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Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

Describing 'Upcycling': Examining Perception and Valuation of Upcycled Meals

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Executive Summary

This study aims to examine the impact labeling has on consumers' ratings of the appealingness and valuation of upcycled meals. We hypothesized that labeling upcycled meals with a short description of what 'upcycled' means will result in increased subjective ratings of appealingness and valuation in comparison to food that is not labeled or labeled 'upcycled' without a description. We conducted a between-subjects experiment with 177 participants randomly assigned to one of three conditions: a photo of a meal with no label, a photo of a meal labeled "made from upcycled ingredients," and a photo of a meal labeled "made from upcycled ingredients" with a description of the what upcycled ingredients are. We found that participants in the third condition showed the highest ratings of appeal as well as being willing to pay more (by 15%), which supports our hypothesis. Additionally, labeling meals with just the term 'upcycled' (without explanation) showed the lowest levels of both appeal and willingness to pay. This research does not only provide evidence that labeling affects consumers' perception and evaluation but also demonstrates that using novel and generally unknown terms such as 'upcycled' without providing any definition or explanation may lead to lower appeal and reduced economic benefits for the food makers.

Introduction

Food labels are the first and often the only tool for customers to learn about the products they purchase and consume. Thus, for food producers, labeling represents a strong marketing tool that influences the perception of food quality and has a significant impact on consumers' choices (Martini, 2022). With increasing consumer interest in choosing more sustainable and environmentally conscious ways of living and eating, there is a growing body of research in the sustainable food field and in finding new ways to decrease the environmental and economic impact of food waste on the planet. In Cecchini & Warin's meta-research (2016) participants showed an overall increasing preference for sustainable and healthier food options when available. Tonkin et al. (2016) demonstrated in their study that labels could help eliminate consumers' uncertainty about food safety or trigger a concern if the label contains information concerning potential unconsidered risks for consumers. That study is of a particular interest, because using such terms as 'upcycled' in the description of food ingredients may create uncertainty and trigger concern if the consumers are not familiar with the term. Some previous studies also showed positive premiums for sustainability labels and health claims, particularly 'green labels' showed a modest increase in willingness to pay (Menozzi et al., 2020 & Duckworth et al., 2022). However, there is still not enough research on how these patterns would translate to labeling cooked meals in food courts and cafeterias settings, where labeling opportunities are often limited or not available. Moreover, previous studies do not investigate the influence of the particular term 'upcycled' on food preferences and valuation. To help consumers make informed food choices, the present study will assess consumers' perception of the cooked meals made with upcycled ingredients and presented with different 'upcycled' ingredient descriptions on the labels, as well as the influence of that information on consumers' willingness to pay.

Research Question and Hypothesis

Based on the background literature, we were interested in evaluating customers' perceived appeal and subjective valuation of upcycled food. Our research aims to answer the question: How do labeling and description influence consumer perception and valuation of upcycled food?

With the question in mind, we have two hypotheses. First, we hypothesize that when the meals are only labeled as "made from upcycled ingredients," the consumer's perceived appeal, as well as the subjective valuation, will be lower in comparison to the meals that are not labeled. Second, we expect that when the meals are labeled as "made from upcycled ingredients" along with a short description of upcycled food and its environmental and economic benefit, the consumer's perceived appeal, as well as the subjective valuation, will be higher than the meals that are not labeled.

Methods

Participants

The target population of the current study is English-speaking adults residing in North America. As the power analysis (assuming a minimum effect size=0.2, alpha=0.05, power=0.8) demonstrated, we need a minimum of 246 participants in our study. Participants were recruited mainly through social media platforms, including Facebook, Instagram, Reddit, and WeChat. In addition, to satisfy the sample needs, an Instagram target advertisement campaign was also utilized in the last week of the data collection period.

By the end of the data collection period, a total of 177 valid responses were collected. Among the 177 valid participants, the majority identify as female (N=111), with N=39 identifying as male and N=3 identifying as non-binary (Appendix Table 3.2). Additionally, in terms of age group, the majority of the participants are aged 30+ (N=75), with N=48 participants aged between 21-25 (Appendix Table 3.1). Lastly, most participants are from outside of UBC (N=133), with N=36 participants reported as UBC students (Appendix Table 3.3).

Conditions

In the current study, our independent variable is the way the food is labeled and whether the concept of upcycling is explained. In order to manipulate our independent variable, we have three conditions; one control condition and two experimental conditions, which are the labeling condition and the description condition. In the control condition, a picture of a bowl of stew was displayed without any labeling or description. We chose the picture of stew for two reasons. First, both meat and vegetable ingredients were visible in the picture, and we rationed that this may reduce the probability of confound due to dietary restrictions and preferences. Second, the presentation of stew is relatively simple, and thus can reduce the probability of confounding due to the presentation of the food. In the labeling condition, the same picture in the control condition was displayed, with the only difference being a label saying “made from upcycled ingredients” was added. The description condition was the same as the labeling condition, with an additional description of upcycled food reading, “Upcycled products are "ugly-looking" products that don't meet the cosmetic requirements of supermarkets, and would otherwise have ended up in landfills. Upcycled food gives people the ability to save money and end food waste. In addition, upcycled food meets all food safety standards.” added following the upcycling label.

Measures

UBC Qualtrics was used in our study to design our survey and to recruit participants. Our study implemented a between-subject design. The dependent variable includes two aspects; the appealingness of the food to participants, operationalized by a Likert-type scale of 1-7, and a measure of participants’ willingness to pay, operationalized by self-reported dollar amounts from $0-25. The measures used were appropriate as we kept the methods of answering as simple as possible for participants while still gaining insight into their thoughts and opinions.

Procedure

The survey starts with a consent form provided by Dr. Zhao. After participants select “Yes” for the consent form, they are shown a transition page, instructing them as to what to expect for the survey and to read the questions carefully. Following the transition page,

participants are randomly assigned to one of the three conditions: Control Condition, Labeling Condition, or Description Condition. Participants are distributed randomly and equally into the three conditions by Qualtrics. In each condition, participants are asked the same two questions: 1. How appealing is this meal to you? A Likert scale of 1-7 is provided for participant rating, 1 being not at all appealing, 7 being very appealing to them, then 2. How much are you willing to pay for this meal? The text entry box is set to a range between $0-$25 to prevent outliers. After participants finish the two questions above, they are shown 6 demographic questions that are optional to answer before ending the survey. These demographic questions are related to gender, age group, UBC student affiliation, academic year standing, faculty, and any dietary restrictions. These questions provide the information needed to construct a population profile for our participants.

Results

In order to investigate how the labeling and descriptions influence the consumer's perceived appeal and subjective valuation of upcycled food, we conducted two one-way between-subject ANOVAs to analyze how the perceived appeal and willingness to pay variables differ between the control, labeling, and description conditions. A total of 217 people participated in the survey, and 40 participants were excluded from the results due to incomplete entries, making a total of 177 valid survey submissions.

For the perceived appeal variable, the ANOVA yielded a statistically significant result ($F(2, 174) = 5.336$, $p = 0.006$, $\eta^2 = 0.058$) (see Appendix B, Table 1.1); as indicated by the F value of 5.336 and $p < 0.05$, suggesting that the group mean of at least one condition is statistically significantly different from the others. Following the significant ANOVA result, a post-hoc analysis (Tukey's HSD) was conducted, which revealed that the statistically significant result was produced by the comparison between the labeling condition and the description condition, suggesting that the participants' perceived appeal of the labeling condition ($M = 4.801$, $SD = 1.341$) is significantly lower than that of the description condition ($M = 5.61$, $SD = 1.26$) ($t = -3.243$, $p = 0.004$) (see Appendix B, Table 1.2), but there was no statistically significant difference between the labeling condition and control condition ($M = 5.286$, $SD = 1.486$) or the description condition and control condition. The descriptive statistics indicate that the participants find food products presented in the description condition to be more appealing compared to food products presented in the control condition and food products presented in the labeling condition to be less appealing (see Appendix B, Table 1.3). The result for the perceived appeal variable supports our hypothesis. We hypothesized that the participants would find food only labeled as upcycled to be less appealing than food with no labels, and food labeled along with a description of upcycled food to be more appealing. As demonstrated in the statistical analysis, labeling the food as upcycled causes a decrease in participants' perceived appeal compared to no label, and food labeled along with a description of the environmental and economic benefits of upcycled foods increases participants' perceived appeal.

The ANOVA of the willingness to pay yielded a null result ($F(2,174) = 1.285$, $p = 0.279$, $\eta^2 = 0.015$) (see Appendix B, Table 2.1), as indicated by the F value of 1.285 and $p > 0.05$, suggesting that none of the group means are significantly different from each other. However, the descriptive statistics did reveal a similar trend to the perceived appeal variable, with the average willingness to pay in the description condition (M = 11.983, SD = 6.593) being the highest across all conditions, followed by the control condition (M =

10.625, SD = 6.369), and labeling condition to be the lowest (M = 10.226, SD = 5.88) (see Appendix B, Table 2.2). Even though the ANOVA yielded a null result, the trend of the descriptive statistics is in line with our hypothesis. For the subjective valuation variable, we hypothesized that when the food is only labeled as upcycled, the participants will value it less than the food that has no label, and when the food is labeled with a description of what upcycled food is, the participants will value it more. As suggested by the descriptive statistics, the participants were willing to pay more for food in the description condition compared to the control condition and less for food in the labeling condition, which supports our hypothesis.

Discussion

As shown in the results, participants tend to find food presented in the labeling condition less appealing, and they are willing to pay less compared to food presented in the control condition. This suggests, by default, the participants have a more negative opinion of upcycled food than regular food. Since the participants find food presented in the description condition to be more appealing and indicate that they are willing to pay more than food presented in the control condition, it is reasonable to infer that the participants' default negative opinion towards upcycled foods is primarily a result of the lack of information about the concept of 'upcycling', which is consistent with prior research about increased uncertainty in food labeling by Tonkin et al. (2016). It is also possible that participants believe using upcycled ingredients in the food industry means lower production costs for food manufacturers, which leads participants to believe food produced from upcycled ingredients should be priced lower to reflect the decreased production cost. Furthermore, the increase in perceived appeal and valuation for food labeled with a description could be the result of internal moral pressure that causes the participants to feel obligated to support the sustainability cause. They may experience cognitive dissonance when indicating that they find sustainable food less appealing because they wish to see themselves as someone who is environmentally conscious. Cognitive dissonance occurs when one's actions are not in line with one's beliefs, and alleviating it requires either changing one's actions or changing one's beliefs so they are in line. In order to alleviate the cognitive dissonance, participants may inflate their appeal ratings and respond they would pay more for the food than they would in a real-world situation. Further research is needed to determine the cognitive mechanisms and cultural influences that lead participants to have a default negative opinion towards upcycled foods, as well as what causes participants to find upcycled food with descriptions to be more appealing and worth more money. Knowing such information can help food producers design more effective marketing strategies that promote the use of upcycled ingredients.

That being said, there are several limitations to our study. First of all, our sample size was smaller than we anticipated. Our power analysis indicated we would need 246 participants, but by the end of the data collection period we only had 177 valid entries. Second, our sample demographic is skewed in terms of age and gender. 44.1% of our participants were over 30 years old, and 66.9% of our participants were female (see Appendix B, Table 3.1, 3.2). Also, 78.7% of our participants were not enrolled in UBC, which makes our study results generalizable to city population but not fully generalizable to the UBC students and faculty members (see Appendix B, Table 3.3). The skewed demographic factors, as well as the ratio between UBC and non-UBC students, are primarily caused by our

participant recruiting methods, specifically Instagram advertisement. When comparing the demographic distribution from before and after we launched the Instagram advertisement campaign, we found the demographic distributions of age and gender were more evenly distributed and more closely resembled the demographics of UBC (see Appendix B, Figure 4.1, 4.2). Third, our survey was conducted online, and it does not resemble the food purchasing experience in real life, which limits the external validity of our result. And lastly, there was only one food picture presented in all three conditions, which was a picture of a bowl of stew. The general public's perceived appeal and subjective valuation may be affected by the type of food presented.

Recommendations for the UBC Client

As expressed in our food services clients' feedback, it might be problematic finding ways to make consumers read labels, especially if they are lengthy or contain fine print. Also, not all cafeterias and food courts have the space or opportunities to post additional information about their meals or even create specific 'upcycled' food labels. As our study shows, upcycled food that was labeled without a description (labeling condition) was found the least appealing. In addition, participants would pay less for the food labeled 'upcycled' only. Therefore, if the establishments are not confident in their ability to nudge consumers to read labels, it would be most beneficial for them to avoid mentioning the presence of upcycled ingredients in their meals.

However, as indicated by our research, once consumers know what upcycled ingredients are, the upcycled food becomes more appealing to them. Moreover, our study shows they would be willing to pay, on average, 15% more for it. Accordingly, if the food producers can find an opportunity to nudge customers into reading the description of 'upcycled,' it will result in increased consumer interest as well as greater economic benefits for food service establishments from selling upcycled meals at a higher price.

Our recommendations are particularly relevant to UBC food services, as one of the strategic goals of UBC is to model "a sustainable and integrated food system that equally values environmental, social, and economic outcomes" (20-Year Sustainability Strategy, 2014, p. 6). By using upcycled ingredients in food preparation along with maximizing the economical benefits from it would help UBC food services to move toward fulfilling two components of the long-term sustainability goals: environmental and economical.

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Appendix A: Survey Design

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Consent Form
Class Research Projects in PSYC 421 - Environmental Psychology

Principal Investigator:

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Course Instructor
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Institute for Resources, Environment and Sustainability
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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, collect and analyze data, present their findings in class, and submit a final report. Their final reports will be published on the SEEDS online library (https://sustain.ubc.ca/teaching-applied-learning/seeds-sustainability-program). Their projects include online surveys and experiments on a variety of sustainability topics, such as waste sorting on campus, student health and wellbeing, food consumption and diet, transportation, 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 encrypted and password protected so that only the principal investigator and course instructor, Dr. Jiaying Zhao and the teaching assistants will have access to it. Following the completion of the study, the data will be transferred to an encrypted and 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 investigators any additional questions that you have about the study.

Ethics ID: H17-02929

- ○ Yes
- ○ No

→

In the next page, you will be shown a picture of a meal. After viewing the picture, please carefully answer the questions followed.

→

Control Group Question:

Please take a look at the meal below

How appealing this meal is to you?

Not at all			Neutral			Very appealing
1	2	3	4	5	6	7

How much are you willing to pay for this meal?
(Please enter a number between 0-25 to indicate how much you are willing to pay. For example, if you are willing to pay $5, enter 5)

→

Experimental 1 Question:

Please take a look at the meal below

This meal is made from upcycled ingredients.

How appealing this meal is to you?

Not at all			Neutral			Very appealing
1	2	3	4	5	6	7

How much are you willing to pay for this meal?
(Please enter a number between 0-25 to indicate how much you are willing to pay. For example, if you are willing to pay $5, enter 5)

→

Experimental 2 Question:

Please take a look at the meal below:

This meal is made from upcycled ingredients:
Upcycled products are "ugly-looking" products that don't meet the cosmetic requirements of supermarkets, and would otherwise have ended up in landfills. Upcycled food gives people the ability to save money and end food waste. In addition, upcycled food meets all food safety standards.

How appealing this meal is to you?

Not at all			Neutral			Very appealing
1	2	3	4	5	6	7

How much are you willing to pay for this meal?
(Please enter a number between 0-25 to indicate how much you are willing to pay. For example, if you are willing to pay $5, enter 5)

→

Demographics

Are you a UBC student?

- ○ No
- ○ Yes

Which year are you in?

- ○ Year 1
- ○ Year 2
- ○ Year 3
- ○ Year 4
- ○ Year 5+
- ○ N/A

Which faculty are you in?

- ○ Applied Science
- ○ Arts
- ○ Business
- ○ Education
- ○ Forestry
- ○ Kinesiology
- ○ Land and Food Systems
- ○ Science
- ○ Other
- ○ N/A

What is your gender?

- ○ Male
- ○ Female
- ○ Non-binary
- ○ Prefer not to answer
- ○ Prefer to self-describe: _____

What is your age?

- ○ 18-20
- ○ 21-25
- ○ 26-30
- ○ 30+
- ○ Prefer not to answer

Do you have any dietary restrictions?

- ○ None
- ○ Vegetarian
- ○ Gluten-Free
- ○ Pescatarian
- ○ Other

Appendix B

Table 1.1

ANOVA – Appealingness

Cases	Sum of Squares	df	Mean Square	F	p	η^2
Conditions	19.821	2	9.910	5.336	0.006	0.058
Residuals	323.140	174	1.857			

Note. Type III Sum of Squares

Table 1.2: 1 = Control condition, 2 = Labeling condition, 3 = Description condition

Post Hoc Comparisons – Conditions ▼

		Mean Difference	SE	t	p_{tukey}
1	2	0.479	0.251	1.908	0.140
	3	−0.324	0.254	−1.276	0.411
2	3	−0.804	0.248	−3.243	0.004

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

Table 1.3: 1 = Control condition, 2 = Labeling condition, 3 = Description condition

Descriptives – Appealingness

Conditions	N	Mean	SD	SE	Coefficient of variation
1	56	5.286	1.486	0.199	0.281
2	62	4.806	1.341	0.170	0.279
3	59	5.610	1.260	0.164	0.225

Table 2.1

ANOVA – WTP

Cases	Sum of Squares	df	Mean Square	F	p	η^2
Conditions	101.376	2	50.688	1.285	0.279	0.015
Residuals	6860.939	174	39.431			

Note. Type III Sum of Squares

Table 2.2: 1 = Control condition, 2 = Labeling condition, 3 = Description condition

Descriptives – WTP

Conditions	N	Mean	SD	SE	Coefficient of variation
1	56	10.625	6.369	0.851	0.599
2	62	10.226	5.880	0.747	0.575
3	59	11.983	6.593	0.858	0.550

Table 3.1

Variable	Level	Counts	Total	Proportion
Age group	18–20	23	170	0.135
	21–25	48	170	0.282
	26–30	18	170	0.106
	30+	75	170	0.441
	Prefer not to answer	6	170	0.035

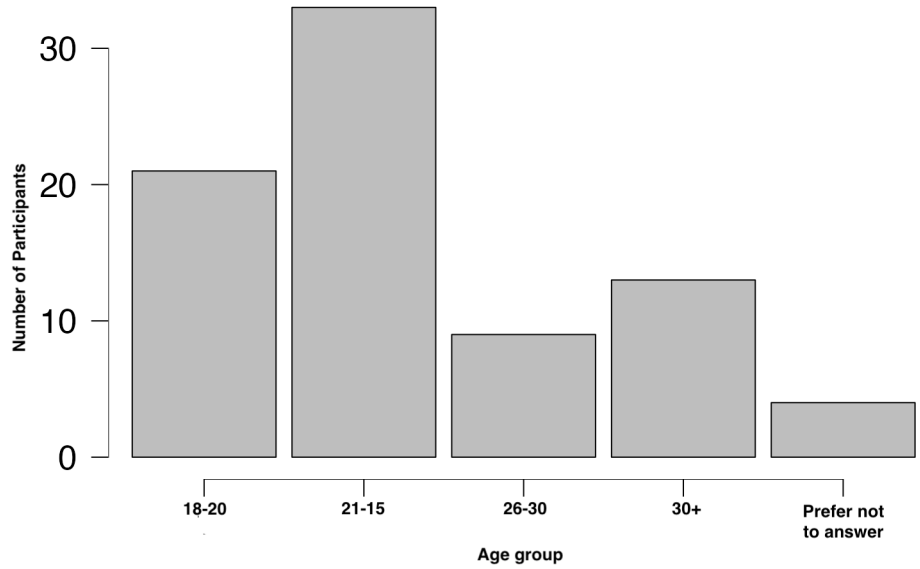
Table 3.2

Variable	Level	Counts	Total	Proportion
Gender	Female	111	166	0.669
	Male	39	166	0.235
	Non-binary	3	166	0.018
	Prefer not to answer	6	166	0.036
	Prefer to self-describe:	7	166	0.042

Table 3.3

Variable	Level	Counts	Total	Proportion
UBC student?	No	133	169	0.787
	Yes	36	169	0.213

Figure 4.1: Age and gender demographic from March 14th



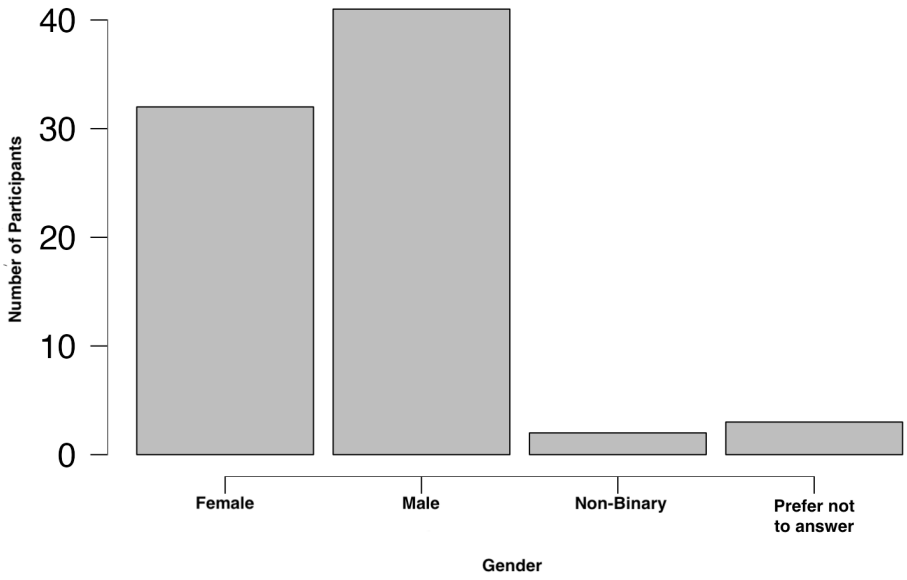
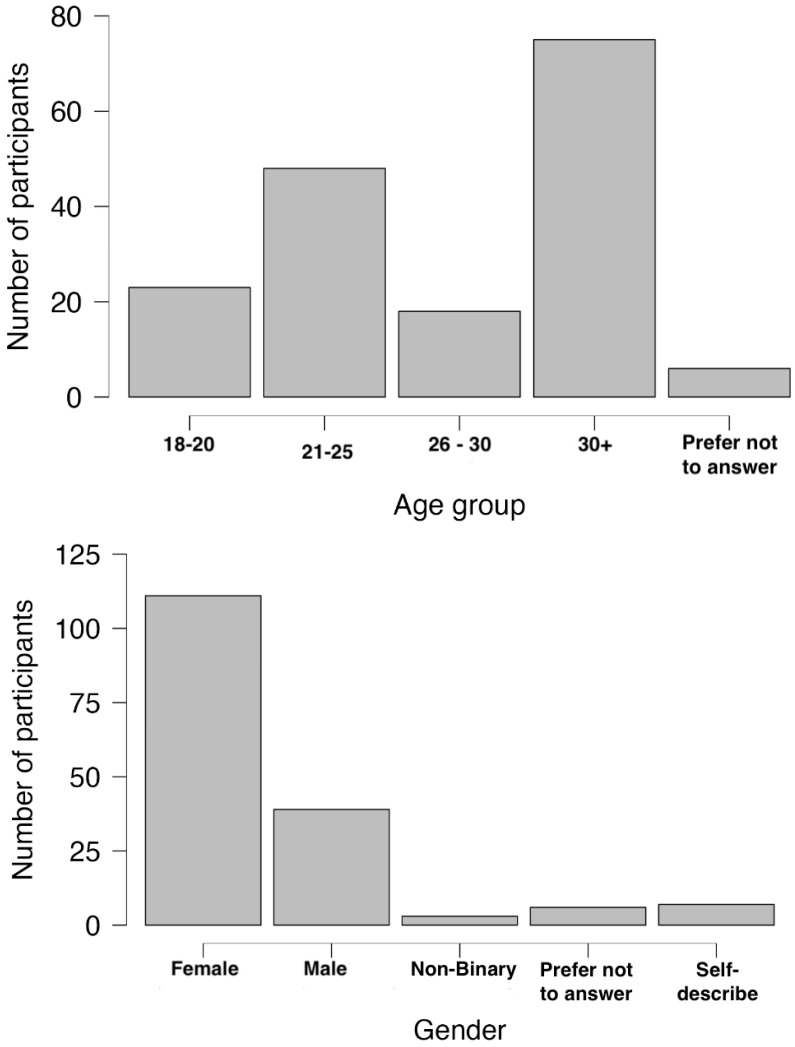


Figure 4.2: Age and gender demographic from April 1st.



Appendix C

Our project was highly collaborative in almost every aspect. In the synthesis phase, everyone contributed ideas to our dialogue and that is how in the end we created an efficient, effective, and sound experimental design. We challenged each others' ideas with respect and support and thus were able to discover potential sources of error quickly. For the proposal, Elena, Amelia and Jingyi took effort to ensure our preparatory research was sound and the proposal was formatted correctly with all the necessary information. Steve, Gloria, and Max did the majority of the work in terms of statistics, with Steve and Max particularly putting in work for the presentation of our results. Max also formatted our survey on Qualtrics and was responsible for troubleshooting any issues that arose due to the software. All members of the group contributed to data collection with their unique access to different social groups. The survey was sent to numerous individuals, posted on various social media sites, and even advertised to target groups on social media. Every member of the group was given a roughly equal portion of the presentation to prepare and present, relating mostly to their area of interest and knowledge. The writing of the final report was divided between all team members and subsequently reviewed and edited after consulting

and collaborating with other members of the team.