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The Effects of Motivation Framing and Content Domain On Intentions to Eat Plant-Based Foods

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Honours Thesis

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Abstract

The present study examined the effectiveness of different types of persuasive messages intended to encourage people to eat more plant-based foods. Seventy-one participants were recruited from King's University College. Participants reported their current eating habits and read an article that emphasized health or ethical implications of food choices as well as a brochure that used autonomy or control motivational framing. They then indicated their future eating intentions. Across conditions, participants reported the intention to eat more plant-based foods following the manipulations compared to current eating habits. In addition, a significant three-way interaction showed that people given information on the ethical (versus health) implications of eating a meat-heavy diet with autonomy (versus control) framing reduced their intentions to eat animal-based foods in the future compared to current eating habits. These findings can assist health-care practitioners and educators in encouraging people to eat fewer animal-based foods and more plant-based foods.

Keywords: plant-based diet, food choices, motivation, health, meat, vegetarian, vegan

The Effects of Motivation Framing and Content Domain On Intentions to Eat Plant-Based Foods

There is a growing societal trend toward eating more plant-based foods, and people in Western society are increasingly choosing to become pescetarians (eat fish/seafood but no other animals), vegetarians, and vegans (Ruby, 2012). The consensus is that a diet rich in plant-based foods has numerous health benefits (Lea, Crawford, & Worsley, 2006), and helps avoid some ethical problems (Plous, 2003). Yet despite the clear benefits, many people in developed countries are not consuming enough plant-based foods and instead are eating increasing amounts of animal-based foods and processed foods (Lea et al., 2006). Therefore, it is helpful to understand which education techniques are most effective at motivating people to improve their health through their diet. However, changing people's eating practices is not easy, and there are many factors involved that are not yet well understood. Unfortunately, bringing people's attention to the problems of a primarily animal-based foods diet can backfire (Bastian, Loughnan, Haslam, & Radke, 2012). The causes behind changing one's eating habits are multifaceted, but two of the main reasons that people report becoming vegetarian are health and ethical rationales (Ruby, 2012). Therefore, the present study compared the effectiveness of information regarding health and ethics on changing food choices. Furthermore, research in the area of prejudice and Self Determination Theory suggests that messages about behaviour change might be more effective when framed in an autonomous rather than controlling manner (Legault, Green-Demers, Grant, & Chung, 2007; Legault, Gutsell, Inzlicht, 2011). Self Determination Theory proposes that people are more likely to internalize goals and change behaviours if the goals facilitate autonomy and choice (Deci & Ryan, 2000). The current study examined the impact of motivational framing (autonomy and control) on participants' eating intentions.

In the current study, the terms “plant-based diet” and “plant-based foods” were used due to the complexities and multiple definitions of defining vegetarianism. There is a continuum of categories associated with the term vegetarianism, and many studies on vegetarianism and veganism have used different operational and conceptual definitions, and therefore there are inconsistencies in the literature on what it means to self-identify as a vegetarian or vegan (Ruby, 2012). Eating a plant-based diet means eating numerous vegetables, fruits, legumes, nuts/seeds, and whole grains, while eating minimal animal-based foods or processed foods (Bittman, 2009). The term “plant-based diet” is not yet as culturally loaded as the terms “vegetarian” or “vegan” are, and because it is less ambiguous and has undergone fewer changes than other terms, it was used for the sake of clarity. Furthermore, the term “plant-based diet” may be less likely to evoke defensiveness because it is not as culturally-loaded, and because changing food attitudes was the focus of the study, inducing defensiveness was minimized when possible. Not only do culture and society inform food choices, but individual psychological perspectives also play a role. There are a myriad of reasons why people choose to eat a plant-based diet, but two main rationales have emerged: health and ethics.

Health arguments for vegetarianism have emerged more recently than ethical arguments, and date back to the 19th century (Ruby, 2012). There is a large body of research on the health implications of eating an animal-based diet, and thus, there are many people who abstain from eating animal-based foods for health reasons. Although there is great debate over which ways of eating are the healthiest, research suggests that major health issues such as heart disease, cancer, and stroke may have links to the over-consumption of animal-based processed foods (Esselstein, 2007). The American Dietetic Association (2009) states that an appropriately planned vegetarian

or vegan diet can be beneficial to people in all stages of life and are healthy, nutritionally sufficient, and may prevent and potentially treat some diseases. Furthermore, Esselstyn (2007) believes that degenerative diseases like heart disease, type 2 diabetes, obesity, and some forms of cancer could be prevented—and in many cases reversed—by adopting a whole-foods, plant-based diet. The American Dietetic Association (2009) supports this claim, stating that vegetarian diets are associated with a lower risk of heart disease, type 2 diabetes, high blood pressure, high body mass index, hypertension, and cancer rates. Although critics have suggested that vegetarian diets are not a good source of energy, Phillips posits that a vegetarian diet can be just as energy-dense as a diet containing meat and animal-based foods (Phillips, 2005). While the body weight of vegetarians is often lower than the weight of meat-eaters, the vegetarian diet can supply a significantly greater amount of energy than the omnivorous diet (Phillips, 2005). In a recent research study, Oyeboade, Gordon-Dseagu, Walker, and Mindell (2014) found that consumption of vegetables and fruit was inversely correlated with “all-cause” mortality when adjusting for physical activity, age, sex, social economic status, education, body mass index, and alcohol consumption. Both vegetables and fruit consumption were associated with reduced cancer and cardiovascular mortality.

There is a great deal of research on plant-based diets and the physical benefits, but there has also been some research about the impact of plant-based diets on mental health as well. One study looked at the impact of vegetarianism on mood and found that vegetarians reported significantly less negative emotional states than omnivores (Beezhold, Johnston, & Daigle, 2010). Furthermore, an experimental study by Beezhold and Johnston (2012) found that participants who ate a vegetarian diet for two weeks had a significantly improved mood

compared to participants who ate meat, poultry, and/or fish. Although it is often difficult to draw causal conclusions from studies on plant-based diets, the consensus is that a diet rich in plant-based foods is beneficial in a myriad of ways.

The notion of limiting or abstaining from meat for ethical and spiritual reasons is not a new concept, as it has been around since ancient Greece (Ruby, 2012). Ethical reasons for becoming a vegetarian include concern for nonhuman animals, such as the conditions and drugging of animals in factory farms, and the abuse and dehumanization that factory farm workers experience (Ruby, 2012). Environmental rationales for reducing animal consumption are also part of the ethical foundation of plant-based diets, although this has sometimes been studied as a separate rationale; in this study, environmental concern was included in the ethical rationale.

One reason to focus on eating more plant-based foods is that it reduces ethical issues, as animal agriculture creates problems of animal cruelty, harm to factory farm workers' psychological well being, and negative environmental impacts. Nonhuman animals experience the emotions of fear, anxiety, joy, and stress, and also possess nervous systems that cause pain, similarly to humans' nervous systems (Bittman, 2009). Common practices in modern animal agriculture cause animals raised and slaughtered for meat to experience ongoing negative emotions and significant pain. For example, it is common practice in animal agriculture to cut off the tails and notch the ears of piglets without any anesthesia (Mason & Finelli, 2006).

The inhumane treatment of animals also puts the humans that work in the factories at risk. Eisnitz (2006) interviewed factory farm workers and found that many of the workers spoke of the physical and emotional dangers of their jobs. Eisnitz reported that the work can be so difficult emotionally that the psychological effects carry over into the workers' personal lives,

potentially contributing to spousal abuse and mental health issues (Eisnitz, 2006). Factory farming also negatively impacts the environment. The chair of the United Nations Panel on Climate Change recently reported that the best and fastest way to reduce greenhouse gas emissions is to reduce meat consumption (Bittman, 2009). Due to the distinction between ethical and health vegetarians, there have been numerous studies examining the processes and differences between these two groups.

According to the literature, there appears to be a difference in transition rates between the two models of becoming vegetarian. There has been some evidence that ethical vegetarians make the transition to vegetarianism abruptly, while health vegetarians make the transition more gradually (Beardsworth & Keil, 1991; Jabs, Devine, & Sobal, 1998). Part of this difference may stem from how the two groups perceive the consumption of meat and animal-based foods. Rozin, Markwith and Stoess (1997) found that ethical vegetarians consider meat more disgusting and have stronger negative emotional reactions to the consumption of meat than health vegetarians. This study also suggests that ethical vegetarians view previously neutral eating activities and foods as moral engagements. Although there are differences between the two models, health and ethical vegetarians have been found to have the same nutritional knowledge (Hoffman, Stallings, Bessinger, & Brooks, 2013). Differences between health and ethical frameworks may also indicate that the two groups arise from different ideological perspectives before transitioning to a plant-based diet. Specifically, Lindeman and Sirelius (2001) found that health-motivated vegetarians were more concerned with a normative view of the world and living their lives according to prevailing norms. Additionally, once a person becomes a vegetarian for whatever reason, they are often exposed to additional information, and may eventually reinforce their

decision to maintain a vegetarian diet with additional reasoning. This notion was supported by Fox and Ward (2008), who propose that although people may become vegetarians according to one of the two modalities, initial motivations may be reinforced through newly encountered motives for sustaining their eating choices. Taken together, the research on health and ethical vegetarians suggests that beliefs play a large role in why we change our food choices. However, to the author's knowledge, no research to date had been conducted on the effectiveness of these two messages (health and ethics) in encouraging people to eat more plant-based foods.

A range of influences affect the food choices that a person makes, including one's attitudes, values, worldview, and traditions, and when those eating habits are questioned, barriers to change can arise. There are specific reasons that people do not adapt a plant-based diet when they are exposed to the beneficial reasons that are associated with such eating habits. Although information on changing one's diet is readily available, there are resistances to certain kinds of messages about food, such as engaging in the mind denial of animals to reduce dissonance (Bastian et al., 2012). Denying that nonhuman animals possess minds means rejecting that they feel human emotions such as hunger, fear, pleasure, pain, and rage (Bastian et al., 2012). When people feel dissonance between the knowledge of the ethical implications of eating meat and their own consumption of it, they can reduce the dissonance by changing their beliefs to support their behavior, rather than changing behavior. One study found that the main perceived barrier to eating a plant-based diet is a lack of information (Lea et al., 2006). However, it is likely not as simple as this, as there are both practical and attitudinal barriers to changing one's eating habits, such as denying that certain animals possess minds. This is an example of speciesism, which is a specific framework of resistance to changing one's perceptions toward animals.

Speciesism is a hierarchical way of thinking that promotes a negative attitude toward nonhuman animals based on the categories of species, and leads people to categorize between humans and animals (Jackson, 2011, p. 148). There are different ideological influences that inform the construction of speciesism. Plous (2003) discusses the processes that allow humans to dissociate eating animals from their self-image. One of these methods is the diction used around factory farming, such as saying “pork” instead of “pig” or “process/harvest” instead of “slaughter” (Plous, 2003). Joy’s (2011) notion of carnism draws on speciesism, as she states that in society there are belief systems that make eating certain animals appropriate while eating other animals is considered unethical. Although she challenges each point, Joy (2011) describes how carnism involves believing that eating animals is normal, natural and necessary. Carnism is one way of framing why the choice to eat meat does not seem like a choice at all, but is instead an accepted norm sanctioned by complex processes.

Most people value health and reject cruelty, and because a meat-heavy diet is unhealthy (Lea et al., 2006), and modern animal agriculture involves animal suffering (Plous, 2003), when a person is exposed to information challenging their dominant way of eating, such as the health and ethical implications of an animal-based diet¹, they are forced to recognize that they are engaging in a practice that is against their value system. When these two competing ideas are held – such as the belief that one does not support cruelty and the knowledge that one eats animals that have been subject to cruelty during meat production – cognitive dissonance results. Cognitive dissonance is experiencing two incompatible beliefs, which causes an unpleasant psychological state that we are motivated to eliminate (Bilewicz, Imhoff, & Drogosz, 2011). To

¹ A typical animal-based diet is a diet that centers on meat as a primary aspect of meals and includes other animal-based foods such as dairy and eggs.

reduce dissonance, people can either change their eating choices, which means changing their behaviour and identity, or they can resist the messages. One form of resistance is mentally disengaging from the origins of the meat and denying that animals possess minds, which reduces dissonance and allows people to enjoy eating meat while still condemning harmful factory farming practices (Bastian et al., 2012). Moral disengagement is a complex issue, as it is not often a conscious choice.

Consistent with mind denial, a study by Bilewicz et al. (2011) found that vegetarians ascribed more human attributes² to nonhuman animals, as opposed to people consuming meat. By utilizing the notion of human uniqueness, people who eat meat can minimize the psychological implications of their actions (Bilewicz et al., 2011). In different areas of the world people choose to eat different kinds of animal-based foods, and there are often norms about what kinds of nonhuman animals should be consumed. One study supported the notion that this process may be in part psychological, for only animals that were considered appropriate for consumption were viewed as lacking minds (Bastian et al., 2012). This flexible recognition of animals' mental capacities is apparent when considering the kinds of animals promoted for consumption in different societies. Furthermore, only when people were reminded of the animals suffering did they deny their mental capacities, implying that this is part of the psychological process of protecting food choices (Bastian et al., 2012). Mind denial is one way that cognitive and emotional processes can be seen as obscuring the complex implications of the eating choices that people make. There are social constraints that affect individual agency to make choices, and it is difficult to deviate from these norms. Therefore, rationalizations and resistance are natural

² The human attributes that Bilewicz et al. (2011) included were emotions such as fear, panic, happiness, excitement, guilt, regret, nostalgia, and melancholy.

reactions to information that challenges one's worldview, and this is precisely why it can be difficult to instigate the change from an animal-based diet to a plant-based diet. What might reduce reliance on carnism and defensive dissonance? A potential answer may come from the Self Determination Theory.

Self Determination Theory is a theory of motivation that promotes the natural and intrinsic tendencies of humans to orient toward healthy ways of being. It stresses the importance of relatedness, competence, and autonomy as fundamental human needs (Deci & Ryan, 2000). The aspect of autonomy promoted by Self Determination Theory relates to intentions and goal-directed behaviour, meaning that when people feel autonomously motivated they are more likely to be intrinsically determined to reach goals (Deci & Ryan, 2000). There are behavioural and attitudinal consequences associated with different kinds of regulation processes, and Deci and Ryan (2000) propose that these processes are important because of their integration into an individual's goals and sense of self. Motivational framing refers to the way in which a persuasive message is communicated. Control-framed messages are framed in ways that suggest people should comply with certain norms; they involve a pressure to change established modes of thinking and emphasize behaving in a specific manner to meet others' expectations (Legault, Gutsell, & Inzlicht, 2011). Conversely, autonomy-framed messages emphasize choice and explain why change is worthwhile and beneficial (Legault et al., 2011) by focusing on volition and agency (Deci & Ryan, 2000). Autonomy promotes integration and freedom, while controlling messages challenge the individual's self-definition, which may result in a resistance to change. Therefore, autonomously framed messages have the potential to change people's behaviour and promote intrinsic motivation. Autonomy framing, through the emphasis of choice

and freedom, may be a way to minimize defensiveness regarding behavioural change. Self Determination Theory has implications for the effectiveness of promoting change by utilizing motivation framing to achieve desired outcomes. These methods of message framing have been used to instigate change or regulate certain thinking and behaviours in other areas of research.

Self Determination Theory notions of motivation framing have been explored in many domains, such as health. There are numerous messages about incentives to quit smoking, but they are often framed in controlling ways, emphasizing the detrimental effects of smoking. Cunningham, Faulkner, Selby and Cordingley (2006) found that by framing messages in a way that emphasizes free choice instead of control framing, it appeared that people in the autonomy group were smoking fewer cigarettes three months after the intervention. Research in the health domain suggests that framing messages in certain ways (autonomy versus control) may have a significant impact on changing attitudes and, subsequently, behaviour.

Motivation framing has also been applied in the area of promoting physical activity. A study by Ortís et al. (2007) found that although both intrinsic and extrinsic motivators were effective at promoting physical activity, intrinsic motivation framing was crucial for the maintenance of the behavioural change (exercising more). This is important information in the area of Self Determination Theory, as it suggests that even if promoting change seems effective, intrinsic motivation is necessary for maintaining goals, suggesting that autonomy motivation framing is more effective long-term than control framing. Motivation framing is a theoretical framework that is starting to be applied to many advocacy areas, such as messages about changing behaviours to protect the environment (Pelletier & Sharp, 2008). There has been no

known research to date that has addressed motivational framing in the area of promoting healthier food choices.

Prejudice research involves examining how to best reduce prejudiced thinking and behaviour. Self Determination Theory and motivation framing have influenced how changing prejudiced attitudes can be conceptualized. In motivating people to reduce both explicit and implicit prejudice, autonomy framing was more successful, whereas control framing actually produced more implicit and explicit prejudice than not intervening at all (Legault et al., 2011). This highlights the notion that a reactive response resulting from socially controlling messages can actually strengthen precisely the attitudes and behaviours that are being targeted for reduction (Legault et al., 2011). Furthermore, another study in the area of prejudice research by Legault, et al. (2007) revealed that participants who had highly self-determined regulation demonstrated lower implicit and explicit prejudice than less self-determined participants. This highlights the importance of intrinsic motivation and choice, suggesting that for people to change because of new information, messages should be framed in a way that promotes self determination.

Motivation framing emphasizes the need to frame interventions in specific ways that encourage choice and self-regulation in order to reduce resistance to change. Research in the area of prejudice and some areas of health suggest why messages might backfire, and also suggest that the solution may be in the nature of the motivation. However, this research looks at changing social attitudes, smoking, and exercise –not food choices. Consequently, the present study examined whether the same effect would occur in the context of food choices. In a study by Povey, Wellens and Conner (2001), meat eaters had more ambivalence toward their own eating

habits than vegetarian or vegan diets. This suggests that there are people eating animal-based foods who are willing to change, and persuasive messages may be effective if framed in ways that promote autonomy.

In motivating people to eat more plant-based foods, the rationale was that people would be more likely to change their current eating habits to reflect plant-based eating choices if they were exposed to autonomously framed messages than if they are exposed to controlling messages. It was expected that a main effect of framing would be found, specifically, that people would change their attitudes in the direction of eating more plant-based foods when exposed to autonomy framing but not control framing. Furthermore, a main effect of domain type was expected; the ethical message was anticipated to motivate people to change their food choices significantly more than people who were exposed to the health implications. The rationale behind this was based on the observation that ethical vegetarians tend to make the switch to vegetarianism more quickly than health vegetarians, and are also more likely to resist switching back to eating animal-based foods (Jabs, Devine, & Sobal, 1998). An interaction was expected between framing and domain type, in which the effect of framing would be strongest in the ethical condition. Overall, participants in the autonomy-framed ethics condition were expected to be the most likely to change their eating choices.

Method

Participants

The present study consisted of 71 undergraduate students at King's University College enrolled in an introductory Psychology course. The age range of the participants was 17-51 ($M=20.54$, $SD=6.29$). There were 46 women between the ages of 17 and 51 years ($M=21.22$, $SD=$

7.65), and 23 men between the ages of 18 and 22 years ($M= 19.30$, $SD= 1.22$). Two participants did not indicate their gender. Written demographic information was collected at the end of the study. Data frequencies revealed that the religious affiliation that participants chose from categories were the following: Catholic (29.6%), Protestant (9.9%), Jewish (1.4%), Muslim (12.7%), Buddhist (4.2%), Other (9.9%), Atheist (7.0%) and Agnostic (25.4%). It is important to note that King's University College is a Catholic College, which resulted in a high proportion of self-reported Catholic participants. The most frequently cited ethnicity was self-reported as "Caucasian" (25%), followed by Asian (15.5%), "Mixed" (11.3%), Unspecified (9.9%), Canadian (8.5%) and Lebanese (7%); other self-reported ethnicities had frequencies that were less than five percent. Participants indicated their political orientation in a Likert-type response format, and frequencies on the data revealed that the most frequently cited political orientation was a left-leaning affiliation (46.5%), followed by a neutral stance (26.8%) and a right-leaning affiliation (26.7%).

Materials

A pre-measure of participants' eating choices included nine questions inquiring about participants' food choices in broad categories (see Appendix A). Additionally, this pre-measure of food choices has been modified to measure participants' *intentions* of future food consumption, with three additional items relating to food choices at the end (see Appendix B). The three-item questionnaire measured participants' intentions to eat a plant-based, vegetarian, and vegan diet measured in a Likert-type response format, with response options ranging from -3 (Definitely no) to +3 (Definitely yes).

There were four experimental groups corresponding to two levels of framing (autonomy or control) and two levels of content domain (health or ethics): autonomy-framed health, autonomy-framed ethics, control-framed health and control-framed ethics. Each condition received one information article (content domain), either on the health implications or ethical implications of eating a non-plant based diet (see Appendix C). After reading the article, each condition either received the autonomy-framed brochure or the control-framed brochure (see Appendix D). The articles were designed to get participants thinking about the implications of not eating a plant-based diet. The health article focused on the impact that eating an animal-based can have on our physical health (e.g. health problems, mental health issues, energy level), while the ethics article focused on the environmental and animal cruelty aspect of eating an animal-based (e.g. factory farm conditions, emotional distress and physical danger for factory farm workers, green house gas emissions). The two brochures were identical except for some key phrases that manipulated motivation framing. The autonomy-framed brochure condition placed an emphasis on the value of switching to a plant-based diet, and provided resources that participants could access that are important, worthwhile and engaging. Autonomy framing refers to giving participants *choice* in whether they want to change their diet or not. The control-framed brochure stressed why eating an animal-based diet is bad for health, environment and animals. Control framing refers to emphasizing why participants should *conform* to a plant-based diet. For example, the autonomy-framed brochure used phrases such as “Do you want to feel good? Consider a plant-based diet”, and “Benefits of a plant-based diet”, while the control-framed brochure used phrases such as “Eat Right! Eat a plant-based diet!”, and “Why you should eat a plant-based diet”.

Two four-item questionnaires were designed for both the content domain (health or ethics article) and motivation framing (autonomy or control) as manipulation checks (see Appendix E). The questions were designed to tap perceptions of both content domain and motivation framing to determine whether participants understood the articles and brochures and interpreted them as intended. The items were measured on a seven-point Likert-type response format, with responses ranging from -3 (Strongly Disagree) to +3 (Strongly Agree).

The “Motivation to Be Nonprejudiced Scale” by Legault, Green-Demers, Grant and Chung (2007) was modified to measure the motivation to eat a plant-based diet (see Appendix F). The Cronbach’s α from the original scale ranges from .85 to .91 for the different subscales (Legault et al., 2007). Experts both in the field of human motivation and Self Determination Theory designed the original scale during focus groups. The adapted scale was intended to measure whether participants were motivated to eat primarily a plant-based diet. There are 18 items measured using a Likert-type response format, with response options ranging from -3 (Strongly disagree) to +3 (Strongly agree). The Cronbach’s α for the modified scale was .87. This scale was included for exploratory purposes and will not be discussed further.

At the end of the study, participants had the opportunity to answer one open-ended question pertaining to their eating choices. This question was exploratory and will be used in conjunction with a second follow-up qualitative study to identify themes regarding why participants make the eating choices that they do and what might motivate them to change. The question asked: “Do you want to change your eating choices (circle your answer)?” and then gave participants space to expand upon and explain their answer.

Procedure

Participants were collected through convenience sampling, as participation was open to all introductory Psychology students on SONA (<https://www.uwo-kings.sona-systems.com>), a web-based recruitment system for universities. Students signed up for one-hour timeslots online after looking at the sign-up poster on SONA and came to the Psychology lab for participation in the study at their allotted time. Participation in the study was explained to them, and if they were still willing to participate, they signed a consent form. Psychology 1000 students could receive bonus marks (up to 2.5%) for completing a related assignment. Participants were free to withdraw from the study at any time and still received credit for the written assignment.

Before arriving, participants were randomly assigned to one of the four experimental groups by rolling dice. The first die was rolled to determine whether participants would be in the health or ethical condition, with even numbers being health and odd numbers being ethical. Another die was rolled to determine whether participants would be in the autonomy-framed or controlled-framed condition, with even numbers being autonomy-framed and odd numbers being control-framed. Participants sat at individual desks (maximum of 10 participants per timeslot) and completed questionnaires independently, only interacting with the researcher if they had questions. The order of materials was as follows: pre-measure questionnaire, article (ethics or health), manipulation check questionnaire, brochure (autonomy or control), manipulation check questionnaire, motivation to eat a plant-based diet/intention to change, open-ended question, and demographic information. Participation did not take more than one hour, and typically took approximately a half hour.

The present study used a 2 (motivation framing: autonomy or control) by 2 (content domain: health or ethics) by 2 (time: current eating habits and eating intentions) mixed-factorial design with repeated measures on time. Participants were given either an article on the ethical or health implications of an animal-based diet. Furthermore, participants were given either a control-framed or autonomy-framed brochure that outlined why the switch to a plant-based diet would be *beneficial* to change (autonomy) or why they *should* change (control). Eating habits were measured before the article/brochure and eating intentions were measured after the manipulation. There were two independent variables: domain (health or ethics) and motivation (control or autonomy). The dependent variables were participants' intentions to eat animal-based foods and plant-based foods.

Results

Manipulation Checks

Content domain. The two items measuring perceptions that the article addressed health were averaged, as were the two items measuring perceptions that the article addressed ethics. Separate 2 (domain) by 2 (framing) ANOVAs were conducted on perceived content domain (health, ethics) of the information articles. Main effects of domain revealed that participants agreed that the content of the article addressed ethical implications of eating animal-based foods in the ethics condition ($M = 2.44$, $SD = .67$) more than in the health condition ($M = -.67$, $SD = 1.92$), $F(1,67) = 81.59$, $p < .001$, and health implications more in the health condition ($M = 2.38$, $SD = .79$) than in the ethics condition ($M = -.24$, $SD = .79$), $F(1,67) = 67.17$, $p < .001$. No other effects were significant.

Motivation framing. The two items measuring perceptions that the brochure was autonomously framed were averaged, as were the two items measuring perceptions that the brochure was controlling. Separate 2 (framing) by 2 (domain) ANOVAs were conducted on perceived motivation framing of the brochures by the autonomy or control motivation framing manipulations. Perceptions that the autonomy brochure promoted autonomous choice or conformity did not differ by framing condition, $F(1,67) = .06, p = .82, ns, M$ (autonomy condition) = 1.44, $SD = .97$; M (control condition) = 1.39, $SD = .99$. Perceptions that the control brochure promoted conformity or autonomous choice did not differ by framing condition, $F(1,67) = .20, p = .65, ns, M$ (control condition) = 1.54, $SD = 1.15$; M (autonomy condition) = 1.65, $SD = .84$.

Test of Hypotheses

Two separate 2 (content domain) by 2 (motivation) by 2 (time) mixed-factorial ANOVAs with repeated measures on time were conducted to test effects of time, domain and framing on each dependent variable (intention to eat plant-based foods and intention to eat animal-based foods) separately.

ANOVA on plant-based foods. A main effect of time showed that participants intended to eat more plant-based foods following the manipulations ($M = 2.55, SD = .82$) than before ($M = 1.90, SD = .74$), $F(1,67) = 97.85, p < .001$. There were no other significant effects or interactions between time and content domain or motivation framing.

ANOVA on animal-based foods. A three-way interaction between time, content domain and motivation framing emerged, $F(1,67) = 4.31, p < .05$. Comparisons of current eating habits and intended eating choices within each condition showed that people's intention to eat animal-

based foods in the future differed significantly from current eating habits only in the ethics domain, autonomy framing condition, $t(17) = 2.15, p < .05$. No other effects or interactions were significant (see Table 1).

Table 1

Means and Standard Deviations for the Interaction Between Time, Content Domain and Motivation Framing

	Ethics	Health
Control framing	Current: 1.29 (.57)	Current: 1.57 (.61)
	Intended: 1.29 (.47)	Intended: 1.50 (.71)
Autonomy framing	Current: 1.54 (.53)	Current: 1.43 (.59)
	Intended: 1.40 (.59)*	Intended: 1.56 (.64)

Note. Numbers in parentheses are standard deviations. Values on each scale (“Current” animal-based food serving consumption per day, “Intended” animal-based food serving consumption per day) potentially range from 0 to 6, with higher numbers indicating more servings per day.

* $p < .05$.

Multivariate ANOVAs on intention to eat plant-based diet, vegetarian, vegan

Separate 2 (content domain) by 2 (motivation) by 2 (time) mixed-factorial ANOVAS with repeated measures on time were conducted to test effects of time, domain and framing on intentions to eat a plant-based diet, or become a vegetarian or vegan. Results of the multivariate ANOVAs revealed no significant effects of time, content domain or motivation framing on intention to eat a plant-based diet, or become vegetarian or vegan.

Discussion

The present study hypothesized that there would be two main effects: people would intend to eat more plant-based foods when given the ethics content domain information article and when given the autonomy-framed brochure. Furthermore, an interaction was hypothesized between content domain and motivation framing, in that the effect of the manipulations would be strongest in the condition in which participants were given the autonomy framed brochure and the ethical article on the implications of eating a primarily animal-based diet.

The effect of time showed that participants indicated an intention to eat more plant-based foods after reading the messages in all conditions, which does not support the hypotheses regarding the main effects, as participants in all conditions intended to eat more plant-based foods, not only those participants given ethics content domain or participants given autonomy-framed brochures. Apparently all information was compelling with regard to promoting eating plant-based foods. This is not surprising, as there is a plethora of information regarding the benefits of eating more plant-based foods, and therefore participants accepted this information readily. The lack of effects involving content domain and motivation framing on intention to eat plant-based foods indicates that people readily accept information that encourages eating more plant-based foods, which may be due to the availability of information about the benefits of plant-based foods.

The three-way interaction on animal-based foods indicated that participants intended to decrease animal-based food consumption in the ethics domain, autonomy framing condition, as was originally hypothesized. This is consistent with Self Determination Theory, which indicates that autonomy framing is more effective in promoting behaviour change than control framing

(Deci & Ryan, 2000). That autonomy framing was effective primarily in the ethics domain condition suggests that information about the ethical implications of food choices may be especially motivating to young adults. It may also indicate that any change in eating choices due to the health content domain information had not yet occurred, as research has indicated that when people transitioning to vegetarianism do so for ethical reasons the transitions is faster than when the transition is for health reasons (Beardsworth & Keil, 1991; Jabs, Devine, & Sobal, 1998). Therefore, a longitudinal study would be beneficial in following-up to see if participants in the health condition changed their food choices later than participants in the ethical condition.

There were no significant effects of the manipulations on intention to become a vegetarian, vegan or eat more plant-based meals. It is possible that participants did not take well to the notion of the labels “plant-based”, “vegetarian” and “vegan”. These terms may have led participants to believe that they would have to change their identity to conform to the norms of the social constructs of “plant-based”, “vegetarian” and “vegan”, and thus they may have a defensive or adverse reaction to being labeled in such a category. As was discussed in the introduction, changing food attitudes was the goal of the study, not converting people to conform to a new identity, therefore, these findings do not signify that participants do not want to change; rather, participants seem to want to change as indicated by their eating intentions, although not by changing their social identity. Given that participants indicated an intention to change their food choices but not an intention to change their identity (e.g. “vegetarian”, “vegan”), it suggests that expectations of different advocacy messages may have different influences on people’s receptivity to those advocacy messages. These findings suggest that although people are receptive to eating more plant-based foods, changing their identities is not appealing. This is

consistent with the notion of cognitive dissonance, as it is easier to change one's behaviour than change one's identity (Bilewicz et al., 2011).

Previously existing research has not explored the effectiveness of different messages in encouraging people to eat more plant-based foods, and has instead explored the rationales people have given for becoming vegetarian. The current study attempted to further the understanding of what rationales are most effective in promoting plant-based food choices. Although no main effects were found between the content domain information articles and intentions to eat plant-based foods, the interaction on animal-based foods between content domain, framing and time suggests that ethics information appears to be most compelling when framed in an autonomous manner. This suggests that when designing advocacy programs and messages to encourage people to eat more plant-based foods, it may be beneficial to frame ethical information in an autonomous manner. It is important to keep in mind that this finding is based on undergraduate university students, so the question of whether this finding would hold true for other populations is uncertain. This also raises the question of whether different messages might be more compelling for different age groups; would health information be more compelling for people who are older because health is more salient? Many factors influence what makes a message compelling, and therefore it is important to consider the population, as different messages could be tailored to meet the specific concerns of different groups of people.

Previous research in the health arena suggests that autonomy framing (versus control framing) is most effective in instigating changes in behaviour (Cunningham et al., 2006; Ortís et al., 2007). The present study supported this idea, as only people in the autonomously-framed ethics condition indicated an intention to eat fewer animal-based foods. Research conducted in

the area of prejudice reduction suggests that framing message content in a controlling manner may provoke reactance in people such that both implicit and explicit prejudice are higher after an intervention aimed at reducing prejudice, while messages framed in an autonomous manner seem to reduce both explicit and implicit prejudice (Legault et al., 2011). The current research did not fully demonstrate this finding, as people in the control framing condition did not indicate an intention to eat more animal-based products.

Given that motivation framing worked in a manner that is consistent with Self Determination Theory, despite the lack of a significant effect on the manipulation check, it is believed that the manipulation check questions may not have adequately tapped actual effects on motivation, or the effect of the manipulation may have been implicit. One way of making the manipulation stronger could be to present videos to participants in either a controlling (video subjects telling participants that they should conform to a plant-based diet) or autonomous manner (video subjects exploring the benefits of choosing to eat more plant-based foods). Future research should focus on strengthening these manipulations (primarily by using stronger words that suggest either autonomy or control framing) and ensuring that the manipulation check questions are clearly worded.

Future research could also use more diverse samples to determine the generalizability of these findings, as a limitation of this study was the sample used. Using a sample of undergraduate Psychology university students is not representative of the North American population, and this results in different influences on ability and willingness to change eating choices. For example, presumably many of the participants live in residence at the university,

and therefore have limited options for their food choices, which may influence their self-reports of willingness to eat less animal-based foods and more plant-based foods.

Future studies are needed to tease apart effects of different ethical motivations (treatment of animals, effects on factory farm workers, environmental effects) encouraging people to eat fewer animal and more plant-based foods. It is possible that only some of the ethical information included in the content domain article appealed to people, so it is important to address what motivation encouraged people to eat less animal-based foods. Furthermore, it would be interesting to explore what personality variables correlate with the different motivations for eating more plant-based foods, as well as what kinds of change are being promoted.

The present study contributes information furthering an understanding of what motivates people to eat more plant-based foods. Participants across all conditions indicated that they wanted to eat more plant-based foods, regardless of what information article and brochure they read. Furthermore, participants given information on the ethical implications of eating primarily animal-based foods in an autonomously framed manner indicated intentions to eat less animal-based foods. This interaction suggests that when encouraging people to change their eating habits in favour of eating less animal-based products, researchers and practitioners should focus on presenting relevant autonomy-framed ethical information. With an increasing focus on the health benefits of eating more plant-based foods and the evidence that supports eating a plant-based diet, educators need to focus on health initiatives to promote the consumption of plant-based foods. However, for such initiatives to be accessible to all people, policy-makers need to focus not only on health initiatives but also on food policy.

Following the commencement of this study, the organization called Animal Charity Evaluators composed a list of questions designed to provide researchers with a set of questionnaires that can be drawn on to assess advocacy efforts. In this way, research efforts advocating for more plant-based eating can be compared more easily if researchers begin to use similar measures. Questionnaires include food frequency charts, barriers to eating vegetarian meals, attitudes and beliefs about vegetarian eating as well as motivation assessments regarding eating choices. Such research that works to bring together different pieces of information collected in such a systematic manner can facilitate our understanding of what encourages people to eat the way they do and what can help them to change. A central goal of this study was to further knowledge on how to encourage people to eat more plants and fewer animals, and by addressing some of the limitations of this study, we can further increase awareness on how to encourage people to eat more plant-based meals.

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Appendix A

Listed below are food items divided into sections according to food type. Please circle the number in the box to indicate how many servings of the specified food you eat each day. Serving sizes are based on Canada's Food Guide.

Food	How many servings, on average, do you eat of the following foods each day?						
	None	One serving	Two servings	Three servings	Four servings	Five servings	Six or more servings
Grains (eg. one slice of bread is one serving)	0	1	2	3	4	5	6
Meat (one half cup equals one serving)	0	1	2	3	4	5	6
Fish (one half cup equals one serving)	0	1	2	3	4	5	6
Dairy (eg. one cup of milk is one serving)	0	1	2	3	4	5	6
Vegetables (one half cup equals one serving)	0	1	2	3	4	5	6
Fruit (one piece equals one serving)	0	1	2	3	4	5	6
Eggs (one egg equals one serving)	0	1	2	3	4	5	6
Nuts/seeds (one quarter cup is one serving)	0	1	2	3	4	5	6
Legumes (one half cup equals one serving)	0	1	2	3	4	5	6

Appendix B

Listed below are food items divided into sections according to food type. Please circle the number in the box to indicate how many servings of the specified food you **intend** to eat on average per day from now on. Serving sizes are based on Canada's Food Guide.

Food	How many servings, on average, do you intend to eat of the following foods per day?						
	None	One serving	Two servings	Three servings	Four servings	Five servings	Six or more servings
Grains (eg. one slice of bread is one serving)	0	1	2	3	4	5	6
Meat (one half cup equals one serving)	0	1	2	3	4	5	6
Fish (one half cup equals one serving)	0	1	2	3	4	5	6
Dairy (eg. one cup of milk is one serving)	0	1	2	3	4	5	6
Vegetables (one half cup equals one serving)	0	1	2	3	4	5	6
Fruit (one piece equals one serving)	0	1	2	3	4	5	6
Eggs (one egg equals one serving)	0	1	2	3	4	5	6
Nuts/seeds (one quarter cup is one serving)	0	1	2	3	4	5	6
Legumes (one half cup equals one serving)	0	1	2	3	4	5	6

Please indicate your answers to the questions below by writing a number from -3 to +3 on the line to the left of each question, using the rating scale provided below.

-3	-2	-1	0	1	2	3
Definitely no	Very unlikely	Probably not	Not sure	Maybe yes	Likely	Definitely yes

___ Do you have any intention of eating more plant-based meals?

___ Do you have any intention of eating a vegetarian diet (a diet that excludes meat products)?

___ Do you have any intention of eating a vegan diet (a diet that excludes all animal products)?

Appendix C

Health Implications of Diet Choices

One reason to focus on eating a plant-based diet is that it is healthy, since eating a highly processed and meat-focused diet may potentially lead to health problems. Industrial animal farming has numerous detrimental health implications. Heart disease, cancer and stroke are major causes of death, and many researchers are suggesting that the vast amounts of animal-based and processed foods that we consume are the culprits (Esselstyn, 2007). Simply eating less meat and processed foods may have a protective effect on our health.

Dr. Esselstyn, a top surgeon at the Cleveland Clinic, has done research suggesting that many of the diseases commonly found in North America are almost unknown in areas of the world where animal-based foods are rarely consumed. One of the studies that Esselstyn was involved in, a comprehensive investigation called The China Study, led the authors to believe that degenerative diseases like heart disease, type 2 diabetes, obesity and even several forms of cancer, could almost always be prevented—and in many cases reversed—by adopting a whole-foods, plant-based diet (Esselstyn, 2007). Furthermore, The Adventist Health Study found that people eating a plant-based diet had a lower risk of Type 2 diabetes, high blood pressure and minimal increase in hypertension with age (Esselstyn, 2007).

Eating red meat, such as beef and pork, is thought to be associated with increased rates of cancer. A National Cancer Institute study of 500,000 people found that those who ate a typical portion size of 113 grams of red meat every day were 30 percent more likely to have died in the following ten years than were those who consumed less (Safran-Foer, 2009). Sausage, luncheon meats and other processed meats also increased the risk of death (Safran-Foer, 2009). A plant-based diet is full of anti-cancer antioxidants and this may help in averting and slowing many cancers (Safran-Foer).

Eating a plant-based or vegetarian diet can be just as energy-dense as a diet containing meat and animal products (Phillips, 2005). While the body weight of vegetarians is often lower than the weight of meat-eaters, the vegetarian diet can supply a significantly greater amount of energy than the omnivorous diet (Phillips, 2005). Therefore, there seem to be benefits to energy levels when eating plant-based meals.

There is a great deal of research on plant-based diets and physical benefits, but there has also been some research about the impact of plant-based diets on mental health as well. One study looked at the impact of vegetarianism on mood and found that vegetarians reported significantly less negative emotional states than omnivores (Beezhold, Johnston, & Daigle, 2010).

The food industry has a lot of influence over the foods we are sold, and in North America the USDA has an unofficial policy to avoid saying that people should “eat less” of any food no matter how damaging its health impact may be (Safran-Foer, 2009). Therefore, the government and USDA will not say that we should “eat less meat”, but they may say that we need to “keep our daily allowance of fat to less than 30 percent of our total calories”. The health information that we receive from such institutions may not be in our best interest, and the result is a misperception of the healthfulness of certain kinds of foods.

Animal-based diets are often associated with a number of health implications, including higher blood cholesterol levels, higher risk of heart disease, higher blood pressure levels, and higher risk of hypertension and type 2 diabetes (Safran-Foer, 2009). It is important for people to be aware of the effects that their food choices have so that they can make informed decisions every day.

[References available on request.]

Ethical Implications of Diet Choices

One reason to focus on eating a plant-based diet is that it is ethical, as animal agriculture creates problems of animal cruelty, harm to factory farm worker's psychological well-being, and negative environmental impacts.

Nonhuman animals experience the emotions of fear, anxiety, joy and stress, and also possess nervous systems that cause pain very much as humans' nervous systems do (Kennell, 2007). Common practices in modern animal agriculture cause animals raised and slaughtered for meat to experience ongoing negative emotions and significant pain. Factory-farmed animals are often crowded into enclosures in which they cannot move and they are forced to stand in urine and feces. Enough ammonia is used to cause severe lung problems (Saffron-Foer, 2009). Examples of standard animal agricultural practices are suffocating or grinding alive male chicks to be used in dog food, cutting and burning chickens' beaks (which contain nerve endings) to prevent fighting, and cutting off the tails and notching the ears of piglets without any anesthesia (Mason & Finelli, 2006). Many of the roughly 450 billion animals factory farmed every year are genetically modified in ways that make them vulnerable to injury and chronic pain, and they are fed unnatural diets which often include drugs (Safran-Foer, 2009) and can cause painful kidney failure.

The inhumane treatment of animals also puts the humans that work in the factories at risk. Investigator Gail Eisnitz interviewed factory farm workers and found that many of the workers spoke of the physical and emotional dangers of their job. For example, animals are not always adequately rendered unconscious before being skinned, which puts both animal and human at risk. As one worker put it, "This is not only extremely cruel, but also very dangerous for the plant personnel who have to skin these kicking animals" (as cited in Eisnitz, 2006, p. 18). Eisnitz reported that the work can be so difficult emotionally that the psychological effects carry over into the workers' personal lives, potentially contributing to spousal abuse and mental health issues (Eisnitz, 2006).

Factory farming also negatively impacts the environment. The chair of the United Nations Panel on Climate Change recently reported that the best and fastest way to reduce greenhouse gas emissions is to reduce meat consumption. The report stated, "Livestock have a substantial impact on the world's water, land and biodiversity resources and contribute significantly to climate change. Animal agriculture produces 18 percent of the world's greenhouse gas emissions, [...] compared with 13.5 percent from all forms of transportation (cars, trucks, planes, trains, ships) combined" (Kennell, 2007, p. 12). The UN also stated that animal agriculture should be a major policy in issues of "land degradation, climate change and air pollution, water shortage and water pollution and loss of biodiversity" (Safran-Foer, 2009, p. 28). An article in *Scientific American* stated that the amount of beef that Americans eat every year is the equivalent of driving a car over 1,800 miles (Kennell, 2007). Looking at this data on a personal scale, it means that omnivores contribute seven times the volume of greenhouse gases that vegans do (Safran-Foer, 2009).

It takes about 15 pounds of grain to produce 1 pound of beef and about 5 pounds of grain to produce 1 pound of chicken (Kennell, 2007). If the grains grown for meat production were instead eaten directly by humans, there would be enough food to feed the world population and eliminate human starvation. It is important for people to be aware of the effects that their food choices have so that they can make informed decisions every day.

[References available on request.]

Appendix E

What was the topic of the article you just read? Please indicate the extent to which you believe that the statements below correspond to what you just read in the article by writing a number from -3 to +3 on the line to the left of each statement.

-3	-2	-1	0	1	2	3
Strongly Disagree	Moderately Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Moderately Agree	Strongly Agree

_____ The article provides information about health risks of a animal-based and processed foods diet.

_____ The article provides information about ethical implications of a animal-based and processed foods diet.

_____ The article talks about the health benefits of eating a plant-based diet.

_____ The article talks about the benefits that would arise to the environment and animal and human welfare if people ate less meat.

What was the topic of the brochure you just read? Please indicate the extent to which the statements below correspond to what you just read in the brochure by writing a number from -3 to +3 on the line to the left of each statement.

-3	-2	-1	0	1	2	3
Strongly Disagree	Moderately Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Moderately Agree	Strongly Agree

_____ The brochure is intended to convince people to eat a plant-based diet.

_____ The brochure is trying to give people choices about how to eat well.

_____ The brochure encourages people to conform to the norm of eating a plant-based diet.

_____ The brochure encourages people to see why eating a plant-based diet is worthwhile.

Appendix F

Below are a series of statements. Please indicate the extent to which you agree or disagree with each statement by writing a number from -3 to +3 on the line to the left of each statement. The definition of a plant-based diet is a diet composed of primarily vegetables, fruits, legumes, whole grains, nuts and seeds and little or no animal products.

-3	-2	-1	0	1	2	3
Strongly Disagree	Moderately Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Moderately Agree	Strongly Agree

- ___ I enjoy relating to people who eat a plant-based diet.
- ___ I find it pleasurable to be open-minded to eating new plant foods.
- ___ I feel joyful when I learn about different ways of preparing plant-based meals.
- ___ I am interested when I discover new kinds of plant-based foods.
- ___ I appreciate what eating plant-based food adds to my life.
- ___ Striving to understand plant foods is part of who I am.
- ___ I am tolerant and accepting of people who advocate for plant-based diets.
- ___ I am open-minded to eating new kinds of plant foods in my life.
- ___ I admire people who value a variety of plant-based foods.
- ___ I place importance on valuing all plant-based foods equally.
- ___ Being tolerant of people who eat plant-based foods is important to me.
- ___ I feel like I should avoid being biased against certain plant foods.
- ___ I would feel guilty if I avoided eating plant-based foods.
- ___ I would feel ashamed if I were eating a diet heavy in animal products.
- ___ I would feel badly about myself if I were eating primarily animal-based meals.
- ___ I want people to admire me for loving all kinds of plant-based foods.
- ___ I do not want people to think that I am narrow-minded.
- ___ I would get more respect and acceptance for being unbiased toward different plant foods.