Messaging Matters? Effect of Framing on Willingness to Reduce Food Waste

Carbon Crushers (Group 4)

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Executive Summary

This study explores the influence of message framing (positive, negative, or neutral) on willingness to reduce food waste among individuals affiliated with UBC Vancouver, including students, staff, families, and residents living on campus.

Using Qualtrics, participants were randomly assigned to view one of three posters with different message framings around food waste. Then, they selected the sustainable options they were willing to adopt from an 11-item checklist, adapted from UBC's Climate Action Plan 2030 (CAP 2030).

We hypothesized that positively and negatively framed messages would increase willingness to reduce food waste compared to a control, and that positive framing would be more effective than negative. On the contrary, we found no significant differences between message conditions influencing participants' willingness to reduce food waste behaviors.

These findings suggest that one-time messaging may be insufficient to bring change. A CAP 2030-aligned initiative could instead emphasize repeated exposure to messaging, use more engaging content, and ensure greater visibility across campus, particularly in high-traffic zones such as dining halls and residence buildings. Such strategies could help strengthen message retention, enhance relevance, and willingness to change behavior.

Contents

Introduction

UBC Climate Action Plan 2030 (CAP 2030) states that UBC campus food systems are the second highest category in extended impact emissions after commuting. CAP 2030 aims to achieve a 50% reduction of greenhouse gas emissions of food systems by 2030 (CAP 2030 Targets and Actions: Food Systems | UBC Campus & Community Planning, n.d.-c).

From a global perspective, food systems are an enormous driver of climate change and contribute between 21% and 50% of global GHG emissions (Support Climate-Friendly Food Systems, 2023). While the campaign has acknowledged the use of communication strategies on food waste reduction, there is a lack of understanding of how message framing influences food waste reduction among UBC community members. Therefore, our research seeks to address UBC community members' willingness to contribute to food waste reduction through message framing.

Research has identified various motivations and barriers to reducing household food waste (Graham-Rowe et al., 2014; Pelt et al., 2020; Stangherlin & De Barcellos, 2018). Previous research focused on consumer behaviors that lead to food waste, including poor food management and disposal practices (Chinie, 2020; Tamasiga et al., 2022; Tavill, 2020). There is a lack of consensus on what counts as food waste, which may contribute to confusion in proper food disposal, relevant to food sorting challenges. Some studies point to routine behaviors and habitual practices as barriers to proper food waste disposal (Manika et al., 2022; Nguyen et al., 2022; Russell et al., 2017). This indicates the need for interventions to target not just awareness but daily habits.

Previous research investigated the influence of message framing on promoting pro-environmental behaviors (e.g., recycling, energy conservation, and water use; Isa et al., 2016; Kim & Chon, 2022; Van de Velde et al., 2010). Message framing can be divided into two types: positive framing is presented as a way to achieve benefits (e.g., *"You can help the planet by sorting your food waste correctly"*), while negative framing emphasized the consequences of not acting (e.g., *"If you don't sort your food waste, it harms the planet"*). These studies suggest that the way environmental messages are framed can significantly shape individuals' attitudes and behavioral desire. However, the effect of message framing on food sorting behavior has received limited attention. Our study will contribute to this literature by examining how positive versus negative message framing influences community members within a university setting, helping to address existing gaps in measuring the willingness of individuals to engage in food sorting behavior.

Research Question and Hypotheses

Given that habitual behaviors often impede proper food waste disposal, interventions must extend beyond awareness-raising to actively influence behavior. This study aimed to fill gaps in the literature by examining how message framing (positive, negative, or neutral) influences

people's willingness to reduce food waste, specifically with regard to UBC's food waste practices. We hypothesized that participants exposed to the positive or negative frame posters would report higher willingness to engage in food waste reduction behaviors compared to those in the neutral (control) condition. Additionally, we also hypothesized that participants exposed to the positive frame poster would report higher willingness to reduce food waste than those exposed to the negative message frame.

Methods

Participants

A priori power analysis indicated that a minimum sample of 246 participants was required to detect an effect size of $\eta^2 = 0.2$, given $\alpha = .05$ and power = .8. The target sample included all individuals affiliated with the UBC Vancouver campus, including students, staff, families, and residents living on campus. A total of 329 participants were recruited to complete an online Qualtrics survey. 67 participants were excluded due to incomplete survey responses, and 1 participant was excluded for not being assigned a valid condition. The final sample size consisted of $N = 263$ participants ranging from ages 16-61 ($M = 22$, $SD = 5.95$). Within the sample, 151 (57.4%) identified as women, 96 (36.5%) as men, 5 (1.9%) as non-binary, 2 (0.8%) preferred not to disclose, and 9 (3.4%) did not answer the question.

Conditions

This study employed a between-subjects experimental design with three conditions, each manipulating the framing of a food waste awareness poster. The independent variable was message framing, which was operationalized through the visual and textual content of the posters. Participants were randomly assigned to one of three conditions: positive framing, negative framing, or neutral control.

In the positive framing condition ($n = 87$), participants viewed a poster with bright, visually appealing colors and optimistic language (See Appendix C, Fig.C.1). The messaging focused on the benefits of reducing food waste, using phrases like *"Every action counts"* and *"Helps fight climate change"* to promote a sense of agency and collective responsibility.

The negative framing condition ($n = 83$) featured a poster with darker visuals and more urgent, somber language (See Appendix C, Fig.C.2). It highlighted the environmental harms of food waste, including methane emissions, and included phrases such as *"Every inaction hurts the planet"* to evoke concern and accountability.

The control condition ($n = 93$) showed participants a neutral, informational poster from UBC's official food scraps sorting guide (See Appendix C, Fig.C.3). The poster used a neutral tone and focused purely on factual information about what items belong in the compost bin. It served as a baseline for evaluating the effects of positive and negative framing on willingness to reduce food waste.

Measures
The dependent variable for this study was participants' willingness to engage in climate-friendly food behaviors, as predicted by our hypotheses. This was measured through a self-report checklist of 11 items adopted from the UBC Climate Action Plan 2030 (CAP 2030) "Support Climate-Friendly Food System" guide. No existing validated scale aligned with UBC-specific food waste practices.

Therefore, adopting items directly from CAP 2030 allowed us to measure realistic, context-specific actions that members of the UBC community are encouraged to take.
Participants were presented with the checklist after viewing their assigned poster (see Appendix B, Fig. B.1) and then asked to select the actions they were willing to adopt. The list included 10 measures such as "*use reusable containers", "compost food waste",* and *"meal plan for the week before going shopping"* (Support Climate-Friendly Food Systems, 2023). A reverse-coded trick item, "*Put my food waste in the garbage*," was also included in the list to measure reduced willingness to engage in climate-friendly food behaviors (See Appendix B, Figure 3).

Procedure
Participants were recruited voluntarily through online social media platforms (e.g., Instagram, Reddit). The data collection took place over a period of two weeks in March 2025.
Upon accessing the survey link, Participants were randomly assigned to one of the three poster conditions (see Appendix C), which were embedded directly into a self-paced Qualtrics survey. Following the poster exposure, participants completed the 11-item multiple-response checklist, indicating the number of actions they would be willing to take to reduce food waste. After completion, participants were asked to complete a few demographic questions. Although we initially faced challenges recruiting participants, promoting the survey on social media platforms like Reddit and Instagram helped us successfully reach the minimum number of participants required to detect an effect.

Results

On average, participants selected 4.09 items (SD = 2.74) from the measures, which had the trick question excluded, in the control condition (n = 93), 4.76 items (SD = 2.28) in the negative condition (n = 83), and 4.30 items (SD = 2.50) in the positive condition (n = 87). The assumption of normality was violated for an one-way ANOVA test; therefore, a Kruskal-Wallis Test was conducted instead, revealing a non-significant difference between the three conditions [$H(2, N = 263) = 4.70$, $p = .095$, $\eta^2 = .018$] (see Appendix E, Tables E.4 and E.5), contrary to our hypothesis that exposure to framing messaging would increase participants' willingness to engage in food waste reduction behaviors when compared to the control condition.

116 (44.1%) participants selected the trick question (see Appendix E, Table E.6), with 47 (50.5%) participants in the control condition, 28 (33.7 %) participants in the negative condition, and 41 (47.1%) participants in the positive condition.

A Chi-Square of Independence test was conducted for the trick question and reported a non-significant difference between the three conditions [χ^2 (2, N = 263) = 5.50, p = .064].

Discussion

Our study explores whether the framing of messages could influence participants' willingness to engage in food waste reduction at UBC. Contrary to our hypothesis, the results revealed no significant differences in the number of behaviors selected across the three conditions, implying that behavioral willingness between those who saw positively framed messages and those who saw negative ones was not statistically significant. These findings suggest that framing alone may not be an effective strategy for influencing food waste behaviors in this context. An additional insight from our research was revealed through the use of a trick question. Surprisingly, 44.1% of the participants across all three conditions chose the trick question, but further analysis yielded no significant result, suggesting that the messaging may not have effectively communicated the intended action. This result may reflect that participants did not carefully read or fully understand the poster content, and it underscores the importance of ensuring that key messages are conveyed clearly and unambiguously.

In addition, the findings emphasize the importance of repeated exposure and strategic placement of messages. A one-time online poster was insufficient to shift behavior, suggesting that interventions should focus on consistency and visibility. Additionally, our manipulation may not have been powerful enough to affect participants meaningfully. Since participants took the survey online at their own pace, many may not have read or processed the poster carefully before responding to the checklist. This aligns with findings by Pelletier and Sharp (2008), who argue that for persuasive messages to influence pro-environmental behavior, they must be carefully tailored and fully processed to foster internalization and motivation. Instead of revealing ignorance on the part of the participants, the findings indicate that greater consideration must be given to how information is framed, formatted, and delivered to be both accessible and memorable. This can help lay a stronger foundation for future efforts aimed at encouraging sustainable behavior. Our study adds to growing evidence that sustainable behavioral change requires accurate information, repeated exposure, and an effective component (Steg & Vlek, 2009).

One limitation of our study was the absence of a time limit; many participants may not have fully read or processed the poster before moving on to the survey, or perhaps may have skimmed or skipped the posters entirely, limiting their exposure to the framing manipulation. As a result, the messages may not have significantly influenced behavior due to diminished attention. We also suspect that there might have been survey fatigue (see Appendix E, Table E.3). Participants might have rushed through questions without giving them much thought, especially since the median survey time was only 74 seconds. In future studies, a time limit could be implemented to ensure that participants take the time to read and process the posters shown.

Recommendations

Given the limited effectiveness of message framing on students' willingness to reduce food, we suggest discontinuing further investment in standalone poster interventions (Bretter et al., 2023). Rather, priority should be given to structural solutions and targeted strategies that directly tackle barriers to student participation and awareness towards food waste issues, consistent with CAP 2030 sustainability goals. Additionally, we suggest using emotional salience to encourage greater willingness toward food waste reduction behaviors (Floriano, 2024), along with increasing the frequency of exposure (Skurka, Myrick, & Yang, 2023), to potentially enhance its impact. To improve the likelihood of behavioral change, communications must incorporate powerful stories, impactful imagery, and clear, relatable calls to action.

To significantly boost engagement and visibility, we recommend ensuring consistent and strategically positioned messaging across busy campus areas - including dining halls, residences, and libraries (Ozanne, Ballantine, & McMaster, 2022). Working closely with student-led groups and campus events to highlight food waste reduction efforts and CAP 2030 messages can further strengthen campus-wide sustainability commitments and encourage active student involvement (OoNorasak et al., 2022). To gain a more nuanced understanding of students' perceptions and barriers regarding food waste, we recommend qualitative research such as interviews or focus groups. Moreover, utilizing long-term exposure or interactive survey techniques could also provide additional valuable insights to improve sustainability initiatives.

An innovative approach towards fostering greater student awareness about sustainability is integrating CAP 2030 objectives directly into university coursework. For instance, courses such as PSYC 421 (Environmental Psychology) provide an ideal context. Aligning course content and learning tools with CAP 2030 objectives enables students to apply theoretical frameworks and research methods to real-world sustainability challenges, an approach that can be replicated across disciplines using their own academic foundations. Such interdisciplinary integration enriches students' educational experiences and promotes collaborative learning. Courses specifically related to sustainability have been shown to foster increased empathy among students, potentially influencing them toward more sustainable behaviors and attitudes (Mallick et al., 2023). These initiatives support institutional objectives by equipping students with the knowledge, awareness, and motivation necessary to actively engage in sustainable practices and solutions on both individual and community levels.

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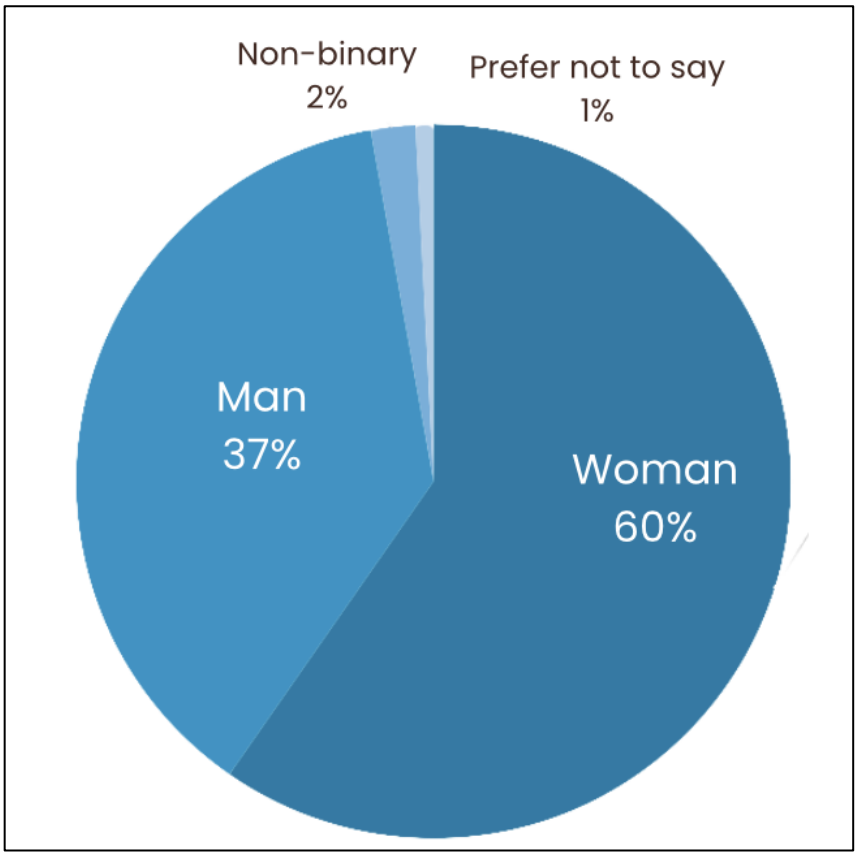
Appendices

Appendix A

Survey Demographics

Fig A. Gender Composition of Participants



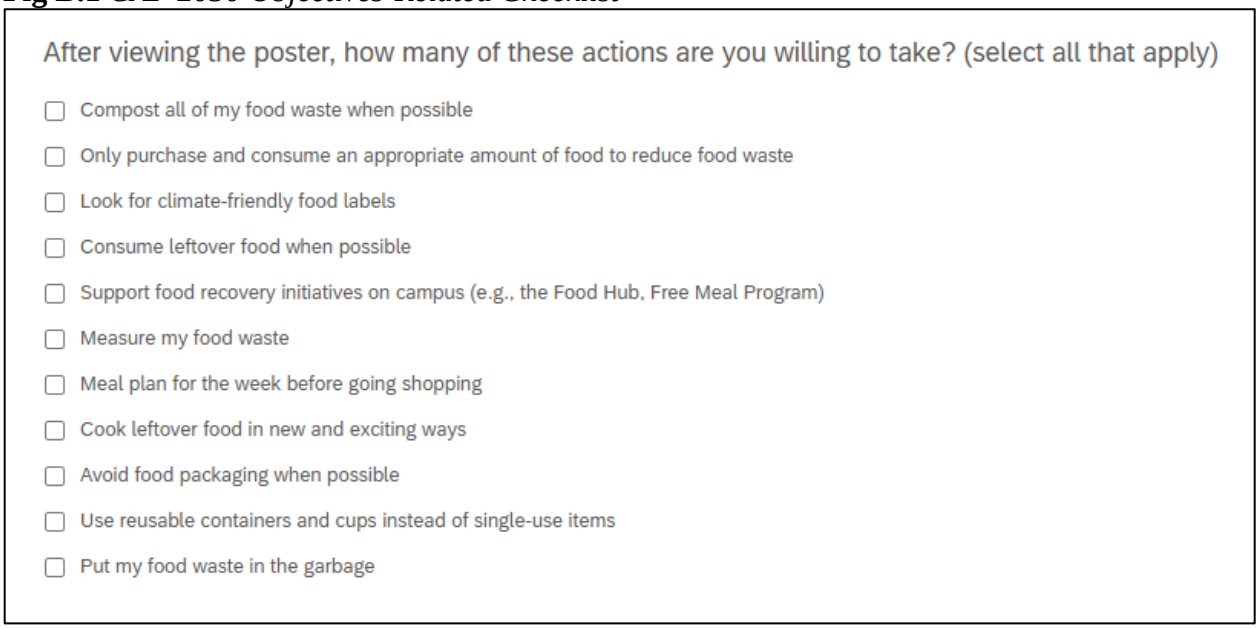
Note. The chart illustrates participants 'selected answer to Q2 (See Fig B.2). The majority identified as women (60%), followed by men (37%), non-binary individuals (2%), and those who preferred not to say (1%)

Appendix B

Qualtrics Survey

1. **Consent form provided by Dr. Zhao**
2. **Random Assignment to Framing Condition:** After consenting, participants were randomly assigned to one of three poster conditions:
   - **a.** Positive Frame: Emphasized the environmental benefits of reducing food waste
   - **b.** Negative Frame: Emphasized the environmental harm caused by increased food waste.
   - **c.** Control: Shown UBC's standard food waste sorting poster, with no food waste messaging.
3. **Dependent variable measure:** Behavioral Willingness

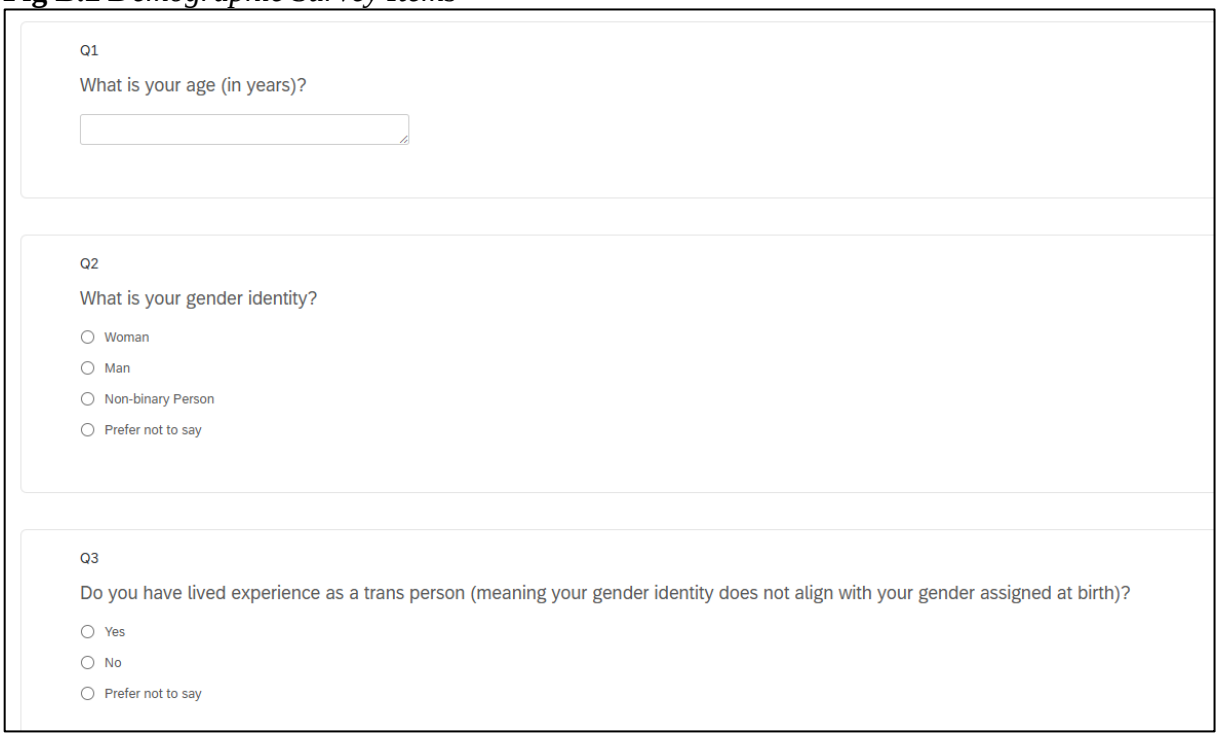
Fig B.1 *CAP 2030 Objectives-Related Checklist*



Note. Participants were shown this survey item following their viewing of their designated poster condition. It evaluated an individual's ability to take part in food sustainability initiatives which align with UBC's CAP 2030 goals. With the exception of the final one ("Put my food waste in the garbage"), which was an attention check, each action reflects the objectives of CAP 2030.

4. Demographics

Fig B.2 *Demographic Survey Items*



Note. Demographic section from the survey, including questions on age, gender identity, and lived experience as a trans person.

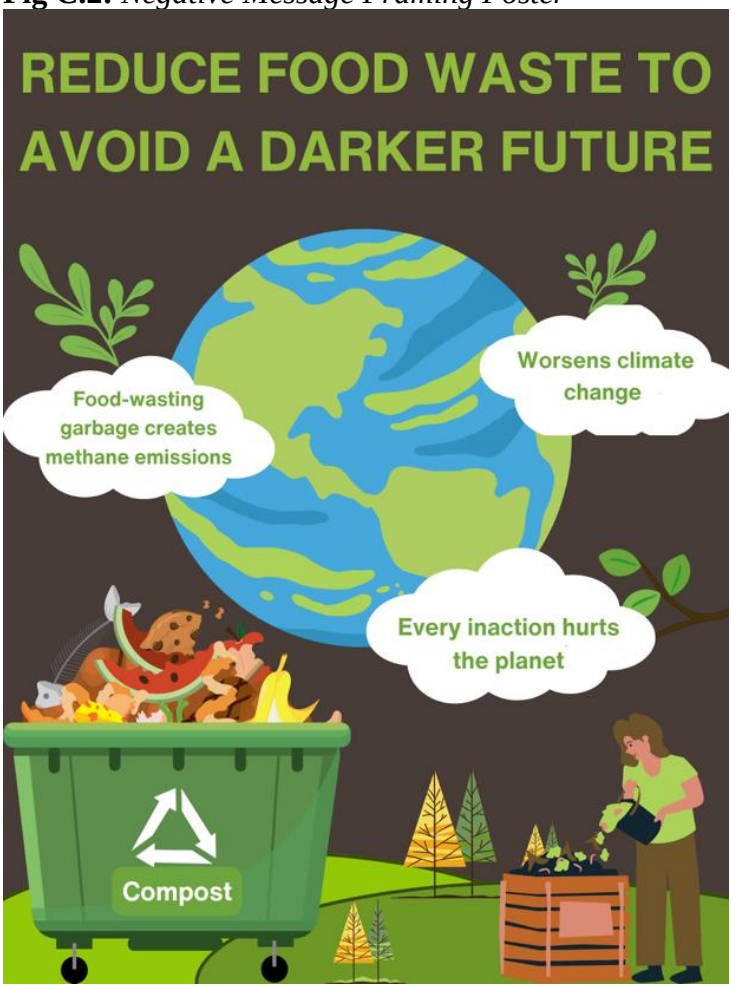
Appendix C

Posters for Experimental Conditions

Fig C.1: *Positive Message Framing Poster*

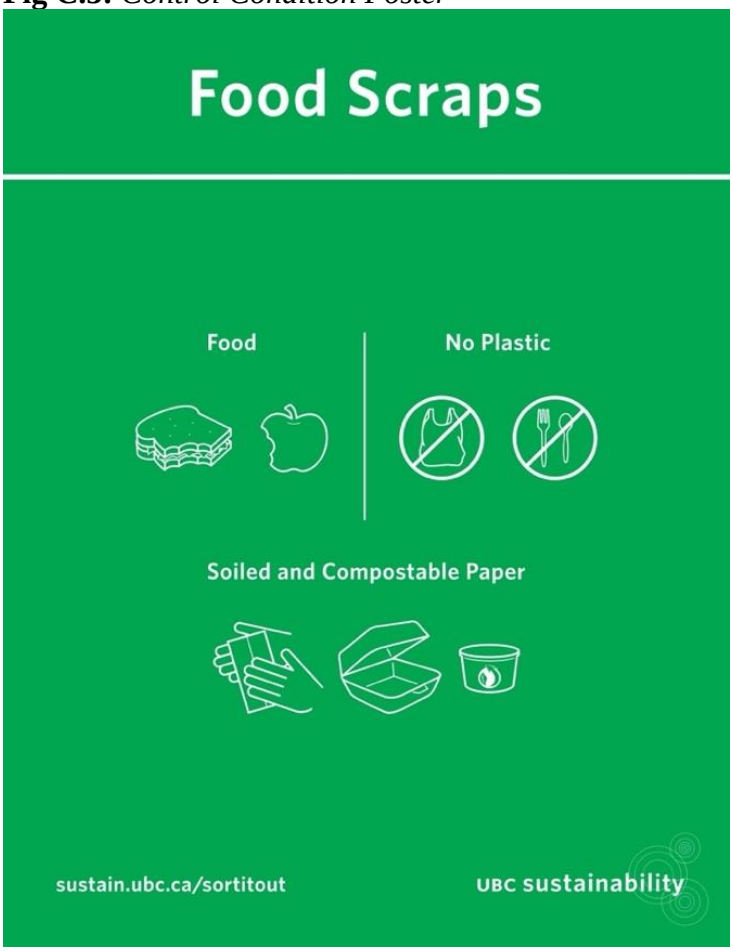
Note. Framed with emphasis on the environmental benefits of reducing food waste

Fig C.2: *Negative Message Framing Poster*



Note. Framed with emphasis on the negative environmental impacts of food waste

Fig C.3: *Control Condition Poster*

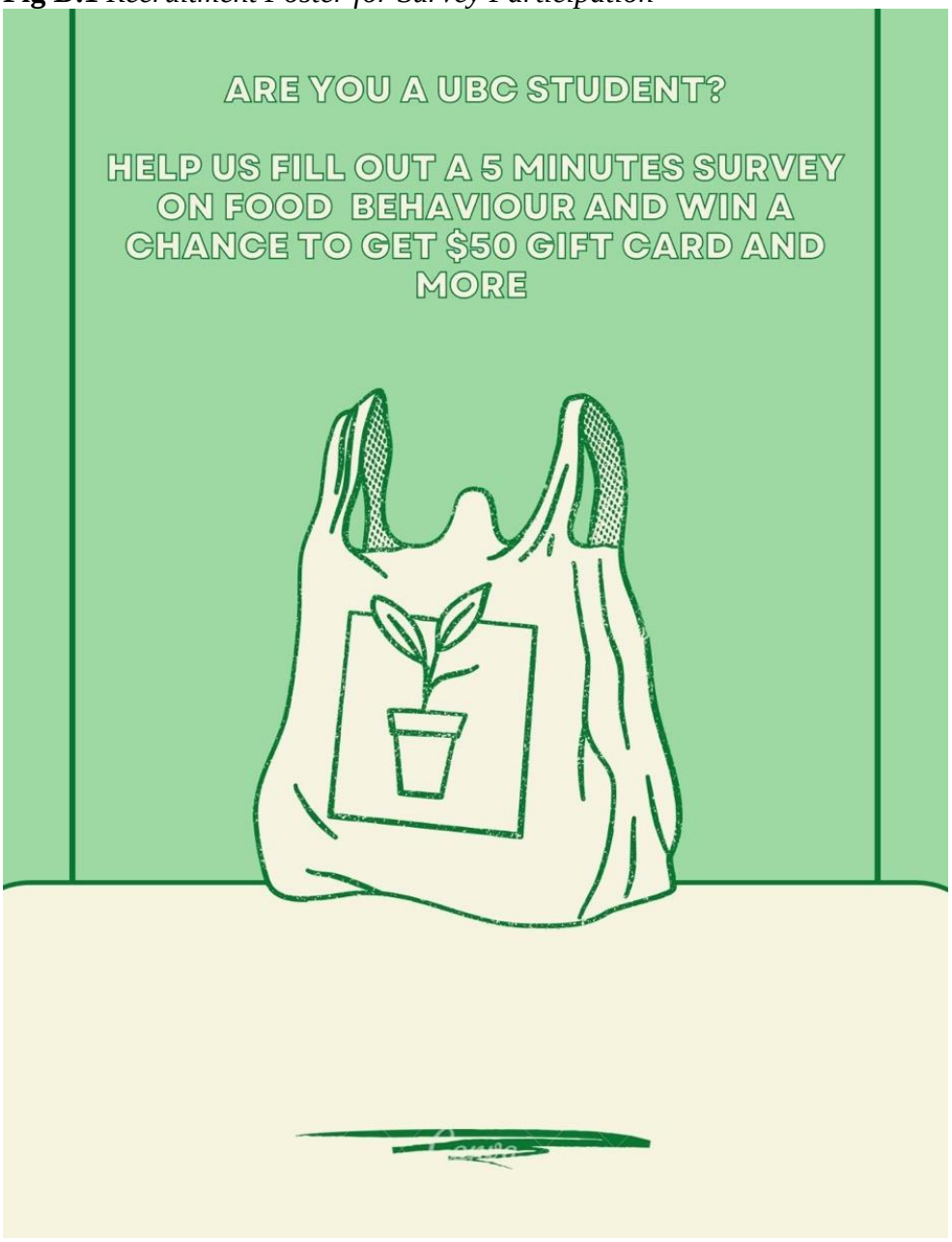


Note. Control condition used UBC's standard food waste sorting poster, which does not include messaging about food waste reduction. This served as a neutral baseline for comparison.

Appendix D

Promotional Poster

Fig D.1 *Recruitment Poster for Survey Participation*

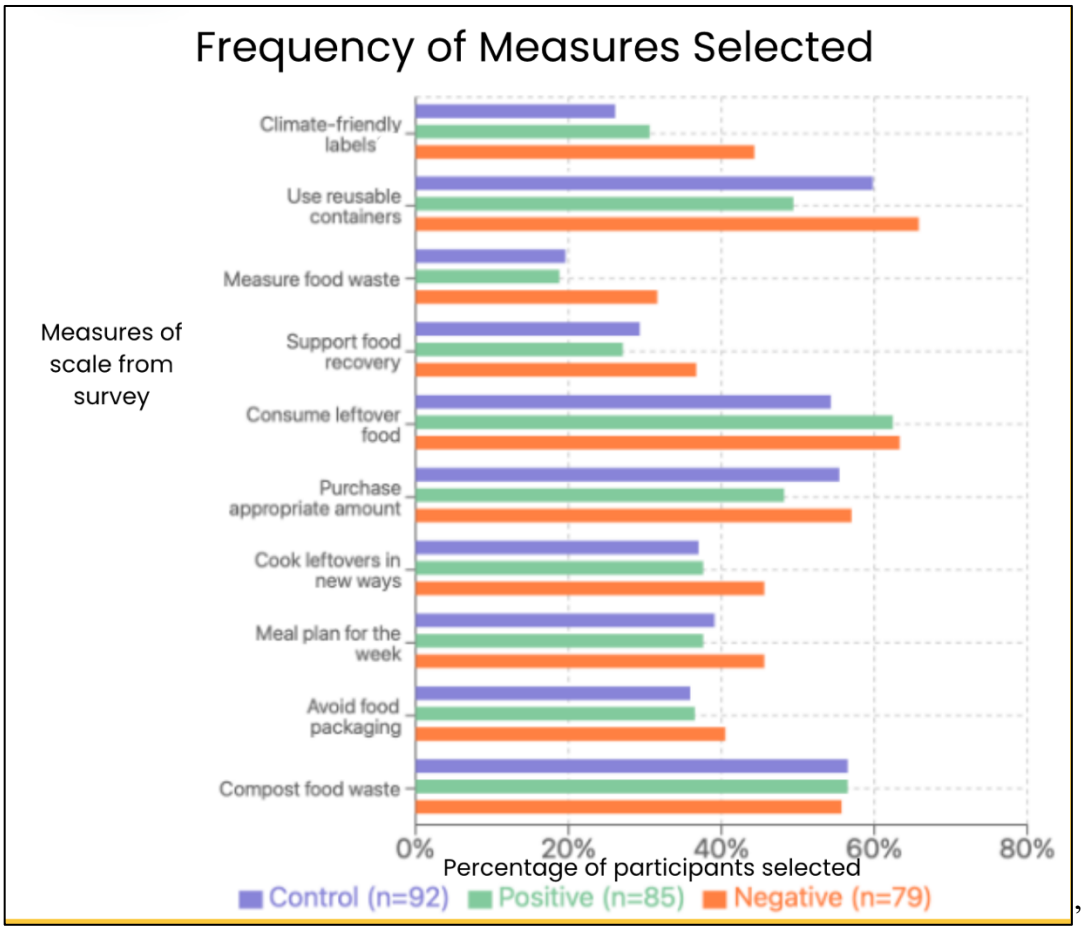


Note. Promotional poster used to recruit UBC students for participation in the sustainability behavior survey. It was distributed online with a link.

Appendix E

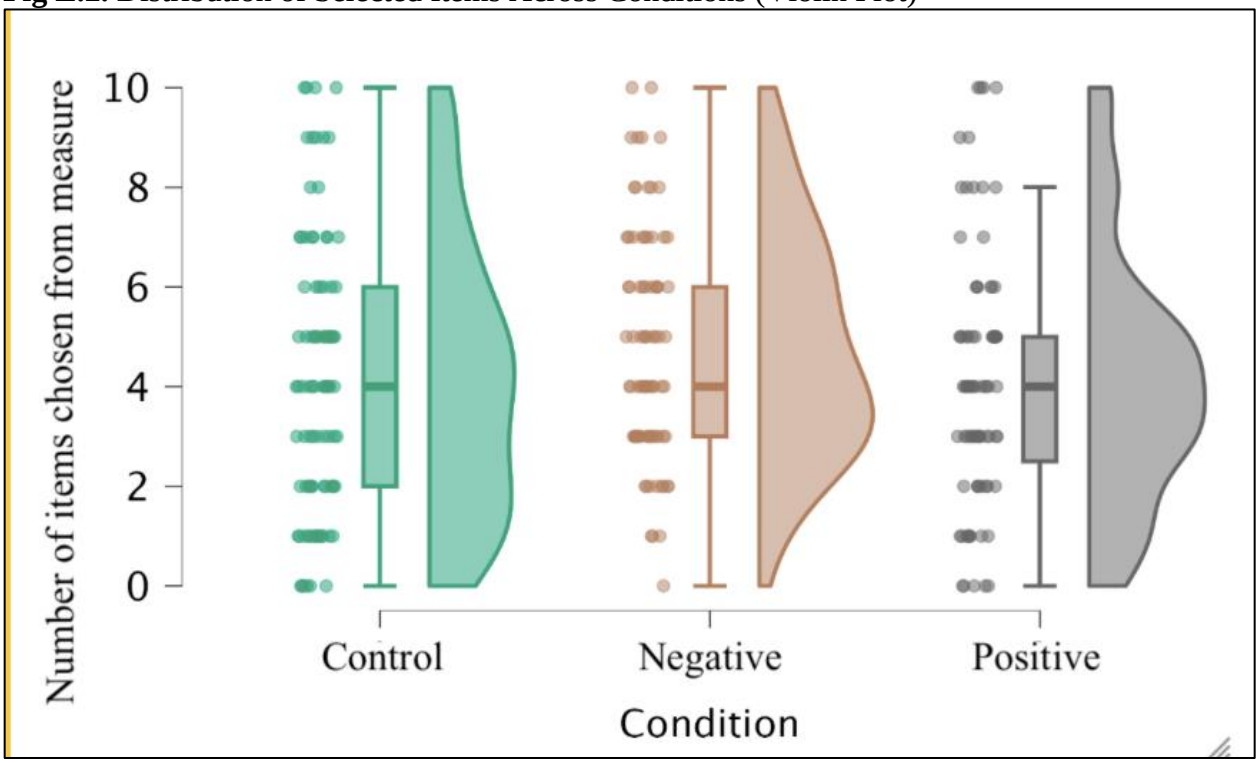
Supplementary Figures and Statistical Analyses

Fig E.1. *Distribution of Measures Selected by Condition (Bar Graph)*



Note. This figure displays the frequency of participants' chosen climate-friendly food waste reduction practices *(See Fig B.1)*, broken down by the message framing condition they were given *(See Appendix C)*.

Fig E.2. Distribution of Selected Items Across Conditions (Violin Plot)



Violin graph showcasing the distribution of number of items chosen from measure and conditions.

Table E.1 Descriptive Statistics Across Experimental Conditions

Descriptives

DV_Actual

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum
					Lower Bound	Upper Bound	
0	93	4.09	2.737	.284	3.52	4.65	0
1	83	4.76	2.282	.251	4.26	5.26	0
2	87	4.09	2.504	.268	3.56	4.63	0
Total	263	4.30	2.533	.156	3.99	4.61	0

Table E.1. outlining the descriptive statistics across 3 conditions. Condition 0 is neutral condition; Condition 1 is Negative condition and Condition 2 is Positive condition.

Table E.2. Test of Homogeneity of Variances

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
DV_Actual	Based on Mean	1.383	2	260	.253
	Based on Median	1.313	2	260	.271
	Based on Median and with adjusted df	1.313	2	259.128	.271
	Based on trimmed mean	1.323	2	260	.268

Table E.2 outlining Test of Homogeneity of variances

Table E.3. Tests of Normality (Shapiro-Wilk Test)

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Condition	Statistic	df	Sig.	Statistic	df	Sig.
DV_Actual	0	.121	93	.002	.945	93	<.001
	1	.148	83	<.001	.961	83	.014
	2	.140	87	<.001	.946	87	.001

a. Lilliefors Significance Correction

Table E.3, Results of Tests of Normality across the 3 conditions.

Fig E.3. Stem and Leaf Plot of DV_actual

DV_Actual

Stem-and-Leaf Plots

```
DV_Actual Stem-and-Leaf Plot for
Condition= 0

 Frequency    Stem &  Leaf

    20.00        0 .  00000011111111111111
    21.00        0 .  22222222222333333333
    27.00        0 .  444444444444455555555555555
    14.00        0 .  66666677777777
     7.00        0 .  8899999
     4.00        1 .  0000

 Stem width:  10
 Each leaf:        1 case(s)



DV_Actual Stem-and-Leaf Plot for
Condition= 1

 Frequency    Stem &  Leaf

     4.00        0 .  0111
    25.00        0 .  2222222233333333333333333
    24.00        0 .  444444444444445555555555
    19.00        0 .  6666666666777777777
     9.00        0 .  888889999
     2.00        1 .  00

 Stem width:  10
 Each leaf:        1 case(s)



DV_Actual Stem-and-Leaf Plot for
Condition= 2

 Frequency    Stem &  Leaf

     5.00        0 .  00000
     9.00        1 .  000000000
```

```
   8.00        2 .  00000000
  16.00        3 .  0000000000000000
  15.00        4 .  000000000000000
  15.00        5 .  000000000000000
   6.00        6 .  000000
   2.00        7 .  00
   5.00        8 .  00000
   6.00 Extremes    (>=9.0)

Stem width:   1
Each leaf:        1 case(s)
```

A stem-and-leaf plot showing the distribution of the number of food waste reduction behaviors selected by all participants, helping visualize spread and frequency.

Table E.4. Kruskal-Wallis Test Summary

Kruskal-Wallis Test

Ranks

	Condition	N	Mean Rank
DV_Actual	0	93	124.68
	1	83	146.86
	2	87	125.66
	Total	263	

Statistical results comparing median number of selected actions across the three conditions using the Kruskal-Wallis nonparametric test.

Table E.5. Kruskal-Wallis Test Statistics

Test Statistics[a,b]

	DV_Actual
Kruskal-Wallis H	4.703
df	2
Asymp. Sig.	.095

a. Kruskal Wallis Test

b. Grouping Variable: Condition

Detailed statistics (test statistic, degrees of freedom, and p-value) from the Kruskal-Wallis test assessing differences between message framing groups.

Table E.6. *Trick Question Cross-Tabulation and Chi-Square Analysis*

Condition * DV_Trick Crosstabulation

			DV_Trick 0	DV_Trick 1	Total
Condition	0	Count	46	47	93
		% within Condition	49.5%	50.5%	100.0%
		% within DV_Trick	31.3%	40.5%	35.4%
	1	Count	55	28	83
		% within Condition	66.3%	33.7%	100.0%
		% within DV_Trick	37.4%	24.1%	31.6%
	2	Count	46	41	87
		% within Condition	52.9%	47.1%	100.0%
		% within DV_Trick	31.3%	35.3%	33.1%
Total		Count	147	116	263
		% within Condition	55.9%	44.1%	100.0%
		% within DV_Trick	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.504[a]	2	.064
Likelihood Ratio	5.581	2	.061
Linear-by-Linear Association	.253	1	.615
N of Valid Cases	263		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 36.61.

Trick question Cross Tabulation and chi square test. Condition 0 is Control, Condition 1 is Negative condition, and Condition 2 is Positive condition.

Appendix F

Limitations

The study's participant recruitment encountered significant challenges. Response rates were initially low regardless of whether the survey link was shared on several social media sites, including Reddit and Instagram. To guarantee sufficient representation across the three experimental circumstances, collecting data required multiple dissemination efforts spanning over a few days. These challenges when collecting a large sample may have reduced the diversity of the final sample and caused delays in the recruitment schedule.

There was minimal influence over who could view and complete the survey because the entire recruitment process was done online. The sample might therefore have been slanted toward people who are more active on social media or have strong ties to student networks. The demographic range of responders may have been further limited by the lack of in-person recruitment techniques like campus tabling or classroom visits. Furthermore, it was more difficult to track participant involvement with the framing materials due to the remote survey style, which might have affected processing depth and, in turn, responses to the behavioural willingness measure.

Appendix G

Team Member Contributions

1. Feely Wong
    - Led and completed all data analysis for the proposal, presentation, and final report
    - Co-designed and contributed to the experimental conditions and results sections of the presentation
    - Co-wrote the methods and results sections of the final report
    - Worked on the results, implications, and slide upload for the presentation
    - Participated in data collection

2. Ganesh Kendre
    - Created one poster for the proposal and contributed to the condition design
    - Helped program the Qualtrics survey
    - Co-wrote the executive summary, results, and appendices of the final report
    - Contributed to the results slides for the presentation
    - Participated in data collection

3. Katyayani Singh
    - Created one poster and contributed to the proposal's methods, conditions, and sample size sections
    - Helped program the Qualtrics survey
    - Co-wrote the methods, measures, and participant demographics sections of the presentation
    - Co-wrote the executive summary, research question/hypothesis, methods, and discussion sections of the final report
    - Participated in data collection

4. Manvi Kalra
    - Contributed to the literature review, conditions, and measures for the project proposal
    - Created the positive message framing poster and participated in data collection
    - Co-wrote the introduction, discussion, and recommendations sections of the final report
    - Helped organize and format the appendices in the final report
    - Contributed to the measures, experimental conditions and timekeeping for the presentation

5. Niharika Chadha
    - Designed five posters for the project proposal
    - Created the negative message framing poster and programmed the Qualtrics survey

- Co-wrote the methods, recommendations, references, and appendices sections of the final report
- Contributed to the results and recommendations slide for the presentation
- Participated in data collection

6. Trisha Dayani
    - Co-wrote the literature review for the project proposal
    - Contributed to the research question and hypothesis for the final report
    - Co-wrote the introduction and discussion sections for the final report
    - Contributed to findings and implications for the presentation
    - Participated in data collection

7. Vanessa Wong
    - Co-wrote the literature review for the project proposal
    - Co-developed the research question and hypothesis, helped with the Qualtrics survey
    - Co-wrote the introduction, discussion, research question, and hypothesis sections of the final report
    - Worked on participant demographics and results for the presentation
    - Contributed to implications, results, and data collection