"Ugly Produce" and Consumer Choices at UBC

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Executive Summary

This study aimed to determine how labels containing different levels of information about "ugly produce" impacted UBC students' food purchase choices. We hypothesized that labels with the term "ugly produce" along with the description of the term, would be a more popular choice compared to labels with just the term, or labels with neither the term nor the description. A between-group research study was conducted, where 89 participants who were all UBC students were exposed to one of 3 conditions: food label with neither the term "ugly produce" nor the description, with the term "ugly produce" and no description, and with the term "ugly produce" and a description of the term. We controlled for participants' year of study, love for consuming meat, price consciousness, and environmental consciousness. Our results supported our hypothesis. We also found a correlation between environmental consciousness and the likelihood of purchasing a dish in each condition. Based on our results, we recommend that if UBC Food Services chooses to use the term "ugly produce" on their Food Labels, they should also include a description of the term and target students who consider themselves environmentally conscious. Overall, these actions will help UBC reach its sustainability goals.

"Ugly Produce" and Consumer Choices at UBC

Introduction

  "Ugly produce" can be defined as produce that is "deformed, wonky, crooked, or misshapen" (Phillips, 2017) but equally as delicious and nutritious as perfect-looking produce. A 2021 study on motivators and demotivators for ugly food consumption found that the majority of individuals who tend to purchase "ugly produce" were price-conscious and pro-environmental individuals below the age of 40 (Xu et al., 2021). In the United States, up to 40% of produce is thrown away or never harvested "due to not meeting the strict cosmetic standards of the food industry" (Yuan et al., 2019). Research has also shown that labeling imperfect produce with the term "Ugly" tends to correct consumers' biased expectations regarding unattractive produce (Mookerjee et al., 2021). Yet, so far, no studies have evaluated whether including a description of "ugly produce" on the label would change consumers' buying habits and prevent "ugly produce" from going to waste. Current research on this topic is crucial, as reducing consumers' stigma toward "ugly produce" has the potential to seriously decrease additions to community landfills in Canada, which will ultimately decrease methane and carbon dioxide production which is harmful to the environment.

  Additional information about "ugly produce", social desirability bias, and pro-climate and prosocial values are the driving forces since they encourage participants to select more sustainable dishes labeled with the term "ugly produce". Restraining forces include personal food preference, e.g. they dislike or are allergic to the ingredients in the food that contains "ugly produce", personal reasons for not being able to choose climate-friendly food such as budget, and lastly, negative attitudes towards greenwashing. Educating consumers on the term and importance of "ugly produce" can have many potential positive impacts on the environment.

Research Question

  Based on the discussions in our background literature, we decided to assess consumer's likelihood of choosing a label with the term "ugly produce," presented in various ways. Our research question is: How does the inclusion of the term "ugly produce" alongside a description of the term on food labels impact consumer choice?

Hypothesis

  Previous research regarding "ugly produce", as well as consumers' choices and their knowledge about "ugly produce", allowed us to develop the following hypothesis. Labels with the term "ugly produce" along with the description of the term, will be a more popular choice compared to the labels with just the term, or labels with neither the term nor the description.

Methods

Participants

  In an a priori power analysis (assuming a minimum effect size=0.2, alpha=0.05, power=0.95) conducted by G* power, we needed a minimum of 390 participants in our study. Our sample included UBC students recruited through online platforms such as Facebook, WhatsApp, and Instagram. The participants were then randomly distributed into 3 groups to conduct a between-group research study. We ended up having 89 participants fully complete the survey, with all participants being UBC students. The majority of students were from the faculties of Arts and Sciences, but the sample also included students from Applied Science, Education, Forestry, Kinesiology, Land and Food Systems, and Sauder School of Business

(Appendix, Figure 1). Additionally, the majority of students identified as female (n = 57), 31 individuals identified as male, one as non-binary, and one preferred to self-identify (Appendix, Figure 2). The majority of students who fully completed the survey were in year 3 of their studies, although some were in their second and fourth years, as well as a few in the first or fifth year (Appendix, Figure 3). Participants were also asked if they had heard of the term "ugly produce" before, and while the majority had not, 35 participants had heard of the term before (Appendix, Figure 4). Lastly, the median household income of participants was between $80,000 and $100,000, with the greatest number of participants belonging to the "Over $150,000" household income bracket (n = 20); although, it is worth noting that 14 participants preferred not to disclose their household income (Appendix, Figure 5).

Conditions

Our independent variable was the condition (i.e. one of 3 groups with a different label) that the participant was randomly assigned to:
1) A food label without the term "ugly produce" but with "UBC dining" written on top; (Appendix, Question 7 - Condition 1)
2) A food label that includes just the term "ugly produce"; (Appendix, Question 7 - Condition 2)
3) A food label that includes the term "ugly produce" along with the description of the term. (Appendix, Question 7 - Condition 3)

Our hypothesis emphasizes that participants' likelihood of choosing a label would be different based on if the label included the term "ugly produce" along with a short description of the term versus if it did not provide such information. Therefore, we operationalized our independent variable as the amount of information about "ugly produce" provided on the label.

Measures

The dependent variable of our study was participants' indicated likelihood of purchasing a dish with their assigned label. The attitudes and opinions of the participants are abstract measures. Hence, the likelihood of buying a dish with one of the labels is operationally defined on a self-rating scale of 1 to 10, with 1 implying extremely unlikely and 10 implying extremely likely (Appendix, Question 7 - Conditions 1 to 3).

Moreover, we created our own survey questions to control for any variables that could potentially impact participants' rating for purchasing a dish with the shown label and to gather some additional demographic information. Research has shown that consumers who are price conscious and pro-environmental are more likely to have a positive attitude and higher purchase intentions toward "ugly produce" (Xu et al., 2021). Therefore, we included questions regarding participants' attitudes toward price consciousness and environmental consciousness and asked participants how much they think about their impact on the environment and the price of items when buying groceries on a scale of 1 to 5. We also thought that participants' eating habits, specifically in terms of how much they enjoy consuming meat, could potentially be a sign of pro-environmental attitudes and have an impact on responses. Additionally, questions regarding the household income of participants, as well as whether they had previously heard of "ugly produce" were also included.

Ultimately, the four covariates that we controlled for during our statistical analysis were:
1) Participants' year of study; 2) Participants' love for consuming meat on a scale of 1 to 5 ; 3) Price consciousness of the participants on a scale of 1 to 5; 4) Whether the participants are environmentally conscious on a scale of 1 to 5 (Appendix, Table 1).

Procedure

        We collected data using Qualtrics. For the survey flow and specific questions in each block, please refer to the "Survey Flow" and "Survey Questions" sections of the appendix. The survey was open for 31 days in total, from March 1st to March 31st, 2022.

        Our survey started with a consent form, which was provided by Dr. Zhao. If the participants did not consent to participate in the study the survey was terminated immediately. If the participant gave consent, they were directed to answer the demographic questions. The demographic question block started by asking if the respondent was a UBC student. This was a mandatory control question because we wanted our sample to only contain UBC students, increasing the ecological validity of the results as the implications inform UBC dining services. If the participant responded that they are not a UBC student, the survey terminated without further displaying the condition questions. After the first 17 days of our survey being active, we decided to open the survey to participants who were not UBC students because we only had 76 responses from UBC students and 15 responses from non-UBC students. In this case, the question of whether the respondent was a UBC student was mandatory and acted as a control question to aid our result analysis. However, after opening the survey to a larger population, we did not receive any responses from participants who were not UBC students, so our results only include responses from UBC students.

        Once participants answered the demographics questions, they were randomly assigned to one of the three conditions. We selected a setting in Qualtrics to evenly present each condition to the participants, aiming to have the same number of participants in each condition. At the end of our data collection period, we had 30 participants in condition 1, 28 participants in condition 2, and 31 participants in condition 3 (Appendix, Table 2). The reason for the unequal number of participants in each condition is that some participants did not fully complete the survey. However, Qualtrics did not account for incomplete survey responses when evenly distributing participants among the three conditions. It is worth noting that we excluded incomplete responses from our final results. Lastly, after responding to the condition question, all the participants were asked the same questions that we used to control for covariates (Appendix, Survey Questions).

        After data collection, we faced a challenge in our statistical analysis where we ultimately had to exclude household income as a covariate, even though we initially wanted to control for this variable. The reason we decided not to control for household income was that participants who had selected "prefer not to answer" for this question, who approximately make up 16% of our entire sample size, would be completely excluded from the analysis when controlling for this covariate.

Results

        An Analysis of Covariance (ANCOVA) was performed at $\alpha=0.05$ and the p value was found to be 0.008 with a partial eta squared of 0.110, indicating a significant difference between the conditions with a medium effect size (Appendix, Table 1). According to our descriptive statistics (Appendix, Table 2), and as illustrated in our descriptives plot (Appendix, Figure 6), participants' mean likelihood rating of purchasing a dish with their assigned label was 4.27 in condition 1 (SD = 2.6), 4.14 in condition 2 (SD = 2.5), and 6.16 in condition 3 (SD = 2.9). Our post hoc Tukey's test (Appendix, Table 3) revealed that there is a significant difference between conditions 1 and 3 ($p_{tukey} = 0.016$) as well as conditions 2 and 3 ($p_{tukey} = 0.026$), but not between conditions 1 and 2 ($p_{tukey} = 0.996$). Additionally, based on our Cohen's d values, it can be

inferred that there is a medium to large effect size of -0.73 when comparing conditions 1 and 3 and an effect size of -0.71 when comparing conditions 2 and 3. These findings support our hypothesis and indicate that participants are in fact more likely to purchase a dish that has the term "ugly produce" alongside the definition of the term on the label compared to dishes labeled with only the term "ugly produce" or those labeled with neither the term nor the description.

Moreover, among the four covariates that we controlled for, environmental consciousness was found to be significantly correlated ($p = 0.002$) with the likelihood of purchasing the dish in each condition, with a partial eta squared of 0.108, indicating a medium effect size (Appendix, Table 1). None of the other covariates were significantly correlated to participants' responses in each condition.

Discussion

Considering that our data supports our hypothesis, our results suggest that consumers are influenced by their ability to understand the label and the term listed on the label when purchasing their food and support findings from similar studies, which found that information on food labels impacts consumer choices (Bleich et al., 2014; Verbeke, 2008). The results also indicate a correlation between environmental consciousness and the likelihood of purchasing the dish in each condition. However, no correlation was found between price-consciousness and the likelihood of purchasing the dish in each condition. Our findings relating to covariates partially support research done by Xu et al. (2021), which found that individuals who tend to purchase "ugly produce" were price-conscious and had pro-environmental attitudes.

If the study were to be conducted again some limitations and challenges must be addressed. Firstly, our survey did not have nearly enough participants. We had 89 participants and we needed 390 to detect a true effect with a statistical power of 95%. To solve this limitation, the survey should run for a much longer period. Furthermore, because we shared the survey via our social media and professors our sample might not be representative of the entire UBC population. Therefore, the link should be posted in more places that UBC students have access to. Solving these limitations would increase the external validity of our results. Another limitation was that some participants did not fully complete the survey. To solve this problem the survey questions and flow should be redesigned. For example, the survey could be shorter to decrease survey fatigue and to increase the likelihood of all participants completing the survey. Finally, as discussed in the procedures section of this report, we decided to exclude household income as a covariate due to the challenges in analyzing the data. This is a great limitation in our study because factors such as household income cannot be ignored since it has an impact on consumer behavior, which our study aims to address.

Our research question and findings have important implications and relevance to environmental sustainability. Our research can help tackle the food waste issue, which affects the entire globe (UN News, 2021). The results we found are specific to UBC students who are westernized and educated. Therefore, the results might not apply to the general population. Due to the high relevance of the food waste issue, our study should be conducted by targeting a larger population. To gain the largest impact, this project should also be conducted in societies that are not 'WEIRD' (Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies) to see if the results generalize (Henrich et al., 2010). Other possible future directions for the study include comparing the term "ugly" to other terms, such as "imperfect", "unique" or "beautiful" to indicate the most effective term that would encourage people to purchase foods containing such produce and in turn reduce food waste. Another important study could assess whether there is a

difference in the amount of money people are willing to pay for "ugly produce" compared to regular produce.

Recommendations for UBC Food Services

Results show that condition 3 (Appendix, Question 7 - Condition 3) stood out the most in terms of having a significant difference from the other two conditions. This means that consumers found the label that included both the term "ugly produce" and a description of the term to be most favorable. It is for this reason that UBC Food Services should consider including a description of the term "ugly produce" when and if it is chosen to be used on food labels at the university. Results demonstrated consumer's self-description of their level of environmental consciousness is significantly correlated with the likelihood of purchasing the dish labeled in each condition, and that past research on the topic has suggested consumers who purchase "ugly produce" or are aware of what the term means, are those who consider themselves to be pro-environmental (Xu et al., 2021). Therefore, UBC Food Services should consider targeting these students when marketing their dishes labeled with "ugly produce."

As mentioned in background literature on the topic of "ugly produce," this type of produce contributes to over 6 billion pounds of food waste every year (Xu et al., 2021). With the successful implementation of food labels with the term and description of "ugly produce," and eventually more of this produce being used and sold on campus, UBC will have the ability to significantly reduce their local landfill contributions. This outcome translates directly into lessening the amount of Methane and Carbon Dioxide that is emitted into the atmosphere as a result of landfill decomposition (Government of Canada, 2022). As of February 2022, UBC has launched a new 5-year plan for sustainability initiatives, with their mission being "a just and sustainable world" and are working to support work on the Climate Action Plan 2030 emission reduction targets (UBC Sustainability, 2022). With the successful implementation of food labels containing the term and description of "ugly produce" the university will be contributing solid work toward this goal. If this strategy is used successfully over time, the University of British Columbia will be successful in reducing its environmental footprint, while also setting an example for other universities and institutions around the country.

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Appendix

Figure 1

Distribution of Participants Based on Faculty
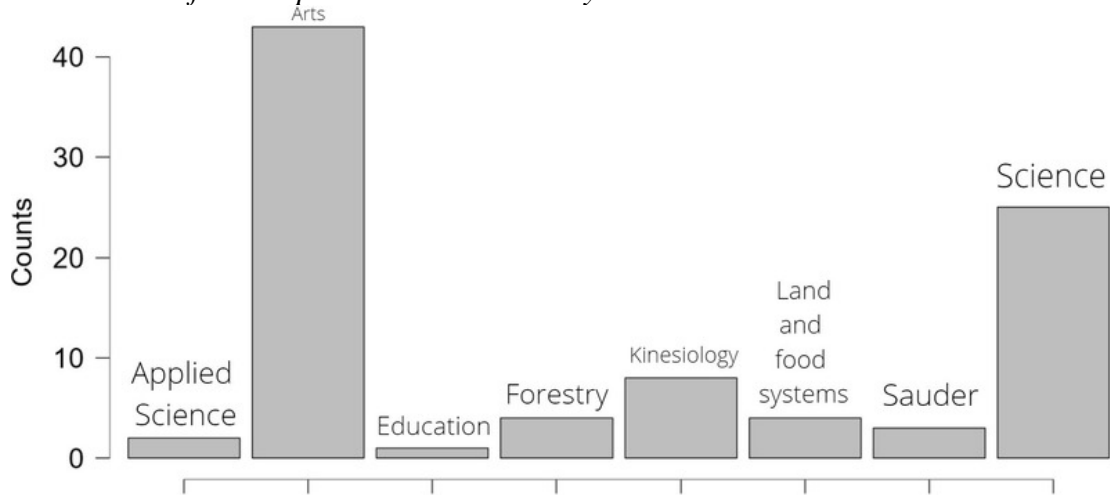
Figure 2

Bar Graph Depicting the Gender Identity of Participants
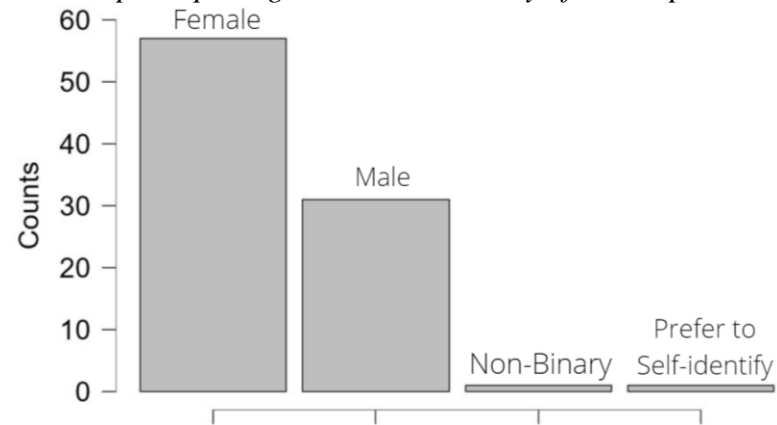
Figure 3

Distribution of Participants Based on Year of Study

Figure 4

Bar Graph Depicting Whether Participants had Heard of "Ugly Produce" or Not

Figure 5

Distribution of Participants Based on Household Income Bracket
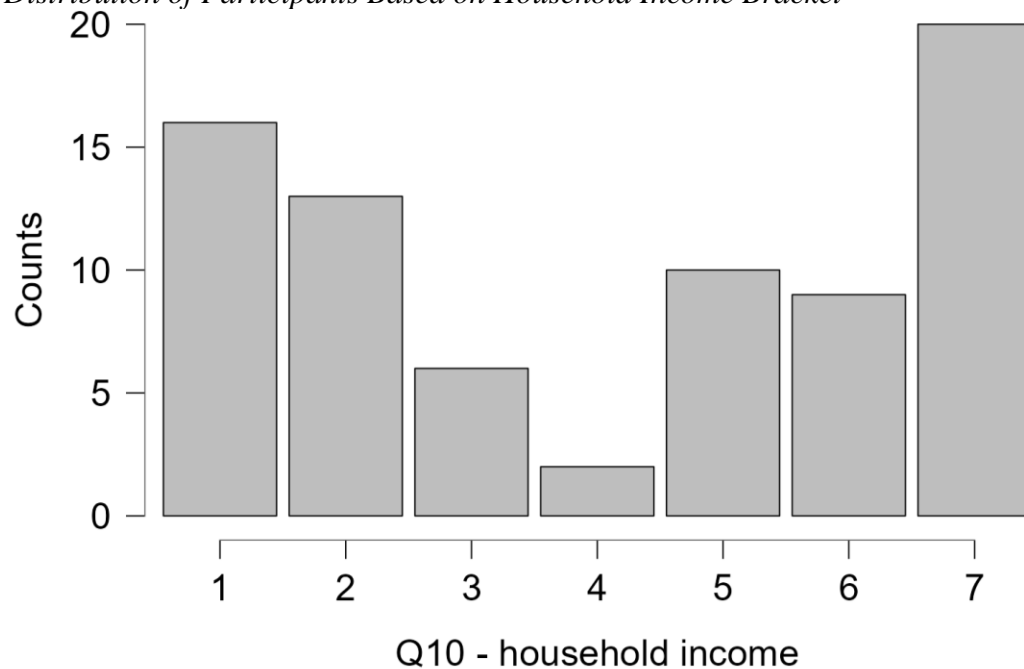
Note. 1 = Under $20,000; 2 = $20,001 to $40,000; 3 = $40,001 to $60,001; 4 = $60,001 to $80,000; 5 = $80,001 to $100,000; 6 = $100,001 to $150,000; 7 = Over $150,000. 14 participants preferred not to answer this question.

Figure 6

Descriptive Plot of the Mean Likelihood Rating of Purchasing a Dish With the Assigned Label in Each Condition

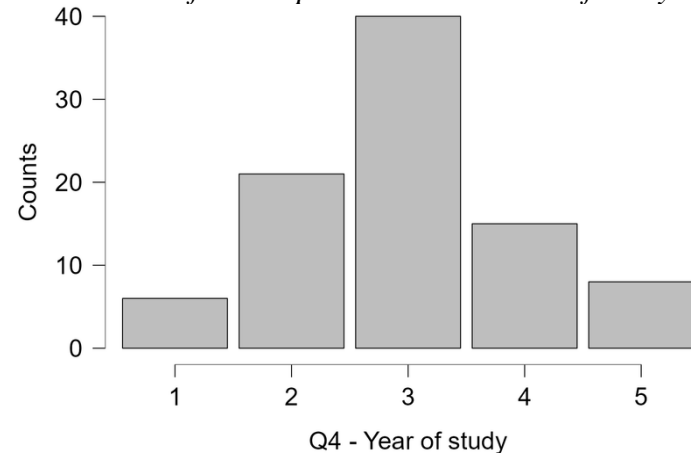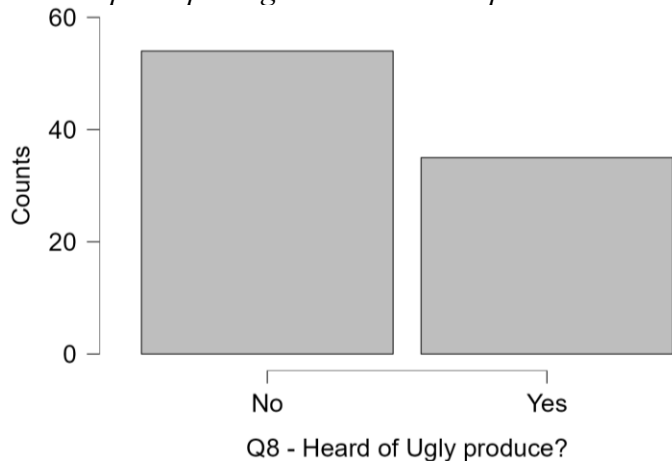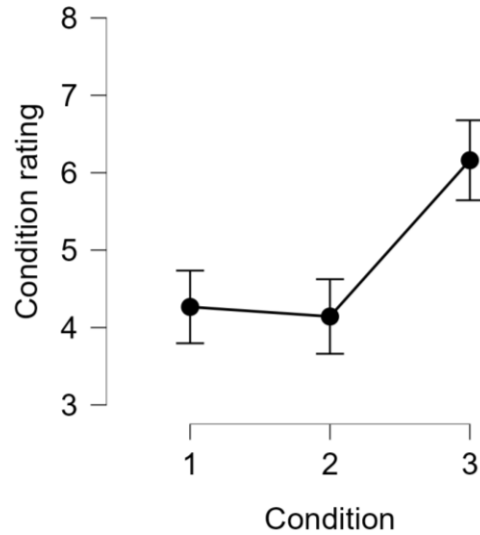*Note. Error bars are displaying the standard error for each condition*

Table 1

Analysis of Covariance (ANCOVA) Results with Partial Eta Squared Effect Sizes

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Condition	54.787	2	27.394	5.057	0.008	0.110
Q4 - Year of study	18.551	1	18.551	3.425	0.068	0.040
Q9 - Love consuming meat	9.591	1	9.591	1.771	0.187	0.021
Q11 - price consciousness	0.201	1	0.201	0.037	0.848	4.517e−4
Q12 - environmental consciousness	53.909	1	53.909	9.952	0.002	0.108
Residuals	444.183	82	5.417			

Note. Type III Sum of Squares

Table 2

Descriptive Statistics: Mean Likelihood Rating of Purchasing a Dish With the Assigned Label in Each Condition

Condition	Mean	SD	N
1	4.267	2.572	30
2	4.143	2.549	28
3	6.161	2.876	31

Table 3

Post Hoc Tests with Tukey Correction and Cohen's d Effect Sizes

		Mean Difference	SE	t	Cohen's d	p_{tukey}
1	2	−0.050	0.622	−0.080	−0.021	0.996
	3	−1.703	0.602	−2.829	−0.732	0.016*
2	3	−1.653	0.625	−2.645	−0.710	0.026*

* $p < .05$

Note. P-value adjusted for comparing a family of 3

Survey Flow

Block: Consent (1 Question)
Standard: Demographics (5 Questions)
Block Randomizer: 1 - One of three conditions randomly shown to participant
      Standard: Condition 1 (1 Question)
      Standard: Condition 2 (1 Question)
      Standard: Condition 3 (1 Question)
Standard: Covariate control questions (5 Questions)
End of Survey

Survey Questions

Question 1 - Consent

Class Research Projects in PSYC 421 - Environmental Psychology

Principal Investigator: Dr. Jiaying Zhao
      Course Instructor
      Department of Psychology
      Institute for Resources, Environment and Sustainability
      Email: jiayingz@psych.ubc.ca

Introduction and Purpose

Students in the PSYC 421 – Environment Psychology class are required to complete a research project on the UBC campus as part of their course credit. In this class, students are required to write up a research proposal, conduct a research project, analyze data, present their findings in class, and submit a final report. Their projects can include surveys, observations, and simple experiments on waste sorting on campus, student health and wellbeing, food consumption and diet, biodiversity perception, and exercise habits. The goal of the project is to train students to learn research techniques, how to work in teams and work with UBC clients selected by the UBC SEEDS (Social Ecological Economic Development Studies) program.

Study Procedures

If you agree to participate, the study will take about 10 minutes of your time. You will answer a few questions in the study. The data will be strictly anonymous. Your participation is entirely voluntary, and you can withdraw at any point without any penalty. Your data in the study will be recorded (e.g., any answer you give) for data analysis purposes. If you are not sure about any instructions, please do not hesitate to ask. Your data will only be used for student projects in the class. There are no risks associated with participating in this experiment.

Confidentiality

Your identity will be kept strictly confidential. All documents will be identified only by code number and kept in a locked filing cabinet. You will not be identified by name in any reports of the completed study. Data that will be kept on a computer hard disk will also be identified only by code number and will be password protected so that only the principle investigator and course instructor, Dr. Jiaying Zhao and the teaching assistant will have access to it. Following the completion of the study, the data will be transferred to a password protected hard drive and stored in a locked filing cabinet. Please note that the results of this study will be used to write a report which is published on the SEEDS library.

Remuneration

There is no remuneration for your participation.

Contact for information about the study

This study is being conducted by Dr. Jiaying Zhao, the principal investigator. Please contact her if you have any questions about this study. Dr. Zhao may be reached at (604) 827-2203 or jiayingz@psych.ubc.ca.

Contact for concerns about the rights of research subjects

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.

Consent

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time. You also may postpone your decision to participate for 24 hours. You have the right to choose to not answer some or any of the questions. By clicking the "continue" button, you are indicating your consent to participate; hence, your signature is not required. The researchers encourage you to keep this information sheet for your records. Please feel free to ask the investigator any additional questions that you have about the study.

○ I consent to participate in this study and will continue to the experiment.

○ I do not consent to participate in this study. (The experiment will now terminate.)

Questions 2 to 6 - Demographics

Are you a UBC student?

○ Yes

○ No

What faculty are you in?

○ Applied Science

○ Arts

○ Dentistry

○ Education

○ Forestry

○ Kinesiology

○ Land and Food Systems

○ Music

○ Nursing

○ Pharmaceutical Science

○ Sauder

○ Science

○ Other

What year are you in?

○ 1

○ 2

○ 3

○ 4

○ 5

○ 6+

What is your gender?

O Male

O Female

O Non-binary

O Prefer not to say

O Prefer to self-describe: [_____]

How old are you?

O Late Teens (15-19 y.o.)

O Early 20s (20-25 y.o.)

O Late 20s (26-29 y.o.)

O Early-Mid 30s (30-35 y.o.)

O Other

Question 7 - Condition 1

How likely are you to purchase a dish at a UBC dining hall with the following label:

Extremely unlikely				Neither likely nor unlikely				Extremely likely	
0	1	2	3	4	5	6	7	8	9	10

Question 7 - Condition 2

How likely are you to purchase a dish at a UBC dining hall with the following label:

Extremely unlikely				Neither likely nor unlikely					Extremely likely
0	1	2	3	4	5	6	7	8	9	10

Question 7 - Condition 3

How likely are you to purchase a dish at a UBC dining hall with the following label:

Extremely unlikely				Neither likely nor unlikely					Extremely likely	
0	1	2	3	4	5	6	7	8	9	10

Questions 8 to 12 - Covariate Control Questions

Have you heard of "ugly produce" before?

○ Yes

○ No

How much do you agree with the following statement: "I love consuming meat and meat products"?

○ Strongly agree

○ Somewhat agree

○ Neither agree nor disagree

○ Somewhat disagree

○ Strongly disagree

What is your approximate household income?

○ Under $20,000

○ $20,001 – $40,000

○ $40,001 – $60,000

○ $60,001 – $80,000

○ $80,001 – $100,000

○ $100,001 - $150,000

○ Over $150,000

○ Prefer not to answer

When buying groceries I...

Am very price conscious and buy what is cheapest   Don't mind spending a lot of money

0   1   2   3   4   5

I tend to think about the environment when buying groceries

Never   Sometimes   About half the time   Most of the time   Always

0   1   2   3   4   5

Contribution of Each Team Member

Tessa Allison: Tessa made outlines of the rough drafts of both the proposal and the final report in advance and shared them with the group to get us started. Tessa designed the food labels using Canva, and sent a variety of choices to the group to see which we preferred. When writing the proposal, she mostly worked on the background literature and anticipated outcomes. Tessa made documents for our meetings which included zoom links, dates and times and questions we should bring up to Dr. Zhao, and shared them with the group to ensure everyone was on the same page. Tessa designed the slide deck using Canva, and completed the slides, minus 'measures' and 'results'. She transferred screenshots of the slides over to a script document and shared with the group. She wrote the script up to slide 9, and for slides 14 and 15. In the final report, Tessa mainly worked on the introduction, recommendations for the client, and collaborated with Mona on the discussion.

Saman Darabian: When writing the proposal, Saman mostly contributed to the 'methods' section and helped with formatting the paper and ensuring that it is under the 1-page limit. In terms of data collection, he distributed the survey by sharing it through his social media and several messaging platforms. For statistical analysis, Saman familiarized himself with JASP as well as ANCOVA and explained how we would perform statistical analysis to Dr. Zhao in our progress check-in and stats meeting. For both the survey and final report, Saman downloaded, cleaned up, and reorganized the data in the CSV file for use in JASP and performed ANCOVA and post hoc tests, and created graphs and statistical tables that were then used in the project. He also wrote the 'results' section in both the presentation and the final report, contributed to the 'methods' section, added figures, tables, and our survey questions to the appendix, and helped with the APA formatting of the paper and references.

Sam Mangat: When writing the proposal, Sam contributed to making some of the survey questions and helped decide which demographics/variables would be considered for the participants. Sam helped with distributing the survey to his teachers to send out a link to the class as well as using social media to distribute it to peers. Sam helped out with suggestions over the course of the term and tried to do some extra help wherever he could as well as reminding the group about deadlines coming up and meetings etc. He presented the introduction for the group presentation and worked on the appendix in the final report.

Don Tang: When writing the proposal, Don was responsible for the conditions and measures section. Don helped out distributing survey links through various social media during the process of data collection. When facing issues regarding the sample size, Don talked to Dr.Zhao and made sure the group can still run the ANCOVA test with a small sample size. He created the slides for the measures and presented the condition and measures section for the final presentation. As for the final report, Don worked on the conditions and measures of the methods section and collaborated with Tessa and Saman to finish the sections.

Mona Zilinskaite: When writing the proposal, Mona worked on the 'driving and restraining forces' section and helped make the proposal more concise, so that it would fit on one page. Mona also created the qualtrics survey for the project. She distributed the survey through social media. She also asked some of her professors to share it in their classes. For the presentation, she created the slides for the results and presented the demographics section. For the final report, she mainly worked on the procedures section, executive summary, and collaborated with Tessa to complete the discussion section.