Accelerating the Skytrain Extension to UBC: Effects of Positive and Negative Framing

Carbon Zero

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Executive Summary

The current study investigated the effectiveness of infographic framing interventions in promoting support for the UBC SkyTrain Extension project.

Participants were randomly assigned to view one of three infographics with different framings of the project in Qualtrics. In the neutral-framing control condition, participants viewed a factual infographic. In the positive-framing condition, participants viewed an infographic stating the benefits of the project, and in the negative-framing condition, the infographic depicted the cost of not implementing the extension. Support for the extension was assessed through three measures: overall support level, intention to send emails to TransLink to support and accelerate the project, and actual email-sending behaviour.

Results showed no significant differences across the three framing conditions for all three measures of support. However, the overall support for the SkyTrain extension was notably high and consistent across framing conditions, averaging 6.30 on a 7-point scale.

These findings suggest that framing may not play a critical role in shaping public support for the SkyTrain extension, especially when baseline approval is already high. However, the neutral framing being the most effective may imply that participants were more likely to support the extension when presented with new, factual information about the project.

Contents

Introduction

Public transportation plays a crucial role in urban sustainability as it reduces congestion and carbon emissions. Through UBC's Climate Action Plan 2030 (CAP 2030), the U-Pass program – an initiative providing universal transit access across Metro Vancouver – was launched to reduce carbon emissions by increasing sustainable transportation options to UBC. However, the lack of high-capacity transit infrastructure to UBC remains a major barrier to further reducing carbon emissions from transportation. Moreover, commuters in Metro Vancouver heavily rely on the 99 B-Line, the busiest bus route in British Columbia[1], with its capacity frequently being exceeded during peak hours, leading to long wait times and overcrowding[2]. A SkyTrain extension to UBC would significantly alleviate these issues by increasing capacity and reducing the number of trips. Recent research highlights the environmental benefits of metro expansions and how increased transit infrastructure reduces reliance on private vehicles, while simultaneously cut carbon emissions[3]. Given these findings, it is crucial to explore effective ways to promote public support for the UBC SkyTrain extension.

Framing effects in climate action support

Kahneman and Tversky[4] pioneered the concept of framing effects, demonstrating how individuals respond differently to the same information based on how it was presented. These include positive framing – emphasizing benefits of climate action; negative framing – highlighting potential risks and consequences associated with inaction; and neutral framing – presenting information in a factual manner[5]. In the context of climate action, framing effects serve as an effective communication tool for engaging the public on climate-related issues by tailoring and aligning messages with individuals' values and identities[6,7,8].

Studies consistently show that positive framing is an effective strategy for encouraging climate friendly behavior and intention[9]. Positively framed messages that emphasize the benefits of climate action have been linked to increased individual and civic engagement, outperforming disaster-focused and neutral messages[10]. Similarly, framing messages with a positive outcome have been shown to increase intention by more than negative messaging[11]. By emphasizing the benefit and reward, Kronrod et al.[12] suggest that individuals foster motivation for prosocial climate behaviour through positive emotions, shared values, and sense of identity.

While negative framing has demonstrated effectiveness in increasing perceived threats, willingness to sacrifice, and pro-environmental behaviour[13,14], it poses emotional drawbacks. Negative framing has been associated with heightened feelings of hopelessness and fear[15], which may lead to disengagement or avoidance as a coping strategy rather than behavioural change or action[16].

Correspondingly, neutral and factual messages, despite avoiding the emotional downside of negative framing, has been found to be disengaging and ineffective, as it is less likely to capture the attention of audiences[17]. Lacking emotional or value-driven appeal, neutral messages may not trigger the motivational processes required to inspire meaningful climate action[18].

Current study

Building on the current literature, our study aims to investigate the effectiveness of different framing—positive, negative, and neutral—on public support for the UBC SkyTrain extension. While previous literature recommended framing to enhance support and action, few studies have examined its effects on local transit infrastructure. Therefore, we hope to contribute

to the current literature by focusing on how different framing effects can promote the level of support, intention to act, and prosocial climate behaviour (e.g., sending emails) regarding the local transit infrastructure.

Research Question

- What framing intervention is most effective in promoting support for the UBC SkyTrain extension?

Hypotheses

1. Participants in the positive-framing condition will show higher levels of support, intention to send an email, and more email-sending, compared to participants in the negative-framing condition
2. Participants in the negative-framing condition will show higher levels of support, intention to send an email, and more email sending, compared to participants in the neutral-framing control condition.

Methods

Participants

An a priori power analysis conducted using G*Power indicated that the minimum sample size required to detect a small effect size (w = .01), given α = .05, and power of 80% for a chi-square goodness-of-fit test was N = 964[19]. Our final sample consisted of N = 312 participants, aged between 18 and 89 years (M = 24.46, SD = 10.75). 207 (66.56%) participants in our sample identified as women, 77 (24.76%) as men, 15 (4.82%) as non-binary, and 12 (3.86%) did not answer. 86.41% of our sample was affiliated with UBC, and 58.50% indicated that buses were their main mode of transportation to UBC. See Appendix A for detailed demographics.

Conditions

Our independent variable was the framing of the infographic presented to participants, which consisted of three conditions: neutral-framing (control), positive-framing, and negative-framing. In the control condition (n = 101), participants viewed a neutral-framing infographic stating factual information about the Millennium Line UBC Extension project. Conversely, participants in the positive-framing condition (n = 109) were presented with an infographic emphasizing the benefits associated with the SkyTrain extension. Finally, participants in the negative-framing condition (n = 102) saw an infographic detailing potential negative consequences if the extension did not occur. The amount of text and the number of points were kept consistent across the three infographics to avoid potential confounds. See Appendix B for detailed framing of the infographics.

Measures

Our first dependent variable was the level of support participants had for the SkyTrain Extension after viewing the infographics, which was measured on a 7-point Likert scale (1 = "*Strongly oppose*"; 7 = "*Strongly agree*"). The second dependent variable was the proportion of participants in each condition who sent the emails to support the acceleration of the SkyTrain

extension. This outcome was assessed in two components: intention to send emails and the actual email-sending behaviour. Intention to send emails was measured by the proportion of people who selected 'Yes' rather than 'No' when asked whether they were interested in sending an email to TransLink to support the acceleration of the SkyTrain extension. Email-sending behaviour was determined by the proportion of participants who subsequently sent the emails. Participants were asked to CC us in their emails, with each condition being assigned a different email to CC, allowing us to identify the proportion of participants who sent emails in each condition.

Procedure

Participants were recruited through advertisement posters displayed around UBC, social media posts (e.g., Instagram), in-class promotion, and word-of-mouth between March 6th and April 2nd (see Appendix C for promotional poster). After providing consent, participants were randomly assigned to view one of the three infographics within our Qualtrics survey. Participants then viewed a pre-written email template addressed to TransLink. Those expressing interest in sending the email were provided with a link to a pre-populated email they could send. If the link did not work, participants had the option to copy and paste the email template to send it. Finally, participants answered some demographic questions and had the option to provide their contact information to enter a raffle for a $50 gift card.

Results

The results showed that there were no significant associations between the effect of infographic framing on any measurement of support towards the UBC Skytrain Extension.

On average, participants in the positive-framing condition rated 6.39 (SD = 1.30) on their level of support for the Skytrain Extension project. For the negative-framing condition, participants rated an average of 6.30 (SD = 1.27) on support levels. Lastly, participants in the control condition had an average of 6.42 (SD = 1.30) supporting level scores. Across all groups, the median support level score was 7. These descriptive statistics indicated a ceiling effect in the three conditions, as the level of support was measured on a 7-point Likert scale. Therefore, most of our participants strongly support the UBC Skytrain Extension, regardless of the framing condition they received. However, these data also suggested that the normality assumption was violated, which was further verified statistically via a Q-Q plot and the Shapiro-Wilk test (W = 0.57, $p < .001$). See Appendix D for the contingency tables with percentages of participants showing intention and behaviour of email sending in each condition.

Support Level

To investigate the effect of the infographic framing on participants' level of support for the UBC SkyTrain extension project, since our data violates the normality assumption of the one-way ANOVA test, we conducted a Kruskal-Wallis Rank Sum test as a non-parametric test alternative to compare across three framing conditions. There was no statistically significant difference found in the rating of support level across all three framing conditions [$H^2(2) = 0.85$, $p = .66$], with a trivial effect size of $\varepsilon^2 = .004$[20]. The results did not support our hypotheses that participants receiving the positive-framing infographic would report the highest level of support

for the UBC Skytrain Extension project, followed by those who received the negative-framing infographics, and then those in the controlled framing condition with factual infographics. See Appendix E for the mean and standard error for the level of support in each condition.

Intention to Send Emails

To study the effect of the infographic framing condition on participants' intention to send emails to TransLink, we conducted a Chi-square Independence test. The results indicated no significant difference between different framing conditions [$\chi^2(2) = 2.31$, $p = .32$], with a trivial-to-none effect size of $V = 0.09$[21]. The results did not support our hypotheses that the positive-framing condition would result in the highest proportion of participants showing intent to send emails, followed by the negative-framing condition, then the controlled condition.

Email-Sending Behaviour

We conducted another Chi-square Independence test to explore the effect of the infographic framing condition on participants' actual behaviour in sending emails to TransLink. The results indicated no significant difference between different framing conditions [$\chi^2(2) = 1.00$, $p = .61$], along with a trivial-to-none effect size of $V = 0.06$[21]. The results did not support our hypotheses that the positive-framing condition would result in the highest proportion of participants sending emails, followed by the negative-framing condition, then the control condition.

Discussion

Contrary to our hypotheses, our results found no significant differences in the effects of framing (positive, negative, and neutral) on support for the UBC SkyTrain Extension project, measured as support level, intention to send emails to TransLink, and actual email-sending behaviour. While prior research has shown that positively framed messages tended to increase climate-related intentions and actions[9,10,11], our results found that participants in the positive framing condition did not exhibit greater support, intention to send emails, or actual email-sending behaviour than those in the negative or control conditions. Notably, the highest proportion of emails sent were from participants in the control group, followed by those in the negative-framing condition, and then positive-framing condition.

Implications

The neutral framing was most effective in encouraging email-sending, suggesting that participants valued novel information. The positive and negative framing conditions relied on emotional responses, which may not have been as effective. Since participants may already be aware of the environmental consequences of the SkyTrain extension, the neutral framing was the only condition to provide new information. Participants' familiarity with the environmental consequences of the extension presented in the positive- and negative-framing conditions may have reduced feelings of relevance and decreased motivation to engage. This interpretation aligns with previous studies[22,23] suggesting that people who place value on new information are more motivated to seek out and engage with information that feels new, useful, or self-relevant.

Interestingly, the negative frame resulted in higher support than the positive frame. While negative framing has been associated with disengagement in other studies[15,16], it may have

heightened participants' sense of urgency or concern, leading to a stronger motivation to act. However, this effect did not surpass the influence of the factual message, suggesting that providing clear, practical information may be a more effective approach to encouraging public engagement with local infrastructure planning.

Moreover, we observed a notable gap between participants' intentions to send emails and their actual email-sending behaviour. While many expressed high supporting attitudes, a much smaller percentage followed through. This discrepancy could be attributed to several factors, including technical inconvenience in sending the email and possible perceptions that individual action would have minimal impact. Additionally, since supportive intentions were not translated into emails sent, this could imply that short-term framing interventions were not an effective method of encouraging actionable behaviour for the SkyTrain extension project.

Limitations and Future Directions

Throughout the study we encountered several limitations that may have impacted the results and led to unreliable interpretations of the data. Firstly, our study failed to meet the minimum number of participants to detect a small effect size, which leaves our results vulnerable to type II errors and low power. Furthermore, using word-of-mouth as the main recruitment strategy could have led to selection biases. Many of the people we approached declined to participate in our survey because they did not use the SkyTrain or were not interested in the project. Since those who did not support the project were unwilling to participate, we observed exceptionally high levels of support. Additionally, participants were not instructed to read through the infographic in detail, which could have led them to skim through without paying attention, diminishing the impact of the framing. Another obstacle we faced was the prepopulated email not working for iOS users or those not logged into Apple Mail. These participants instead had to copy and paste the email manually, and this extra step may have deterred some participants from following through with sending the email.

Future efforts should aim to recruit more participants to meet the minimum sample size required and simplify the email-sending procedure to reduce friction. Future research could look more into effective intervention strategies to convert level of support into actionable behaviour.

Recommendations

Despite the lack of significant differences between framing conditions, we observed a high level of support for the SkyTrain extension across all groups. This indicates that students are generally in favor of the project. Therefore, we recommend the Climate and Sustainability Engagement team shift their focus from persuasive messaging (e.g., framing interventions) to strategies that translate supportive attitudes into behaviors. Specifically, instead of relying on short, emotionally driven interventions, the team could implement longer messaging formats that encourage deeper engagement. Events such as open forums, panel discussions, or Q&A sessions with TransLink management representatives would offer students opportunities to ask questions, voice concerns, and gain a clearer understanding of the SkyTrain extension's progress. Incorporating new factual information about the project, sharing UBC transit stories (e.g., long waiting lines for the R4) and showcasing project milestones can enhance students' sense of involvement, self-relevance, and motivate them to take initiative in supporting the project.

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Appendices

Appendix A: Detailed Demographic Table

Table 1
Detailed Sample Demographics

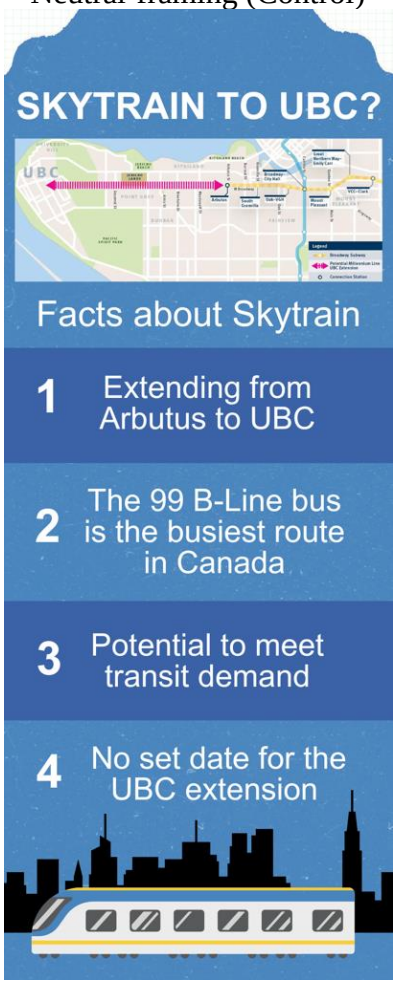
Variable	Sample Statistic
Gender	
Woman	207 (66.56)
Man	77 (24.76)
Non-binary person	15 (4.82)
Not Answered	12 (3.86)
Trans Experience	
Yes	16 (5.16)
No	287 (92.58)
Not Answered	7 (2.26)
Age	24.46 (10.75)
UBC Affiliation	
Undergraduate	252 (81.55)
Faculty/Staff	3 (0.97)
Graduate	12 (3.88)
Not Affiliated	37 (11.97)
Other	5 (1.62)
Transportation to UBC	
Walking	64 (21.77)
Bike	7 (2.38)
Car	37 (12.59)
Bus	172 (58.50)
Others	14 (4.76)

Note. Data are reported as means (*SD*) or counts (%)

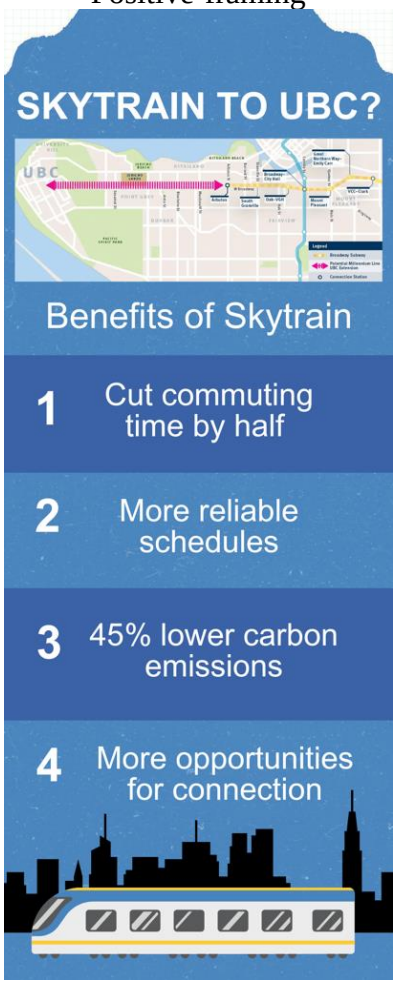
Appendix B: Qualtrics Survey

1. Consent form provided by Dr. Zhao
2. Random Assignment to different framing conditions

Neutral-framing (Control)



Positive-framing



Negative-framing

3. Dependent variable measures (i.e., measures)
    a. Support for the SkyTrain Extension

    b. Intention to send emails to TransLink

To: ubcextension@translink.ca
Cc: carbonzero2025@gmail.com
Subject: Support to Accelerate the Millennium Line UBC Extension

Dear TransLink Team,

I am a UBC commuter writing to express my thoughts regarding the SkyTrain extension project to UBC:

Commuting to UBC can be quite challenging, as buses are often full and delays are common. A UBC extension would eliminate 3,000 vehicle trips per day during peak hours, cutting emissions and reducing reliance on fossil fuels.

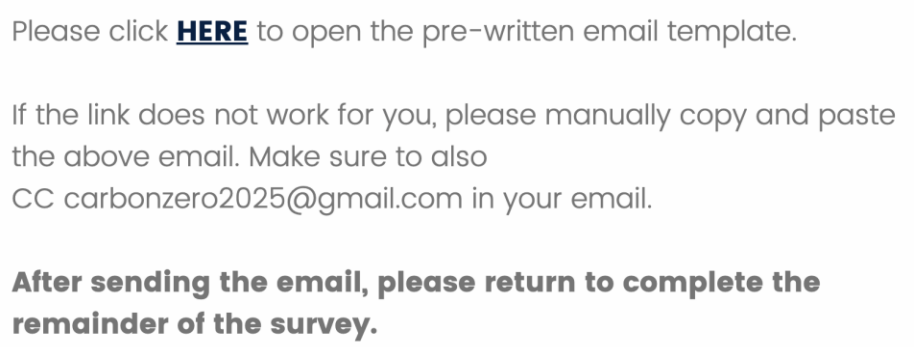
We cannot afford to wait. By 2030, I urge you to:

- Make a firm commitment to completing the UBC Line extension with a clear, publicly available timeline and plan for its expected completion.
- Develop a business case for the UBC Line Extension project without further delay.
- Secure dedicated funding specifically for the UBC Line extension.
- Regularly publicize financial progress to ensure transparency and accountability, allowing the public to stay informed and monitor the progress.

Sincerely yours,

A Concerned Resident and Commuter.

c. Behaviour of sending the pre-written email to TransLink



i. The actual behaviour of sending emails was measured through the number of cc'd emails.

ii. Participants in each condition cc'd a different email as follows, so we could identify which condition they were assigned to.
    1. Neutral: Carbonzero2025@gmail.com
    2. Positive: Carbonzero202501@gmail.com
    3. Negative: Carbonzero202502@gmail.com

4. Demographics
    a. What is your age?
    b. What is your gender identity?
        1. Woman
        2. Man
        3. Non-binary person
        4. Prefer not to answer
    c. Do you have lived experience as a trans person (meaning your gender identity does not align with your gender assigned at birth)?
        1. Yes
        2. No
        3. Prefer not to answer
    d. Are you currently a UBC student or a staff/faculty?
        1. Yes, I am a student
        2. Yes, I am a staff/faculty
        3. No, I am not affiliated with UBC
        4. Others (please specify)
    e. What is your current year level?
        1. First year
        2. Second year
        3. Third year
        4. Fourth year
        5. Fifth year and above
        6. Graduate level
    f. How long have you been a staff/faculty at UBC?
        1. Less than 5 years
        2. Between 5 and 10 years
        3. Between 10 and 15 years
    g. What is your main mode of transportation to UBC?
        1. Walking
        2. Bike
        3. Car
        4. Bus
        5. Others (please specify)
5. Contact information for $50 gift card raffle

Appendix C: Promotional Poster

Appendix D: Contingency Tables & Percentages of Participants in Each Condition

Table 2

Contingency Table & Percentages of Participants Showing Intention of Email Sending

	Not Intended (%)	Intended (%)	*n*
Control	45 (44.55%)	56 (55.45%)	101
Negative Framing	51 (50%)	51 (50%)	102
Positive Framing	60 (55.05%)	49 (44.95%)	109

Table 3

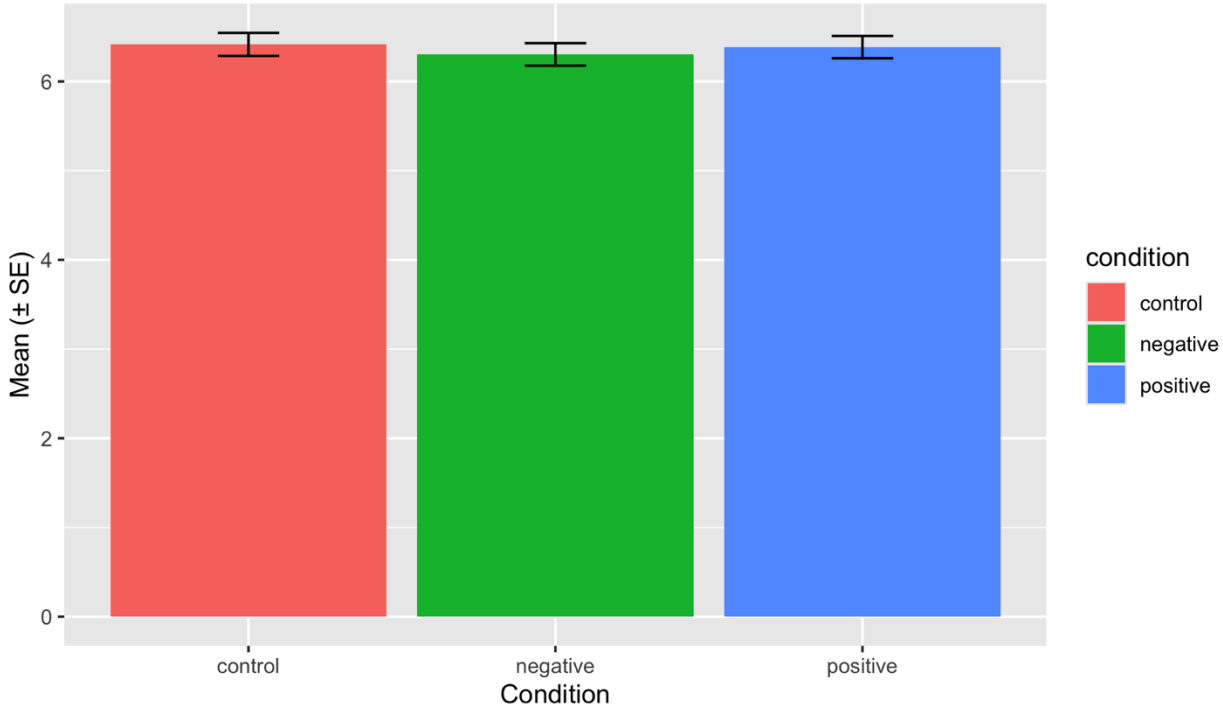
Contingency Table & Percentages of Participants Sending Emails

	Not Intended (%)	Intended (%)	*n*
Control	82 (81.19%)	19 (18.81%)	101
Negative Framing	88 (86.27%)	14 (13.73%)	102
Positive Framing	92 (84.40%)	17 (15.60%)	109

Appendix E: Descriptive Statistics of the Supporting Levels in Each Condition

Figure 1

Mean and Standard Error of the Level of Support



Note. [a.] Error bars reflect ±1SEM

Appendix F: Member Contributions

Writing proposal	Background literature Research question Research hypothesis Methods (Qualtrics)	Alice, Paris, Marcus Muhan, Paris Muhan, Ariya Ariya (Qualtrics developer) Muhan (Scale/question design) Roy (Qualtrics) Alice (Infographics)
Collecting data	Instagram/word of mouth Posters Class advertisement In-person (around campus) App advertisement Monitoring emails sent	Everyone Roy, Ariya, Muhan, Marcus Marucs, Ariya, Muhan Marcus, Paris, Ariya, Roy Paris, Alice Paris
Conducting data analysis		Muhan (done in R)
Making presentation	Introduction Methods Results Discussion Slide Design	Alice (slides, script, presenter) Ariya (slides, script, presenter) Muhan (slides, script, presenter) Marcus (slides, script, presenter) Paris (slides, script) Alice, Ariya, Muhan, Marcus, Paris
Writing the final report	Introduction Research Question/Hypothesis Methods Results Discussion Recommendations Executive Summary References Appendix	Alice, Roy Alice Ariya Muhan Paris, Marcus Paris, Marcus Ariya, Muhan Alice, Ariya, Roy Ariya, Muhan