Re-Use the Mug: Effects of Visual Animal Nudges on Self-reported Likelihood of Reusable Mug Usage and Emotional Response

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SEEDS Sustainability Program

Executive Summary

Introduction

This study aimed to investigate the impact of visual animal nudge-based interventions, specifically through posters, on participants' self-reported likelihood of future reusable mug use and emotional response to environmental messaging.

Research Question

How does placing two different empathy-eliciting marine animals (turtle and dolphin) on visual nudge posters impact people's emotions and influence their decision to use reusable coffee cups?

Methods

Conducted among 328 participants, primarily consisting of University of British Columbia students aged 18-44, the experiment divided individuals into one of three poster groups. Inspired by past research indicating the effectiveness of certain animals in eliciting empathetic responses, the posters selected were a control, turtle, and dolphin poster. Participants' intentions regarding reusable mug usage and their emotional reactions (measured through happiness, distress, and empathy) were measured using Likert scales following exposure. Additionally, participants were asked to select barriers and motivations surrounding reusable mug use from a list to gauge which factors may affect the overall user experience of reusable mugs.

Results

Findings did not find significant alterations in emotional response or likelihood of reusable mug use. This was possibly due to the short intervention duration, the study's post-test-only design, and the hypothetical nature. These limitations, alongside the sampling method and environmental conditions, may have influenced the study's outcomes, suggesting a need for more controlled, observational research to gauge the efficacy of visual animal nudges in promoting environmental behaviours.

Recommendations

We recommend UBC implement interventions that target forgetfulness and leverage environmental consciousness. Furthermore, the UBC campus should focus on creating spaces that incentivize reusable mug use as the user experience for a reusable mug user can be hostile due to inconvenience, financial issues, hygiene, and limited availability. To further increase the usage of reusable mugs and to meet the Zero Waste Action Plan (ZWAP) 2030 target, UBC can also opt to provide reusable cups for free to their students.

Table of Contents

Introduction

Plastic pollution poses a significant threat to the environment, particularly marine ecosystems and nearby habitats (Kibria et al., 2023; Li et al., 2016). The widespread use of plastic in industries such as food packaging and construction results in substantial amounts of plastic waste (Kibria et al., 2023). Shockingly, almost half of all plastic produced is discarded after a single use (Mathalon & Hill, 2014). This includes commonly used items like coffee cups, which contribute to this environmental issue despite the availability of reusable alternatives.

Considering this issue, the University of British Columbia will need to scale up reuse initiatives and encourage changes in consumer behaviour to achieve its Zero Waste Action Plan (ZWAP) 2030 goal of reducing operational waste disposal by 50% below 2019 levels and slashing disposable cup usage by 80% before 2030 (The UBC Vancouver Climate Action Plan 2030, 2021). Proactive measures are needed to mitigate the environmental impact of single-use coffee cup waste.

Nudge-based behavioural shifts can play a crucial role in achieving pro-environmental targets by subtly influencing individuals' choices, making reusable alternatives more appealing and convenient, thus encouraging sustainable behaviour (Luo et al., 2022). Nudges intend to encourage people to make better decisions without limiting their options or forcing significant changes on them; they frequently include changing how options are presented or how information is framed (Luo et al., 2023). In recent years, the use of psychological behavioural nudges by both public and private organizations has gained traction as a way to influence people's behaviour (Luo et al., 2023). Previous research, such as Luo et al.'s 2022 study, has found that depicting the impact of plastic waste on marine life in posters with waste signage can be an effective nudge for reducing plastic waste. This study investigated the impact of visualizing the marine consequences of plastic debris on the disposal of single-use plastic items in an office building. While the study showed decreased plastic waste when visualizing marine consequences, only a few employees reported seeing the posters (Luo et al., 2022). Additionally, the paper did not delve into the underlying psychological motivations behind why these animals in the posters reduced plastic waste.

Our study aims to delve deeper into how specific characteristics of animals, such as perceived intelligence, size, aesthetic appeal, and perceived harmlessness, can elicit empathy among individuals, as these have been shown to influence prosocial and sustainable behaviours (Callahan et al., 2021; L. Paulhus, 2023; Wang et al., 2017). The present study examines how placing two different empathy-eliciting marine animals (turtle and dolphin) on visual nudge posters impacts people's emotional reactions, ultimately influencing their decision to utilize reusable coffee cups. Different animals may evoke varying emotions in individuals, affecting their influence on behaviour (Callahan et al., 2021). Understanding how different high empathy-eliciting animals (dolphins and turtles) mediate emotional responses and influence mug reuse behaviour can provide valuable insights for designing more effective nudge interventions to promote sustainable practices.

Thus, our research aims to answer how different animal posters influence the likelihood of reusable cup usage and emotional response. This study will test the following hypotheses: (1) Both dolphin and turtle poster conditions will have a higher self-reported likelihood of future reusable mug use than the control condition. (2) Participants in the dolphin poster condition will report more

happiness, more empathy, and less distress, as well as a higher self-reported likelihood of future reusable mug use than those in the turtle or control poster conditions.

Methods

Participants

The target sample size was 246 participants, calculated based on a minimum effect size of f=0.2, alpha level of 0.05, power of 0.8, and three between-subjects conditions. Ultimately, 328 participants were included in the study, distributed across three conditions: control poster (*N*=84), turtle poster (*N*=87), and dolphin poster (*N*=90). The mean age of participants was 21.719 (*SD* = 4.773), with the majority being UBC students (82%) and women (64%). The remaining participants identified as men (29%), non-binary (6%), or chose not to respond (1%). Despite the participant total of *N* = 328, not all survey responses were fully completed due to an initial design error that allowed for incomplete answers, leading to the discrepancy between total respondents and the aggregate of condition-specific responses (*N*=261).

Conditions

Participants were randomly assigned to view one of three conditions: control poster, turtle poster, or dolphin poster (see Appendix A). Poster interventions were chosen based on previous research on visual nudge-based interventions (Mertens et al., 2022; Luo et al., 2023), which aims to encourage individuals to make better decisions by changing the way options are presented or the way information is framed, and to fulfill client requests. The selection of animals was informed by successful past interventions (Luo et al., 2022) and their recognized intelligence and aesthetic appeal, known to evoke stronger empathetic responses (Callahan et al., 2021; Paulhus, 2023).

Measures

Participants' likelihood of future reusable mug use and emotional responses (happy, distressed, empathetic) were assessed post-intervention. The likelihood of mug usage was rated on a five-point Likert scale ranging from "extremely likely" to "extremely unlikely." Emotional responses were measured using a six-point Likert scale ranging from "not at all" to "extremely." Individual barriers and motivators of reusable mug use were also measured through a “choose all that apply” section listing common barriers and motivators (see Appendix B) to meet client deliverables. Participants could also report any additional barriers or motivators through an open-text box titled “other.”

The selected survey questions, "How did the image you just saw make you feel?" and "How likely are you to use a reusable mug in the future after viewing this poster?" were deemed appropriate measures for several reasons. Firstly, their simplicity ensured ease of comprehension for participants, minimizing potential confusion and enhancing response accuracy. Secondly, these questions effectively isolated participants' reactions in direct relation to the poster they had just viewed, enabling a focused assessment of the intervention's impact. Moreover, their neutral wording prevented bias and allowed participants to freely express their sentiments. By utilizing Likert scales, the questions provided flexibility, enabling participants to convey varying intensities of emotion and likelihood without constraint.

Procedure

This study employed a Qualtrics survey, in which participants were randomly assigned to one of three independent variable (IV) poster conditions. Following exposure to the assigned poster, participants indicated their future likelihood of utilizing reusable mugs and the intensity of their emotional responses (happy, distressed, empathetic). Demographic information, including gender, age, and UBC affiliation, was collected in a subsequent section. Participants were debriefed following the completion of the survey. Data was also collected from March 14th to March 29th, 2024, through convenience sampling at the University of British Columbia Vancouver campus and online via personal Instagram stories. To mitigate incomplete responses during the initial data collection week, survey questions were made mandatory to ensure completion.

Results

Hypothesis 1

To measure whether exposure to one of the experimental conditions increases the likelihood of using a reusable mug, we measured the likelihood of using a reusable mug on a 5-point Likert Scale, with 1 being not at all likely and 5 being extremely likely. The control condition had the highest reported likelihood of using a reusable mug ($M = 2.631$, $SD = 1.050$), the dolphin condition scored second highest ($M = 2.456$, $SD = 1.083$), and the turtle condition scored the lowest likelihood of using a reusable mug ($M = 2.375$, $SD = 0.938$) (see Appendix F).

A one-way ANOVA was performed to compare the effect of the conditions on the likelihood of using a reusable mug. The one-way ANOVA revealed that there was no statistically significant difference in the mean likelihood of using a reusable mug between the experimental conditions and control condition ($F(2, 259) = [1.393]$, $p = 0.250$). Assumptions of homogeneity of variances and normality of data were met (see Appendix F). These results mean that we fail to accept hypothesis 1 that the dolphin and turtle poster conditions will have a higher self-reported likelihood of future reusable mug use than the control condition.

Hypothesis 2

We also measured the emotional response to each condition, assessing happiness, distress, and empathy in response to the independent variables. We measured participants' level of emotion based on a 5-point Likert Scale, with 1 being not at all experiencing this emotion and 5 being greatly experiencing this emotion. The results indicated that those in the dolphin condition showed the greatest happiness ($M = 2.708$, $SD = 1.375$), followed by the control condition ($M = 2.612$, $SD = 1.547$), and then the turtle condition ($M = 2.424$, $SD = 1.417$). A one-way ANOVA revealed no significant difference in mean happiness experienced ($F(2, 251) = [0.866]$, $p = 0.422$) (see Appendix C).

In terms of distress, individuals in the turtle condition reported the most distress ($M = 1.320$, $SD = 1.337$), individuals in the control condition reported the second most distress ($M = 1.000$, $SD = 1.234$), and those in the dolphin condition reported the least distress ($M = 0.880$, $SD = 1.208$). A

one-way ANOVA revealed no significant difference in mean distress experienced between conditions (F(2, 215) = [2.427], $p = 0.091$) (see Appendix D).

For empathy, individuals in the turtle condition reported the greatest empathy ($M = 2.851$, $SD = 1.410$), followed by those in the dolphin condition ($M = 2.556$, $SD = 1.559$), and finally the control condition ($M = 2.362$, $SD = 1.545$) (see Appendix E).

For all emotional response data, assumptions of homogeneity of variances and normality of data were met (see Appendix C, D, & E). These results mean that we fail to support hypothesis 2 that participants in the dolphin poster condition would report more happiness, more empathy and less distress, as well as a higher self-reported likelihood of future reusable mug use than those in the turtle or control poster conditions.

Barriers and motivators to reusable mug use

Finally, we also collected information on the most common barriers and motivators to reusable mug use. Participants in all conditions selected from a list of barriers and motivators provided in the survey. The most commonly reported barriers were forgetfulness (59.1%) and inconvenience (53%), followed by financial (22.6%), hygiene (19.2%), limited availability of accessibility such as lack of refill stations or discounts for using reusable mugs (16.2%) preference for taste or experience of disposable cups (5.2%), perceived stigma of using a reusable cup (2.7%), and other (2.4%) (see Appendix G). The most commonly reported motivators for using reusable mugs were environmental concern (68.3%) and financial motivators (41.8%), followed by aesthetic appeal of the reusable mug (35.7%), convenience of using reusable mug (26.5%), personal health considerations such as avoiding chemicals in disposable cups (18.9%) social influence (13.7%), and other (1.5%) (see Appendix H). Four or the five participants who selected “other” mentioned insulation when they were asked to explain.

Discussion

When conducting a one-way ANOVA on the emotional reactions to dolphin, turtle, and control posters, results found no effect on happiness ($F(2, 251) = 0.87$, $p = 0.42$), distress ($F(2, 251) = 0.87$, $p = 0.42$), and empathy ($F(2, 254) = 2.24$, $p = 0.11$). The same analysis also found no significant differences between conditions regarding self-reported likelihood of future reusable mug use ($F(2, 259) = 1.39$, $p = 0.25$). This would suggest that dolphin and turtle animal nudge interventions may not be effective in increasing the use of reusable mugs. Moreover, even though the turtle condition had the most dramatic emotional response at the sub-significant level, results imply that neither of the animals led to a significantly different emotional reaction than the control condition.

Although previous research, such as Luo et al.'s in 2022, has shown that animal-based interventions successfully foster pro-environmental behaviour, our study was the first to investigate such behaviours by comparing dolphins and turtles. Furthermore, it fills a research gap by narrowing it to the effect of emotions on reusable mug behaviours. However, unlike previous research, our study suggests these interventions may be ineffective (at least in the reusable mug space).

Moreover, emotional measure results imply that the mechanisms behind previously observed pro-environmental reactions may not be emotionally mediated.

Despite this, this study's findings in the motivations and barriers to use section corroborate previous research concerns. The most identified barrier was forgetfulness (Putnam-Farr et al., 2023; See Appendix G), and the most reported motivator was environmental concern (See Appendix H). These results point to participants' existing pro-environmental interest and awareness, suggesting that people are environmentally conscious and thus may be receptive to engaging in pro-environmental behaviour such as reusable mug use.

This paper's lack of significant results may be due to various limitations that hindered the research process. In terms of intervention length, participants only viewed each nudge poster for a few seconds before reporting their emotional state and likelihood of mug usage. The brevity of this exposure may have prevented participants from considering the poster's message or creating an emotional reaction. Even so, this length of exposure mimics a naturalistic interaction with real-life nudge posters and thus may be more representative than a forced time interaction. Furthermore, many participants were UBC students approached on sunny afternoons. This lack of control over the response environment may have caused many confounding variables, such as a non-response bias where participants would carelessly respond to the survey to finish it quickly. In replicating this study, data collection should be limited to one indoor space to minimize the effect of these external variables while still retaining a naturalistic setting. The majority of this study's sample of students may also affect its generalizability as the degree of environmental consciousness may be overrepresented in a young student population.

Additionally, the post-test-only between-subjects design prevented the creation of accurate participant controls and thus made it impossible to identify any differences pre- and post-exposure. There was no established baseline for the likelihood of reusable mug use nor the participants' emotional state. Thus, whether the intervention changed any participants' behaviours could not be established. Similarly, by positing the likelihood of mug use as a hypothetical, this study could not identify actual behaviour change. It may be more meaningful to conduct the study as observational research in the future as there may be a cognitive dissonance between participants' pro-environmental intentions and actual behaviours.

In line with these limitations, future research could investigate the effect of nudges on a long-term scale. Tracking participants for a longer period would help identify whether interventions can build up on each other while also observing the duration of the effect of any given pro-environmental intervention. Additional research should also seek to include non-student groups or focus on using different sampling strategies, such as stratified sampling. This would allow for more generalizable research to shed light on the environmental impact and tendencies of a wider range of people.

Recommendations

While the present study did not find significant effects of animal nudge posters on reusable mug use, it underscores the importance of continuously refining and adapting sustainability initiatives. This research suggests that animal nudge posters may not effectively foster pro-environmental

behaviours within the UBC community. Despite this, results for the barriers and motivations to reusable mug use section suggest that more effort is needed to combat forgetfulness of reusable mugs.

To enhance sustainable behaviour on campus and reach its CAP 2030 targets, specifically regarding reducing food and waste greenhouse gas emissions, UBC should implement interventions that target forgetfulness and leverage environmental consciousness. This could include establishing a comprehensive reminder system, such as strategically placed signage reminding students to bring their reusable mugs. In line with this, the current *Mugshare* program should be re-evaluated as it could potentially be a solution to this forgetfulness, but it is not being used in a way that removes the issue. This may come as awareness campaigns in front of campus *Mugshare* partner locations. It may also be implemented through a script change, where the *Mugshare* or a reusable mug is assumed when ordering a drink on campus. These implementations should also be tracked and monitored for progress.

Furthermore, the UBC campus should focus on creating spaces that incentivize reusable mug use as the user experience for a reusable mug user can be hostile due to inconvenience, financial issues, hygiene, and limited availability (see Appendix G). These could be tackled through the normalization of reusable mug use by establishing designated campus “mug zones”.

To further increase the usage of reusable mugs and to meet the Zero Waste Action Plan (ZWAP) 2030 target, UBC can also opt to provide reusable cups for free to their students. A university-based study found that providing free reusable mugs to its students significantly increased reusable cup usage, reaching 33.7% across three university cafés (Poortinga & Whitaker, 2018). Implementing a disposable cup charge and providing alternative options to students can effectively increase the long-term use of reusable cups (Poortinga & Whitaker, 2018).

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Appendices

Appendix A: Posters Used

Condition 1: Control Condition

Condition 2: Animal Visual Nudge: Turtle Condition

Condition 3: Animal Visual Nudge: Dolphin Condition

Appendix B: Qualtrics Survey

Consent Form

Class Research Projects in PSYC 421 - Environmental Psychology
Principal Investigator: Dr. Jiaying Zhao
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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

The following page will display a poster. Please review the poster for a few moments before responding to the following questions.

Control Condition:

How did the image you just saw make you feel?
Not at all A little bit Moderately Very Extremely

0 1 2 3 4 5

Happy ()	
Distressed ()	
Empathetic ()	

Q26 How likely are you to use a reusable mug in the future after viewing this poster?

- **o Extremely likely (1)**
- **o Somewhat likely (2)**
- **o Neither likely nor unlikely (3)**
- **o Somewhat unlikely (4)**
- **o Extremely unlikely (5)**

Which of the following do you consider to be a barrier to using reusable mugs? (select all that apply)

- ☐ **Financial - purchasing a reusable mug is expensive**
- ☐ **Forgetfulness - I struggle to remember my reusable mug**
- ☐ **Inconvenience - in terms of cleaning/maintenance/carrying around**
- ☐ **Hygiene - Concerns about hygiene or cleanliness of the mug**
- ☐ **Preference - taste or experience of beverages in disposable cups**
- ☐ **Perceived stigma - embarrassment associated with carrying a reusable mug**
- ☐ **Limited availability or accessibility - lack of refill stations or discounts for using reusable mugs**
- ☐ **Other (please specify): _____**

Which of the following do you consider to be a barrier to using reusable mugs? (select all that apply)

- ☐ **Financial - purchasing a reusable mug is expensive**
- ☐ **Forgetfulness - I struggle to remember my reusable mug**
- ☐ **Inconvenience - in terms of cleaning/maintenance/carrying around**
- ☐ **Hygiene - Concerns about hygiene or cleanliness of the mug**
- ☐ **Preference - taste or experience of beverages in disposable cups**
- ☐ **Perceived stigma - embarrassment associated with carrying a reusable mug**
- ☐ **Limited availability or accessibility - lack of refill stations or discounts for using reusable mugs**
- ☐ **Other (please specify): _____**

Which of the following motivate you to use reusable mugs? (select all that apply)

- ☐ **Environmental - awareness and concern for reducing waste**

- ☐ **Financial - Cost savings over time/Discount or incentives when using reusable mugs**
- ☐ **Aesthetic appeal - design of the reusable mug**
- ☐ **Convenience - carrying or using the mug**
- ☐ **Social - influence or peer pressure**
- ☐ **Personal health considerations - e.g. avoiding chemicals in disposable cups**
- ☐ **Other (please specify): _____**

Which of the following motivate you to use reusable mugs? (select all that apply)

- ☐ **Environmental - awareness and concern for reducing waste**
- ☐ **Financial - Cost savings over time/Discount or incentives when using reusable mugs**
- ☐ **Aesthetic appeal - design of the reusable mug**
- ☐ **Convenience - carrying or using the mug**
- ☐ **Social - influence or peer pressure**
- ☐ **Personal health considerations - e.g. avoiding chemicals in disposable cups**
- ☐ **Other (please specify): _____**

Condition 1: Animal Visual Nudge - Turtle

How did the image you just saw make you feel?

Not at all A little bit Moderately Very Extremely

0 1 2 3 4 5

Happy ()	
Distressed ()	
Empathetic ()	

How likely are you to use a reusable mug in the future after viewing this poster?

- **o Extremely likely (1)**
- **o Somewhat likely (2)**
- **o Neither likely nor unlikely (3)**
- **o Somewhat unlikely (4)**
- **o Extremely unlikely (5)**

Which of the following do you consider to be a barrier to using reusable mugs? (select all that apply)

- ☐ **Financial - purchasing a reusable mug is expensive**
- ☐ **Forgetfulness - I struggle to remember my reusable mug**
- ☐ **Inconvenience - in terms of cleaning/maintenance/carrying around**
- ☐ **Hygiene - Concerns about hygiene or cleanliness of the mug**
- ☐ **Preference - taste or experience of beverages in disposable cups**
- ☐ **Perceived stigma - embarrassment associated with carrying a reusable mug**
- ☐ **Limited availability or accessibility - lack of refill stations or discounts for using reusable mugs**
- ☐ **Other (please specify): _____**

Which of the following motivate you to use reusable mugs? (select all that apply)

- ☐ **Environmental - awareness and concern for reducing waste**
- ☐ **Financial - Cost savings over time/Discount or incentives when using reusable mugs**
- ☐ **Aesthetic appeal - design of the reusable mug**
- ☐ **Convenience - carrying or using the mug**

- ☐ **Social - influence or peer pressure**
- ☐ **Personal health considerations - e.g. avoiding chemicals in disposable cups**
- ☐ **Other (please specify): _____**

Condition 2: Animal Visual Nudge - Dolphin

How did the image you just saw make you feel?
Not at all A little bit Moderately Very Extremely

0 1 2 3 4 5

Happy ()	
Distressed ()	
Empathetic ()	

How likely are you to use a reusable mug in the future after viewing this poster?

- **o Extremely likely (1)**
- **o Somewhat likely (2)**
- **o Neither likely nor unlikely (3)**
- **o Somewhat unlikely (4)**
- **o Extremely unlikely (5)**

Which of the following do you consider to be a barrier to using reusable mugs? (select all that apply)

- ☐ **Financial - purchasing a reusable mug is expensive**
- ☐ **Forgetfulness - I struggle to remember my reusable mug**
- ☐ **Inconvenience - in terms of cleaning/maintenance/carrying around**
- ☐ **Hygiene - Concerns about hygiene or cleanliness of the mug**
- ☐ **Preference - taste or experience of beverages in disposable cups**
- ☐ **Perceived stigma - embarrassment associated with carrying a reusable mug**
- ☐ **Limited availability or accessibility - lack of refill stations or discounts for using reusable mugs**
- ☐ **Other (please specify): _____**

Which of the following motivate you to use reusable mugs? (select all that apply)

- ☐ **Environmental - awareness and concern for reducing waste**
- ☐ **Financial - Cost savings over time/Discount or incentives when using reusable mugs**
- ☐ **Aesthetic appeal - design of the reusable mug**
- ☐ **Convenience - carrying or using the mug**
- ☐ **Social - influence or peer pressure**

- ☐ **Personal health considerations - e.g. avoiding chemicals in disposable cups**
- ☐ **Other (please specify): _____**

Demographics:

Q1 Are you a UBC student?

- **o Yes (1)**
- **o No (2)**

Q16 What is your age?

_____

Q17 What is your gender?

- **o Man (1)**
- **o Woman (2)**
- **o Non-binary / third gender (3)**
- **o Prefer not to say (4)**

Debriefing:
Thank you for participating in our study!
The aim of this survey was to identify whether different animal posters would alter participants' self-reported emotional response and likelihood of reusable mug usage. When taking the survey, you were randomly assigned to one of three conditions: a control (no presence of an animal), a turtle condition, or a dolphin condition. These were acting as nudges. Nudges are small interventions intended to encourage people to make better decisions without limiting their options or forcing big changes on them; they frequently include changing the way options are presented or the way information is framed. Nudge-based interventions have shown promise in encouraging environmentally-conscious behaviour.
After the nudge, we asked about your emotional response to your assigned poster in order to gauge whether this response related to your inclination towards reusable mug usage. According to past research (Luo et al., 2022), we hypothesized that being exposed to an animal nudge would significantly increase self-reported likelihood of reusable mug usage. Additionally, the animals selected were ones that are perceived as having higher cognitive abilities than others. Dolphins and sea turtles are among the top-ranked in this metric for the mammal and reptile category, respectively (Callahan et al., 2021), which we presumed would elicit a higher empathetic reaction.
This study is in conversation with a larger body of research which seeks to learn more about how nudges can be helpful in promoting pro-environmental behaviours.
If you want to learn more or have any questions, please contact: Dr. Jiaying Zhao, the principal investigator. Dr. Zhao may be reached at (604) 827-2203 or jiayingz@psych.ubc.ca.

Callahan, M.M., Satterfield, T., & Zhao, J. (2021). Into the Animal Mind: Perceptions of Emotive and Cognitive Traits in Animals. *Anthrozoos*, *34*(4), 597–614.Luo, Y., Douglas, J., Pahl, S., & Zhao, J. (2022). Reducing Plastic Waste by Visualizing Marine Consequences. *Environment and Behavior*, *54*(4), 809–832.

Appendix C: Happiness

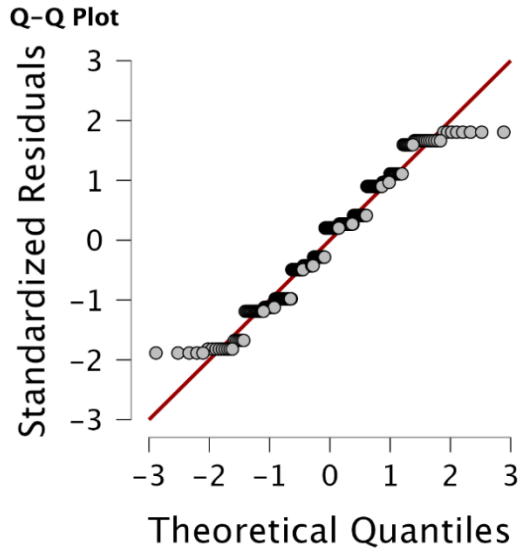
ANOVA - Happiness

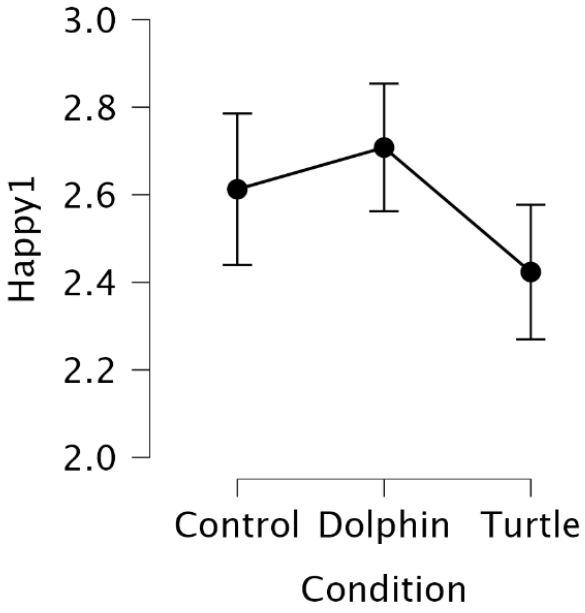
Cases	Sum of Squares	df	Mean Square	F	p	η^2	η^2_p	ω^2
Condition	3.619	2	1.809	0.866	0.422	0.007	0.007	0.000
Residuals	524.145	251	2.088					

Note. Type III Sum of Squares

Descriptives

Condition	N	Mean	SD	SE	Coefficient of variation
Control	80	2.612	1.547	0.173	0.592
Dolphin	89	2.708	1.375	0.146	0.508
Turtle	85	2.424	1.417	0.154	0.585


Q-Q Plot
Standardized Residuals
3
2
1
0
-1
-2
-3
-3 -2 -1 0 1 2 3
Theoretical Quantiles


Happy1
3.0
2.8
2.6
2.4
2.2
2.0
Control Dolphin Turtle
Condition

Appendix D: Distress

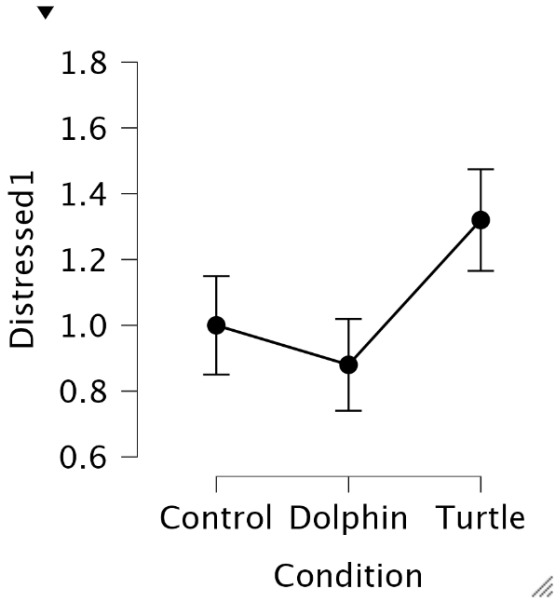
ANOVA - Distress

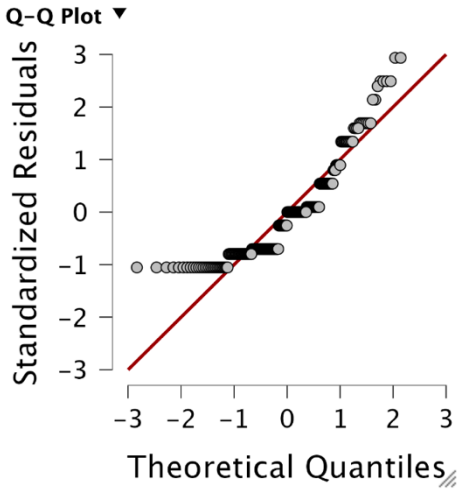
Cases	Sum of Squares	df	Mean Square	F	p	η^2	η^2_p	ω^2
Condition	7.728	2	3.864	2.427	0.091	0.022	0.022	0.013
Residuals	342.240	215	1.592					

Note. Type III Sum of Squares

Descriptives - Distress

Condition	N	Mean	SD	SE	Coefficient of variation
Control	68	1.000	1.234	0.150	1.234
Dolphin	75	0.880	1.208	0.139	1.372
Turtle	75	1.320	1.337	0.154	1.013


1.8
1.6
1.4
1.2
1.0
0.8
0.6
Distressed1
Control
Dolphin
Turtle
Condition


Q-Q Plot
Standardized Residuals
3
2
1
0
−1
−2
−3
−3
−2
−1
0
1
2
3
Theoretical Quantiles

Appendix E: Empathy

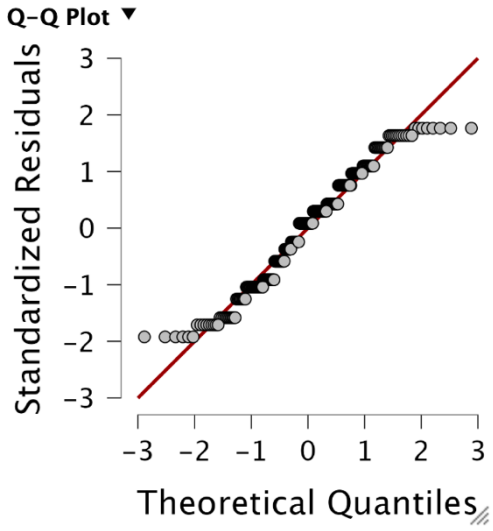
ANOVA - Empathy

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η^2_p	ω^2
Condition	10.147	2	5.074	2.238	0.109	0.017	0.017	0.010
Residuals	575.767	254	2.267					

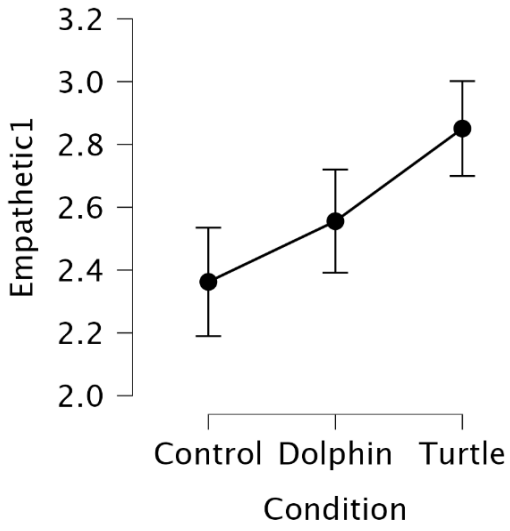
Note. Type III Sum of Squares

Descriptives - Empathy

Condition	N	Mean	SD	SE	Coefficient of variation
Control	80	2.362	1.545	0.173	0.654
Dolphin	90	2.556	1.559	0.164	0.610
Turtle	87	2.851	1.410	0.151	0.495



Descriptives plots



Appendix F: Likelihood

ANOVA

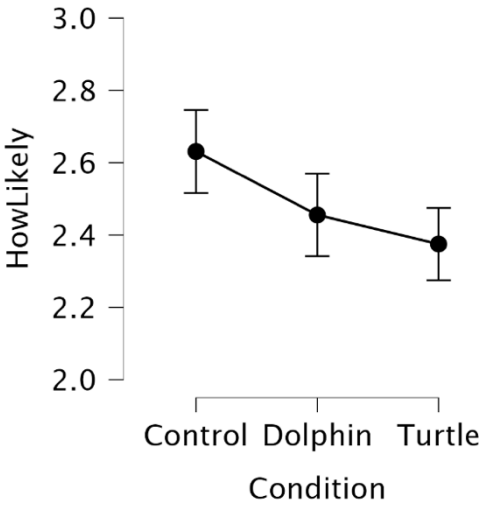
Cases	Sum of Squares	df	Mean Square	F	p	η^2	η^2_p	ω^2
Condition	2.932	2	1.466	1.393	0.250	0.011	0.011	0.003
Residuals	272.507	259	1.052					

Note. Type III Sum of Squares

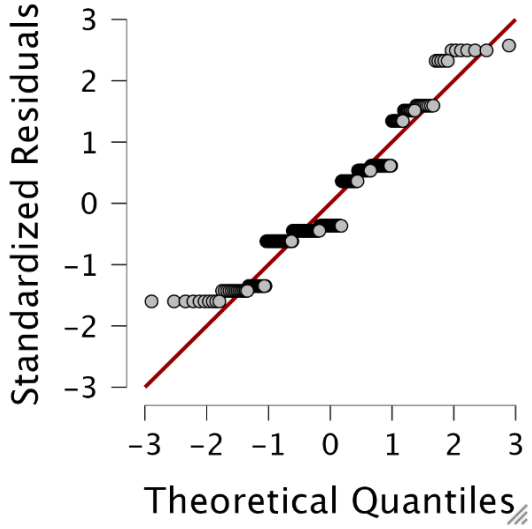
Descriptives

Condition	N	Mean	SD	SE	Coefficient of variation
Control	84	2.631	1.050	0.115	0.399
Dolphin	90	2.456	1.083	0.114	0.441
Turtle	88	2.375	0.938	0.100	0.395

Descriptives plots



Q-Q Plot ▼



Appendix G

Barriers	**Number of responses**	**Percentage of responses (%)**
Financial - purchasing a reusable mug is expensive	74	22.6
Forgetfulness - I struggle to remember my reusable mug	194	59.1
Inconvenience - in terms of cleaning/maintenance/carrying around	174	53
Hygiene - concerns about hygiene or cleanliness of mug	63	19.2
Preference - for taste or experience of beverage in disposable cups	17	5.2
Perceived stigma - embarrassment associated with carrying a reusable mug	9	2.7
Limited availability or accessibility - lack of refill stations or discounts for using reusable mugs	53	16.2
Other	8	2.4

Appendix H

Motivators	**Number of responses**	**Percentage of responses (%)**
Environmental - awareness and concern for reducing waste	224	68.3
Financial - cost savings over time/discount or incentives when using reusable mugs	137	41.8
Aesthetic appeal - design of reusable mug	117	35.7
Convenience - carrying or using the mug	87	26.5
Social - influence or peer pressure	45	13.7
Personal health considerations - e.g. avoiding chemicals in disposable cups	62	18.9
Others	5	1.5

Appendix I

Descriptive Statistics - Age

	Age
Valid	**260**
Median	**21.000**
Mean	**21.719**
Std. Error of Mean	**0.296**
Std. Deviation	**4.773**
Variance	**22.782**