University of British Columbia

Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

Relationship between Climate Friendly Food Labeling & consumers' willingness

Planet Climate Enlightenment

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Course: PSYC 421
Themes: Climate-friendly food, Labeling
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Executive Summary

This study examines how intuitive and specific labeling influences consumers' choice of climate-friendly foods and thus promotes climate sustainability. We predict that intuitive and specific labeling is more likely to increase climate-friendly food choices than conditions with intuitive but non-specific labeling or no labeling. We assessed our hypothesis through an online survey we designed. Within-group comparisons were made among students and staffs in UBC and others (N=155) to determine their willingness to purchase climate-friendly foods with different labels. Research has shown that information integrated into everyday life can encourage consumers to choose more climate-friendly foods (Feucht & Zander, 2017). Results from a one-way repeated measures ANOVA indicated that intuitive and specific labels were statistically significant compared to intuitive but non-specific labels, which suggests that specific information needs to be incorporated into existing intuitive labels to encourage climate-friendly food choices.

Introduction

Food labeling has grown increasingly significant in recent years, owing to rising customer demand for healthier, safer, and more ecologically friendly foods (McCluskey & Loureiro, 2003), so the design of the label will largely influence the consumer's choice. And whether people choose climate-friendly food or not can be changed through guidelines (Schmidt, 2020). Research shows that people need more information to encourage them to choose climate-friendly food, for example suggestions for incorporating climate-friendly behavior into daily lives (Feucht & Zander, 2017). We realized UBC is using the label combined with traffic lights in people's lives. However, existing studies do not discuss much whether specific labels have more influence on consumer choice, and we hope to find out if providing more detailed information to consumers will be more encouraging for them to choose climate-friendly food. Our driving force is although some people do not have a lot of knowledge about climate-friendly food, when this concept is proposed, people who are aware of environmental protection will still act, so we hope that the design of the label will lead more people to pay attention to climate protection and stimulate consumers' desire to buy climate-friendly food. There're lots of barriers will influence people's choice of climate-friendly food. For example, price will be a very important reason. People always hesitate to pay a higher price for climate-friendly foods (Feucht & Zander, 2017). Therefore, in our survey, we examined how labels influence consumers' choice by assuming that all types of food are climate-friendly and sold at the same price.

Research Question & Hypothesis

Our research would like to find out how do intuitive and specific labels influence consumer choice of climate-friendly foods? And we hypothesize that intuitive and specific labels are more likely to increase climate-friendly food choices compared to intuitive but not specific labels or no labels conditions

Methods

Participations

By conducting a power analysis, we need 252 participants in our survey to meet the sample size for proving the result. After collecting data, 204 people with an average age 23.38 years old joined our survey and 155 participants provided valid data. Among all participants, 42.7% (n=64) participants were students at UBC, 36% (n=54) participants were students from other schools, and 21.3% (n=32) participants were not students (Figure 1). Year 3 students and people already graduated accounted for the largest number of participants, roughly 26% (n=39) of the total number of participants. Students in year 5 contribute least, accounting to 2% (n=3). There was no very significant difference in the number of female and male participants, 75 and 66 respectively (Figure 2). The remaining 6% of participants consisted of transgender (n=3), non-binary (n=2) and other (n=4) (Figure 3). Among all participants (Figure 4), Asians have the heaviest share, accounting for 96% (n=144). When participants joined in our survey 16.8% of participants chose "a small amount of stress" (n=25) and "a slightly stressful amount of stress" (n= 24) and least people chose "overwhelming amount of stress" accounting to 0.67% (n=1) (Figure 5).

Conditions

Our independent variables were food labels. There were three levels of conditions in our survey to test whether different kinds of food labeling will influence consumer's willingness to purchase climate friendly food. Condition one was intuitive and specific food labeling. We designed labels with an equation (Eatz, 2022) of car emissions and the greenhouse gas emissions produced by corresponding food to highlight the extent of damage caused by each kind of food to the climate with figures. Carbon emission from cars will influence climate and it's familiar to most people, but many people do not know that food can also have a negative impact on the climate, so we can use this equation label to tell consumers more intuitively and specifically how exact the impact of different kinds of food on the climate is. Condition two in our survey was only intuitive but not specific label. The label that UBC is using right now looks like a traffic light, and this label applies the common sense of traffic lights which red light means dangerous and green light means safe. Although this label is very intuitive, this label does not tell the consumer exactly how big the impact is, so it is not specific. Condition three in our survey is non-labeling.

Measures

In the research, the dependent variable is their likelihood of them purchasing the product based on the label they see. And we use a slider scale of 0 -10 to measure participants' tendency of buying climate-friendly food, with 0 being the least likely to purchase and 10 being the most likely to purchase. We choose this scale because it's a self-reported response from participants, so we can have a clear idea of what participants really think of the labels. These rating questions about different labels on food we designed are the most direct and intuitive way to test how participants' view different labels.

Procedure

We recruited participants for our study by disseminating the designed Qualtrics survey through social media, study groups at UBC and other institutions. Data used in this study were collected between March 8th to March 29th. The survey consisted of three main sections. The first part was the consent letter for the study. The second part was a set of fifteen rating questions addressing the research questions, in which participants were asked to rate their willingness to purchase various foods based on the images provided by the researchers. All participants were asked to answer the same number of rating questions, which included five questions corresponding to each of the three conditions. A total of five food products were used to test the participants' willingness to purchase, including vegetables, fruits, chicken, eggs, and beef. Each food was labeled in three different ways (Condition 1: specific label with equation; Condition 2: non-specific label with traffic light example; Condition 3: no label) and was replicated three times to test whether participants would change their willingness to purchase the same food because of the different labels. All questions in this section appeared in random orders, and participants were not able to skip during this section. After answering the rating questions, participants were provided with seven voluntary questions on demographics, such as gender, age, and the level of stress towards the environment. The demographic questions were the last part of the survey. Some of the problems encountered in data collection included the fact that the total number of participants did not reach the target of 252 in the end (only 204 responses were received), given that the

survey was anonymous and unrewarded. In addition, some participants ended the survey without completing all the rating questions. The responses from participants who did not complete all the rating questions were excluded from the statistical analysis.

Result

We conducted a statistical analysis to determine whether participants were more likely to choose environmentally friendly foods when presented with a specific food label (condition 1) than when presented with a non-specific label (condition 2) or no label (condition 3). A total of 204 participants submitted the survey, but only 155 participants' responses were recorded in the final statistics as they completed all the willingness rating questions. A one-way repeated measures ANOVA was performed to compare the effect of different labels on participant's willingness to purchase climate friendly food

Figure 6 shows the willingness to purchase environmentally friendly foods was highest, on average, when participants were shown specific labels in condition 1 (Mean = 7.23; SD = 1.72), followed by being shown no specific labels in condition 2 (Mean = 6.38; SD = 1.62), and the least willingness to purchase was without any labels in condition 3 (Mean = 6.38; SD = 1.90). The mean for condition 2 was not significantly different from condition 3, but the spread was slightly lower in condition 2 compared to condition 3 and condition 1. The descriptive plots in Figure 7 clearly illustrate that participants had a significantly higher mean level of willingness to purchase climate friendly food in condition 1 than in conditions 2 or 3.

Figure 8 shows that the F-ratio of the independent variable (food labels) is 25. 21, which indicates that the experimental manipulation has a significant effect on the dependent variable (participants' willingness to buy). The results show a p-value less than .001, which indicates that the experimental results did not occur by chance, but due to the influence of different food labels. The Partial Eta Squared is greater than 0.14, which indicates a large effect size. The results of the one-way repeated measures ANOVA showed that there was a significant main effect of food labeling on the average rating of participants' willingness between at least two conditions ($F(2,308) = [25.21]$, $p < .001$, $\eta p^2 = 0.14$).

Following a one-way repeated measures ANOVA statistic that was significant, post-hoc comparisons were conducted to highlight significant differences between means. The results of the multiple comparisons (Figure 9) revealed that the mean value of participants' willingness to purchase was significantly different between specific labels in condition 1 and non-specific labels in condition 2 ($p < .001$, 95% C.I. = [0.52, 1.17]). There was also a significant difference in the mean value of willingness between specific labels and no labels in condition 3 ($p < .001$, 95% C.I. = [0.51, 1.38]). However, there was no statistically significant difference in the mean value of willingness to purchase between non-specific labels and no labels ($p = 0.41$).

The above results are consistent with our hypothesis that intuitive and specific labels are more likely to increase climate-friendly food choices compared to intuitive but not specific labels or no labels conditions. In conclusion, when participants were introduced with intuitive and specific food labels which are food labels with specific values or equations, their willingness to purchase climate friendly food was significantly greater than when they were provided with simple food labels or no labels at all.

Discussion

The results indicate that the label that we designed, C1 (intuitive and specific labels), were more specific to participants, and was more significantly encouraged for consumers choosing climate-friendly food. All things equal, participants were more likely to choose products with intuitive and specific labels on it. This indicates that the label offers a clearer message regarding carbon emissions than the C2 (intuitive but not specific labels) label and the condition with no labels, as expected. In this way, the findings suggest the importance of having more intuitive as well as more informative labels. The intuitive but not specific label, which is color-coded and features a small spectrum to indicate emission levels, is not always easy to interpret as it contains no words and specific information about emission levels. The intuitive and specific labels provide more information and offer a unit of emission that is believed to be the main reason why it was chosen more frequently. But an interesting phenomenon is that a small number of participants cannot understand the intuitive and specific labels, which causes the SD of non-specific labels to be lower than specific labels and non-labeling. Moreover, non-labeling does not have any label, thus participants are more likely to rate their willingness depending on their personal preference.

There were several limitations to this study. First, the sample size is relatively small, at approximately 200. However, more than 50 participants' results had to be removed because they did not agree to consent, or their data are invalid. Furthermore, the sample is not representative of the general population in UBC as most of them were undergraduate college and university students not in UBC and graduated. Thus, it's limited for our clients from UBC to determine whether the label can be used in the university. A more refined and robust study that can be conducted in the future should consider not only increasing sample size but performing an experiment where participants are placed in a controlled setting simulating a shopping environment at campus where they can choose these products with labels. A challenge that we faced, which we believe will also affect an experimental version of this study, is to truly simulate the feel of purchasing products. Given that the goal of this research is to determine the effect of labels on buying behavior, pricing of products need to be considered. In surveys and in experiments, participants cannot genuinely feel the effects of food price, and so future work needs to consider how to address this key factor in informing buying behavior.

Recommendations for the UBC Client

1. The study shows that better labels are needed to ensure that consumers are informed about the carbon emissions related to the food they purchase. This aligns with research on the usefulness of labels in affecting behavior and sustainable choices (McCluskey & Loureiro, 2003). We recommend to our UBC client that the study shows a need to modify existing labels, so they are clearer, larger, and more informative. The findings have indicated that the intuitive and specific labels, which have all these elements, were more likely to influence the behavior of students. We believe that designing new labels and requiring them to be used in stores on campus are not only feasible but cost-effective. Given that the label initiative has already been devised, we recommend more studies be taken so that the most effective label can be produced and deployed by UBC.
2. In addition to adding specific information (carbon emission values) to the current

label, there are other representations that can be considered to highlight the degree of environmental impact of a product, as the label designed in our experiment may not be applicable to large volume products (overly complicated calculations). A more practical example could be presenting the environmental friendliness of the product on a scale of 0-10 to give the customer a clear idea of how friendly this product is.

Appendix

Reference

Eatz, J. of G. (n.d.). Food's carbon footprint. Green Eatz. Retrieved April 14, 2022, from https://www.greeneatz.com/foods-carbon-footprint.html

Feucht, Y., & Zander, K. (2017). Consumers' willingness to pay for climate-friendly food in European countries. Proceedings in Food System Dynamics, 360-377.

McCluskey, J. J., & Loureiro, M. L. (2003). consumer preferences and willingness to pay for food labeling: A discussion of empirical studies.

Schmidt, K. (2020). Behavioral effects of guideline-provision on climate-friendly food choices–A psychological perspective. Journal of Cleaner Production, 277, 123284.

Figures

Figure 1: Participants distribution

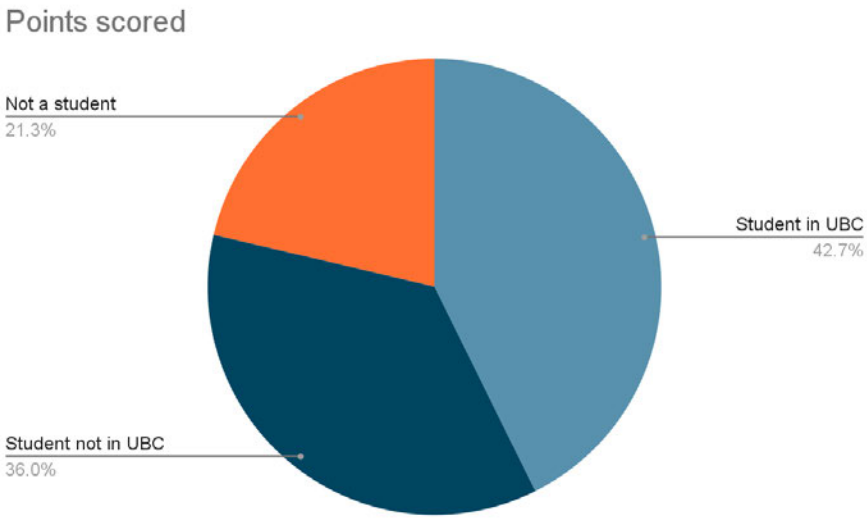

Figure 2: Participants academic year distribution

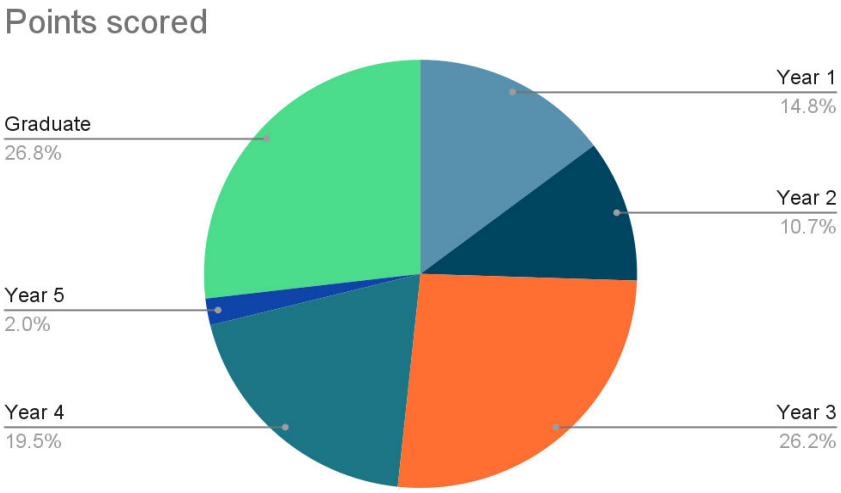

Figure 3: Participants' gender

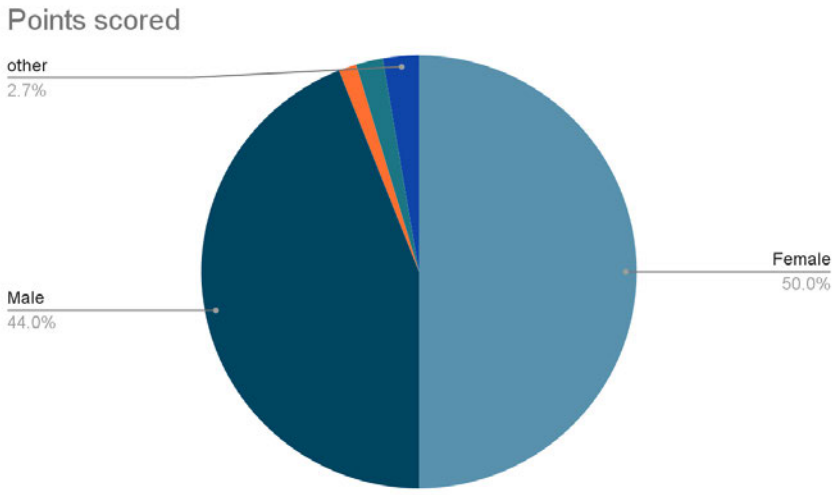

Figure 4: Participants' race

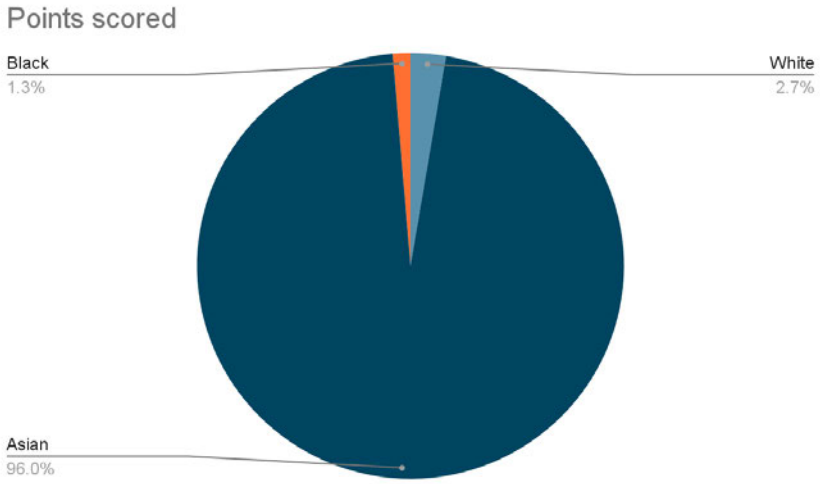

Figure 5: Participants' attitude for climate-friendly food during our survey

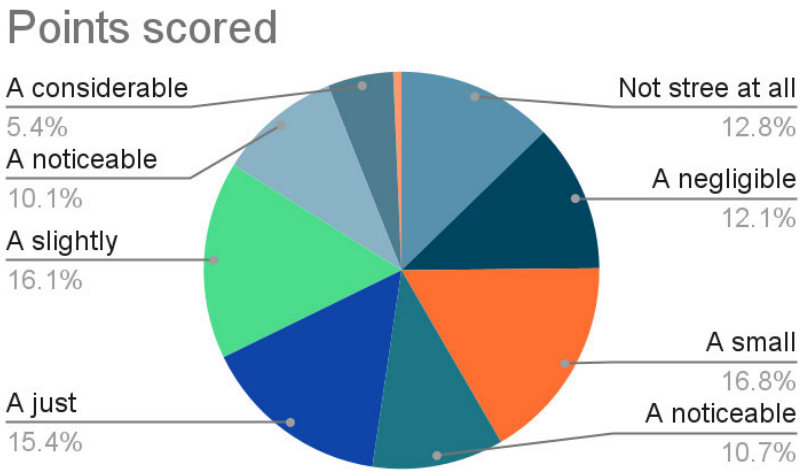

Figure 6: Descriptive Table

Descriptives

Food Label	Mean	SD	N
C1-Specific	7.228	1.718	155
C2-Non Specific	6.380	1.618	155
C3-No Label	6.284	1.892	155

Figure 7: Descriptive Plots

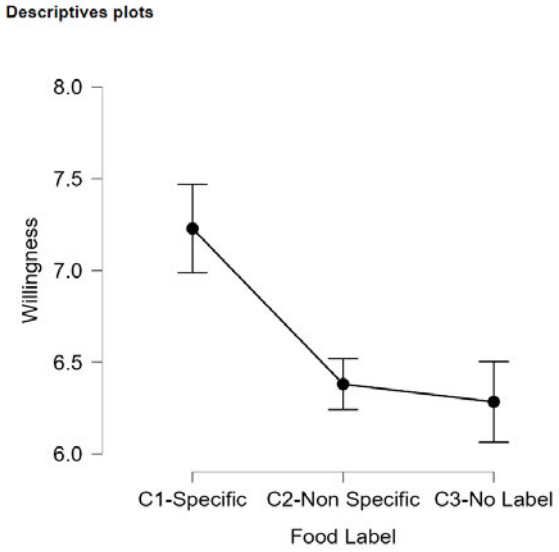

Figure 8: ANOVA Table

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Food Label	83.732[a]	2[a]	41.866[a]	25.212[a]	< .001[a]	0.141
Residuals	511.449	308	1.661			

Note. Type III Sum of Squares

[a] Mauchly's test of sphericity indicates that the assumption of sphericity is violated (p < .05).

Figure 9: Post-hoc Table

Post Hoc Comparisons - Food Label

			95% CI for Mean Difference				
		Mean Difference	Lower	Upper	SE	t	p_{holm}
C1-Specific	C2-Non Specific	0.848	0.523	1.173	0.134	6.319	< .001
	C3-No Label	0.945	0.505	1.384	0.181	5.205	< .001
C2-Non Specific	C3-No Label	0.096	−0.183	0.376	0.116	0.835	0.405

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the bonferroni method).

Contribution of each team member

- Survey: We both joined in the design of questions, Chenxi & Meilin design the labels
- Proposal: Chenxi Zhang (Introduction, Research question, Hypothesis)
  Meilin Yang (Participants, Conditions, Measures, Statistical analysis)
  Naqi Fu (Outcomes, Measures)
- Data collection: We both post our survey link in social media with UBC and other universities or colleges' students.
- Data analysis: Data analysis in excel has been done by Meilin & Chenxi. JASP has been done by Meilin, Chenxi & Naqi
- Presentation: In the final presentation: Chenxi Zhang (Introduction, Research Question, Hypothesis, Participants, Conditions, Clients questions)
  Meilin (Results)
  Naqi (Measures, Recommendation)
- Final report: Chenxi Zhang (Introduction, Research Question, Hypothesis, Participants, Condition)
  Meilin Yang (Results, Procedure, Executive summary)
  Naqi Fu (Measures, Discussion, Recommendation)