Self-Affirmation on Increasing Message Acceptance about Consequences of Meat Consumption

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Abstract

Self-affirmation methods have been commonly used to reduce reactance to potentially threatening health information, but far less focus has been given to other threatening outcomes. The current study examined the effect of a self-affirmation writing activity on subsequent acceptance of messages about either the health or environmental consequences of eating meat. In Fall 2016, participants (N = 181; 81.2% female) from WSU Pullman completed an online study. Using a 2 (self-affirmation) X 2 (message type) design, participants were randomly assigned to one of four conditions. Participants either completed a self-affirmation writing activity or a control, non-affirmation writing activity. Then, after reading either a health or environmental message about meat consumption, participants’ message reactance was evaluated by assessing negative cognitions and emotions elicited from the warnings, along with their message advocacy (i.e. agreement with the message). They also indicated their intentions to change future eating behavior. We anticipated that those who self-affirmed prior to message exposure would experience less reactance, greater message advocacy, and report greater intentions to change compared to those who did not first self-affirm. Further, we also anticipated that reactance to health messages would be greater than reactance to environmental messages. Opposite to anticipations, there were no significant differences between self-affirmed and non-affirmed conditions. However, the environmental messages elicited more negative cognitive and emotional reactance than health messages. Given the considerable support for self-affirmation on reducing reactance to threatening information, these findings call into question the use of self-affirmation in an online setting.

Keywords: self-affirmation, health messages, meat consumption, self-affirmation theory, message acceptance
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Meat consumption in the United States has increased over the past sixty years. In 2000, total meat consumption (red meat, poultry, and fish) reached 195 pounds per person, 57 pounds greater than in the 1950s (U.S. Department of Agriculture [USDA], 2002). This change in diet has significant health and environmental consequences. Regular meat consumption is associated with a higher risk of negative health outcomes, such as high cholesterol and blood pressure, which can lead to atherosclerosis and heart disease. Alternatively, vegetarian or vegan diets are usually lower in total and saturated fat, as well as cholesterol (American Heart Association [AHA], 2015), and vegetarians typically have lower Body Mass Index (BMI) than omnivores (i.e., those who eat animal and plant products; Rizzo, Jaceldo-Siegel, Sabate & Fraser, 2013; CDC, 2015). Additionally, the standard meat-focused U.S. diet requires a substantial amount of environmental resources. It is estimated that up to 51% of greenhouse gas emissions come from industrial animal agriculture and its byproducts (Herrero, Thronton, Gerber, & Reid, 2009; United Nations Food and Agriculture Organization, 2006; Goodland & Anhang, 2009), as compared to 13% of greenhouse gas emissions from the transportation sector (Environmental Protection Agency [EPA], 2015). Given that over half of Americans suffer from one or more chronic diseases that could be related to diet (DeVol et al., 2007), along with the global destruction of the environment, it is crucial to inform the public about the potential negative outcomes of meat-eating behaviors.

In an effort to inform the public and improve overall public health, health messages have been used to communicate the risks and/or benefits of engaging in various health behaviors such as decreasing sugar intake (Barragan et al., 2014), eating fruits and vegetables (Williams-Piehota
et al., 2004), quitting smoking (Toll et al., 2007), or encouraging regular exercise (Berry, Jones, McLeod, & Spence, 2011). However, an issue that arises with health messages is that people may experience psychological reactance, a defensive response to the information being conveyed in order to protect personal freedom from a real or perceived threat (Brehm, 1966).

Psychological reactance is comprised of negative cognitive (e.g., counter arguing) and affective (e.g., hostility, irritation) responses towards the information presented (Dillard & Shen, 2005). When a person experiences reactance, they are likely to dismiss, mock, or downplay the information at hand and may actually engage in the targeted behavior at a greater frequency (e.g., smoking more in response to an anti-smoking campaign) – a term Dillard and Shen (2005) referred to as a “boomerang effect.” Psychological reactance can be further explained by the theory of cognitive dissonance (Festinger, 1957) which suggests that internal discomfort (i.e., dissonance) arises when a person is aware of two conflicting cognitions (i.e. thoughts, beliefs, morals, or ideas) they hold (Gerard, 1994). In the case of a person who engages in an unhealthy behavior like smoking, when confronted with information on the harms of smoking, they are aware of competing cognitions about smoking (i.e., “I smoke.” and “Smoking is bad for me.”). Moreover, according to cognitive dissonance theory, there is a drive to maintain consistency between one’s cognitions and behaviors. When discrepancy occurs, an individual takes steps to reduce the inconsistency (e.g., downplay information or justify their actions). Thus, the dissonance experienced may lead to defensiveness or invalidation of the information presented.

A result of exposure to informational messages is that a person may deny or ignore the content of the message to protect their self-integrity and avoid a negative self-perception (Steele, 1988). Self-affirmation theory (Steele, 1988) examines threats to self-integrity and uses self-affirmations as a catalyst to behavior change by lowering barriers to message acceptance –
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mainly by minimizing psychological reactance. The premise of self-affirmation theory is that the self’s underlying motive is to maintain good self-integrity and to be “morally and adaptively adequate; good and efficacious” (Steele, 1988, p. 262). This need to feel morally adequate is threatened when an individual learns, or is reminded, that a behavior they engage in (i.e., smoking) is harmful, suggesting they are not capable of making good decisions. Information which threatens global self-integrity causes mental stress and triggers defensive, self-protective reactions, which can undermine a well-meaning attempt to convey new information (Cohen & Sherman, 2014). A threat to one’s adequacy and ‘goodness’ stimulates a need to re-establish self-integrity, thus prompting the defensive and derogative responses observed in someone experiencing psychological reactance. To directly diminish the psychological threat to one’s self-integrity, an individual might deny the importance of the threat (e.g., an informative health message).

Self-affirmation works by indirectly reducing the psychological threat, because an individual recalls worthy aspects of their self-integrity to mind, which reaﬁrms a global sense of self (Steele, 1988; Howell, 2016). Self-affirmation stimulates a more objective and positive view of the self, which diminishes threat to personal integrity, such as threatening health information (Cohen & Sherman, 2014). This increases the likelihood that a health message will be better received (McQueen & Klein, 2006; Sherman & Cohen, 2006). For health messages in particular, the target audience is often those who engage in the unhealthy behavior at a greater frequency (e.g., daily heavy drinkers or pack-a-day smokers). People who tend to engage in such behaviors are precisely the individuals who are more likely to react defensively to health messages (Schuz, Schuz, & Eid, 2013). Thus, efforts that may reduce defensiveness, such as self-affirmation, could help to enhance the effectiveness of messages among those who need them most. Indeed, self-
affirmation prior to message exposure enhances acceptance of the information in the message, thereby making the message more effective because it successfully communicates the intended information (Scott, Brown, Phair, Westland, & Schuz, 2013; Harris & Napper, 2005).

Various self-affirmation approaches have been used to improve acceptance of health messages. For example, Harris and colleagues (Harris, Mayle, Mabbott, & Napper, 2007) investigated the influence of self-affirmation on reducing defensive responses to graphic cigarette warnings among young smokers. Participants who self-affirmed (by writing down as many of their desirable characteristics as they could recall) prior to viewing the warnings rated the messages as more threatening and personally relevant, reported more negative thoughts and feelings about smoking, and reported greater intentions to quit than those in a non-affirmation control condition. Self-affirmation tasks may also be quite minimal. A recent study by Armitage and Arden (2016) examined the effectiveness of a brief self-affirmation instruction included on alcohol warning labels. The self-affirmation instruction stated: “If I feel threatened or anxious, then I will think about the things that are important to me.” Inclusion of the self-affirmation instruction significantly reduced subsequent alcohol consumption over the next month. Another technique of self-affirmation is to have individuals write about their most important value and why it is meaningful to them (Sherman, Nelson, & Steele, 2000; Steele & Liu, 1983). For example, in a study among college students, this self-affirmation technique increased feelings of love, joy, empathy, connectedness, and gratitude when compared to a control group who wrote about their least important value (Crocker, Niiya, & Mischkowski, 2008). The affirmed participants’ increase in feelings of love and other positive emotions subsequently increased their acceptance of an article about the risks of smoking, indicating that an increase in positive feelings correlated with an increase in message acceptance (Crocker et al, 2008). This strategy
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was adapted for use in the following study because of prior support for its effectiveness and the ease of modification to an online platform.

Current Study

This study investigated the effect of self-affirmation on acceptance of health and environmental messages about the consequences of meat consumption. The vast majority of research on self-affirmation implementation has been done with health messages. No research to date has addressed the ability to reduce reactance to environmental messages, such as messages about the consequences of meat consumption on the environment. Such tests are important in order to increase the generalizability of self-affirmation to other areas besides health messages. The purpose of this study was to examine the effectiveness of a self-affirmation manipulation on participants’ acceptance of health or environmental messages about the consequences of meat consumption. The behavior of eating meat was chosen because it has both health and environmental repercussions and thus is a good target for this investigation. We expected that participants who self-affirmed prior to exposure to a message about meat-based diets would report less cognitive and affective reactance to the message, greater message advocacy (i.e. agreement with the message), and report greater intentions to change their diet. Further, because health messages are more personally relevant, we expected that reactance would be greater for health messages than environmental messages.

Method

Participants and Design

Participants were psychology undergraduate students recruited from the WSU psychology student subject pool who participated in exchange for course credit. A 2 (self-affirmation/non-affirmation) x 2 (health message/environmental message) between-subjects
design was used. Participants were randomly assigned to one of four conditions. Participants completed an experimental self-affirmation writing exercise or a non-affirming control exercise and then viewed a message about the health consequences of a meat-based diet or a message about the environmental consequences of a meat-based diet.

Procedure

All procedures were conducted online using the Qualtrics survey platform. Each participant provided informed consent and then answered questions about their demographics, eating habits, attitudes toward current diet, trait reactance, and environmental attitudes. The survey was programmed to randomly assign participants to one of four experimental conditions (e.g., self-affirmation/health message, self-affirmation/environmental message, no affirmation/health message, no affirmation/environmental message) upon completing the pretest questionnaire. After completing their assigned writing exercise (described below), participants viewed a health or environmental message conveying the negative consequences of a meat-based diet (see Appendix A). Messages remained on the screen for 30 seconds to enhance the likelihood participants read the message. Then, participants evaluated their thoughts and feelings about the message (i.e., assessing psychological and emotional/trait reactance), the degree to which they agreed with the message (i.e. message advocacy), and indicated their current intentions to reduce meat consumption. Four quality control checks were interspersed throughout the survey to ensure that participants were attentive. Items gave explicit instructions on how to respond (e.g., “For this item, please select the number 3.”). This protocol was classified as exempt by the WSU Institutional Review Board.

Self-affirmation writing exercise. The self-affirmation writing exercise was modified from an effective self-affirmation method developed by Crocker et al (2008). Participants viewed
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six values (art/music/theater, business, science/pursuit of knowledge, religion/spirituality/morality, government/politics, and social life/relationships) and wrote about the value most important to them. They were instructed to write as much as they could about why the topic was important to them. To enhance the likelihood of engagement with the task, the online system was programmed to remain on the writing task screen for 90 seconds. Specific instructions for the task can be seen in Appendix B.

**Non-affirming control exercise.** Using the same six values as the self-affirmation exercise, participants identified their least important value and wrote about why this value could be important for someone else. They were instructed to write as much as they could about why the topic could be important to someone else. As with the self-affirmation task, the system was programmed to remain on the task for 90 seconds. This is consistent with the approach Crocker and colleagues (2008) used in their non-affirming control group.

**Measures**

All questionnaire items are available in Appendix C.

**Demographics.** Age, sex, and ethnicity were measured.

**Eating habits.** Participants indicated the extent to which they consume produce (fruit and vegetables), plant protein (tofu, legumes, substitute meat products, soy milk, or tempeh), and meat (chicken, beef, fish, pork) using a 7-point scale (1 = none or less than one serving per week, 2 = about 1 serving per week, 3 = 2-3 servings per week, 4 = 4-6 servings per week, 5 = about 1 serving per day, 6 = 2-3 servings per day, 7 = 4-5 servings per day).

**Eating Attitudes.** *Attitudes towards current diet* was assessed using eight 7-point semantic differential scales. Participants indicated how unsatisfying/satisfying, unhealthy/healthy, unpleasant/pleasant, bad/good, unenjoyable/enjoyable, difficult/easy, time-
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Consuming/quick, and stressful/relaxing their current eating habits are. Items were averaged; higher values indicate greater contentment and satisfaction with current eating habits (α = .77).

Attitudes towards changing eating habits was assessed using a measure adapted from Satie, Kirstal, Curry, & Trudeau (2001). On a 7-point scale (1 = not at all interested; 7 = extremely interested), participants indicated their interest in changing their eating habits for various reasons (e.g., “To be generally healthier” or “To support local or organic farmers.”). Items were averaged; higher values indicate greater desire to change eating habits (α = .86).

**Trait Reactance.** The 14-item Psychological Reactance Scale (Hong & Page, 1989), was used to measure trait psychological reactance (e.g., “Rules trigger a sense of resistance in me.”). Responses were made on a 5-point (1 = strongly disagree, 5 = strongly agree) scale. Items were averaged; higher values indicate greater reactance (α = .82).

**Environmental Attitudes.** An environmental attitudes scale from La Trobe & Acott (2010) was used to evaluate opinions about concern for climate change and humans’ role in nature. Participants indicated the extent to which they agreed with eight statements (e.g., “Present levels of industrial activity are severely upsetting the natural environment.”) using a 5-point (1 = strongly disagree, 5 = strongly agree) scale. Items were averaged; higher values indicate greater care about the environment and its wellbeing (α = .74).

**Emotional reactance to messages.** Emotional reactance to the message was assessed with 5 items (adapted from Dillard & Shen, 2005). Participants indicated the extent to which the message made them feel worried, angry, aggravated, irritated, and annoyed on a 5-point (1 = not at all, 5 = extremely) scale. Items were averaged; higher values indicate greater emotional reactance, α = .92.
Cognitive reactance to messages. The state reactance scale (Dillard & Shen, 2005) was used to measure cognitive reactance to the messages. Participants indicated the extent to which they agreed with four items regarding the message (e.g., “To what extent did this message make you feel angry?”). Responses were made on a 5-point (1 = strongly disagree, 5 = strongly agree) scale. Items were averaged; higher values indicate greater cognitive reactance (α = .86).

Message advocacy. Message advocacy, or the extent to which one agreed with the content of the message, was evaluated with five items (adapted from Dillard & Shen, 2005). For example, “I support what the message was trying to accomplish.” or “I am favorable toward the main point of the message.” Responses were made on a 5-point (1 = strongly disagree, 5 = strongly agree) scale. Items were averaged; higher values indicate greater message advocacy (α = .85).

Intentions. Intentions to reduce meat consumption was measured with three items using a 7-point (1 = not at all likely, 7 = extremely likely) response scale. Participants indicated the extent to which they intend to reduce their meat consumption over the next week and next month, and how likely they would be to choose an alternative-to-meat option. Items were averaged; higher values indicate greater intentions to reduce meat-eating behavior (α = .92).

Analysis

Continuous variables were first checked for assumptions of normality. Then, a series of 2 (self-affirmation or non-affirmation) x 2 (health or environmental message) between-subjects ANOVAs were conducted on pretest measures (e.g., trait reactance, age) to establish success of randomization. 2 x 2 ANOVAs were also conducted on the posttest outcomes of emotional and cognitive reactance to the messages, message advocacy, and intentions to reduce meat consumption. For any significant pretest differences, these values were included as covariates in
the subsequent analyses. However, because they did not influence interpretations of the outcomes, only the unadjusted outcomes are reported.

Results

Participants

In total, 208 Washington State University psychology students responded to the online survey. Prior to analysis, data were assessed for invalid responses. Data from vegans or vegetarians was excluded from the analysis (N = 8). Of the four quality control check items, data from individuals were excluded if they only answered fewer than 25% of the items correctly (N = 5); if they spent less than 5 minutes completing the online assessment (N = 8); and if they did not complete the writing task (N = 6). The final sample included 181 participants. Participants were 80.7% female and 20.72 years old on average (SD = 3.67). The majority were White/Caucasian (66.9%), followed by mixed/bi-racial (10.5%), Hispanic (7.7%), Asian American (7.7%), Black/African American (3.9%), Hawaii/Pacific Island (1.7%), other or could not be identified (1.1%), and Native American/Alaska Native (0.6%).

Pretest

Table 1 provides the means and standard deviations for baseline characteristics across all conditions. Across 10 pretest outcomes, two significant effects were identified for trait reactance and attitudes towards changing diet. Prior to exposure, those randomized to view health message reported more positive attitudes for changing one’s diet ($M = 4.57$, $SD = 1.10$) than those randomized to view environmental message ($M = 4.26$, $SD = .92$), $F(1, 177) = 4.14, p = .04$. Additionally, those randomized to complete the self-affirmation task had greater trait reactance ($M = 2.78$, $SD = .56$) than those randomized to the non self-affirmation task ($M = 2.55$, $SD = .60$), $F(1, 177) = 7.05, p = .009$. 
Main Outcomes

Outcomes of the 2x2 ANOVAs on cognitive reactance, emotional reactance, message advocacy, and intentions to change behavior are presented in Table 2. Participants exposed to the environmental message reported significantly greater emotional reactance \((M = 2.70, SD = 1.06)\) than those exposed to health message \((M = 1.89, SD = .92)\), \(F(1, 177) = 30.03, p < .001\). Similarly, participants exposed to the environmental message also reported significantly greater cognitive reactance \((M = 2.52, SD = .93)\) compared to those exposed to the health message \((M = 2.16, SD = .94)\), \(F(1, 175) = 6.82, p = .01\). No other significant effects occurred for message type. Contrary to expectations, there were no significant main effects of self-affirmation condition or self-affirmation X message interactions. However, for intentions to change behavior, there was a crossover interaction approaching significance, \(F(1, 177) = 3.17, p = .08\). Participants who self-affirmed and were exposed to the health message reported greater intentions to change \((M = 3.50, SD = 1.97)\) compared to those who self-affirmed but were exposed to the environmental message \((M = 2.89, SD = 1.94)\). Participants who did not self-affirm and were exposed to the environmental message, however, reported greater intentions to change behavior \((M = 3.36, SD = 2.01)\) than did participants who did not self-affirm and were exposed to the health message \((M = 2.92, SD = 1.98)\).

Discussion

The purpose of the current study was to examine the effect of a self-affirmation writing activity on reactance to messages about the health and environmental consequences of meat consumption. In contrast to expectations, there was no effect of self-affirmation on emotional or cognitive reactance to the messages, message advocacy, or intentions to change eating behavior. These findings are inconsistent with previous work. For example, this self-affirmation approach
was adapted from one used by Crocker and colleagues (2008) to enhance acceptance of anti-smoking messages. However, they implemented their self-affirmation in person, where participants wrote for 10 minutes about their most important value from the given list. The current study adapted the procedure to be used online and for a shorter duration of time. Participants in the current study were asked to write for at least 90 seconds, in contrast to the 10 minutes required in Crocker et al.’s study (2008). Thus, a longer period of affirmation writing may be needed for this activity to be effective. However, it is worth noting that Armitage and Arden (2016) found significant effects with a minimal engagement self-affirmation task. Their study had participants read an alcohol warning label that stated: “If I feel threatened or anxious, then I will think about the things that are important to me.” This brief self-affirmation instruction significantly reduced alcohol consumption over the next month for these participants, indicating that a self-affirmation task can be effective with little duration. Additionally, the online nature of the current task may have reduced engagement when completing it compared to in-person methods. It is possible that this specific type of self-affirmation activity may not be appropriate for an online assessment.

It was also not possible to determine if the self-affirmation task actually enhanced self-affirming positive feelings such as love and connectedness. A manipulation check was not used in the current study because the interest here was to get immediate reactions to the messages in as close proximity to the manipulation as possible. Nonetheless, this exclusion makes it difficult to determine if lack of condition effects are due to the manipulation not appropriately enhancing self-affirming values, or if self-affirmation itself simply did not reduce reactance to messages in this context.
Research has also found that experiencing negative emotions, such as anger and fear, while completing a self-affirmation task interrupts the potential effect of self-affirmation (Ferrer, Klein, & Graff, 2017). The study completed by Ferrer and colleagues measured health behavior change plans (reducing alcohol consumption in relation to breast cancer risk in females) in participants who were induced with an anger, sadness, or neutral event before completing a self-affirming (or non-affirming, for control) essay. The presence of negative affect while writing a self-affirming essay made it less likely the writing task was self-affirming because the negative emotion prevented the individual from experiencing the positive aspects of the activity. Participants who received an anger or sadness induction produced significantly less specific plans to change health behavior, compared to the non-affirmation neutral affect conditions. These findings are relevant to the outcomes of the current study. Specifically, other emotions experienced during the self-affirmation activity were not accounted for. Participants in the current study may have experienced negative affect, which could have interrupted the effectiveness of their self-affirmation task.

Notably, there was a significant message type (health or environmental) effect on cognitive and emotional reactance to the messages. However, the outcomes were opposite of hypotheses. We expected that reactance would be greater for health messages due to the personally relevant information in a health message. Rather, reactance was greater for environmental messages than health messages. This could have been due to the surprising nature of the content of the environmental message: people are often unaware about the impact of consuming meat on the environment (Macdiarmid, Douglas, & Campbell, 2015). In contrast, people are typically aware of negative health consequences of eating meat (Dagevos & Voordouw, 2013). Thus, individuals may feel that information in health messages is familiar,
and therefore, it is not perceived as threatening. However, these interpretations should be taken with caution since prior knowledge was not measured before exposure to the message.

Although there were effects of message type on immediate cognitive and emotional responses to the messages, there was not an effect on intentions to change diet. Message type may be important regarding immediate reactions to the content of messages, but this may not translate to more reasoned, planned thinking about future behavior. Perhaps, messages may be more effective for in-the-moment reflexive decisions instead of planned, reflective decisions.

**Limitations**

Outcomes of the current study should be taken in light of several limitations. The current study did not employ a self-affirmation manipulation check, but rather measured it as a (hypothetical) reduction in reactance for the self-affirmed conditions. Because there was no significant difference in reactance between self-affirmed and non-affirmed conditions, it is not possible to determine if the self-affirmation activity itself was ineffective, or if there was indeed no difference between conditions because participants did not fully engage in the questionnaire and self-affirmation writing activity. The sample also consisted of predominantly white undergraduate psychology students, and thus these findings may not generalize to other populations.

**Conclusion**

The current investigation did not find support for an online-based self-affirmation task to reduce reactance to messages about meat-based diets. However, this study provides evidence that the topic of messages (e.g., health or environmental) is important to take into consideration when developing messages to convey negative consequences of diet. More research is needed to
examine how the content of the environmental messages is emotionally triggering, and whether this type of dissonance can be addressed by self-affirmation.
Table 1. Pretest outcomes by condition.

<table>
<thead>
<tr>
<th></th>
<th>Self-Affirmation</th>
<th>Non-Affirmation</th>
<th>SA Condition</th>
<th>Message Condition</th>
<th>SA x Message Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Health (N=47)</td>
<td>Environmental (N=43)</td>
<td>Health (N=46)</td>
<td>Environmental (N=44)</td>
<td>( p (\eta^2) )</td>
</tr>
<tr>
<td><strong>Background</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Age</td>
<td>21.38 (5.28)</td>
<td>20.51 (3.56)</td>
<td>20.26 (2.09)</td>
<td>20.73 (2.97)</td>
<td>.41 (.004)</td>
</tr>
<tr>
<td>Gender (% female)*</td>
<td>74.5</td>
<td>86.0</td>
<td>82.6</td>
<td>81.8</td>
<td>.34</td>
</tr>
<tr>
<td>Ethnicity (% White)*</td>
<td>57.4</td>
<td>76.7</td>
<td>69.6</td>
<td>63.6</td>
<td>.23</td>
</tr>
<tr>
<td>Trait Reactance</td>
<td>2.78 (.56)</td>
<td>2.79 (.56)</td>
<td>2.50 (.62)</td>
<td>2.59 (.59)</td>
<td><strong>.009 (.04)</strong></td>
</tr>
<tr>
<td><strong>Eating Habits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Produce</td>
<td>2.44 (.81)</td>
<td>2.19 (.83)</td>
<td>2.25 (.92)</td>
<td>2.43 (1.2)</td>
<td>.79 (.000)</td>
</tr>
<tr>
<td>Meat</td>
<td>2.75 (.93)</td>
<td>2.82 (.95)</td>
<td>2.81 (.88)</td>
<td>2.88 (.85)</td>
<td>.62 (.001)</td>
</tr>
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<td>Plant Proteins</td>
<td>1.96 (.88)</td>
<td>1.98 (.77)</td>
<td>1.99 (.79)</td>
<td>1.90 (.96)</td>
<td>.72 (.001)</td>
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<td><strong>Attitudes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Current Diet Attitudes</td>
<td>4.73 (.97)</td>
<td>4.74 (.73)</td>
<td>4.84 (1.3)</td>
<td>4.56 (1.1)</td>
<td>.79 (.000)</td>
</tr>
<tr>
<td>Changing Eating Habits</td>
<td>4.62 (1.1)</td>
<td>4.01 (.83)</td>
<td>4.51 (1.1)</td>
<td>4.48 (.95)</td>
<td>.28 (.007)</td>
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<td>Environmental Attitudes</td>
<td>4.46 (.59)</td>
<td>4.37 (.53)</td>
<td>4.26 (.53)</td>
<td>4.28 (.57)</td>
<td>.18 (.010)</td>
</tr>
</tbody>
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*Note. All values are means (standard deviations) unless otherwise noted. \( \eta^2 \) = partial eta squared. * Significant condition differences were tested using logistic regression. Significant effects at \( p < .05 \) are bolded.
Table 2. Posttest outcomes by condition.

<table>
<thead>
<tr>
<th></th>
<th>Self-Affirmation</th>
<th>Non-Affirmation</th>
<th>SA Condition p (η²)</th>
<th>Message Condition p (η²)</th>
<th>SA x Message Interaction p (η²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Health (N=47)</td>
<td>Environmental (N=43)</td>
<td>Health (N=46)</td>
<td>Environmental (N=44)</td>
<td></td>
</tr>
<tr>
<td>Emotional Reactance</td>
<td>1.96 (.94)</td>
<td>2.70 (1.05)</td>
<td>1.88 (.91)</td>
<td>2.68 (1.08)</td>
<td>.84 (.000)</td>
</tr>
<tr>
<td>Cognitive Reactance</td>
<td>2.18 (1.01)</td>
<td>2.66 (.89)</td>
<td>2.14 (.88)</td>
<td>2.37 (.96)</td>
<td>.21 (.009)</td>
</tr>
<tr>
<td>Message Advocacy</td>
<td>4.05 (.74)</td>
<td>4.21 (.90)</td>
<td>3.99 (.92)</td>
<td>4.20 (.89)</td>
<td>.79 (.000)</td>
</tr>
<tr>
<td>Intentions to change diet</td>
<td>3.50 (1.97)</td>
<td>2.89 (1.94)</td>
<td>2.92 (1.98)</td>
<td>3.36 (2.01)</td>
<td>.86 (.000)</td>
</tr>
</tbody>
</table>

*Note. All values are means (standard deviations) unless otherwise noted. η² = partial eta squared. Significant effects at p < .05 are bolded.*
References


doi:2182/docview/617499857?accountid=14902


Appendix A: Health and Environmental Messages

Environmental Message

Research has found that factory farming and agricultural practices contributing to animal consumption are responsible for up to 91 percent of Amazon rainforest destruction.\(^1\) Livestock and feed for livestock takes up 1/3 of the Earth’s ice-free land.\(^2\) When evaluating water use for livestock feed, livestock, and manufacturing practices, it takes 2500 gallons of water to produce one pound of beef.\(^3\,^4\) Along with this, manufacturing practices that contribute to animal agriculture are the leading cause of species extinction, ocean dead zones, water pollution, and habitat destruction.\(^5\,^6\,^7\) You can mitigate the environmental impact by eating a plant-based, vegan diet (without meat, dairy or eggs), which may reduce your carbon footprint by 50 percent.\(^8\,^9\)

References
\(^1\) Margulis, S. (2004). World Bank
\(^6\) U.S. Environmental Protection Agency (2016).
\(^7\) Environmental Protection Agency (2015).
\(^8\) Scarborough et al. (2014). Climate Change.

Health Message

Research has found that regular consumption of red meat and processed meat (about 2 servings daily) significantly increased risk of colon cancer in both men and women.\(^1\,^2\) Along with this, the American Heart Association states that vegetarian or vegan diets are usually lower in total fat, saturated fat and cholesterol.\(^3\) Additionally, vegetarians have a lower risk of heart attack, obesity, diabetes, and high blood pressure.\(^4\) For example, a collaborative analysis across five studies including 76,000 people found that vegetarians had a 24% decreased risk of dying from a heart attack compared to omnivores (those who eat plants, meat, dairy and egg products).\(^4\) Vegans (who eat only plant-based foods) also tend to have a lower BMI (Body Mass Index) than omnivores.\(^5\,^6\) You may mitigate the negative health impact by eating a plant-based, vegan diet (without meat, dairy or eggs), which may reduce risk of certain health consequences.

References
\(^1\) Norat et al. (2002). International Journal of Cancer
\(^3\) American Heart Association (2015).
\(^5\) Rizzo et al. (2013). Journal of the Academy of Nutrition and Dietetics
\(^6\) Centers for Disease Control (2015).
Full References for Citations

Environmental Messages


Health Messages

Appendix B: Self-Affirmation Activity

Participant Writing Task

(Self-Affirmation Writing Task)

In this section, we would like to learn more about your personal interests. Please choose the topic that is **most important to you** from the following list, and write about **why it is important to you**. There is no wrong answer, so please write whatever comes to mind. If you feel two topics are equally important to you, please choose just one to write about. The browser will stay on this page for **3 minutes** to give you proper time to decide on your topic and write all your thoughts about the topic. **Please write as much as you can about why this topic is important to you.** After the time is up, you may move to the next screen when you are ready.

- Business
- Art/Music/Theater
- Social life/Relationships
- Science/Pursuit of knowledge
- Religion/Morality
- Government/Politics

(Control Writing Task)

In this section, we would like to learn more about your personal interests. Please choose the topic that is **least important to you** from the following list, and write about **why it could be important to someone else**. There is no wrong answer, so please write whatever comes to mind. If you feel two topics are equally unimportant to you, please choose just one to write about. The browser will stay on this page for **3 minutes** to give you proper time to decide on your topic and write all your thoughts about the topic. **Please write as much as you can about why this topic could be important to someone else.** After the time is up, you may move to the next screen when you are ready.

- Business
- Art/Music/Theater
- Social life/Relationships
- Science/Pursuit of knowledge
- Religion/Morality
- Government/Politics
Appendix C: Codebook for Questionnaire
Evaluation of Information about Meat-Eating Habits

Section I – Consent

Consent information from the approved consent document will be copied here. If consent is given (via selecting “accept” on the electronic form), they will be transferred to the study survey. If they select “decline” the survey will end.

Section II – General Instructions, reiteration of main points.

Welcome to the Evaluation of Messages about a Carnivorous Diet research study.

As a reminder, this study is conducted entirely online and will take approximately 25-30 minutes to complete. You will be asked questions about your eating habits, your attitudes and perceptions about your eating habits, and your desire to change your eating habits. You will complete a brief writing task (2-3 minutes) describing how certain characteristics may or may not relate to you. Then, we will ask you to provide your reactions to an informational message about health or environmental consequences of a meat-based diet.

All responses will be confidential. Please read all questions carefully and respond honestly.

If you are interested in still participating in this survey, please select “continue” and the study will begin.

Section III: Background Information

This section of the survey will ask you questions about your background.

1. What is your sex? b01
   Male _____
   Female _____

2. How old are you? b02
   _____ years

3. What is your ethnic background/race? Please select all that apply.
   _____ White or Caucasian b03_01
   _____ African American or Black b03_02
   _____ Hispanic or Latino b03_03
   _____ Native-American or Alaskan Native b03_04
   _____ Asian American b03_05
   _____ Native Hawaiian or Pacific Islander b03_06
   _____ Other. b03_07
   Please Specify b03_08

4. Please indicate your current year in college. b04
   _____ Freshman
   _____ Sophomore
   _____ Junior
   _____ Senior
Section IV: eating habits

This set of questions asks about your general eating habits. Please indicate how often you eat each of the following types of foods IN A TYPICAL WEEK. We understand what you eat can vary by day, but please give you best guess. Serving information has been provided to help you answer the questions.

1. In a typical week, how many servings of FRUIT do you eat? One serving of fruit is equivalent to about ½ cup of fruit. eh01

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>None, or less than one serving per WEEK</td>
<td>None, or less than one serving per WEEK</td>
<td>About 1 serving per WEEK</td>
<td>2-3 servings per WEEK</td>
<td>4-6 servings per WEEK</td>
<td>About 1 serving per DAY</td>
<td>2-3 servings per DAY</td>
<td>4-5 servings per DAY</td>
<td>More than 5 servings per DAY</td>
</tr>
</tbody>
</table>

2. In a typical week, how many servings of VEGETABLES do you eat? One serving of vegetables is equivalent to about ½ cup of vegetables. eh02

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>None, or less than one serving per WEEK</td>
<td>None, or less than one serving per WEEK</td>
<td>About 1 serving per WEEK</td>
<td>2-3 servings per WEEK</td>
<td>4-6 servings per WEEK</td>
<td>About 1 serving per DAY</td>
<td>2-3 servings per DAY</td>
<td>4-5 servings per DAY</td>
<td>More than 5 servings per DAY</td>
</tr>
</tbody>
</table>
3. In a typical week, how many servings of **BEANS/LENTILS/PEAS** do you eat? One serving of beans, lentils, or peas is equivalent to about ½ cup. eh03

<table>
<thead>
<tr>
<th>None, or less than one serving per WEEK</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4-6</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>serving per WEEK</td>
<td>About 1</td>
<td>2-3</td>
<td>servings per WEEK</td>
<td>servings per WEEK</td>
<td>servings per DAY</td>
<td>servings per DAY</td>
<td>servings per DAY</td>
<td>More than 5 servings per DAY</td>
</tr>
</tbody>
</table>

4. In a typical week, how many servings of **MEAT ALTERNATIVES** (such as tofu or tempeh) do you eat? One serving of soy products is equivalent to about about ½ cup. eh04

<table>
<thead>
<tr>
<th>None, or less than one serving per WEEK</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4-6</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>serving per WEEK</td>
<td>About 1</td>
<td>2-3</td>
<td>servings per WEEK</td>
<td>servings per WEEK</td>
<td>servings per DAY</td>
<td>servings per DAY</td>
<td>servings per DAY</td>
<td>More than 5 servings per DAY</td>
</tr>
</tbody>
</table>

5. In a typical week, how many servings of **CHICKEN** do you eat? One serving of chicken is 2-3oz or about the size of a deck of cards. eh05

<table>
<thead>
<tr>
<th>None, or less than one serving per WEEK</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4-6</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>serving per WEEK</td>
<td>About 1</td>
<td>2-3</td>
<td>servings per WEEK</td>
<td>servings per WEEK</td>
<td>servings per DAY</td>
<td>servings per DAY</td>
<td>servings per DAY</td>
<td>More than 5 servings per DAY</td>
</tr>
</tbody>
</table>
6. In a typical week, how many servings of **FISH** do you eat? One serving of fish is 2-3 oz or about the size of the palm of your hand. eh06

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>None, or less than one serving per WEEK</td>
<td>About 1 serving per WEEK</td>
<td>2-3 servings per WEEK</td>
<td>4-6 servings per WEEK</td>
<td>About 1 serving per DAY</td>
<td>2-3 servings per DAY</td>
<td>4-5 servings per DAY</td>
<td>More than 5 servings per DAY</td>
</tr>
</tbody>
</table>

7. In a typical week, how many servings of **PORK** do you eat? One serving of pork is about 2-3 oz or about the size of a computer mouse. eh07

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>None, or less than one serving per WEEK</td>
<td>About 1 serving per WEEK</td>
<td>2-3 servings per WEEK</td>
<td>4-6 servings per WEEK</td>
<td>About 1 serving per DAY</td>
<td>2-3 servings per DAY</td>
<td>4-5 servings per DAY</td>
<td>More than 5 servings per DAY</td>
</tr>
</tbody>
</table>
8. In a typical week, how many servings of **BEEF** or other red meat (e.g., lamb, veal, venison) do you eat? One serving of red meat is about 2-3 oz or about the size of a computer mouse. 

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>None, or less than one serving per WEEK</td>
<td>About 1 servings per WEEK</td>
<td>2-3 servings per WEEK</td>
<td>4-6 servings per WEEK</td>
<td>About 1 servings per DAY</td>
<td>2-3 servings per DAY</td>
<td>4-5 servings per DAY</td>
<td>More than 5 servings per DAY</td>
<td></td>
</tr>
</tbody>
</table>

**Section V: Attitudes towards current diet**

Below is a list of thoughts you might have related to your current eating habits. For each word pair, please indicate the number that best describes you.

My current eating habits are...

| Unsatisfying att01_1 | 1 2 3 4 5 6 7 Satisfying |
| Unhealthy att01_2 | 1 2 3 4 5 6 7 Healthy |
| Unpleasant att01_3 | 1 2 3 4 5 6 7 Pleasant |
| Bad att01_4 | 1 2 3 4 5 6 7 Good |
| Unenjoyable att01_5 | 1 2 3 4 5 6 7 Enjoyable |
| Difficult att01_6 | 1 2 3 4 5 6 7 Easy |
| Time-Consuming att01_7 | 1 2 3 4 5 6 7 Quick |
| Stressful att01_8 | 1 2 3 4 5 6 7 Relaxing |

4. How interested are you in changing your eating habits for the following reasons?


1. To be generally healthier. att04_1

<table>
<thead>
<tr>
<th>Not at all interested</th>
<th>1 2 3 4 5 6 7 Extremely interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
Section VI: Trait Reactance


Instructions: The following statements concern your general attitudes. Read each statement and please indicate how much you agree or disagree with each statement. If you strongly agree mark a 5. If you strongly disagree, mark a 1. If the statement is more or less true of you, find the number between 5 and 1 that best describes you. Realize that students do not feel the same nor are they expected to feel the same. Simply answer how you feel. There are no right or wrong answers. Just answer as accurately as possible.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Neither agree nor disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rules trigger a sense of resistance in me. tr01</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. I find contradicting others stimulating. tr02</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. When something is prohibited, I usually think, “That's exactly what I'm going to do.” tr03</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. The thought of being dependent on others aggravates me. tr04</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. I consider advice from others to be an intrusion. tr05</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. I become frustrated when I am unable to make free and independent choices. tr06</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. It irritates me when someone points out things which are obvious to me. tr07</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. I become angry when my freedom of choice is restricted. tr08</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. I am content only when I am acting of my own free will. tr09</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. I resist the attempts of others to influence me. tr10</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. It makes me angry when another person is held up as a role model for me to follow. tr11</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. When someone forces me to do something, I want to do the opposite. tr12</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
13. It disappoints me to see others submitting to standards and rules.  
   Tr13
14. Advice and recommendations usually make me want to do the opposite.  tr14

**Section VII: Environmental Attitudes** — *Modified New Environmental Paradigm Scale.*

Please rate the following statements based on how much you agree or disagree with them.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Neither agree nor disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Present levels of industrial activity are severely upsetting the natural environment. eatt01</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. Humans have the right to alter nature to satisfy wants and desires. eatt02</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. Nature is a store of resources for humans to use. eatt03</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Humans should adapt to nature rather than modify it to suit us. eatt04</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Present generations of humans have moral duties and obligations to future humans. eatt05</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Humans have the right to reduce the number of species on earth in order to promote economic development. eatt06</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. People should have compassion and respect for the rest of nature. eatt07</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. Humans are presently interfering too much with the natural environment. eatt08</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

**Section VII: Self-reflection writing activity** *(See Appendix A for writing activity)*

**Section VIII: message evaluations** *(See Appendix B for messages)*

Now you we will present you with a brief message conveying information regarding a meat-based diet.

Please read the message carefully and use the following questions to provide your opinions about this message.

SHOW MESSAGE HERE
**Message Evaluation: emotional reactance** [adapted from Dillard & Shen, 2005]

1. To what extent did this message make you feel **worried**?
   - Not at All: 1 2 3 4 5
2. To what extent did this message make you feel **angry**?
   - Not at All: 1 2 3 4 5
3. To what extent did this message make you feel **aggravated**?
   - Not at All: 1 2 3 4 5
4. To what extent did this message make you feel **irritated**?
   - Not at All: 1 2 3 4 5
5. To what extent did this message make you feel **annoyed**?
   - Not at All: 1 2 3 4 5

**Message Evaluation: trait reactance** [Dillard & Shen, 2008]

Please indicate the extent to which you agree with each of the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Neither agree nor disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The message threatened my freedom to choose.</td>
<td>1 2</td>
<td>3 4 5</td>
<td></td>
</tr>
<tr>
<td>2. The message tried to manipulate me.</td>
<td>1 2</td>
<td>3 4 5</td>
<td></td>
</tr>
<tr>
<td>3. The message tried to persuade me.</td>
<td>1 2</td>
<td>3 4 5</td>
<td></td>
</tr>
<tr>
<td>4. The message got in the way of what I wanted.</td>
<td>1 2</td>
<td>3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

**Message Evaluation: message advocacy** [adapted from Dillard & Shen, 2005]

Please indicate the extent to which you agree with each of the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Neither agree nor disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I support what the message was trying to accomplish.</td>
<td>1 2</td>
<td>3 4 5</td>
<td></td>
</tr>
<tr>
<td>2. I agree with the position advocated in the message.</td>
<td>1 2</td>
<td>3 4 5</td>
<td></td>
</tr>
<tr>
<td>3. I am favorable toward the main point of the message.</td>
<td>1 2</td>
<td>3 4 5</td>
<td></td>
</tr>
<tr>
<td>4. I am critical toward the main point of the message.</td>
<td>1 2</td>
<td>3 4 5</td>
<td></td>
</tr>
<tr>
<td>5. I disagree with the position advocated in the message.</td>
<td>1 2</td>
<td>3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
Section IX: intentions

1. How likely are you to reduce your meat consumption within the next week?

   1  2  3  4  5  6  7
Not at all likely  Neither likely nor unlikely  Extremely likely

2. How likely are you to lower your meat consumption with the next month?

   1  2  3  4  5  6  7
Not at all likely  Neither likely nor unlikely  Extremely likely

3. Given the chance to choose between meat or a meat alternative, how likely are you to choose a meat alternative?

   1  2  3  4  5  6  7
Not at all likely to choose a meat alternative  Neither likely nor unlikely  Extremely likely to choose a meat alternative

Section X: Message recall.

Finally, in the space provided, we would like you to list as many topics as you can remember that were conveyed in the message you just evaluated.

Section XI: Conclusion of study

This completes your participation in this survey! Thank you!

Your course credit will be awarded within 24 hours. If you have questions or concerns about this study, please contact Kathrine Kofoed (Kathrine.kofoed@wsu.edu) or Dr. Magnan (renee.magnan@wsu.edu).