

Fin-tastic Alternatives: The Impact of Animal Image and Messaging on Single-cup Use

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Executive Summary

Introduction

Our study aimed to measure the effects of exposure to an orca image and a short text depicting marine consequences on individuals' behavioral intentions to purchase single-use cups.

Research Question

How does an animal image and a short text affect people's intention to use single-use cups?

Methods

Participants (N=252) ranging from ages 16 to 69 were randomly assigned into one of the three conditions: image + text condition, text condition, and blank cup (control condition). We hypothesized that participants in the image + text condition would be less inclined to purchase the single-use cup in our study and were willing to pay less than the other conditions. We used a 7-point Likert scale measuring their willingness to purchase the cup and a scale ranging from 0 to 1 Canadian dollar regarding their willingness to pay.

Results

We found that participants in the text condition were less inclined to purchase the single-use cup than the control condition but not the image + text condition. There was no significant difference in the amount of money participants were willing to pay for the cup, which contradicted our hypothesis. This may be due to the study being conducted online and participants finding the orca image appealing.

Recommendations

Enhancing social media platforms regarding single-use cup impacts and promoting 5S principles could increase sustainability on campus.

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Introduction

An ongoing issue rising for the past decade is animals suffering from disposable items, prompting research into behaviors aimed at minimizing waste. As stated by Tate et al. (2014), priming, a psychological process in which initial stimulus exposure affects responses to later stimuli, is effective as prior exposure to pro-environmental messages leads to engagement in sustainable activities. Also, Small et al. (2007)'s study on individuals' intentions for donation, indicates that participants exposed to individuals' personal stories expressed more "sympathy" than those who read statistical stories in which they showed more "callousness." These studies illustrate the effectiveness of priming and personal narratives in directing intentions toward more environmentally friendly behaviors. However, they lack discussion regarding individuals' thoughts towards animals experiencing harm. This knowledge gap underscores a potential area of focus for our study: highlighting the challenges faced by wildlife due to waste as a motivator for individuals to adopt more sustainable practices.

Previous research on the relationship between "marine birds" and "plastic debris" in Canada found that almost half of the birds consumed plastic debris, which is detrimental not only to birds but also to wildlife in general (Provencher et al, 2015). In fact, instead of biodegrading upon exposure to heat, plastic waste reduces in size and remains in wildlife habitats (Provencher et al, 2015). The finding is relevant to our research due to its focus on the environmental impact of disposable waste on animals. In addition, Luo et al. (2022)'s study on the effects of presenting oceanic animals in harmful circumstances on behaviors of "reducing plastic waste" indicated that people are willing to use less plastic after viewing an image of a marine animal suffering in plastic debris with signage that advocates for reductions in plastic use.

Although these studies provide important suggestions for reducing plastic waste, single-use paper cups have been an issue that caused environmental consequences for animals and humans worldwide. Evidence from Botsman and Rogers (2010) highlights that while plastic debris does have an impact on our society, single-use containers are a harmful contributor that almost saturates our entire continent. In addition, according to barista employees in Canada, single-use cups are often observed being disposed of in landfills rather than being recycled as intended (Johnson, 2015). Since single-use cups also negatively impact animals' habitats, we aim to conduct a study measuring people's intentions towards single-use cups by using visual imagery as a priming mechanism to reduce usage.

Research Question and Hypothesis

Due to limited research on individuals' evaluation of single-use cups, our research question aims to assess how an animal image and a short text affect people's intention to use single-use cups. Drawing on previous studies, we hypothesized that presenting visual information highlighting the environmental impact of single-use cups would foster empathy among participants, reducing their inclination to purchase the cup and lowering the monetary value they assign to it. We featured an orca image as the manipulation for the study, as it is a marine species well-recognized around the world. Given its significance and familiarity, we anticipated that it would be most impactful for modifying behavior. As previously shown in Luo et al.'s (2022) study, the reduction in plastic waste was shown mostly within the image and signage condition, thus, we hypothesized that participants in the image and text describing negative marine life consequences would be less inclined to purchase single-use cups compared to those in the text condition or the control condition (a blank single-use cup without image and text). We also planned to assess individuals' willingness to pay and hypothesized that participants in the image + text condition would pay less than those in the text and control conditions.

Methods

Participants

Our study's parameters involved comparing means across conditions. Hence, a priori power analysis for a one-way ANOVA F-test was chosen to determine our target sample size using the G*Power tool. Based on a minimum effect size of $f = .2$, power = .8, and alpha = .05 for three between-subjects conditions, we aimed to recruit a total of $N = 246$ participants to ensure adequate statistical power. Our study consists of 252 respondents who ranged in age from 16 to 69 years ($M = 28.23$, $SD = 12.56$). Among the sample, 93 were men, 146 were women, 3 were non-binary individuals, 5 participants preferred not to answer, and 5 did not respond. Also, 106 respondents were UBC students, 2 were UBC faculty members, 19 were UBC alumni, 119 were not from the UBC community, and 6 did not answer.

Conditions

Participants were randomly assigned to one of the three between-subjects conditions while imagining themselves ordering a drink at a coffee shop. The independent variable in the study is the visual stimulus presented on the single-use cup during the hypothetical scenario. In the two experimental groups, participants saw a coffee cup with information about the environmental impact of single-use cups. Participants in the image + text condition viewed the cup with an image of an orca with the text "Orcas need clean water, not cups". Those in text condition saw the text with no image. For our control condition, participants viewed a blank cup without images and text.

Measures

The dependent variable is the participants' behavioral intention to purchase the single-use cup presented in the study. We operationalized it as a willingness to purchase, which was measured by asking participants to rate two questions: "How likely would you purchase this single-use cup?" using a 7-point Likert scale (1 = extremely unlikely, 7 = extremely likely) and "How much are you willing to pay for this single-use cup?" on a scale ranging from 0 to 1 CAD. We selected these questions because they directly assessed participants' intentions regarding single-use cup purchases. The 7-point Likert scale was chosen to capture the nuances in participants' views on purchasing the single-use cup, facilitating self-reflection. The question of how much participants are willing to pay evaluates whether their purchase intent aligns with their valuation of the cup's worth. This effectively links the participants' subjective intent to buy the single-use cup with an objective measure of its value.

Procedure

The online survey was conducted on UBC Qualtrics. Participants were first made to provide consent before being randomly assigned to one of three between-subjects conditions. After being exposed to their assigned condition, participants were asked two questions about their willingness to purchase and the amount of money they would like to pay for the single-use cup in

the study. The last section of the survey included optional demographic questions regarding age, gender, and affiliation to UBC. The survey was conducted for approximately three weeks spanning from March 7th to March 25th. Participants were recruited online through social media platforms and in person through QR codes. We did not encounter any challenges during data collection.

Results

Descriptive Statistics

Among 252 participants, 83 were assigned to the control condition, 82 to the text condition and 87 to the text + image condition. In response to the willingness to purchase the single-use cup (Question 1), the image + text condition had a mean of 3.55 ($SD = 2.07$), while the text condition had a mean of 3.20 ($SD = 2.05$) and the control condition had a mean of 4.33 ($SD = 2.23$). For Question 2, which assesses the amount of money that participants were willing to pay, the image + text condition had a mean of \$0.27 ($SD = 0.27$), while the text condition had a mean of \$0.24 ($SD = 0.26$) and the control condition had a mean of \$0.31 ($SD = 0.30$).

Inferential Statistics

Test of Homogeneity and Normality

Question 1: How likely would you like to purchase this single-use cup?

We performed a test of homogeneity to assess whether variances were uniform across conditions. The result of Bartlett's test indicated that our data met the assumption of homogeneity in participants' willingness to purchase the single-use cup ($\chi^2 (2) = .75, p = .69$). Also, we conducted a Shapiro-Wilk test to ascertain the normality of the distribution of willingness to purchase the single-use cup. The result showed that our data significantly deviated from normality in the willingness to pay for the single-use cup ($W = 0.87, p < .01$).

Question 2: How much would you like to purchase this single-use cup?

A test of homogeneity was conducted for data collected in Question 2. The result of Bartlett's test showed equal variances in our data across conditions ($\chi^2 (2) = 2.24, p = .32$). A Shapiro-Wilk test indicated that the distribution of the amount of money that participants were willing to pay for the single-use cup departed significantly from normality ($W = 0.84, p < .01$).

Kruskal-Wallis Test and posthoc Dunn Test

Question 1: How likely would you like to purchase this single-use cup?

As our data violated the assumption of a one-way ANOVA, we ran a Kruskal-Wallis test to assess whether the difference in individuals' willingness to purchase this single-use cup was statistically significant among conditions. The result showed a significant difference between at least 2 conditions (test statistic = 12.077 (2), $p = .002, \eta^2 = .04$).

We performed the post-hoc Dunn test to determine which conditions were significantly different in participants' willingness to purchase the single-use cup. The result of the post-hoc analysis presented that the mean willingness to purchase the cup was significantly lower in the text condition than in the control condition ($p = 0.002$). However, no significant differences were found between the image + text condition and the control condition ($p = 0.05$) or the text + image condition and text condition ($p = 0.90$). Compared to the control condition, exposure to a short text describing the marine consequences of single-use cups is effective in decreasing individuals' willingness to purchase single-use cups in our study.

Question 2: How much would you like to purchase this single-use cup?

Our data violated the assumption of a one-way ANOVA due to the significant p-value in the test of normality ($p < .01$). Thus, we performed a Kruskal-Wallis test to assess whether the difference in the amount of money that participants were willing to pay for the single-use cup in the study was significant among conditions. The result showed that the effect of exposure to an orca image and a text describing the environmental impact of using this single-use cup was not significant (test statistic = 2.48 (2), $p = .29$, $\eta^2 = .002$).

The statistical findings did not support our hypothesis. We predicted that participants in the image + text condition would be less willing to purchase and pay less for the single-use cup in our study. However, we did find that participants in the text condition significantly decreased their willingness to purchase the cup than those in the control condition. Also, no statistically significant differences were observed in the amount of money participants were willing to pay across the three conditions.

Discussion

Our study provides psychological insight into the effectiveness of a printed short text and image in describing the negative marine life consequences of single-use cups in discouraging individuals from purchasing the cup. We found that participants who were exposed to the text demonstrated a lower level of willingness to purchase the cup than those who viewed a blank single-use cup presented in our experiment. However, the results from the statistical analyses indicated that compared to those in the control condition, providing the participants with an image in addition to the text did not significantly weaken their intention to purchase the cup. Our findings did not support our prediction that subjects who were exposed to both image and text would show the lowest inclination to purchase the cup. The difference in findings could be attributed to the presence of confounding variables in our study. For instance, participants may find the orca image appealing, which increased their intention to purchase the single-use cup shown in our study. Alternatively, the image possibly lacked the emotional impact to evoke a stronger reaction from participants, leading to indifference in outcomes between the two conditions. Thus, it is essential to conduct a pilot study to ensure that our manipulations are effective to achieve the desired effect. Future studies could evaluate the impact of utilizing different marine species such as sea turtles, seabirds, and corals, particularly in imagery and text. Additionally, in light of our findings, images that explicitly show these animals being impacted by single-use waste may elicit a stronger reaction.

This study has several limitations that point to potential avenues for further research. University students, who are often “more receptive to environmental manipulations” than the general public, may be more readily primed by our independent variables (Tate et al., 2014). Thus, our convenience sample may cause range restriction, which leads to misleading results that decrease the external validity of our study. Researchers could replicate the study on a large, diverse sample to strengthen generalizability.

Our study's limitation also extends to its characteristics and data collection methodology. Specifically, our survey did not adequately capture the psychological processes influencing participants' willingness to buy single-use cups. Hence, future research should incorporate questions measuring participants' emotions post-manipulation. Furthermore, our reliance on a hypothetical scenario means self-reported purchasing intentions may not mirror actual behaviors. Conducting a similar study in real-life contexts enhances the external validity of our results.

Recommendations

Based on our findings, we suggest integrating a concise environmental message of less than 10 words on single-use cups offered on campus. This message should highlight the negative environmental impacts of single-use cups, which may decrease individuals' willingness to purchase these cups and raise awareness of sustainable practices on campus. These messages do not necessarily have to be on the cups but should be prominently displayed so customers can easily see them whenever they make a purchase decision. Regular exposure to such messages can prime individuals, gradually motivating them to select more sustainable choices.

We also suggest conducting a naturalistic observational study with campus coffee shops such as Blue Chip and Loafe Cafe to track customer behaviors regarding single-use cup purchases. The study would compare purchases during a baseline period, before interventions, to an intervention period with visible environmental messages. UBC could also use social media platforms to highlight the impacts of single-use cups and encourage participation. This study would help determine the effectiveness of messaging in promoting sustainable consumer choices.

Implementing the 5S principles, including Sort, Set in Order, Shine, Standardize, and Sustain, across UBC's facilities can significantly enhance sustainability campus-wide. This systematic approach involves organizing resources efficiently, establishing protocols, and fostering a culture of sustainability on campus.

Our recommendations for UBC include integrating concise environmental messages on single-use cups to encourage the usage of more sustainable alternatives, conducting observational studies with local coffee shops to assess consumer responses, and implementing the 5S principles across campus facilities to promote sustainability. These measures, collectively, are expected to contribute to UBC's sustainability goals by reducing single-use cup consumption.

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Appendices

Appendix A: Qualtrics Survey Questions

Appendix A1: Consent form

Class Research Projects in PSYC 421 - Environmental Psychology

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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

Do you consent to participate in the study?

- ☐ Yes
☐ No

Appendix A2: Single-use Cup in the Image + Text Condition

Imagine yourself ordering a drink at a coffee shop.

The staff asks you whether you would like to purchase this single-use cup.



Appendix A3: Single-use Cup in the Text Condition

Imagine yourself ordering a drink at a coffee shop.

The staff asks you whether you would like to purchase this single-use cup.



Appendix A4: Single-use Cup in the Control Condition

Imagine yourself ordering a drink at a coffee shop.

The staff asks you whether you would like to purchase this single-use cup.



Appendix A5: Survey Questions

Q1



How likely would you like to purchase this single-use cup?

- ☐ Extremely unlikely
- ☐ Moderately unlikely
- ☐ Slightly unlikely
- ☐ Neither likely nor unlikely
- ☐ Slightly likely
- ☐ Moderately likely
- ☐ Extremely likely

☐ Q2



How much are you willing to pay for this cup?



Appendix A6: Demographic Questions

Q3

What is your age? (Please enter your age. Enter "NA" if you are not comfortable to answer.)

Q4

What is your gender?

- ☐ Male
- ☐ Female
- ☐ Non-binary
- ☐ Prefer not to disclose
- ☐ Prefer to self-describe

Q5

Are you a UBC community member?

- ☐ UBC student
- ☐ UBC staff
- ☐ UBC alumni
- ☐ Not from UBC community

Appendix B: Results (Descriptive Statistics)

Table 1. Demographic characteristics of the sample.

	Full Sample		Control		Text		Text + Image	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Gender ^a								
Female	146	59.1	50	20.2	49	19.8	47	19.0
Male	93	37.7	31	12.6	28	11.3	34	13.8
Non-binary	3	1.2	1	0.4	1	0.4	1	0.4
Prefer not to answer	5	2.0	1	0.4	3	1.2	1	0.4
Affiliation ^b								
UBC Students	106	42.9	39	47.0	32	39.5	35	42.7
UBC Faculty	2	0.8	1	1.2	1	1.2	0	0.0
UBC Alumni	19	7.7	8	9.6	7	8.6	4	4.9
Outside UBC	119	48.2	35	42.2	41	50.6	43	52.4

Note. Total *N* = 252 excluding responses marked as NAs. The average age of participants was 28.23 years (SD =

12.56), with no significant difference in age across the conditions.

^a 5 participants were excluded due to absence of response.

^b 6 participants were excluded due to absence of response.

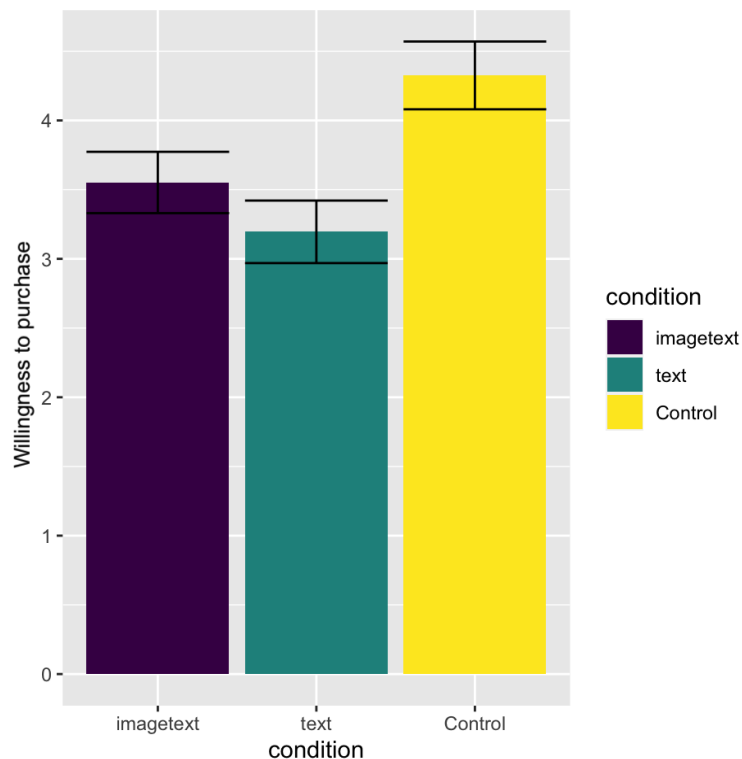
Table 2. Descriptive Statistics of Willingness to purchase and Willingness to pay for single-use cups by condition.

Variable	Willingness to purchase ^a			Willingness to pay ^b	
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Control	83	4.33	5.00	0.31	0.30
Text	82	3.20	2.05	0.24	0.26
Image + Text	87	3.55	2.07	0.27	0.27

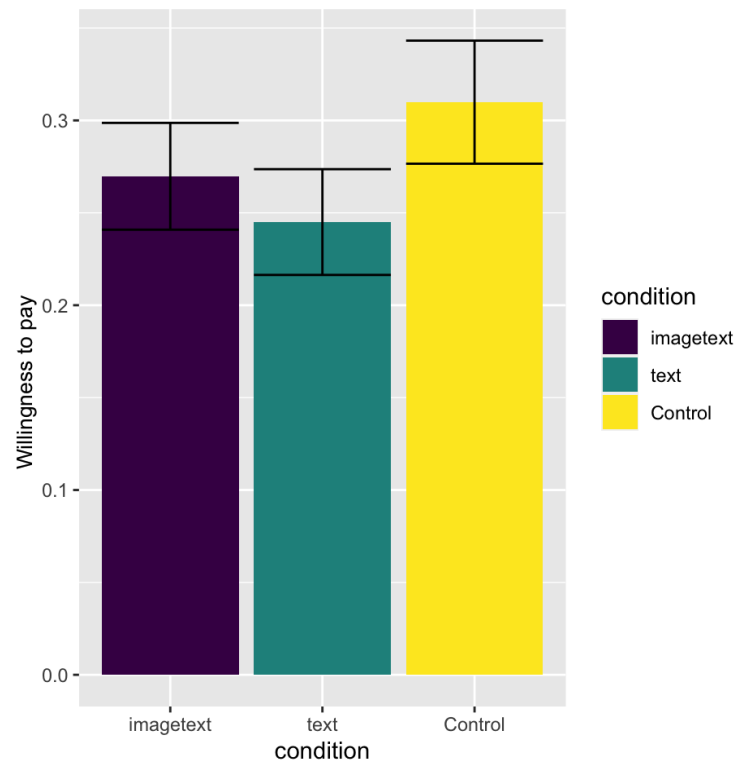
Note. M = Mean score; SD = standard deviation.

^a Responses measured on a Likert scale ranging from 1 (very unlikely) to 5 (very likely)

^b Responses measured on a monetary scale ranging from 0 to 1 CAD.

Appendix B1: Bar Graph of Descriptive Statistics for Willingness to Purchase

Appendix B2: Bar Graph of Descriptive Statistics for Willingness to Pay



Appendix C: Results (Tests of Assumptions of One-Way ANOVA)

Table 1. Bartlett's Test of Homogeneity for Willingness to purchase and Willingness to pay.

Variable	χ^2	df	p
Willingness to purchase	.748	2	.688 ***
Willingness to pay	2.244	2	.326 ***

Note. χ^2 = chi-square statistic ; df = degrees of freedom.

*** $p > .05$ indicates that there is no significant violation of the assumption of equal variances for both variables.

Table 2. Test of Normality (Shapiro-Wilk) for Willingness to purchase and Willingness to pay.

Variable	W	p
Willingness to purchase	.867	< .001 *
Willingness to pay	.842	< .001 *

Note. W = test statistic.

* $p < .05$ indicates that the assumption of normality is rejected for both variables.

Appendix D: Results (Inferential Statistics)

Table 1. Kruskal-Wallis Test for Willingness to purchase and Willingness to pay

Variable	Kruskal-Wallis Test			
	H	df	p	η^2
Willingness to Purchase	12.077	2	.002**	.04
Willingness to Pay	2.48	2	.289	.002

Note. H = test statistic ; df = degrees of freedom , η^2 = effect size.

* $p < .05$. ** $p < .01$.

Table 2. Post Hoc Analysis (Dunn Test) for Willingness to purchase

Post-hoc Comparisons ^a	p
Text vs. Control	.002**
Image + Text vs. Text	.902
Image + Text vs. Control	.050 *

Note. * $p < .05$. ** $p < .01$.

^a Post-hoc analyses were performed solely on the willingness to purchase variable, as the Kruskal-Wallis test showed no statistically significant differences among groups in terms of willingness to pay ($p \geq 0.05$).