

UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

Examining the Impact of Environmental Messaging on Behavioural Intentions

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Executive Summary

The Social Ecological Economic Development Studies (SEEDS) program is devoted to advancing environmentally responsible practices and encouraging innovation in sustainability at the University of British Columbia (UBC). To examine whether pro-environmental messaging impacts behavioural intentions, a between-subjects study design was conducted in UBC at the Vancouver campus. We were interested in determining whether exposure to a video showing the negative environmental impact of single-use coffee cup waste would be an effective nudge to reduce disposable cup use. We examined whether participants exposed to this sensory cue differed from participants who viewed a neutral video that was not environmentally charged. We also examined any difference between the two groups in regard to identified environmental concern, perceived environmental impact of disposable cups, and interest in environmental issues. Our analysis showed no statistically significant differences between the two groups, which may be due to a small sample size. However, the trends of the results revealed possible differences if a larger sample size had been employed for the study.

Keywords: reusable mugs, disposable cups, environmental messaging, sustainable behavioral intentions, visual cues.

Introduction

The University of British Columbia community considers sustainability as a core value and commits to integrating the principle into all aspects of life, including waste reduction of single-use food wares like cups (UBC report, 2011). In 2017, UBC's food sector produced 1.7 million disposable coffee cups, and 1.2 million lids. The city of Vancouver goes through 2.6 million disposable cups waste every week, an issue that has been addressed in the city's plan to become a zero-waste city by 2040, in part through discontinuing single-use food ware items. Single-use coffee cups cannot be recycled as paper due to the interior polyethylene lining. Those cups are difficult to be recycled because of several reasons such as economic (high cost), technical (limited companies), and social/external (students who are not engaging in waste sorting). Therefore, a high amount of disposable cups ends up being toxic waste that continues to accumulate in our landfill and oceans (Poortinga & Whitaker, 2018). UBC proposes the Zero Waste Action Plan (ZWAP) which aims to cut down 80% of food wares by 2030. In order to achieve this goal, UBC's Social Ecological Economic Development Studies (SEEDS) Program provides a platform for students to engage in practices with staff or professors to develop and implement projects that can contribute to campus sustainability.

As students in Environmental Psychology, we attempted to add an easily implementable intervention as an addition to the existing tactics in place to promote sustainability-minded behaviours towards disposable coffee cups. Current strategies in effect at UBC include the 25 cents surcharge for single-use coffee cups. In our study, we attempted to address the importance of environmental consciousness towards waste reduction practices. The Theory of Planned Behaviour posits that intention is the most reliable predictor of behavioural change, and that intention is influenced by three factors: attitudes towards the behaviour, subjective norms and perceived behavioural control (Ajzen, 1991). Subjective norms are based on our perceptions of the expectations of significant people in our lives; perceived behavioural control is based on the extent to which one believes one is able to change (Steinmetz, Knappstein, Ajzen, Schmidt, and Kabst, 2016). A change in these three factors can result in a change in intentions. The three

factors reflect beliefs, and interventions based on the Theory of Planned Behaviour target these beliefs (Steinmetz, et al., 2016). Intention accounts for 24% of behavioural variance (Steinmetz, et al., 2016) and acts as the best predictor of behavior (Morris, Marzano, Dandy, O'Brien, 2012). An effective intervention should increase beliefs of positive outcomes and decrease beliefs of negative outcomes (Steinmetz, et al., 2016). A three-level meta-analysis (Steinmetz, et al., 2016) found an effect size of .50 in 83 selected papers reporting 123 interventions based on the theory of behaviour. The effectiveness of interventions based on the Theory of Planned Behaviour and the importance of behaviour change in addressing environmental concerns provided us with the psychological insight that the change in behavioural beliefs on the use of reusable cups could change intentions towards increased reusable cup use. Behrend et al. (2009) found that environmental messages can even affect a person's intention in job pursuits. Meanwhile, another study by Poortinga & Whitaker (2018) obtained success in a long-term increase (33.7%) of usage of reusable cups after the addition of behavioural measures in conjunction with a coffee cup surcharge. Thus, we posed the question of whether environmental messages can be applied into boosting usage rate of reusable mugs and reducing the use of single-use cups. In other words, this report is interested in whether the delivery of pro-environmental messaging through visual cues has an impact on behavioral intentions and environmental concern. We hypothesized that participants who watch a video regarding negative environmental impacts of paper cups will expect to use reusable mugs more often, report higher interest in environmental issues, show a higher concern for environmental issues, and perceive a higher negative impact of paper cups.

Methods

Participants

We targeted the issue specifically on campus hence the study only sampled the UBC population. Our inclusion criteria were undergraduate and graduate students, and staff who belong in UBC while above 18 years old. Furthermore, the approach of limited sampling because it was more convenient to be approached in-person on campus, the data analysis could be more practical for the SEEDS program, the study would be strengthened by minimizing the variance of sample since the subjects own similar education background and enough cognitive function for completing the survey. The power calculation was derived from an effect size of 0.445. For a power of 0.8 and an alpha level 0.05, our minimum sample size was supposed to be 166, with at least 83 subjects in each group. However, at the end 52 UBC participants were recruited. 38 were in the experimental group, 14 were in the control group. Among the participants, there were 8 males and 44 females. 14 were domestic students, 34 were international students, and 3 were classified as others. 84% of them were between 18 to 24 years old. 16% were between 24 to 19 years old.

Conditions

The study is a between-subjects design. There were two conditions and participants were randomly assigned to either one. The experimental condition consisted of watching a minute-long video about the negative impact of disposable coffee cups on the environment and then answering the short survey immediately after. The control condition consisted of watching a minute-long video about the production of disposable coffee cups with no pro-environmental messaging nor connotations. After watching it, participants in this condition also answered the same survey (see Appendix 2).

Measures

Multiple-choice questions were employed to measure the dependent variables, which are expected frequency of reusable mug use, interest in environmental issues, identified environmental concern, and perceived impact. Self-reported change in intentions and concerns towards sustainability efforts were operationalized as expected frequency of reusable mug use (i.e., “Going forward, how often do you plan to bring your mug on campus?”), interest in environmental issues (i.e., “Please rate your interest in environmental/climate issues.”), identified environmental concern (i.e., “Do you agree with this statement: the use of disposable beverage cups is a major problem for the environment.”), and perceived impacted (i.e., “How serious do you believe the impact of disposable cups is on the environment?”). These questions reflect the awareness towards intentional behaviours and beliefs in the Theory of Planned Behaviour. Meanwhile, we measured the subjects’ knowledge and current reasons for personal usage of disposable and reusable cups.

Procedure

Initial data collection began in person at the Irving K. Barber Learning Centre, but the onset of COVID-19 protective measures resulted in a shift to exclusively online data collection. Fourteen participants were recruited from the centre, and the remainder were recruited online. Our survey was developed and distributed using the Qualtrics platform. It included questions concerned with current behaviours regarding hot beverage purchases on campus and intended behaviours on switching to disposable cups. It also addressed support of and intent to comply with UBC’s efforts to increase reusable cup use, among others. In total, the data collection ran for three weeks. We used an incentive to motivate people to participate in our study, which consisted of a \$25 gift card for food services. There were 38 subjects in the experimental group and 14 subjects in the control group. Among them, 14 subjects were recruited in person and the rest of the participants were recruited online. After signing the consent, the experimental group watched a one-minute-long video regarding negative environmental impacts of disposable coffee cups, which attempted to deliver the pro-environmental messages that overloaded single-use cups are contaminating the planet. This was our independent variable. On the other hand, the control group watched a minute-long video showing the production of paper cups, which contained neutral or non-environmental connotations. After watching the video, participants in both groups answered the same short survey on Qualtrics. The survey required less than 10 minutes to complete and included 14 questions. Links to the videos and consent forms were attached to the survey and uploaded to social media platforms. The survey remained online for a period of two weeks. Overall, response to our survey was low. We also saw an imbalance in the relative size of the two groups, and an overall sample size smaller than the minimum of 166 prescribed for our study.

Results

The t-test showed that the results are not statistically significant since the p-value was higher than 0.05. We had four main findings (Table A&B). First, the experimental group which was exposed to pro-environmental messages ($M=2.37$, $SD=0.97$) compared to the control group which received neutral messages ($M=2.57$, $SD=0.85$) demonstrated a lower intention in future expected frequency of reusable mug use, $t(50)=-0.69$, *Cohen's d*=-0.22, $p=0.49$ (Figure 1). This directly contradicted our prediction. Second, the experimental group ($M=1.71$, $SD=0.61$) compared to the control group ($M=1.79$, $SD=0.58$) exhibited a lower interest in environmental

issues, $t(50) = -0.40$, *Cohen's d* = -0.12, $p = 0.69$ (Figure 2). Third, the experimental group ($M=1.97$, $SD=0.92$) compared to the control group ($M=1.71$, $SD=0.61$), expressed a higher concern in identified potential damage that cause by the single-use cups, $t(50)=0.98$, *Cohen's d* = -0.306, $p = 0.33$ (Figure 3). Fourth, the experimental group ($M=1.71$, $SD=0.56$) compared to the control group ($M=1.85$, $SD=0.54$) exhibited a lower interest in environmental issues, $t(50) = -0.84$, *Cohen's d* = -0.26, $p = 0.40$ (Figure 4).

In conclusion, the results for the main measurements of three out of the four we tested are not in line with our hypothesis; only the identified environmental concern was higher in the experimental group. However, none of the results showed significance. The purpose of the report was promoting the reduction of the use of disposable cups while switching to reusable cups. Table A (see Appendix 1) shows the results of a t-test measuring statistical significance for our four variables of interest. Results for our descriptive analysis are shown in Appendix 1.

Discussion

Several challenges and limitations were present in our research. The small sample size and uneven sample sizes between each condition likely contributed to the observed lack of significant differences obtained in the results. Had we been able to examine a much larger sample, we might have even observed results consistent with our hypothesis. There was also some difficulty in maintaining a controlled study, since our in-person survey administration was cut short, and we continued with online surveys only. We had no way of determining whether participants had indeed watched the video, prior to responding to our self-report questionnaire. Another limitation is that we did not measure any baseline values in our variables of interest before the participants were exposed to the independent variable. Therefore, it is difficult to ascertain with some certainty that any change behavioural intention indeed occurred, and that the change was a result of the sensory cue. The inclusion of a pre-and-post design could have strengthened our study. The current situation with the COVID-19 outbreak also meant that many restaurants and cafes banned reusable mug use as a protective measure, and this may have influenced the observed responses. The imbalance of gender in the sample may also influence the response. Furthermore, the disruption of classes and on-campus activities posed constraints on our data collection.

The manner in which we measured behavioural intention could also be a source of uncertainty. Self-report responses present the risk of social desirability bias, which can undermine the validity of results. Additional limitations of our study are based on our underlying assumptions, including that behavioural intention is an accurate predictor of behavioural change. Studies have shown that behavioural intentions do not necessarily correspond to behavioural change. Furthermore, compliance with reusable mug strategies does not necessarily generalize to other environmentally conscious behaviours. Even if the results were consistent with our hypothesis, the findings might have held only for reducing disposable cup use or waste reduction in general, but not for other climate-harming habits that show higher resistance to change, such as frequent car use and meat consumption. Also, it is difficult to say whether any observed effects of visual cues on intended behaviours would endure past the time of exposure. It may be the case that the effects only last to the time of survey response.

Recommendations

Our analysis of the exploratory variables revealed some interesting insights that could prove useful to UBC's efforts at promoting sustainability practices on campus. Our study found

that most students agreed that UBC should devote more effort to reducing waste. This shows that students are demonstrating concern for environmental issues, and continued engagement of students on campus could accelerate the achievement of UBC's waste reduction goals. It was also found that the current campaigns on campus were perhaps not successful at raising awareness, as many participants were aware of only one or two campaigns about sustainability on campus. Future work should be aimed at determining the most effective methods to raise the profile of sustainability programs on campus and encouraging increased involvement from students and the campus community at large. When students were asked about their main reason for switching to reusable mugs, many participants pointed to waste reduction as the primary motivator. Continued research into reducing the waste burden of single-use coffee cups on the environment, and an increased focus on waste reduction strategy implementation would be effective in having more students on board with campus efforts. Despite the promising hint that students are examining ways to reduce waste, however, convenience remained as the primary barrier to discontinuing the use of disposable coffee cups. Concerns of cleaning the mug were reported as the most inconvenient factor of using reusable mugs on campus. One program at UBC that aims to mitigate this issue is the Mug Share program (Collins et al., 2016). Continued monitoring of this recent program, and other sustainability efforts on campus, can provide insight into effective strategies for compliance and ensure long-term success in the reduction of single-use coffee cup waste.

Appendix

Appendix 1

* The table A shows the result of the independent samples t - test

Table A: Independent Samples T-Test

Independent Samples T-Test

	t	df	p	Cohen's d
Expected Freq. of Reusable Mug Use	- 0.690	50.00 0	0.49 3	-0.216
Interest in environmental issues	- 0.399	50.00 0	0.69 2	-0.125
Identified Environmental Concern	0.980	50.00 0	0.33 2	0.306
Perceived Impact	- 0.841	50.00 0	0.40 4	-0.263

*The table B shows the descriptive result of two groups. Group 1 represents the experimental group; Group 2 represents the control group.

Table B: Descriptives

Group Descriptives

	Grou	N	Mean	SD	SE
	p				
Expected Freq. of Reusable Mug Use	1	3	2.36	0.97	0.15
	2	8	8	0	7
Interest in environmental issues	1	1	2.57	0.85	0.22
	2	4	1	2	8
Identified Environmental Concern	1	3	1.71	0.61	0.09
	2	8	1	1	9
Perceived Impact	1	1	1.78	0.57	0.15
	2	4	6	9	5
Expected Freq. of Reusable Mug Use	1	3	1.97	0.91	0.14
	2	8	4	5	8
Interest in environmental issues	1	1	1.71	0.61	0.16
	2	4	4	1	3
Perceived Impact	1	3	1.71	0.56	0.09
	2	8	1	5	2
Identified Environmental Concern	1	1	1.85	0.53	0.14
	2	4	7	5	3

The four main measurements:

Figure 1: The descriptive plot for expected frequency of reusable mug use.

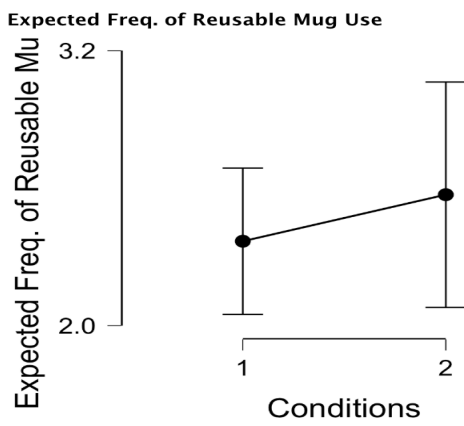


Figure 2: The descriptive plot for interest in environmental issues.

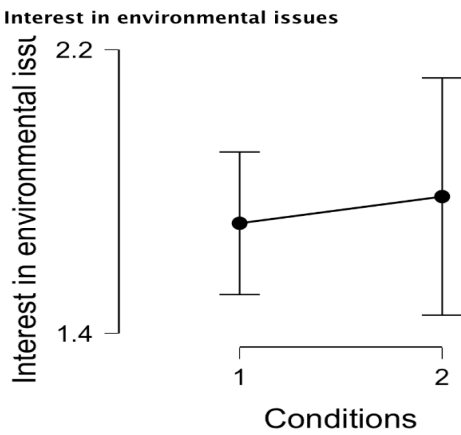


Figure 3: The descriptive plot for identified environmental concern.

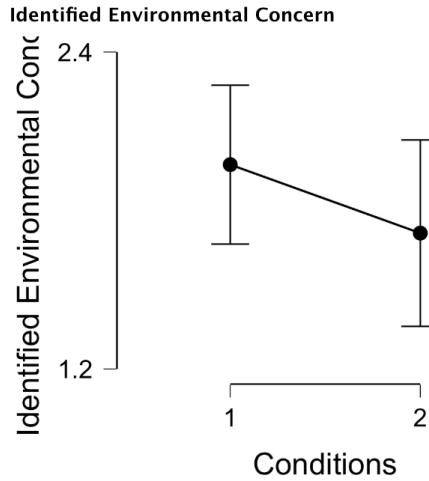
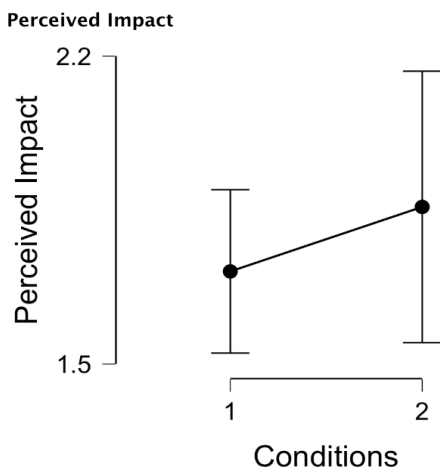
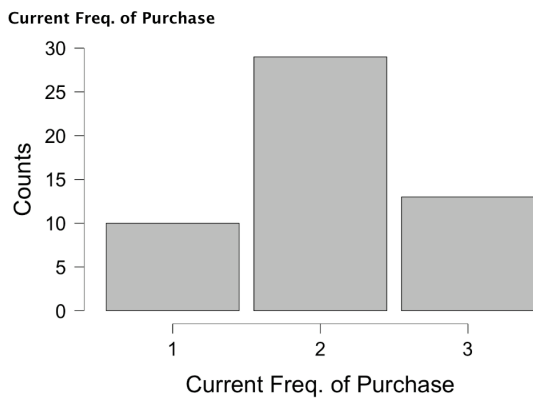


Figure 4: The descriptive plot for perceived impact

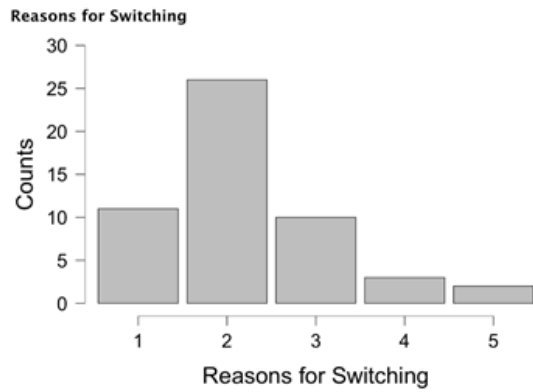


Descriptive Statistics for exploratory variables



1- None; 2 - One to three cups; 3 - Four to six cups

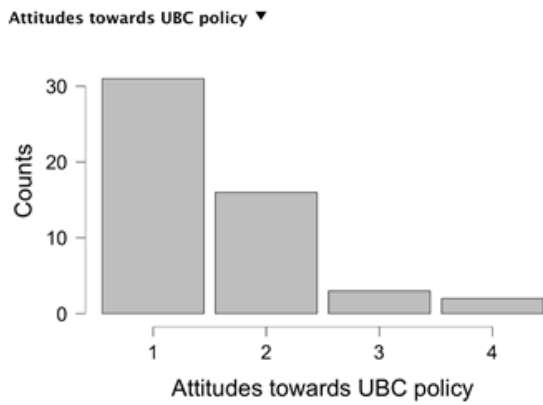
*When asked how often they bought hot beverages on campus, the majority reported 1-3 times per week, and others reported 4-6 cups per week, others reported none



1- ownership ; 2- reduce waste; 3- financial reasons;

4- other reasons; 5- no intent to use a mug.

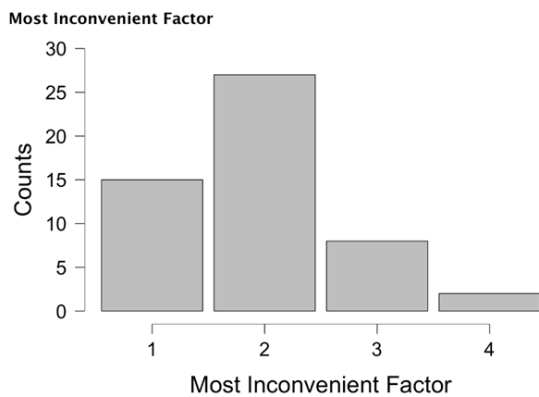
*The main reason for switching to reusable mugs across both groups was to reduce waste in the environment, followed by ownership (having a mug that suits taste and personality) and financial reasons (saving on disposable cup surcharges).



1-Agree; 2-Somewhat agree; 3-Somewhat disagree;

4-Disagree.

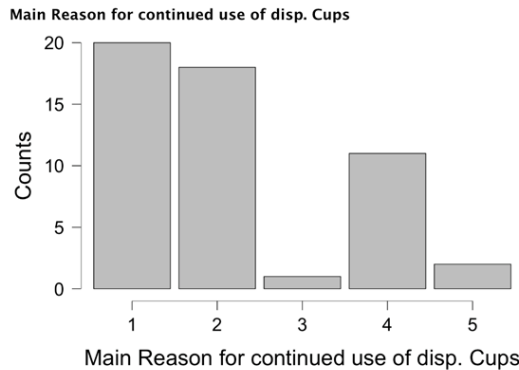
*Most people selected agree with that UBC needs to be devoting more effort to reducing waste on campus.



1- bulkiness; 2 - cleaning; 3 - misplacing mug;

4 - no intent to use a mug.

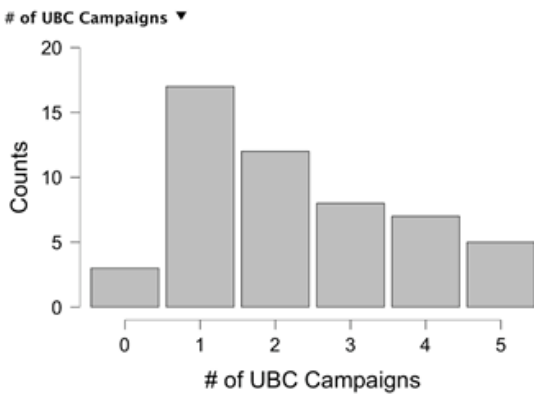
*Majority of students stated that it would be a hassle to keep cleaning the mug throughout the day.



1- convenience; 2- little consumption; 3- high cost

of mugs; 4- forgetting to bring mug; 5- no intent to continue using disposable cups

*Most participants reported the main reasons for continuing to use the disposable cups are convenience and low consumption in hot beverages on campus.



The numbers represent how many Campaigns

they have heard.

*When asked how many UBC sustainability campaigns they had heard of, most reported being aware of only 1 or 2 campaigns. The most well-known one was Sort it Out

Appendix 2

Videos.

- Experimental video: <https://www.youtube.com/watch?v=CijlvedzFt8>
- Control video: <https://www.youtube.com/watch?v=3vboPdSjjAo> with speed of 1.75x

Survey links.

- Control survey: https://ubc.ca1.qualtrics.com/jfe/form/SV_00LHpjho7KnLCq9
- Experimental survey: https://ubc.ca1.qualtrics.com/jfe/form/SV_dj7PkIxLuHqtOAd

Survey questions.

How many times a week do you purchase hot beverages (ie: coffee, tea) on campus?

- 0
- 1-3

- 4-6
- 7 or more

How likely is it that you will start using reusable mugs more often on campus?

- Very likely
- Somewhat likely
- Somewhat unlikely
- Not likely at all

What are your main reasons for switching to reusable mugs in the future?

- I would like to buy/use a mug that suits my taste and personality.
- I want to reduce waste in the environment.
- It makes more financial sense to me.
- Other reasons.
- I don't plan to use a reusable mug.

If you were to start using a reusable mug everyday on campus, what factor do you think would be

the most **inconvenient**?

- It might be too bulky and difficult to carry around
- It might be a hassle to keep cleaning the mug throughout the day
- I'm worried I will lose it
- Other

Going forward, how often do you plan to bring your own mug on campus?

- Every time I purchase a hot beverage
- Most of the time
- Sometimes
- Almost never/Never

To what extent do you agree with this statement: UBC needs to be devoting more effort to reducing waste on campus.

- Agree
- Somewhat agree
- Somewhat disagree
- Disagree

Please rate your interest in environmental/ climate issues.

- Very interested
- Somewhat interested
- Not interested
- I'm not sure

From UBC's campaigns for sustainable practices on campus, which ones have you heard about?
Check all that apply.

- Choose to Reuse

- Paper Cup Surcharge Campaign
- UBC Drinks Tap Water
- Sort it Out
- Cool Campus
- Be Water Wise
- Chill Up Challenge
- Seasonal Shutdown
- Mugshare
- None of the above

Do you agree with this statement: The use of disposable beverage cups is a major problem for the environment.

- Agree
- Somewhat agree
- Somewhat disagree
- Disagree

How serious do you believe the impact of disposable cups is on the environment?

- Very serious
- Somewhat serious
- Not really serious
- Not at all serious

What is the main reason that you will continue to use one-time disposable coffee cups?

- It's more convenient.
- I don't regularly drink hot beverages on campus.
- Reusable mugs are too expensive.
- I often forget to bring my own mug.
- None. I have no intention to keep using disposable coffee cups.

What is your age?

- 18-24
- 25-29
- 30-49
- 50+

Gender

- Gender
- Female
- Other

What is your status at UBC?

- Domestic student
- International student
- Faculty member
- Staff member

- Other

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Behrend, T.S., Baker, B.A. & Thompson, L.F. Effects of Pro-Environmental Recruiting Messages: The Role of Organizational Reputation. *J Bus Psychol* 24, 341–350 (2009). <https://doi.org/10.1007/s10869-009-9112-6>
- Lee, J. (2016). A study for increasing reusable and personal cup consumption in the coffee industry - Focused on behavior change with motivation -. *Journal of Korea Design Forum, null* (53), 327–340. doi: 10.21326/ksdt.2016..53.028
- Lucio, M., Giulia, R., & Lorenzo, C. (2018). Investigating Attitudes towards Water Savings, Price Increases, and Willingness to Pay among Italian University Students. *Water Resources Management*, 32(12), 4123–4138. doi: 10.1007/s11269-018-2049-7
- Morris, J., Marzano, M., Dandy, N., & O'Brien, L. (2012). Theories and models of behaviour and behaviour change. *Forest Research*.
- Poortinga, W., & Whitaker, L. (2018). Promoting the Use of Reusable Coffee Cups through Environmental Messaging, the Provision of Alternatives and Financial Incentives. *Sustainability*, 10(3), 873. Retrieved from <http://dx.doi.org/10.3390/su10030873>.
- Steinmetz, H., Knappstein, M., Ajzen, I., Schmidt, P., & Kabst, R. (2016). How Effective are Behavior Change Interventions Based on the Theory of Planned Behavior? *Zeitschrift Für Psychologie*, 224(3), 216–233. doi: 10.1027/2151-2604/a000255
- UBC campus. (2011). Annual Operational Sustainability Report in Vancouver Campus.
- UBC Sustainability. <http://www.sustain.ubc.ca/>