The Impact of Message Framing on UBC Students' Likelihood of Adopting Sustainable Behaviours

Group 13: Go Cap!

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Executive Summary

This research project investigated the impact of message framing (positive, negative, and neutral) on self-reported likelihoods of UBC students adopting low-effort, everyday sustainable behaviours, specifically reduced water usage, biking/walking to campus, carpooling, switching to a plant-based diet, and purchasing second-hand items.

A sample of 203 participants (ages 17 to 44) was recruited and randomly assigned to one of the three message conditions. They rated their likelihood of adoption of behaviours on a 6-point Likert scale. Contrary to our hypothesis, Kruskal-Wallis tests revealed no significant differences across framing conditions. Message framing also did not significantly impact participants' climate beliefs, which were consistently high across all groups. These results may reflect UBC students' pre-existing environmental awareness, limited engagement with text-based messaging, or the subtlety of the framing manipulations.

Despite these findings, the study offers valuable insights for sustainability communication at UBC. We recommend: (1) avoiding neutral messaging, (2) making messages more relatable by referencing campus life, and (3) using purposeful framing messages. Future studies could incorporate visuals, behavioural measures, and long-term follow-ups to improve ecological validity and real-world impact.

Contents

Introduction

Communicators, policymakers, and educational institutions have sought to raise public support for climate action, and we contend that climate change mitigation depends on the collective efforts of every individual in their daily lives. We believe that effective communication—mainly through message framing—can encourage sustainable behaviours among the student population and aid in achieving the objectives set forth by the UBC Climate Action Plan 2030. Message framing—how information is presented—has been shown to affect an individual's engagement with climate change positively (Li & Su, 2018; Cheng et al., 2011). However, the extent to which it affects the likelihood of behavioural changes remains unclear. Research has also shown that positive framing produces stronger intentions to act than negatively framed messages. Their work focused on broad climate policy support and advocacy efforts rather than personal, actionable sustainability behaviours (Gifford & Comeau, 2011).

The present study addresses this gap by examining whether different types of message framing—positive, negative, and neutral—affect UBC students' self-reported likelihood to adopt climate actions. These include reduced water usage, biking/walking to campus, carpooling, switching to a plant-based diet, and purchasing second-hand goods. By focusing on direct, everyday behaviours, this study aims to contribute to climate communication and offer insight into climate initiatives at UBC.

Research Question and Hypothesis

This paper investigates the research question: *How does the framing of climate action messages influence UBC students' likelihood of adopting sustainable behaviours in their daily lives?*

We hypothesize that **both positive and negative message framing** will increase the reported likelihood of behaviour change compared to neutral messaging, **with positive framing having a greater impact than negative framing**.

Methods

Participants

An a priori power analysis using G*Power 3.1 indicated that a target sample size of 246 participants was required to detect a moderate effect size ($f = 0.2$) with a significance level of $\alpha = .05$, and statistical power of .80, assuming a one-way fixed effects ANOVA with three groups. We recruited a convenience sample of 251 participants from UBC. After excluding incomplete responses, 203 participants provided informed consent and completed the required questions.

Participants' ages ranged from 17 to 44, with age $\underline{X}$ = 22.144, with 24.14% identifying as men, 67.49% as women, 1.97% as non-binary, and 6.40% preferring not to answer. A visual representation of demographics is provided in Appendix I.

Conditions

Our independent variable was the type of message framing presented to the participants, which was operationally defined through three distinct conditions: positive (benefit-oriented), negative (risk/sacrifice-oriented), and neutral framing (fact-based). We framed our messages in three different ways to assess their impact on behaviour. Each framing was designed to examine the idiosyncratic impact on the likelihood of adopting sustainable behaviours.

1. Positive Framing (n = 68): Participants were presented with a message highlighting benefits such as improved well-being, cost savings, and contributing to a greener university through behaviours, including campus shuttles, reducing food waste, and choosing reusable products.
2. Negative Framing (n = 68): This condition focused on risks, such as rising temperatures, extreme weather, and economic instability, urging students to make small daily choices to prevent disastrous outcomes.
3. Neutral Framing (n = 67): This was the control condition. The message presented factual information regarding how students contribute to carbon emissions through daily activities without emphasizing benefits and risks.

Participants were randomly assigned to one of the three framing conditions using Qualtrics' built-in randomization feature. The three messages were designed to be equal in length to control for potential effects related to word count. The behaviours used in the messages were selected in a team brainstorming session and chosen for their simplicity and relevance to students. For the exact phrasing of every framing message, refer to Appendix A.

Measures

The dependent variable in this study was the self-reported likelihood of adopting sustainable behaviours, assessed using five questions specifically developed for this study. Each item included a simple, climate-friendly behaviour that students could realistically incorporate into their daily lives. These behaviours were also emphasized in the framing messages presented at the beginning of the survey, ensuring that the items were directly tied to the experimental manipulation. Participants rated their self-reported likelihood of engaging in each behaviour on a 6-point Likert scale, ranging from 1 ("Not at all likely") to 6 ("Extremely likely"). Since no existing validated scale directly assesses this type of sustainability-related behavioural likelihood in this context, we designed face-valid items to capture concrete, actionable behaviours aligned with our research question.

In addition to behavioural likelihood items, the survey included a climate belief section consisting of three items that assessed participants' beliefs about climate change. These items asked whether participants believed the Earth's climate to be changing, the cause of this change,

and the perceived severity of its global impacts (Fairbrother et al., 2019). These items allowed the assessment of whether pre-existing beliefs about climate change influenced their responses to the different message framings. The complete list of items can be found in Appendix B. The Climate belief score was calculated by obtaining the geometric mean of the three answers using Excel.

Procedure

The survey was conducted online using Qualtrics between March 10 and March 27. Participants provided informed consent and were randomly assigned to one of three message conditions. After reading the randomly assigned framing messages, the participants completed five questions assessing their likelihood of adopting sustainable acts, as shown in Appendix C.

The survey was promoted and distributed through social media platforms (e.g., Instagram), group chats for UBC students, in-class announcements, posters around campus, and directly approaching students in the AMS Nest (March 13, 18, 20, 23, 24, and 25) and the Life Building (March 18). Participants were encouraged to share the survey link with their friends at UBC, with the added incentive of a chance to win a $10 cash prize. Through these recruitment methods, we initially collected data from 251 participants. After excluding incomplete or invalid responses, the final sample consisted of 203 valid responses. A copy of the recruitment poster and the script used to recruit participants in person are included in Appendix D.

Results

Table E1 in Appendix E presents the descriptive statistics of the data for each condition, accompanied by distribution graphs in Appendix E to highlight the lower likelihood for plant-based diets and carpooling, but higher likelihood for water usage reduction. The likelihood of adopting different sustainable behaviours showed relatively similar mean and standard deviation values across conditions, with a $\underline{X}$ value of around 3. Participants' likelihood to reduce water usage was the highest overall, particularly when exposed to the negatively framed message, as indicated by the $\underline{X}$ = 4.294—higher $\underline{X}$ values than for other types of behaviour in the negative condition. Conversely, participants were least likely to adopt a plant-based diet, especially when shown the positively framed message, with the $\underline{X}$ = 2.926, which was lower than the other behaviours in the positive condition. These responses were based on a Likert scale where a value of 1 represented “Not at all likely” and a value of 6 represented “Extremely likely.” In summary, the descriptive statistics on the data showed that participants had a higher likelihood to reduce their water usage and a lower likelihood to change their diets to plant-based diets out of all the proposed behaviours.

To assess whether the framing of climate action messages influenced participants’ likelihood of changing their behaviours, a one-way ANOVA would be appropriate if the assumptions of homogeneity of variance and normality of distribution were met (UCLA). A Levene’s test was

conducted in JASP to assess the homogeneity of variance, which indicated no significant difference across groups ($p > 0.05$), suggesting homogeneity was met for almost all behaviours (Goss-Sampson, 2020). However, as shown in Table E2 in Appendix E, homogeneity was violated for the plant-based diet condition with ($F(2) = 4.707$, $p = 0.010$). Additionally, the Shapiro-Wilk test was conducted in JASP to assess normality, which showed significant deviations for all behaviours ($p < 0.001$), violating this assumption (Goss-Sampson, 2020). While the Kolmogorov-Smirnov test would be more appropriate for samples of this size ($n > 50$), it was not available in the free software, JASP. The Q-Q plot graphs provided in Appendix G visually present the data nas ot having a normal distribution, with a deviation from the diagonal line. Therefore, due to the violation of the normality of distribution for one-way ANOVA, we opted for the non-parametric equivalent—the Kruskal-Wallis test.

Figures G1-G5 in Appendix G present the results of the Kruskal-Wallis test for each behaviour proposed. A significant result from the Kruskal-Wallis test would be indicated by p-values < 0.05 (Goss-Sampson, 2020). Additionally, the interquartile range would be outside of the standard error range in the boxplot graph. Using degrees of freedom of two, the results were insignificant: likelihood to reduce water consumption ($p = 0.160$), bike/walk to campus ($p = 0.723$), carpool to campus ($p = 0.676$), adopt a plant-based diet ($p = 0.895$) and purchase second-hand goods ($p = 0.942$). These results suggest that the framing of climate action messages did not significantly influence participants' likelihood to adopt sustainable behaviours. Thus, **our hypothesis was not supported.**

To assess the participants' belief in climate change, we analyze the self-reported belief scores across conditions. Mean scores were consistent: $\underline{X}$ = 4.913, 4.885, 4.887 in the negative, neutral, and positive conditions, respectively, supported by the distribution graph in Appendix H. This insinuates a "belief in [a] dangerous, anthropogenic climate change" (Fairbrother et al., 2019). We again used a Kruskal-Wallis test to assess message framing's influence on climate belief due to violated assumptions for one-way ANOVA (Levene's test: $p = 0.041$; Shapiro-Wilk's test: $p < 0.001$). Results were insignificant, $H(2) = 3.41310\text{-}5$, $p = 0.367$ (Figure H4), indicating that the framing of messages did not influence people's belief score. Overall, our sample population was high in belief in a changing climate, with insignificant results of framing of messages influencing people's likelihood of adopting sustainable behaviours.

Discussion

This research had several implications that should be considered when interpreting the results. First, the framing manipulation did not yield statistically significant effects, which may be due to the subtlety of message differences and the potential ineffectiveness of text-based interventions. It is also unclear whether participants have fully read or engaged with the messages. Future studies could incorporate visual elements to boost engagement and implement attention checks. Furthermore, this study relied on self-reported behaviour likelihoods within a short timeframe, limiting our ability to ascertain the actual long-term change in behaviour. Finally, research has shown that university students are significantly less likely to be skeptical about climate change

(Hoekstra et al., 2024). At UBC, where most students already believe in climate change, the lack of significant results may reflect the sample's existing consciousness of environmental issues rather than the ineffectiveness of framing messages. Future studies should consider participants from more diverse socioeconomic and educational backgrounds.

We also encountered practical challenges during data collection. Although the survey was designed to be brief—taking no more than two minutes to complete—many participants recruited in person appeared disengaged or rushed. As a result, several responses were incomplete or invalid, with key items left blank. This reduced overall data quality and may have impacted the reliability of our findings. If the study were to be replicated, improvements, such as incorporating attention checks, longer-term follow-ups, adding behavioural tasks, or small incentives, could increase ecological validity. Additionally, future in-person recruitment would benefit from using a more controlled environment or offering participation rewards to improve response quality.

Recommendations for your UBC Client

While our results were insignificant, they offer valuable insights into how to better tailor sustainability communication to the UBC population. We offer three key recommendations to our UBC client to achieve the CAP 2030 environmental objective of going net-zero.

1. **Avoid Neutral Options in Messaging**: Our study suggests that offering neutral responses may discourage action, as participants gravitate towards them by default. We recommend eliminating neutral, emotionless options. Removing this option encourages deliberate decision-making and could gently nudge students toward environmentally responsible actions.
2. **Increase Relatability of Messages**: Climate action messages should be personalized and relevant to students at UBC. For example, referencing low-cost, time-efficient campus activities, such as commuting, food choices, and food waste, can make sustainability communication feel more personable and relatable. Framing behaviours in a familiar context may increase perceived relevance and improve message effectiveness.
3. **Clear and Purposeful Framing**: Given that students are exposed to constant new information through classes, social media, and social interactions daily, clarity and intentionality of messaging are critical. In a time of information overload, vague and broad messages will not grab attention. UBC could develop a style guide for sustainability-related campaigns to encourage behavioural change.

Our project contributes to UBC's CAP 2030 sustainability initiatives by identifying features and implications of message design that may influence the likelihood of actions. Although we did not observe long-term actual behavioural changes, the project provides a foundation for effective climate communication. Lastly, we recommend campaigns that apply the insights from our project and partner up with sustainability clubs and student organizations to spread the message.

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Appendix

Appendix A: Exact Framing Message in our Survey

Q3 | Positive Message

Please read the following:

Sustainable choices on campus can improve student well-being, save money, and support a greener university. Using public transit, car pooling, reducing food waste and water usage, and purchasing second-hand benefit the environment while promoting a more affordable and healthier student life.

Q4 | Negative Message

Please read the following:

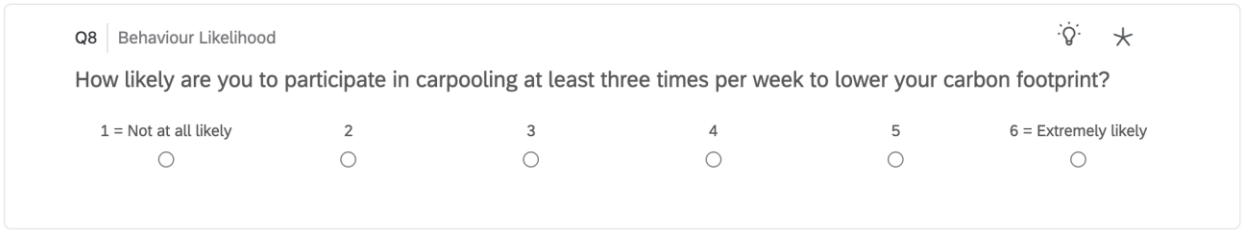
Climate change intensifies with temperatures, extreme weather conditions, and sea-level rise. Daily actions—using public transit, car pooling, reducing food waste and water usage, and purchasing second-hand —can prevent long-term harm. Students will face food scarcity, financial strain, and environmental decline without taking action.

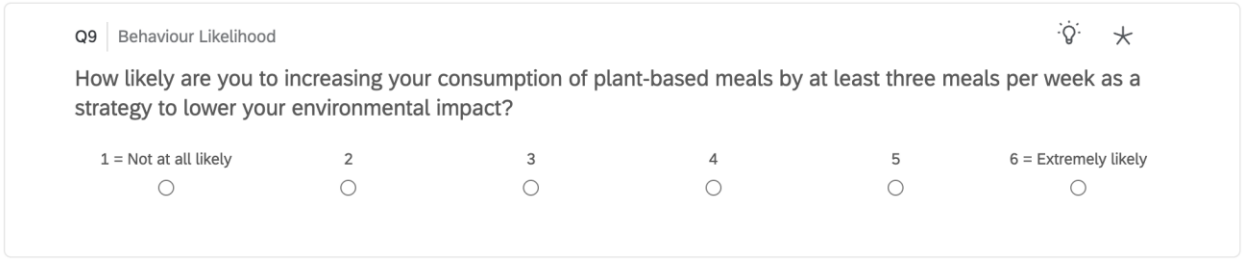
Q5 | Neutral Message

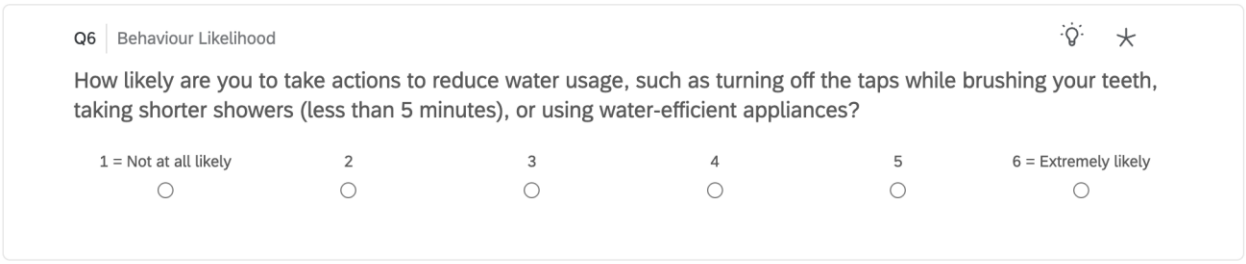
Please read the following:

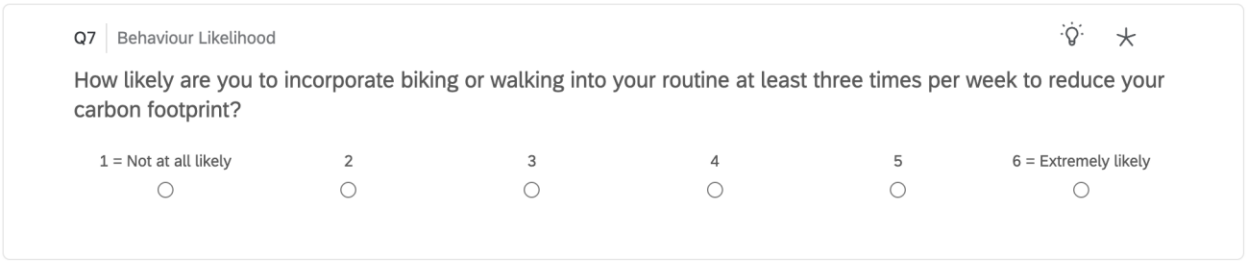
Students contribute to carbon emissions through food choices, energy use, and purchasing decisions. Individuals' carbon footprint comes from these sources. Using public transit, car pooling, reducing food waste and water usage, and purchasing second-hand can help decrease emissions and reduce environmental impact.

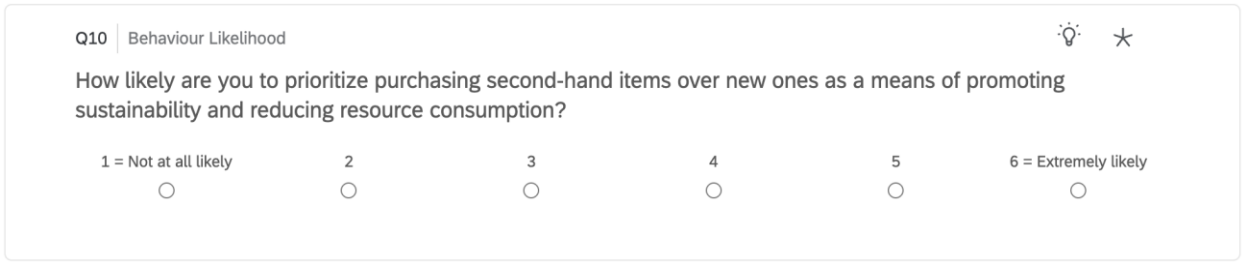
Appendix B: Climate Friendly Action Portion of our Survey



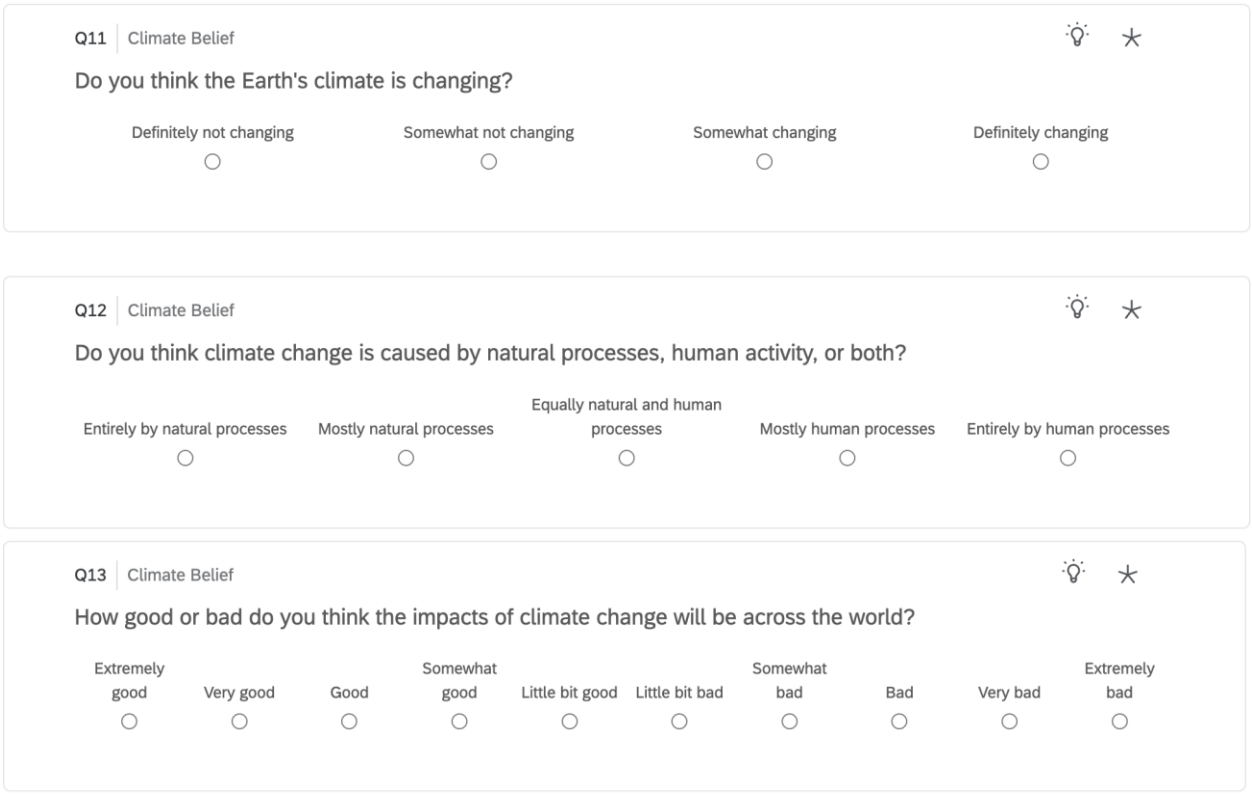








Appendix C: Climate Belief Section in our Survey



Appendix D: Recruitment Poster for Survey (QR code expires weekly)

Script for Participant Recruitment

"Do you have 2 minutes?" If they showed affirmation, the following was said: "We have a Psychology 421 research study on environmental sustainability and we are recruiting participants to fill out an anonymous survey using the QR code."

Appendix E: Distribution of Data For Each Condition

Figure E1: Water Reduction Likelihood to Change Behaviour

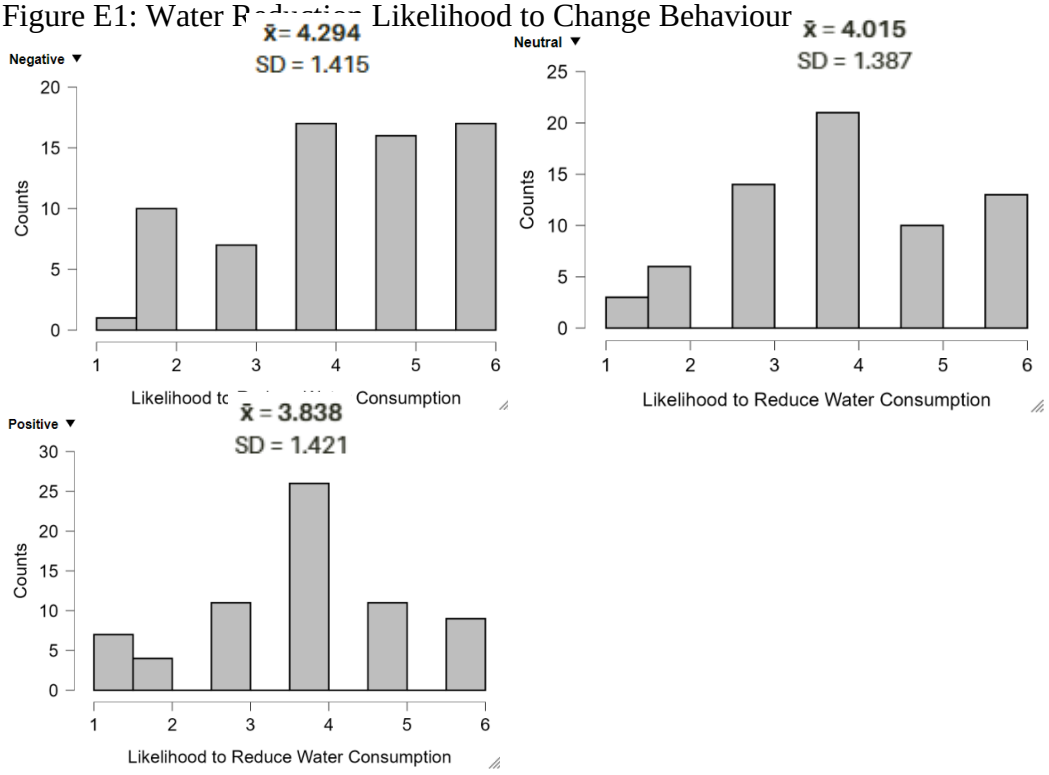
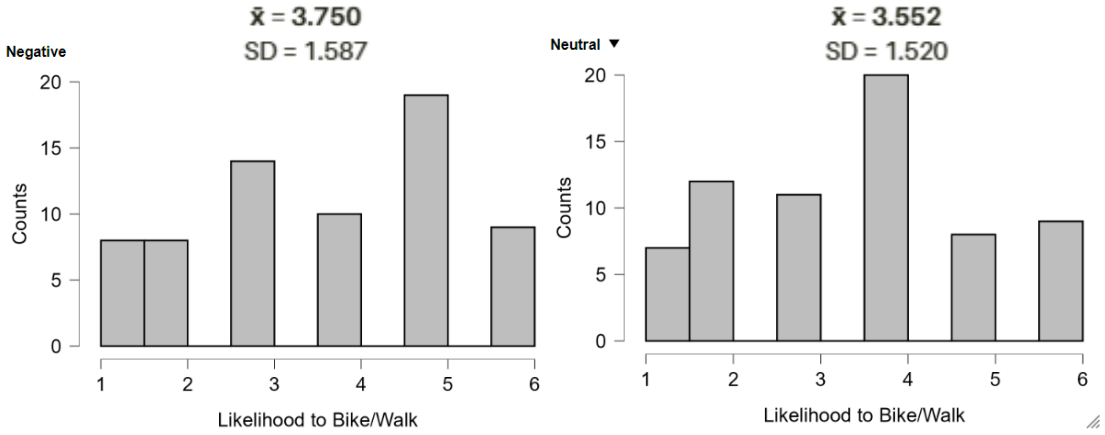


Figure E2: Biking/Walking



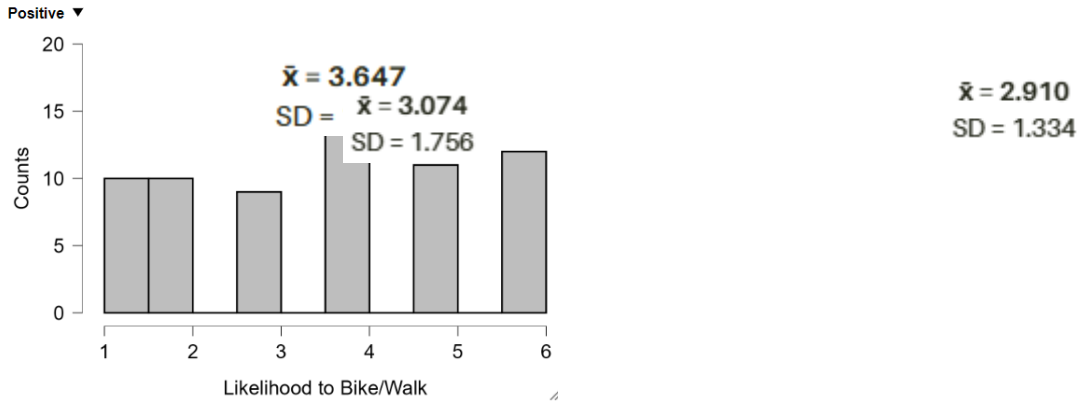


Figure E3: Carpooling

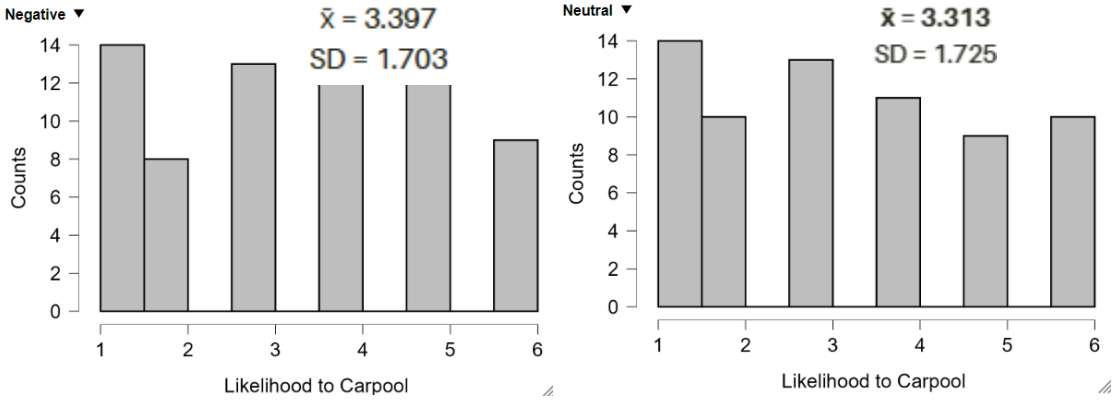
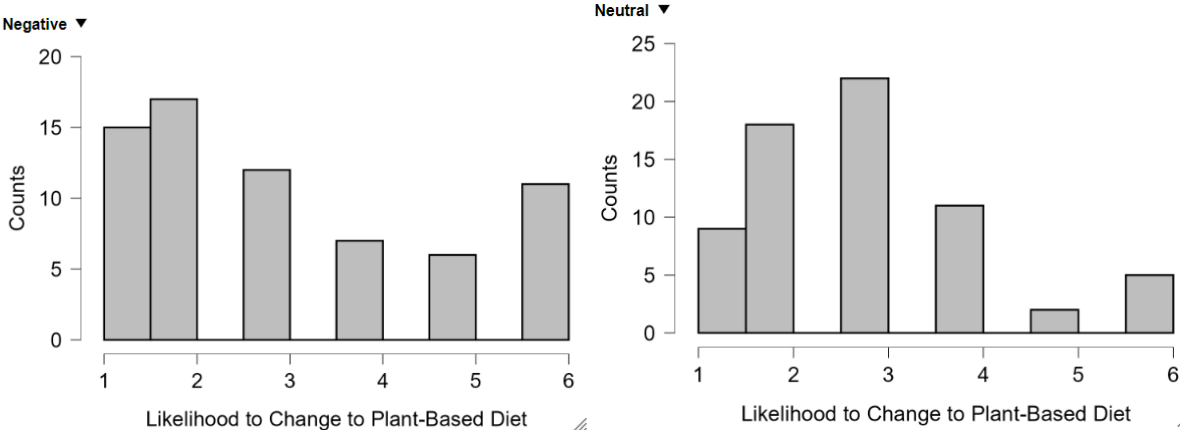


Figure E4: Plant-Based Diets



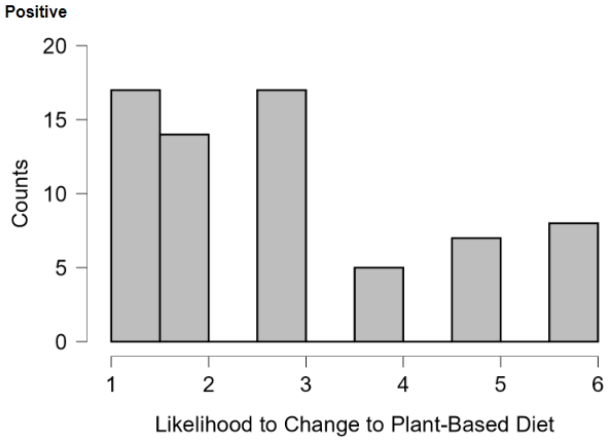


Figure E5: Purchasing Second-Hand Goods

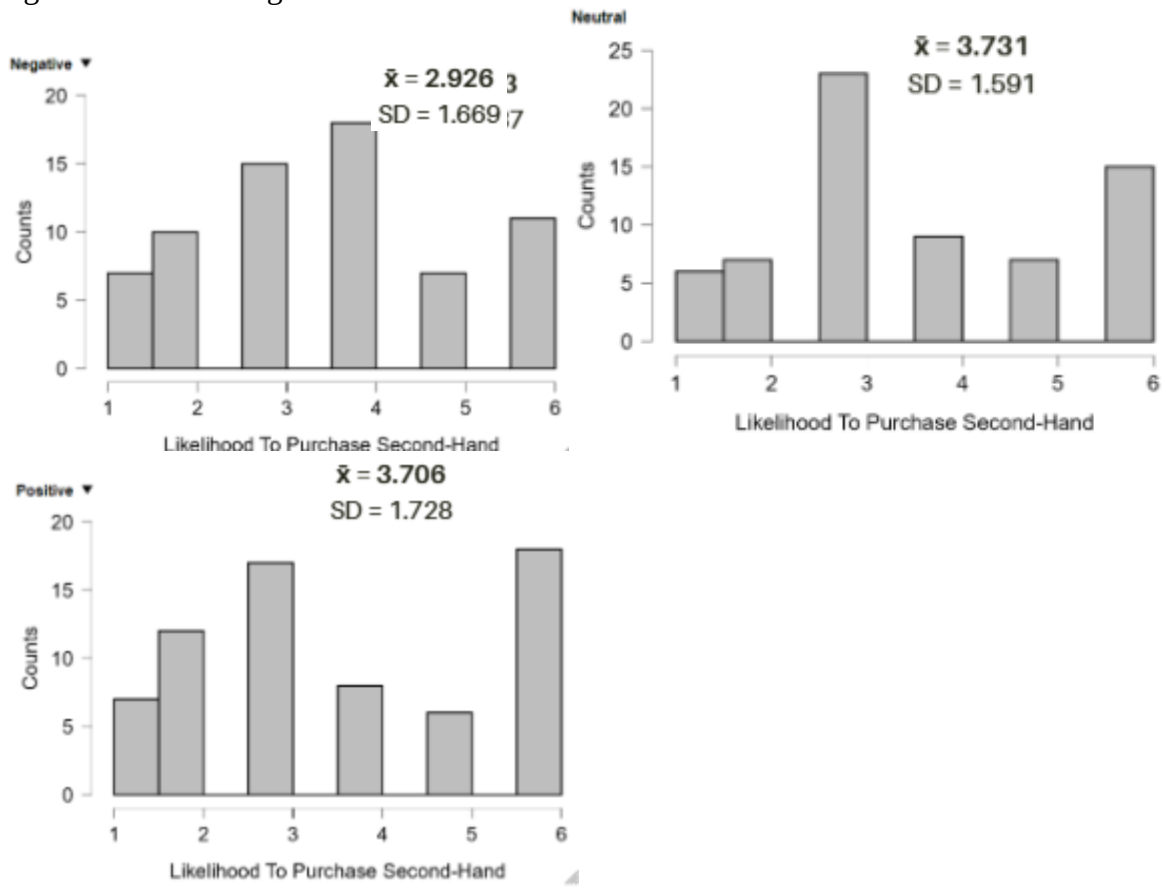


Table E1: Descriptive Statistics of Data

Behaviour Adopted For a Better Climate	Negative Condition	Netural Condition	Positive Condition
Water Usage	$\bar{x}$ = 4.294 SD = 1.415	$\bar{x}$ = 4.015 SD = 1.387	$\bar{x}$ = 3.838 SD = 1.421
Walk/Bike	$\bar{x}$ = 3.750 SD = 1.587	$\bar{x}$ = 3.552 SD = 1.520	$\bar{x}$ = 3.647 SD = 1.682
Carpool	$\bar{x}$ = 3.397 SD = 1.703	$\bar{x}$ = 3.313 SD = 1.725	$\bar{x}$ = 3.574 SD = 1.739
Plant Based Diet	$\bar{x}$ = 3.074 SD = 1.756	$\bar{x}$ = 2.910 SD = 1.334	$\bar{x}$ = 2.926 SD = 1.669
Purchase Second-Hand	$\bar{x}$ = 3.603 SD = 1.537	$\bar{x}$ = 3.731 SD = 1.591	$\bar{x}$ = 3.706 SD = 1.728

Table E2: Assumption Checks for One-Way ANOVA Statistics

Behaviour Adopted For a Better Climate	Levene's Test p-value	Levene's Test F Value	Shapiro-Wilk Test p-value Negative, Neutral and Positive Conditions
Water Usage	0.893	0.423	$p < 0.001$
Walk/Bike	0.511	0.673	$p < 0.001$
Carpool	0.992	0.008	$p < 0.001$
Plant Based Diet	0.010	4.707	$p < 0.001$
Purchase Second-Hand	0.234	1.465	$p < 0.001$

Appendix F: Q-Q Plot Testing Normal Distribution

Figure F1: Water Usage Reduction Likelihood Q-Q Plot

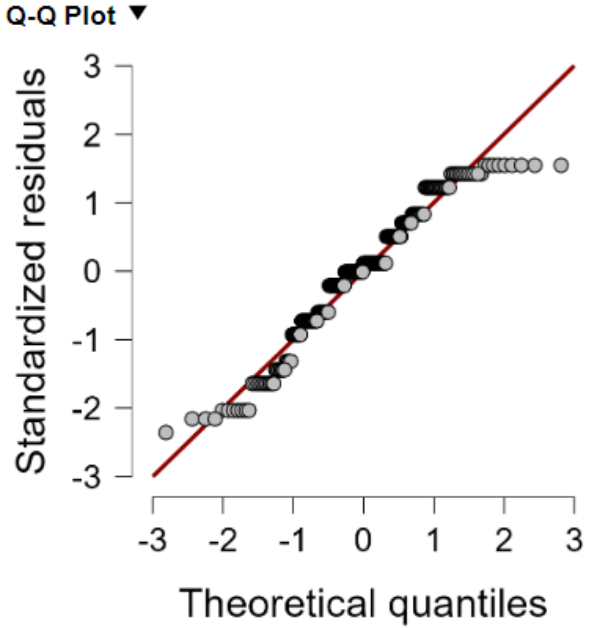


Figure F2: Walk/Bike Likelihood Q-Q Plot

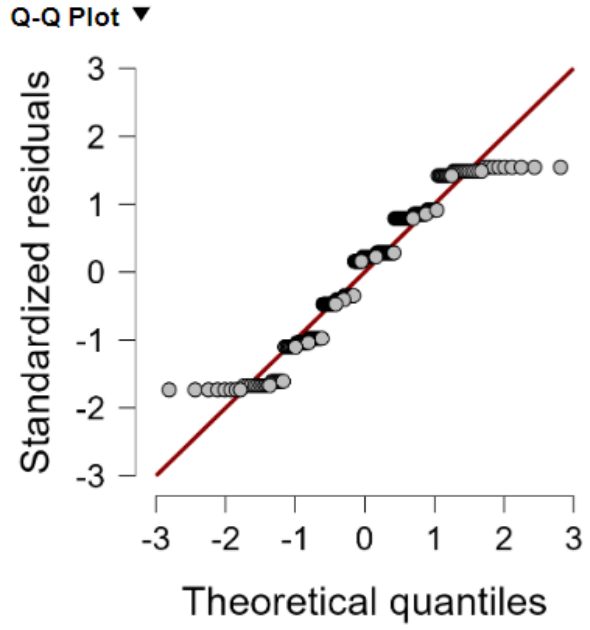


Figure F3: Carpool Likelihood Q-Q Plot

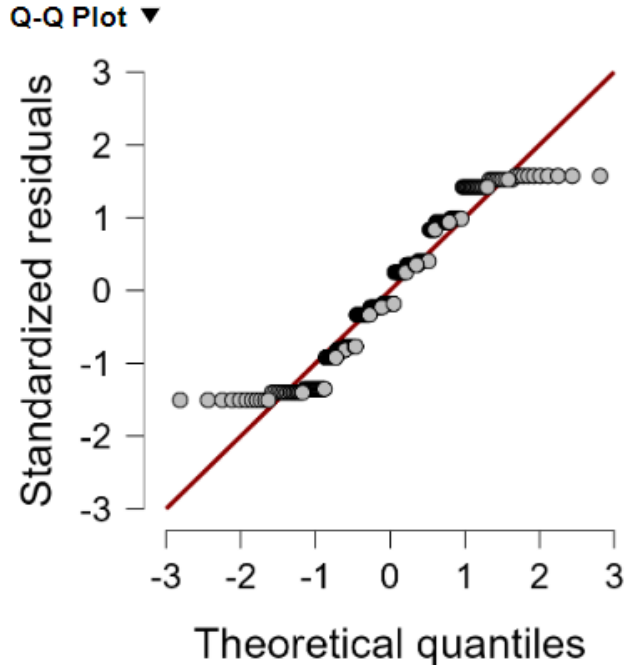


Figure F4: Plant-Based Diet Likelihood Q-Q Plot

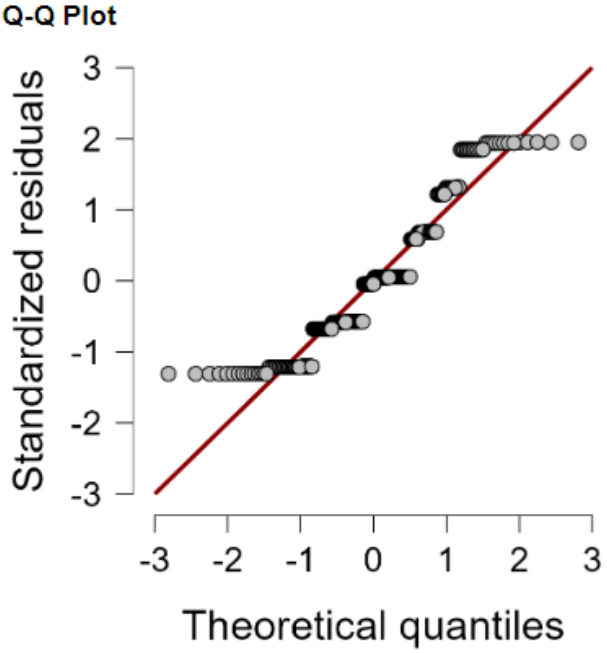
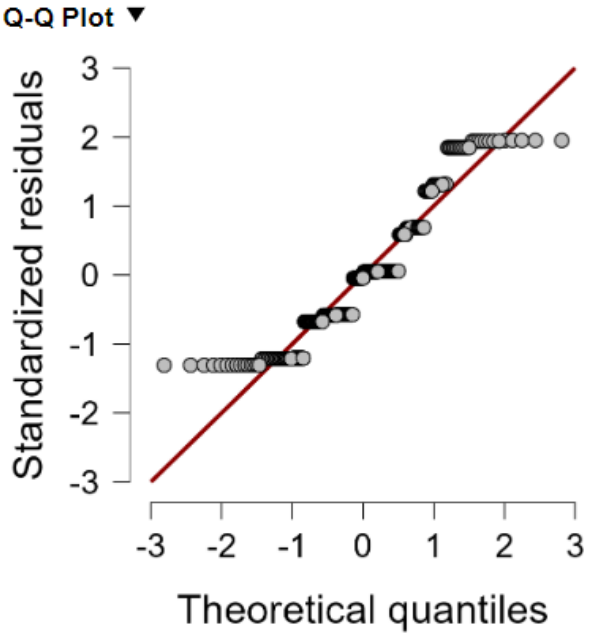
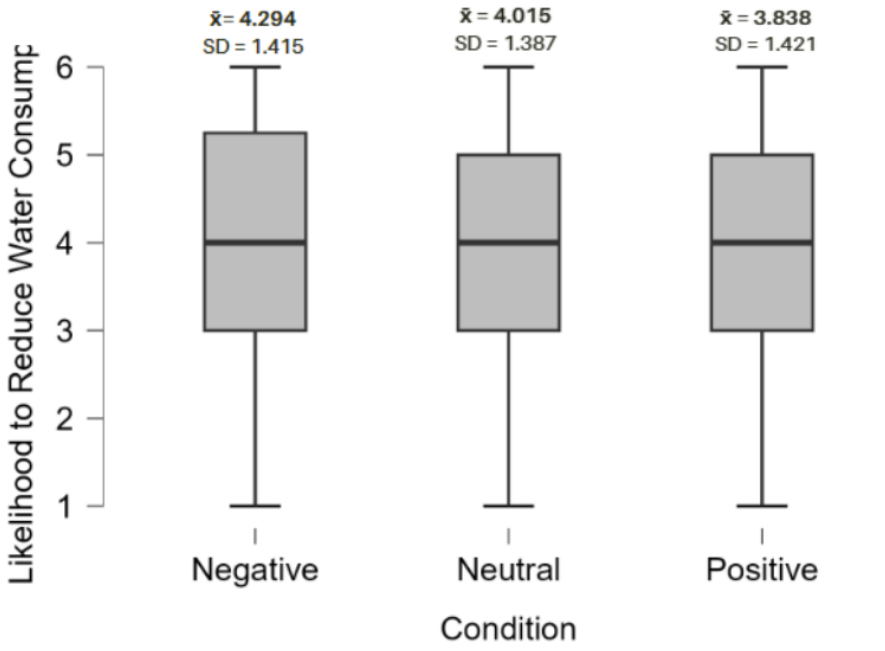


Figure F5: Purchase Second-Hand Objects Likelihood Q-Q Plot



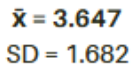
Appendix G: Kruskal-Wallis Test Results For Each Condition

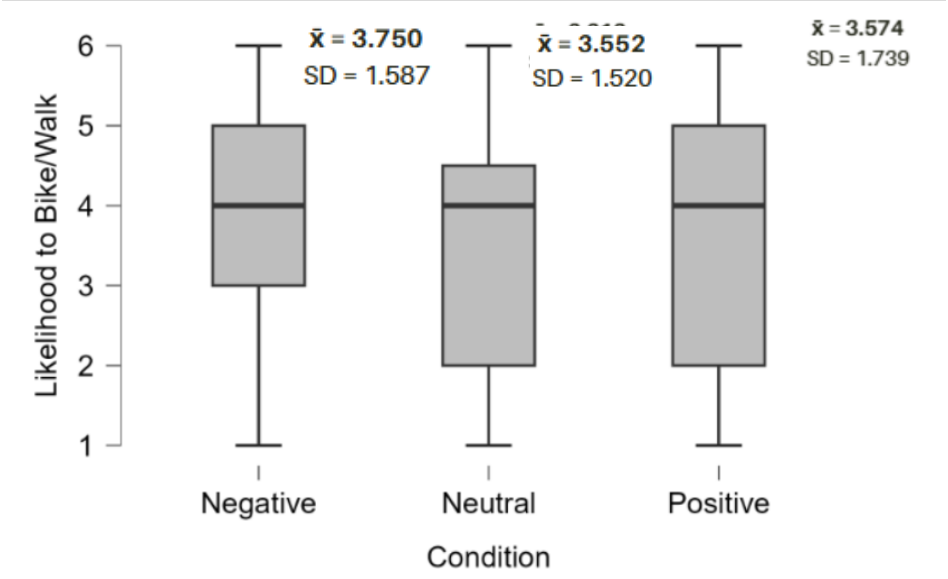
Figure G1: Boxplot Graph of Likelihood to Reduce Water Usage



H(2) = 3.661, p = 0.160, $\eta^2 = 0.008$

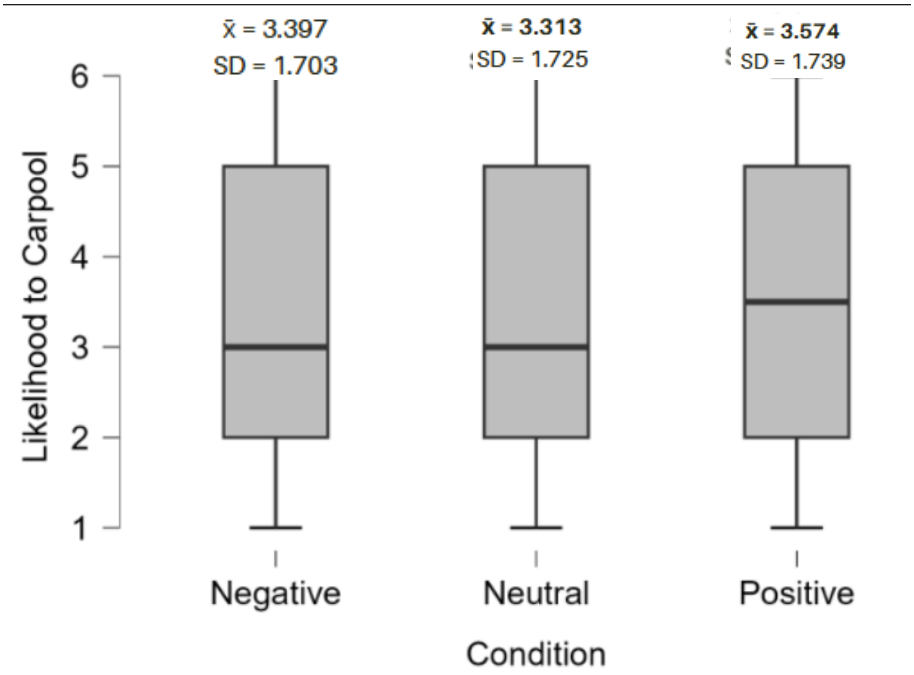
Figure G2: Boxplot Graph of Likelihood to Bike/Walk to Campus





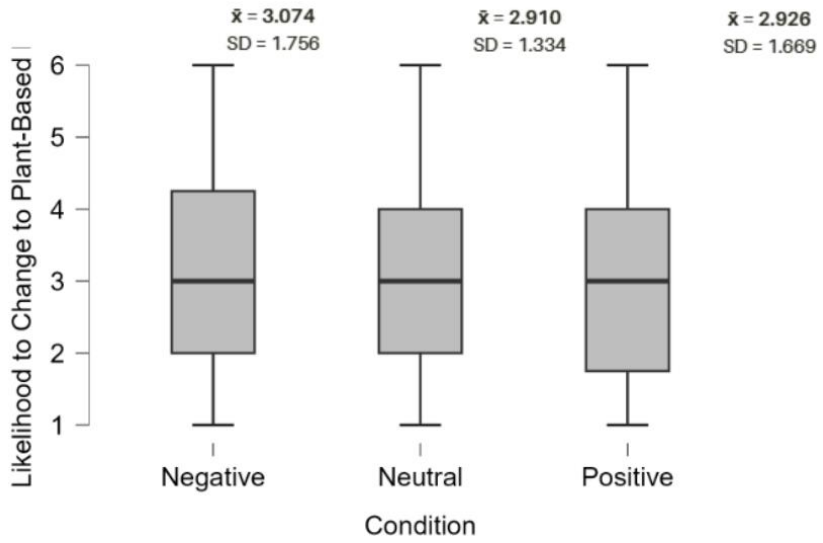
H(2) = 0.650, p = 0.723, $\eta^2 = 0.000$

Figure G3: Boxplot Graph of Likelihood to Carpool



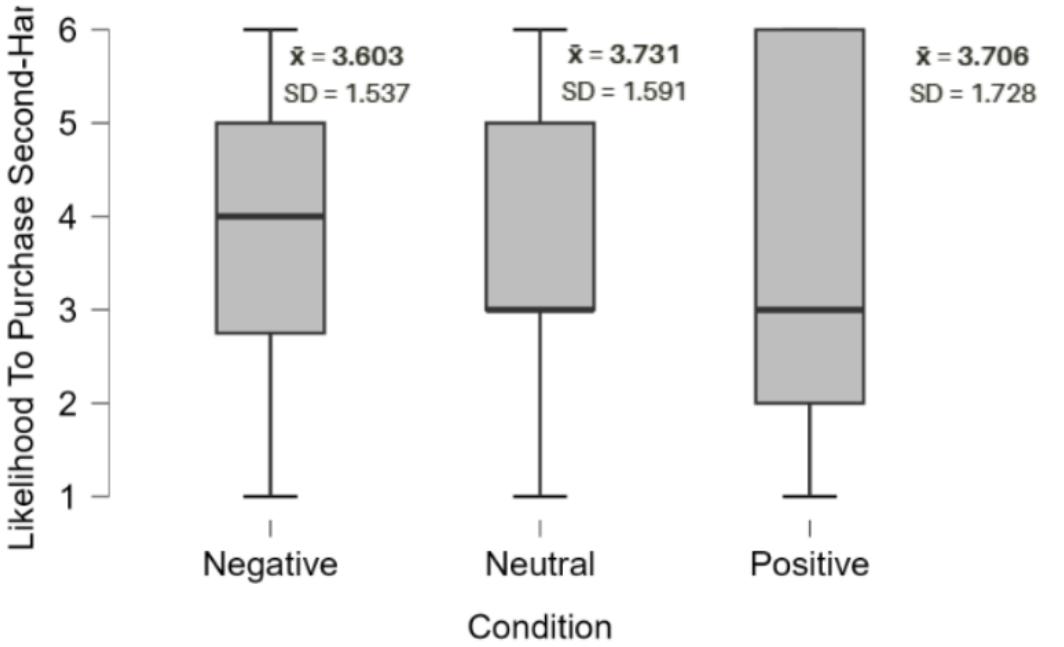
H(2) = 0.782, p = 0.676, $\eta^2 = 0.000$

Figure G4: Boxplot Graph of Likelihood to Change to Plant-Based Diets



H(2) = 0.223, p = 0.895, $\eta^2 = 0.000$

Figure G5: Boxplot Graph of Likelihood to Purchase Second-Hand Objects



H(2) = 0.119, p = 0.942, $\eta^2 = 0.000$

Appendix H: Climate Belief Score Analysis

Figure H1: Negative Framing Condition Distribution of Climate Belief Score

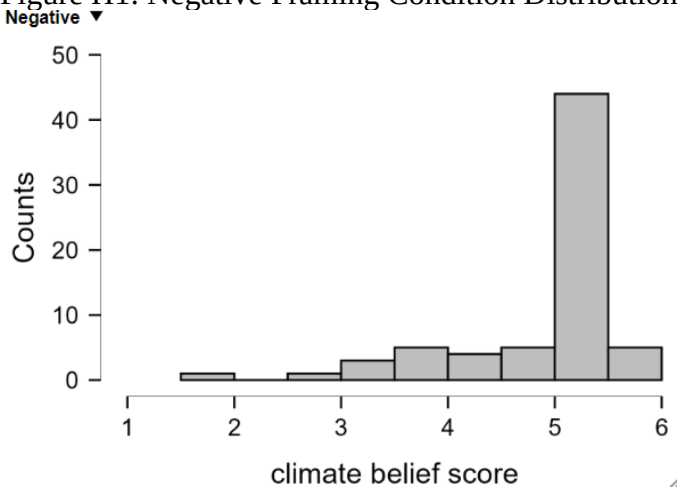


Figure H2: Neutral Framing Condition Distribution of Climate Belief Score

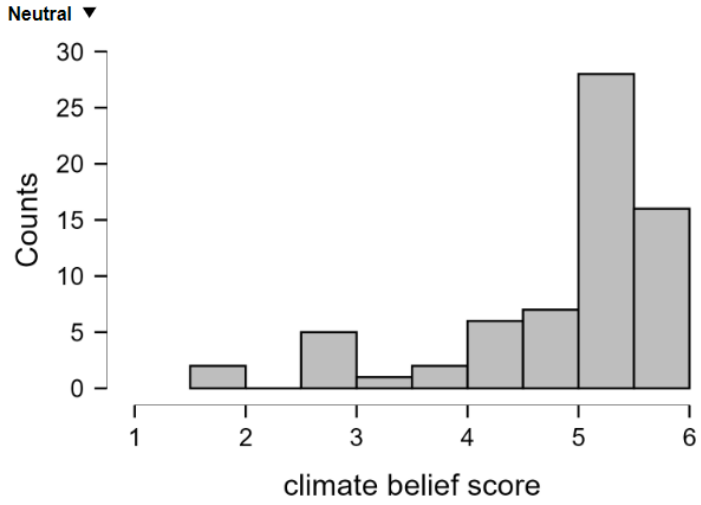


Figure H3: Positive Framing Condition Distribution of Climate Belief Score

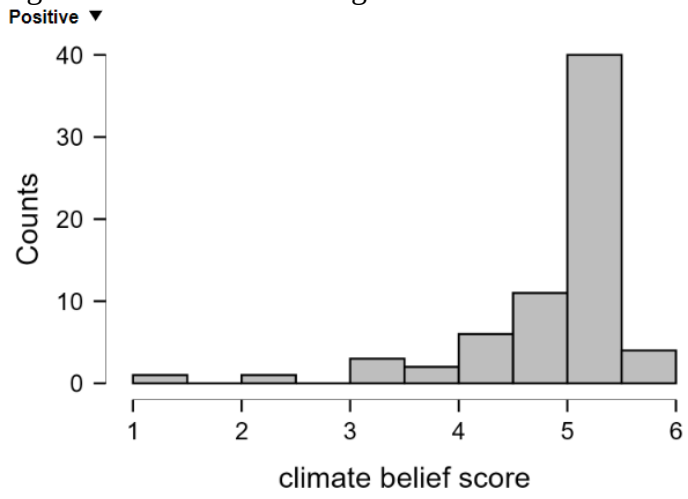
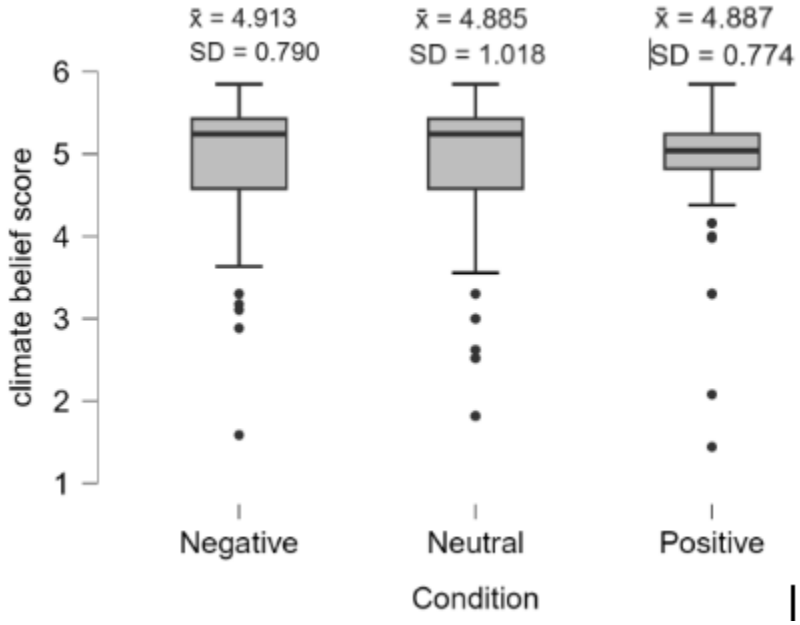


Figure H4: Framing Influencing Climate Belief Score Kruskal-Wallis Test Result



Appendix I: Demographic Information

Figure I1: Age Demographic

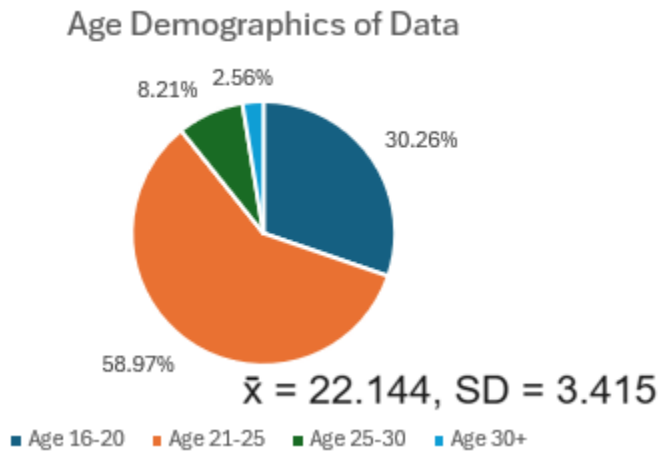


Figure I2: Gender Demographic

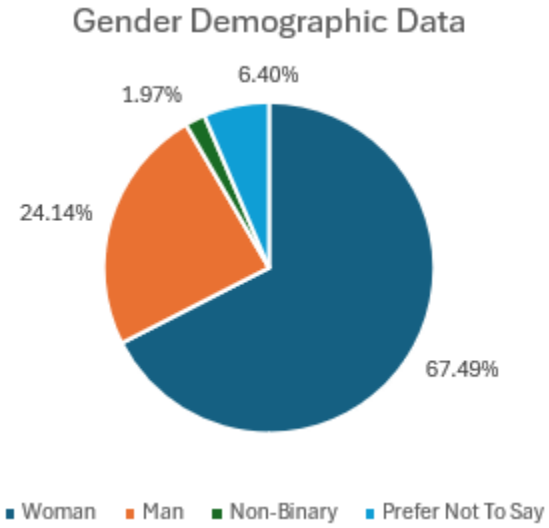


Figure I3: Lived Experiences as a Trans Person Demographic

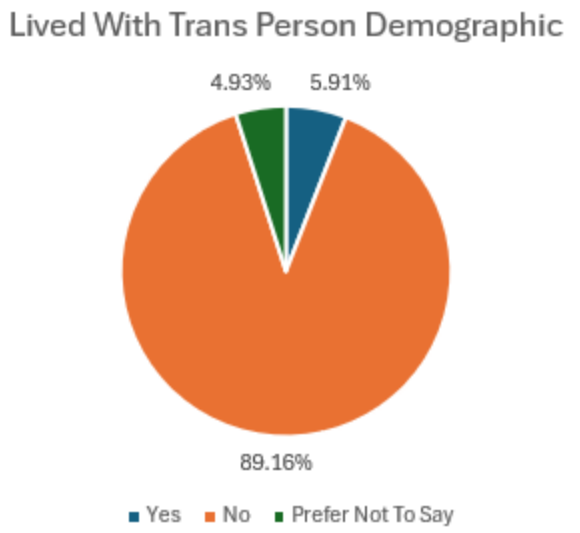
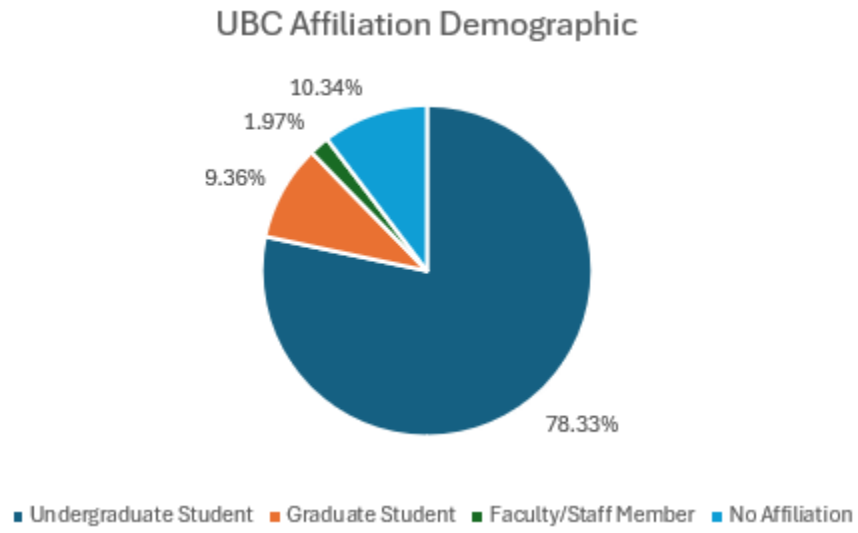


Figure I4: Affiliation With UBC Demographic



Appendix J: Contribution of Each Team Member:

Research Project Proposal:
Background Literature: Khushi, Patrick
Methods: Aneri, Ria, Jasmine, Ian, Jacqueline
Participant Sample & Sample Size: Aneri, Ria
Conditions: Jasmine
Measures: Jasmine, Aneri
Statistical Analyses: Patrick, Ian
Research Hypothesis: Jacqueline
Survey or Experimental Materials: Jacqueline, Ian
Final Editor: Ian

Research Project Presentation:
Presentation Material: Ian
Introduction: Ian, Jasmine, Khushi
Research Question & Hypothesis: Jasmine, Jacqueline
Sample Size: Aneri, Ria
Conditions and Measures: Aneri, Ria
Results: Patrick
Implication of Results: Jacqueline, Ian

Presentation Day: Jacqueline, Ian, Aneri, Jasmine
Introduction: Jasmine
Research Question & Hypothesis: Jasmine
Sample Size: Aneri
Conditions and Measures: Aneri, Jasmine
Results: Jacqueline, Ian
Implication of Results: Ian, Jacqueline

Research Project Final Report:
Executive Summary: Ian
Background Literature: Khushi, Ian
Methodology (include research question and hypothesis): Jacqueline, Jasmine
Data Collection Lead: Aneri (though everyone collected data)
Results/Data Analysis: Patrick
Implications of Results: Ian, Jasmine
Flaws/Strengths of Study: Jacqueline
Future Studies Research & Recommendation for UBC client: Jasmine
Final Editor: Ian, Aneri, Jasmine, Jacqueline, Patrick