	30.4%	2.7%	29.5%

Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group) * Reflecting on the information you read, how willing are you to reduce the amount of meat you eat?									
Chi-Square Tests									
	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	49.926 ^a	20	<.001	<.001 ^b	<.001	<.001			
Likelihood Ratio	56.169	20	<.001	<.001 ^b	<.001	<.001			
Fisher-Freeman-Halton Exact Test	50.502			<.001 ^b	<.001	<.001			
Linear-by-Linear Association	4.951 ^c	1	.026	.026 ^b	.021	.030	.014 ^b	.011	.017
N of Valid Cases	180								
a. 17 cells (56.7%) have expected count less than 5. The minimum expected count is 1.71.									
b. Based on 10000 sampled tables with starting seed 2000000.									
c. The standardized statistic is -2.225.									
Symmetric Measures									
		Value	Approximate Significance	Monte Carlo Significance					
				Significance	99% Confidence Interval				
					Lower Bound		Upper Bound		
Nominal by Nominal	Cramer's V	.263	<.001	<.001 ^a	<.001		<.001		
N of Valid Cases		180							
a. Based on 10000 sampled tables with starting seed 2000000.									

Please select the statement you'd like to learn more about. On the following page, you'll have the opportunity to read more about the information you choose. (Experimental group) * Reflecting on the information you read, how willing are you to reduce the amount of meat you eat?						
	Environmental risk <i>n</i> = 14	Environmental benefit <i>n</i> = 23	Health risk <i>n</i> = 28	Health benefit <i>n</i> = 65	Environmental risk + information utility <i>n</i> = 19	Health risk + information utility <i>n</i> = 31
Very willing	21.4%	13%	28.6%	3.1%	26.3%	25.8%
Somewhat willing	28.6%	17.4%	35.7%	16.9%	31.6%	38.7%
Could go either way	28.6%	13%	17.9%	33.8%	21.1%	29%
Somewhat unwilling	0%	8.7%	14.3%	20%	10.5%	3.2%
Not willing at all	21.4%	47.8%	3.6%	26.2%	10.5%	3.2%

Participants' willingness to reduce meat consumption pre vs post-experiment (control group)				
	Environmental risk	Environmental benefit	Health risk	Health benefit
<i>Very willing pre-experiment (n = 20)</i>				
Very willing post-experiment n = 13	n = 6	n = 2	n = 4	n = 1
Somewhat willing post-experiment n = 4	n = 1	n = 1	n = 0	n = 2
Could go either way post-experiment n = 3	n = 0	n = 0	n = 0	n = 3
<i>Somewhat willing pre-experiment (n = 63)</i>				
Very willing post-experiment n = 9	n = 1	n = 0	n = 7	n = 1
Somewhat willing post-experiment n = 24	n = 3	n = 2	n = 9	n = 10
Could go either way post-experiment n = 23	n = 1	n = 3	n = 1	n = 18
Somewhat unwilling post-experiment n = 5	n = 0	n = 0	n = 0	n = 5
Not willing at all post-experiment n = 2	n = 0	n = 0	n = 0	n = 2
<i>Could go either way pre-experiment (n = 51)</i>				
Very willing post-experiment n = 2	n = 0	n = 0	n = 2	n = 0
Somewhat willing post-experiment n = 14	n = 4	n = 2	n = 4	n = 4
Could go either way post-experiment n = 29	n = 3	n = 5	n = 5	n = 16
Somewhat unwilling post-experiment n = 2	n = 0	n = 0	n = 1	n = 1
Not willing at all post-experiment n = 4	n = 0	n = 1	n = 1	n = 2
<i>Somewhat unwilling pre-experiment (n = 17)</i>				
Somewhat willing post-experiment n = 4	n = 1	n = 0	n = 1	n = 2

Could go either way post-experiment $n = 2$	$n = 1$	$n = 0$	$n = 0$	$N = 1$
Somewhat unwilling $n = 4$	$n = 0$	$n = 1$	$n = 1$	$n = 2$
Not willing at all post-experiment $n = 7$	$n = 0$	$n = 2$	$n = 0$	$n = 5$
<i>Not willing at all pre-experiment ($n = 27$)</i>				
Could go either way post-experiment $n = 1$	$n = 0$	$n = 0$	$n = 1$	$n = 0$
Somewhat unwilling post-experiment $n = 2$	$n = 1$	$n = 0$	$n = 0$	$n = 1$
Not willing at all post-experiment $n = 24$	$n = 1$	$n = 4$	$n = 0$	$n = 19$

Participants' willingness to reduce meat consumption pre vs post-experiment (experimental group)						
	Environmental risk	Environmental benefit	Health risk	Health benefit	Environmental risk + information utility	Health risk + information utility
<i>Very willing pre-experiment (n = 26)</i>						
Very willing post-experiment n = 18	n = 1	n = 1	n = 3	n = 2	n = 4	n = 7
Somewhat willing post-experiment n = 3	n = 0	n = 1	n = 0	n = 1	n = 0	n = 1
Could go either way post-experiment n = 3	n = 1	n = 1	n = 0	n = 1	n = 0	n = 0
Not willing at all post-experiment n = 2	n = 0	n = 0	n = 1	n = 1	n = 0	n = 0
<i>Somewhat willing pre-experiment (n = 58)</i>						
Very willing post-experiment n = 4	n = 0	n = 1	n = 2	n = 0	n = 0	n = 1
Somewhat willing post-experiment n = 32	n = 2	n = 2	n = 8	n = 7	n = 6	n = 7
Could go either way post-experiment n = 17	n = 1	n = 0	n = 0	n = 10	n = 1	n = 5
Somewhat unwilling post-experiment n = 5	n = 0	n = 0	n = 2	n = 3	n = 0	n = 0
<i>Could go either way pre-experiment (n = 48)</i>						
Very willing post-experiment n = 5	n = 1	n = 0	n = 3	n = 0	n = 1	n = 0
Somewhat willing post-experiment n = 7	n = 1	n = 0	n = 2	n = 2	n = 1	n = 2
Could go either way post-experiment n = 23	n = 1	n = 2	n = 4	n = 9	n = 3	n = 4
Somewhat unwilling post-experiment n = 5	n = 0	n = 0	n = 1	n = 3	n = 0	n = 1
Not willing at all post-experiment n = 8	n = 0	n = 2	n = 0	n = 6	n = 0	n = 0
<i>Somewhat unwilling pre-experiment (n = 28)</i>						

Very willing post-experiment $n = 2$	$n = 1$	$n = 1$	$n = 0$	$n = 0$	$n = 0$	$n = 0$
Somewhat willing post-experiment $n = 5$	$n = 1$	$n = 1$	$n = 0$	$n = 1$	$n = 0$	$n = 2$
Could go either way post-experiment $n = 4$	$n = 1$	$n = 0$	$n = 1$	$n = 2$	$n = 0$	$n = 0$
Somewhat unwilling post-experiment $n = 11$	$n = 0$	$n = 2$	$n = 1$	$n = 6$	$n = 2$	$n = 0$
Not willing at all post-experiment $n = 6$	$n = 1$	$n = 2$	$n = 0$	$n = 2$	$n = 1$	$n = 0$
<i>Not willing at all pre-experiment ($n = 20$)</i>						
Somewhat unwilling post-experiment $n = 1$	$n = 0$	$n = 0$	$n = 1$	$n = 0$	$n = 0$	$n = 0$
Not willing at all post-experiment $n = 19$	$n = 2$	$n = 7$	$n = 8$	$n = 1$	$n = 1$	$n = 1$