Through Ups and Downs: The Effect of Real-Time Feedback on Food Waste Behavior in a University Dining Hall

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SEEDS Sustainability Program

Executive Summary

Introduction

UBC Vancouver's all-access dining model implemented in 2022 has presented challenges to reducing post-consumer food waste. While informational feedback has been widely used to combat food waste behavior, there is a lack of research on the combined effects of informational feedback with other forms of interventions. Consequently, as part of UBC's goal to reduce food waste by 50% by 2030, our study examines how the combination of informational feedback and normative prompt can influence post-consumer food waste.

Research Question

How does signage displaying daily fluctuations in food waste (percent change) affect the total food waste weight in kilograms at an all-access dining hall?

Methods

We designed signs placed in three locations at Open Kitchen displaying daily food waste percentage change along with a prompt to reduce food waste. Our condition 1 is when there is a displayed decrease, and condition 2 is when there is a displayed increase. Over 14 days, food waste data from Open Kitchen was collected to update the percentage change in food waste.

Results

Results show that combining a normative prompt and feedback effectively reduces food waste at Open Kitchen, specifically by 40.5%. Furthermore, when comparing the effectiveness of a displayed decrease and a displayed increase, there are no statistically significant differences in food waste behavior.

Recommendations

We recommend that UBC dining halls display waste data in the three first year dining halls: Gather, Feast, and Open Kitchen. We also recommend that UBC continue collecting waste data so that future research can utilize a larger data sample which accounts for time-of-year as a confounding factor. UBC dining halls may also benefit from tracking waste in relation to dining options and adjusting their menus accordingly. Finally, we recommend the implementation of a food waste tracking system, such as LeanPath™, that provides data collection tools and analytics across UBC's dining halls.

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Introduction

Existing literature reveals a predominant reliance on informational interventions, such as informational feedback, both in practical campaigns against consumer food waste (FW) and academic literature on FW reduction.[8] Informational feedback provides relevant descriptive numerical data that gives individuals insight into their FW behavior. However, the effectiveness of informational feedback when presented alone is often limited, due to the absence of social comparison exposed to the individuals.[9, 10] Concurrently, studies advocate for the integration of combined interventions to enhance the effectiveness of informational feedback.[7, 9] This highlights a critical gap in current research, suggesting the need to explore the effectiveness of combining informational interventions with other interventions on influencing FW behavior.

Prompts are direct verbal or written reminders to perform or avoid certain behaviors, which has been shown to be one of the most effective intervention types for influencing FW reduction.[6, 9] Notably, prompts that convey obligatory directive messages are more effective than knowledge-based prompts.[9] Consequently, it is meaningful to explore the effect of the combination of informational feedback and prompt on overall FW production, specifically focusing on the combination of live informational feedback and obligatory directive prompt.

Moreover, informational feedback on FW behavior as descriptive numerical data can be categorized as either desirable or undesirable, depending on the amount of FW produced. Reporting desirable progress may have an unintended *boomerang effect* on individuals who already engage in the desired behavior, wherein the message induces further waste behavior, contradicting the intended direction of FW reduction.[7] Conversely, repeatedly reporting undesirable changes may lead to *learned helplessnes*s,[3] a failure to improve behavior brought on by the belief that a goal is unattainable. Thus, we also aimed to evaluate the difference in the effectiveness between desirable vs. undesirable informational feedback on affecting FW production.

Research Question and Hypotheses

Research Question

How does signage displaying daily fluctuations in food waste (percent change) affect the total food waste weight in kilograms at an all-access dining hall?

Hypotheses

Our first hypothesis (*H1*) states that the combination of feedback and normative prompt significantly affects post-consumer food waste. Our second hypothesis (*H2*) states that there will be a difference between the effectiveness of a displayed decrease versus a displayed increase on post-consumer food waste.

Method

Participants

Open Kitchen at Orchard Commons was chosen as the site for this experiment. Our participants consisted of mostly first-year UBC residents who use their mandatory All-Access Dining Plan to dine at Open Kitchen. The dining hall offers a door rate for non-residents, therefore we anticipated a variety of participants. After conducting an a priori power analysis (effect size = 0.2, $\alpha = 0.05$, power = 0.8, and 2 groups) (see Figure A1), the minimum sample size needed was 100 per condition ($N = 200$). We initially had 3 condition groups, requiring a minimum sample size of 82 per 3 conditions ($N = 246$). Hence, during the first 2 days of the 14 day intervention, we collected 82 samples per 3 conditions ($N = 164$). In the remaining 12 days, we collected 100 samples per 2 conditions daily ($N = 1200$). We have obtained a total of 1364 participants ($N = 1364$) for observation and collected 28 days ($N = 28$) of total FW data in kilograms (kg) over the course of the experiment. The day following the intervention period, we obtained an additional 95 participants ($N = 95$) as samples for a debrief survey.

Conditions

Our experimental conditions involved two variations of posters which were displayed depending on the amount of total FW (kg) produced. In our first condition: *display decrease*, decrease in FW (in percentage) from the previous day, and a green downward arrow was displayed. An additional smiley face was included to mitigate a boomerang effect.[3] In the second condition: *display increase*, increase in FW (in percentage) from the previous day, and a red upward arrow was displayed (see Figure A2). The arrow colors were chosen to clearly communicate that a decrease is desirable and an increase is not desirable. The normative prompt, design, and placement, were kept constant between conditions. Posters were strategically placed in locations with high foot traffic to maximize visibility prior to entering the food sorting station (see Figure A3). These specific locations were chosen in hopes of encouraging conscious consumption and disposal. Since our study had no control group, we obtained pre-intervention data for comparison.

Measures

To test for *H1*, we measured total FW in kilograms as the dependent variable. The total FW (kg) was obtained from Open Kitchen daily after business hours. The total FW (kg) data for the 14-day period preceding our intervention was provided by the Social Ecological Economic Development Studies (SEEDS) program to establish our baseline period for a total of 28 days ($N = 28$). 8 days were omitted due to missing data values (see Figure A4). For *H2*, to support the strength of the quantitative data of the FW (kg), qualitative data was collected using our FW behavior observation rating scale (see Figure A5) which rates participants on the amount of FW produced on-site to determine whether there is a difference in effect between the two conditions. Our scale ranged from 0 to 5 (0 = *no food waste*, 1 = *unavoidable food waste*, 2 = *cleaning plate*, 3 = *minimal food waste*, 4 = *moderate food waste*, 5 = *excessive food waste*). Inter-Rater

Agreement was assessed through Intraclass Correlation Coefficient (ICC) to measure the degree of agreements between two group members (observers) to validate the reliability of the scale (see Table B1).

Procedure

Intervention Food Waste Data Collection

Our intervention period began late-February until early-March 2024 where we managed to obtain FW (kg) data for 14 days. During the intervention, group members updated all three display posters daily to display either the green downward arrow (*display decrease*) or the red upward arrow (*display increase*) along with the numerical value (in percentage) to demonstrate either an increase or decrease in total FW (kg) per person. To update the posters with the correct value and condition, group members acquired the number of daily guests (see Figure A6) from the kitchen office and referred to the daily FW (kg) bins weighed (see Figure A7) after business hours (10 p.m.). Total FW (kg) was divided by the total number of guests to calculate the average food waste per person (AFWPP) in kilograms. The AFWPP (kg) difference is then divided by the AFWPP of the preceding day to calculate the change in FW which either results in an increase or decrease compared to the previous day (see Figure A8).

Observation Data Collection

During the intervention period, two observers rated participants who entered the sorting station area during dinner hours (7 p.m.) daily. Observers rated participants in 0.5 increments (e.g., 2.5 = 2-3) to account for parameters between whole numbers. Observation was conducted inside the second floor study room above the dining hall. The study room windows allowed observers to view participants entering and using the sorting station. We collected our samples using convenience sampling. Observers selected and agreed on rating the same participants (see Figure A9). Ratings are based on the quantity of food that participants discard. Not all participants who entered the sorting station were captured in the sample due to the busy nature of the dining hall. The duration of observation depended on when the total sample size (N = 100) was reached.

Survey

After the completion of the study, we conducted a debrief survey (see Figure C1) the following day on March 10, 2024, during lunch hour as a supplement to our study. The survey was constructed using Qualtrics provided by UBC. Group members distributed the survey through the use of quick response (QR) codes and by approaching potential participants in the vicinity of the dining hall. Only completed survey samples on March 10 were used (N = 95) in the final results (see Figure C2) while the remaining incomplete surveys were omitted. The purpose of the survey was to serve as a supplementary material to determine how often our posters were noticed and understood amongst the population.

Results

Hypothesis 1: Baseline vs. Intervention

To measure the effectiveness of signage with the combination of feedback and normative prompt significantly affecting FW, we conducted a Mann-Whitney U test to compare the difference in FW (kg) production between the baseline (N = 14, M = 0.11, SD = 0.07) and intervention (N = 14, M = 0.06, SD = 0.01) periods. The non-parametric test was used due to the violation of the normality assumption in our datasets based on the Shapiro-Wilk test result (*baseline:* W = 0.32, p <.001; *intervention*: W = 0.98, p = .94). We found that there was a significant difference in FW (kg) production between the two periods (U = 44, p = .01, r = 0.55, a moderate effect), baseline and intervention. This supports our hypothesis that displaying descriptive feedback alongside a normative prompt leads to a reduction in total FW (kg). The calculated mean across both periods also suggests that on average, FWPP was reduced by 40.5% during the intervention period, graphically represented with a box plot (see Figure B1).

Hypothesis 2: Display Decrease vs. Display Increase

To measure the difference in the effectiveness between the two conditions of the *display increase* and *display decrease* on FW, a Mann-Whitney U test is also conducted to compare the difference in FW (kg) production between the *display decrease* (N = 8, M = 0.0683, SD = 0.0114) and *display increase* (N = 6, M = 0.0576, SD = 0.0154). The non-parametric test was used due to the violation of the normality assumption in our datasets based on the Shapiro-Wilk test result (*Decrease:* W = 0.931, p = .523*; Increase:* W = 0.927, p = .558). The comparison yielded a non-significant difference between the two conditions of *display decrease* and *display increase* (U = 13, p = .181, r = 0.458) (see Table B6, Figure B2), which fails to support our hypothesis that there is a difference in the effectiveness between the two conditions.

Observation

To further examine the effectiveness of our intervention, we also analyzed the consistency of our observational rating data and the collected FW data. For the observational ratings, we first tested for inter-rater reliability by conducting an Intraclass Correlation Coefficient (ICC) analysis to assess the degree of agreement between the two raters rating the same subject. We used a one-way random effects model (2,1) which yielded a value of 0.89. The 95% confidence interval for the ICC ranged from 0.83 to 0.93 (see Table B1*)*. This indicates high reliability among any given two observers. To examine the consistency of the observational rating with the FW data (kg) trend during the intervention period, we conducted a Pearson's correlation between the average observation ratings and the average dinner FW (kg) data during the intervention period since observation occurred during dinner hours. Our findings suggest a weak relationship (*r* = .289*)* between the average observation ratings and the trend of FW data (kg) during the intervention (see Table B3). To further support our findings on *H2*, we conducted a Mann-Whitney U test to compare the difference in observational ratings between the days exhibiting increase (N = 6, M = 2.05, SD = 0.295) and days exhibiting decrease (N = 8, M = 2.19, SD = 0.348) (see Table B4*)*.

Our findings did not find a statistical significance between the ratings on the two conditions exhibited ($U = 18.5$, $p = .518$, $r = 0.229$) (see Table B5), which is consistent with the findings from the previous analysis of FW data (kg).

Survey

Of those who completed the debrief survey ($N = 95$), 96% reported themselves as a regular diner at Open Kitchen. 66% reported to have seen both poster conditions, with 79% answering "Yes" for *display decrease* and 78% answering "Yes" for *display increase*. There were mixed results when asked if seeing either poster led them to waste less food (see Figure C2).

Discussion

Implications

Past studies advocate for combining interventions to enhance the effectiveness of informational feedback.[6, 9] Consistent with this research, our results indicate support for our hypothesis that the combination of daily informational feedback and normative prompt is an effective approach to reduce FW at Open Kitchen. Despite this, we found that consumer behavior does not differ depending on whether an increase or decrease in FW is displayed which did not support our second hypothesis considering we were able to maintain a sustained decrease regardless of changes in our signage. Moreover, written reminders have previously been proven effective in encouraging FW reduction behaviors.[5, 9] However, since our study combined two intervention types, our current data cannot conclude the effectiveness of written reminders alone.

Nonetheless, our data exhibits an average waste weight decrease of 40.5% by the end of the intervention period, with 66% of participants reporting observing the poster within the dining hall (see Appendix C2). The presence of informational feedback and normative prompt appear to be effective in reducing FW at Open Kitchen Dining Hall, suggesting that the continued presence of such posters may contribute to behavior maintenance, and permit a greater understanding of behavioral change in waste reduction contexts in the long-term. This approach can be implemented in real-world settings using simple yet effective signage, contributing to existing literature by advocating for the integration of combined interventions ultimately enhancing the effectiveness of informational feedback in reducing dining hall waste. Our intervention supports UBC's environmental sustainability objective by encouraging responsible waste behavior and conservation practices. This impact extends beyond the UBC community into the greater population as even small changes in waste habits have potential to ripple out and influence practices in other communities and settings.

Limitations

However, it is important to consider the limitations of our study. Firstly, the 14-day intervention period provided an insufficient amount of time to evaluate the true impact on consumer behavior. This also limited our analysis for our second hypothesis, resulting in only eight data points for *display decrease* and six data points for *display increase*. Secondly, the inclusion of unavoidable and accidental waste, such as bones and cups, within the daily FW data complicated the overall FW weight analysis. Additionally, the daily changes that are made to the food menu make it difficult to measure the impact of our intervention alone, considering FW may also be influenced by individual food preferences. A fixed menu rotation would make it possible to identify causes for potential outliers in FW, and whether food preference is an important confounding variable. Concerning our observation site, we encountered a blindspot for one of the sorting bins which made it difficult to accurately discern the amount of food some participants wasted. In addition, we faced the challenge of participants who made double trips. While we tried our best to omit this from our 100 samples of observational data, there is a margin of human error that was difficult to control. Future research should look to collect and log waste data in the same way for

at least one whole semester where menu items would rotate on a fixed weekly schedule. This would allow for greater data collection and thus a more reliable analysis, as well as more time for participants to potentially adopt and maintain the desirable behavior. Ultimately, this future research would more accurately understand the effectiveness of our interventional approach.

Recommendations

Given the decrease in total food waste during our intervention (see Figure B3*)*, we recommend that UBC dining halls display waste data in the three first year dining halls: Gather, Feast, and Open Kitchen. By tracking and reporting according to individual dining halls, the impact of feedback can be increased through the use of social-norms messaging which involves informing target groups of peer behavior and has been proven effective in motivating behavior change.[2, 5, 8] We also recommend that UBC continue collecting waste data so that future research can utilize a larger data sample which accounts for time-of-year as a confounding factor. Due to the absence of a boomerang effect or learned helplessness, we don't see any justification for omitting any fluctuations when reporting data to diners. We have found that visual assessments of volume according to our scale are not a reliable predictor of total waste mass (kg), however, during our qualitative observations there were several days with a noticeably high number of untouched plates being tossed which prompts us to recommend that UBC dining halls track waste in relation to dining options and adjust their menus accordingly.

Finally, we recognize that collecting, processing, and reporting data on a daily basis would heighten operational demands, so we recommend the implementation of a FW tracking system, such as LeanPath, that provides data collection tools and analytics. Though it would cost an estimated $30,000 a year to implement across the 3 first year dining halls, reducing waste has positive financial impacts in addition to environmental ones.[1] Other universities that have implemented the program consistently report a 48-64% reduction in waste year over year[4] which is consistent with our results. Additionally, the LeanPath Online cloud-based analytics software reports the dollar value of each gram wasted in real time which would make it easy to quickly determine whether the benefits of the program outweigh the costs.

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Appendices

Appendix A: Methods

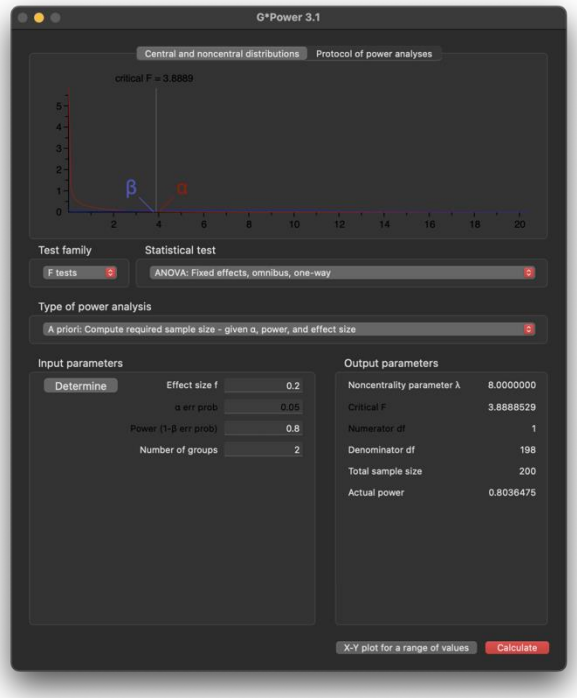


Figure A1. A priori power analysis using G*Power.

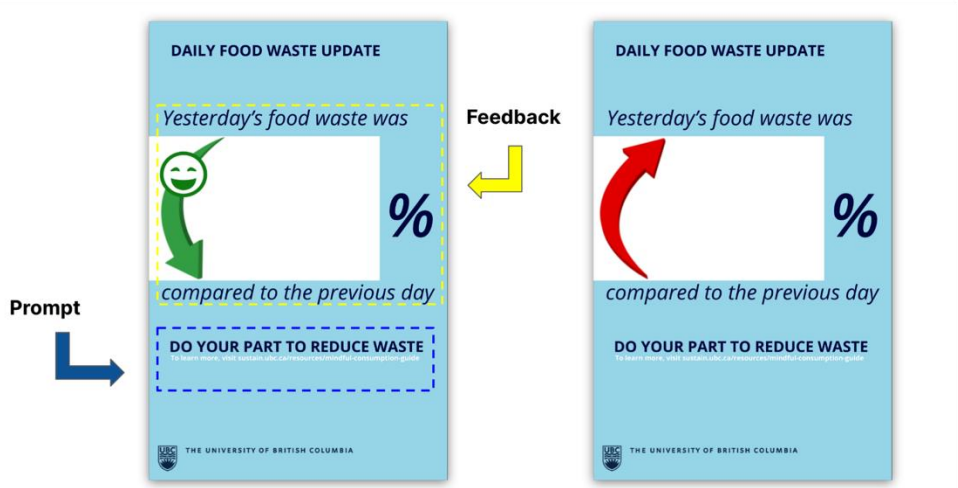


Figure A2. The two condition poster designs. Condition 1: Displayed Decrease (left) & Condition 2: Displayed Increase (right).

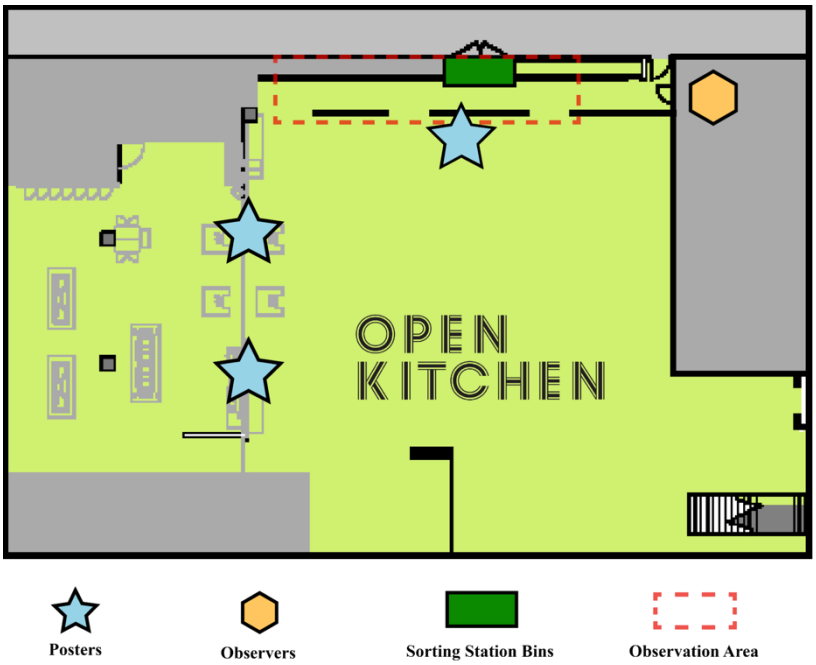
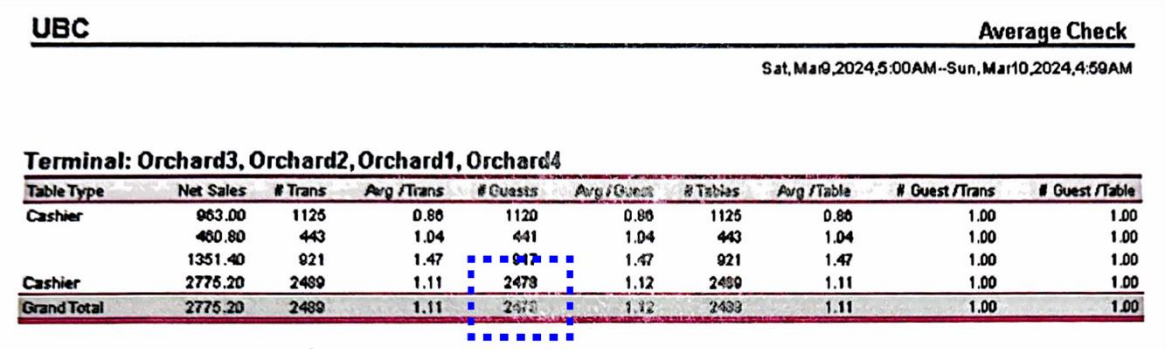


Figure A3. Site of the experiment: Open Kitchen dining hall at Orchard Commons at UBC.

Food Waste in kg			
Date	Kitchen	Shift	Plate
25-January-24	Open Kitchen	Breakfast	122.50
25-January-24	Open Kitchen	Lunch	148.20
25-January-24	Open Kitchen	Dinner	693.10
26-January-24	Open Kitchen	Breakfast	MISSING
26-January-24	Open Kitchen	Lunch	MISSING
26-January-24	Open Kitchen	Dinner	MISSING
27-January-24	Open Kitchen	Breakfast	MISSING
27-January-24	Open Kitchen	Lunch	MISSING
27-January-24	Open Kitchen	Dinner	MISSING
28-January-24	Open Kitchen	Breakfast	MISSING
28-January-24	Open Kitchen	Lunch	MISSING
28-January-24	Open Kitchen	Dinner	MISSING
29-January-24	Open Kitchen	Breakfast	44.60
29-January-24	Open Kitchen	Lunch	109.90
29-January-24	Open Kitchen	Dinner	284.40
30-January-24	Open Kitchen	Breakfast	23.90
30-January-24	Open Kitchen	Lunch	82.70
30-January-24	Open Kitchen	Dinner	237.10
31-January-24	Open Kitchen	Breakfast	164.20
31-January-24	Open Kitchen	Lunch	344.00
31-January-24	Open Kitchen	Dinner	760.50

Figure A4. A section of the Google Sheets page of the imported baseline data from SEEDS with the available data for food waste highlighted in green.

Figure A5. A visual representation of the Food Waste Behaviour Observation Rating Scale



UBC — **Average Check**

Sat,Mar9,2024,5:00AM--Sun,Mar10,2024,4:59AM

Terminal: Orchard3, Orchard2, Orchard1, Orchard4

Table Type	Net Sales	# Trans	Avg /Trans	# Guests	Avg /Guest	# Tables	Avg /Table	# Guest /Trans	# Guest /Table
Cashier	963.00	1125	0.86	1120	0.86	1125	0.86	1.00	1.00
	460.80	443	1.04	441	1.04	443	1.04	1.00	1.00
	1351.40	921	1.47	917	1.47	921	1.47	1.00	1.00
Cashier	2775.20	2489	1.11	2478	1.12	2489	1.11	1.00	1.00
Grand Total	2775.20	2489	1.11	2478	1.12	2489	1.11	1.00	1.00

Figure A6. An example of the printed copy of the number of guests for March 9, 2024 showing a total number of 2478 guests provided by the kitchen staff.

Post-Consumer Waste

Only weigh and record bins from the front of the house areas. Do not record kitchen waste on this spreadsheet

B (Breakfast) 7am-11am
L (Lunch) 11am-4pm
D (Dinner) 4pm-10pm

Meal Period	Date	Weight	Bin Weight	Actual Weight
B /L /D	3/8	27.6	-12KG	15.6
B /L /D	3/8	16.6	-12KG	4.6
B /L /D	3/8	26.7	-12KG	14.9
B /L /D	3/8	17.9	-12KG	5.9
B /L /D	3/8	64.9	-12KG	52.9
B /L /D	3/8	55.3	-12KG	43.3
B /L /D	3/8	32.3	-12KG	20.3
B /L /D	3/9	37.7	-12KG	25.7
B /L /D	3/9	38.6	-12KG	26.6
B /L /D	3/9	56.8	-12KG	44.8
B /L /D	3/9	66.9	-12KG	54.9
B /L /D			-12KG	
B /L /D			-12KG	
B /L /D			-12KG	
B /L /D			-12KG	

Figure A7. An example page from March 9, 2024 showing a total daily food waste of 152 (kg) from the clipboard located behind the sorting station.

AFWPP (kg.) for March 7 – AFWPP (kg.) March 8 = AFWPP Difference (kg.)

AFWPP Difference (kg.) / AFWPP (kg.) for March 7 = -49% (-0.03541150678)

AFWPP: *average food waste per person*

	A	B	C	D	E	F	G	H
1	Date	Total Subject (Guest)	Total Food Waste (kg)	Avg. FW P/P(kg)	Total Difference (kg)	Avg. FW P/P Difference (kg)	P/P Difference Change (%) USE THIS # FOR POSTER	
13	Feb 23, 2024	1351	127	0.09400444115	N/A	N/A	N/A	Data To Resume Intervention After Reading Break
14	Feb 24, 2024	1541	103.4	0.06709928618	-23.6	-0.02690515498	-29%	
15	Feb 25, 2024	2008	171.5	0.08540836653	68.1	0.01830908036	27%	Intervention Resume
16	Feb 26, 2024	4447	222.2	0.0499662694	50.7	-0.03544209714	-41%	
17	Feb 27, 2024	4034	289.7	0.0718145761	67.5	0.02184830671	44%	
18	Feb 28, 2024	4507	282.7	0.06272465054	-7	-0.00908992556	-13%	
19	Feb 29, 2024	4205	330.3	0.07854934602	47.6	0.01582469547	25%	
20	Mar 01, 2024	3598	197.4	0.05486381323	-132.9	-0.02368553279	-30%	
21	Mar 02, 2024	2170	148.1	0.06824884793	-49.3	0.0133850347	24%	
22	Mar 03, 2024	2362	133	0.05630821338	-15.1	-0.01194063455	-17%	
23	Mar 04, 2024	4241	216.5	0.05104928083	83.5	-0.005258932548	-9%	
24	Mar 05, 2024	3993	334.3	0.08372151265	117.8	0.03267223182	64%	
25	Mar 06, 2024	4251	248.8	0.05852740532	-85.5	-0.02519410733	-30%	
26	Mar 07, 2024	3736	269.8	0.07221627409	21	0.01368886877	23%	
27	Mar 08, 2024	3524	129.7	0.03680476731	-140.1	-0.03541150678	-49%	
28	Mar 09, 2024	2478	152	0.06133979015	22.3	0.02453502284	67%	Last Day of Intervention

Figure A8. Display Decrease poster for March 8, 2024 displaying a desirable 49% decrease (above) calculated with a formula (middle) using Google Sheets (below).

							Mini	Eli
	Dish Bins Filled	32	Chopsticks Discarded	6				
	Total Average Rating		2.01				2.06	1.95
	Total Samples		100		Observation Start:	07:06	Average	Average
	91	0	9	16	Observation End:	08:02	Observer 1	Observer 2
Sample	Used Bins	~~Double Trips~~	Skipped Bins	Liquid Bin	Obversation 100:	08:17	Rating	Rating
#1	X						0.5	0.5
#2			X	X			0	0
#3			X	x			0	0
#4	X						2	2
#5	X						4	3

Figure A9. Observational rating interface for March 8, 2024 using Google sheets.

Appendix B: Statistical Analyses

Reliability

Scale: Food Waste Behavior Observation Rating

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.898	.899	2

Item Statistics

	Mean	Std. Deviation	N
Observer1Ratings	2.125	1.6288	1364
Observer2Ratings	2.122	1.5150	1364

Intraclass Correlation Coefficient

	Intraclass Correlation	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.815	.796	.832	9.810	1363	1364	<.001
Average Measures	.898	.887	.908	9.810	1363	1364	<.001

One-way random effects model where people effects are random.

Table B1. Observer 1 Ratings and Observer 2 Ratings, ICC.

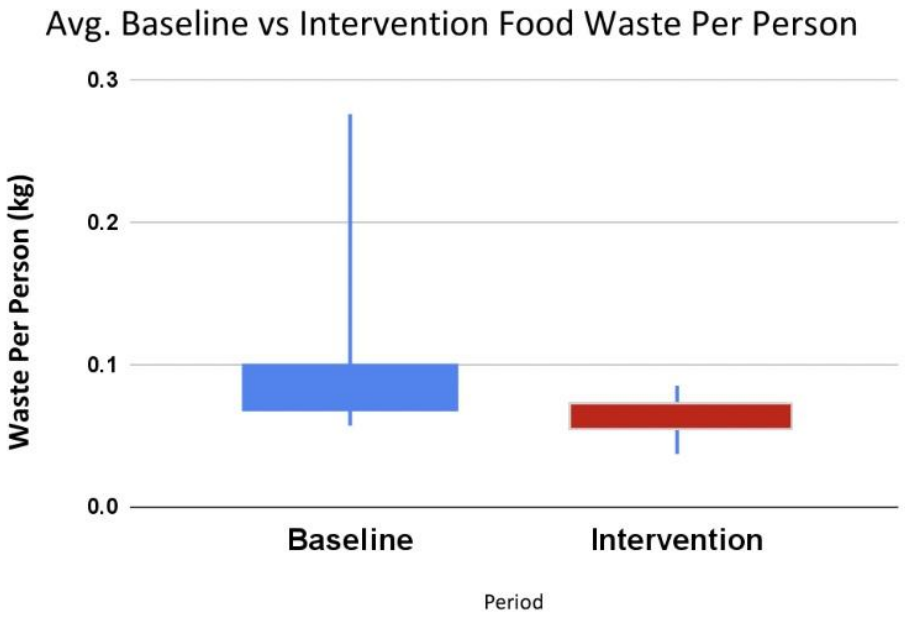


Figure B1. Box Plot of Waste Per Person in kilograms (Baseline vs. Intervention).

Mann-Whitney Test

Ranks

	Treatment	N	Mean Rank	Sum of Ranks
FWPP	Baseline	14	18.36	257.00
	Intervention	14	10.64	149.00
	Total	28		

Test Statistics[a]

	FWPP
Mann-Whitney U	44.000
Wilcoxon W	149.000
Z	-2.481
Asymp. Sig. (2-tailed)	.013
Exact Sig. [2*(1-tailed Sig.)]	.012[b]

a. Grouping Variable: Treatment

b. Not corrected for ties.

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Treatment	Statistic	df	Sig.	Statistic	df	Sig.
FWPP	Baseline	.320	14	<.001	.698	14	<.001
	Intervention	.099	14	.200*	.975	14	.937

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table B2. Baseline vs. Intervention, Mann-Whitney U test for *H1*.

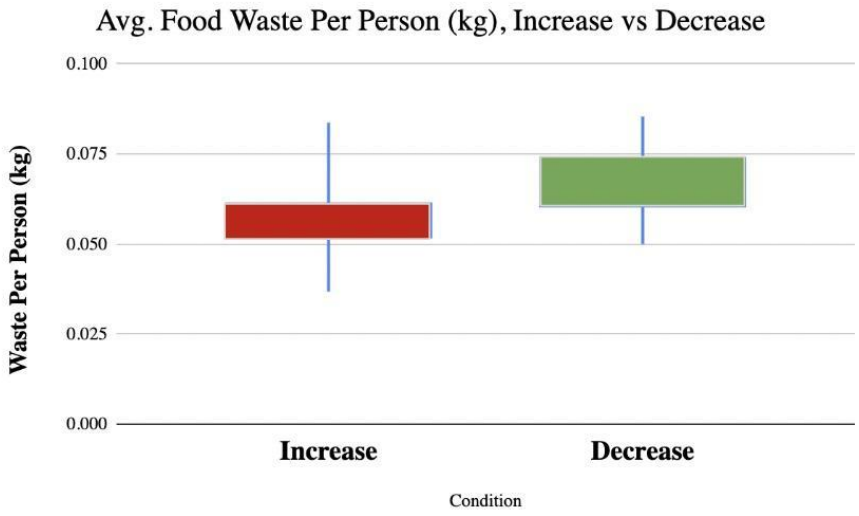


Figure B2. Box Plot of Avg. Food Waste Per Person in kilograms (Increase vs. Decrease).

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Average Observer Rating	2.1336	.32346	14
Average Dinner FW (kg.)	.12807	.028941	14

Correlations

		Average Observer Rating	Average Dinner FW (kg.)
Average Observer Rating	Pearson Correlation	1	.289
	Sig. (2-tailed)		.317
	N	14	14
Average Dinner FW (kg.)	Pearson Correlation	.289	1
	Sig. (2-tailed)	.317	
	N	14	14

Table B3. Avg. Observation Rating vs. Avg. Dinner FW in kilograms, Pearson's correlation.

Descriptives

	Decrease (kg Data)	Increase (kg Data)
N	8	6
Mean	2.19	2.05
Median	2.26	2.06
Standard deviation	0.348	0.295
Minimum	1.71	1.73
Maximum	2.76	2.52
Shapiro-Wilk W	0.931	0.927
Shapiro-Wilk p	0.523	0.558

Table B4. Decrease (kg) data vs. Increase (kg) data, Shapiro-Wilk test for *H2*.

Independent Samples T-Test

		Statistic	p		Effect Size
B	Mann-Whitney U	18.5	0.518	Rank biserial correlation	0.229

Note. $H_a\ \mu_{Down} \neq \mu_{Up}$

Table B5. Decrease Ratings vs. Increase Ratings data, Mann-Whitney U test for *H2*.

Independent Samples T-Test

		Statistic	p		Effect Size
B	Mann-Whitney U	13.0	0.181	Rank biserial correlation	0.458

Note. $H_a\ \mu_{Down} \neq \mu_{Up}$

Table B6. Decrease (kg) vs. Increase (kg) Waste Data, Mann-Whitney U test for *H2*.

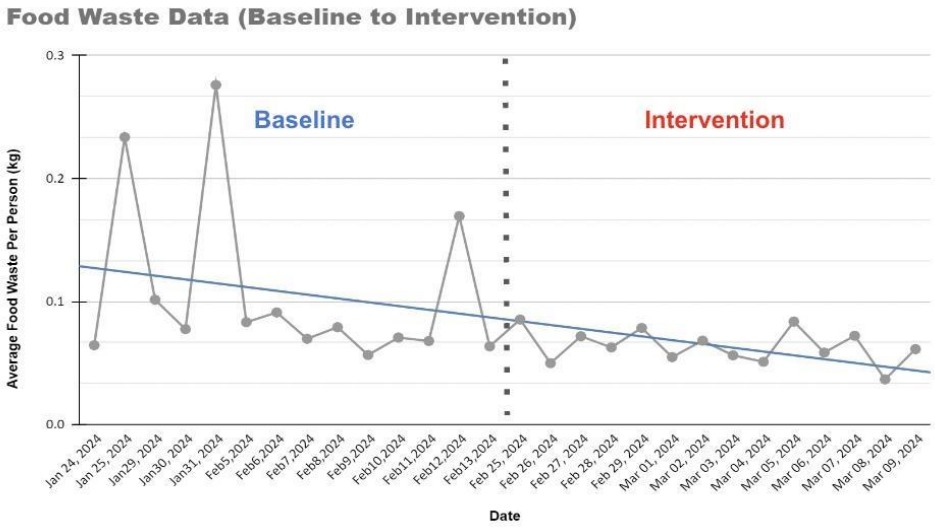
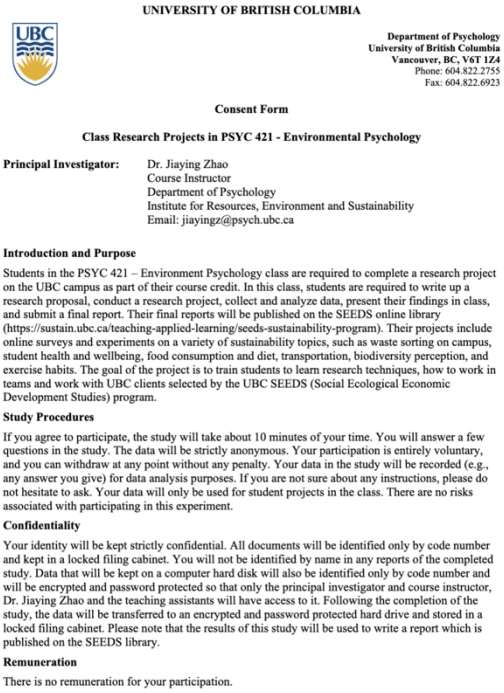


Figure B3. Line Graph of the Baseline to Intervention Food Waste Data.

Appendix C: Survey

Q1. Before beginning the survey, select I consent to indicate that you have read and understood the attached form.



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Consent Form

Class Research Projects in PSYC 421 - Environmental Psychology

Principal Investigator: Dr. Jiaying Zhao
Course Instructor
Department of Psychology
Institute for Resources, Environment and Sustainability
Email: jiayingz@psych.ubc.ca

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

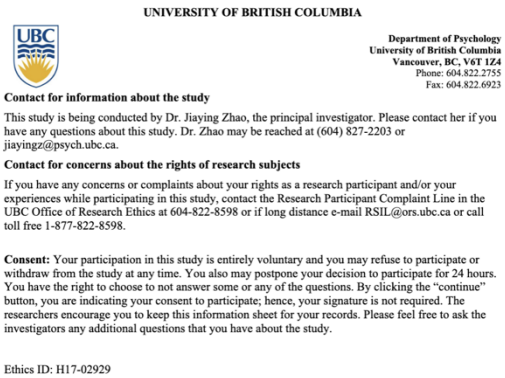
If you agree to participate, the study will take about 10 minutes of your time. You will answer a few questions in the study. The data will be strictly anonymous. Your participation is entirely voluntary, and you can withdraw at any point without any penalty. Your data in the study will be recorded (e.g., 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.



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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

○ I consent

Q2. Do you regularly eat at Open Kitchen?

○ Yes ○ No

Q3. Have you seen these posters in the dining hall?

○ Yes ○ No

Q4. Have you seen this variation?

○ Yes
○ No

Q5. Did you understand this to mean that waste went up by the displayed percentage?

○ Yes
○ Mostly
○ No

Q6. Did seeing this poster lead you to waste less food?

○ Definitely not
○ Probably not
○ Maybe
○ Probably
○ Definitely

Q7. Have you seen this variation?

○ Yes
○ No

Q8. Did you understand this to mean that waste went down by the displayed percentage?

○ Yes
○ Mostly
○ No

Q9. Did seeing this poster lead you to waste less food?

○ Definitely not
○ Probably not
○ Maybe
○ Probably
○ Definitely

Figure C1. Survey Questions

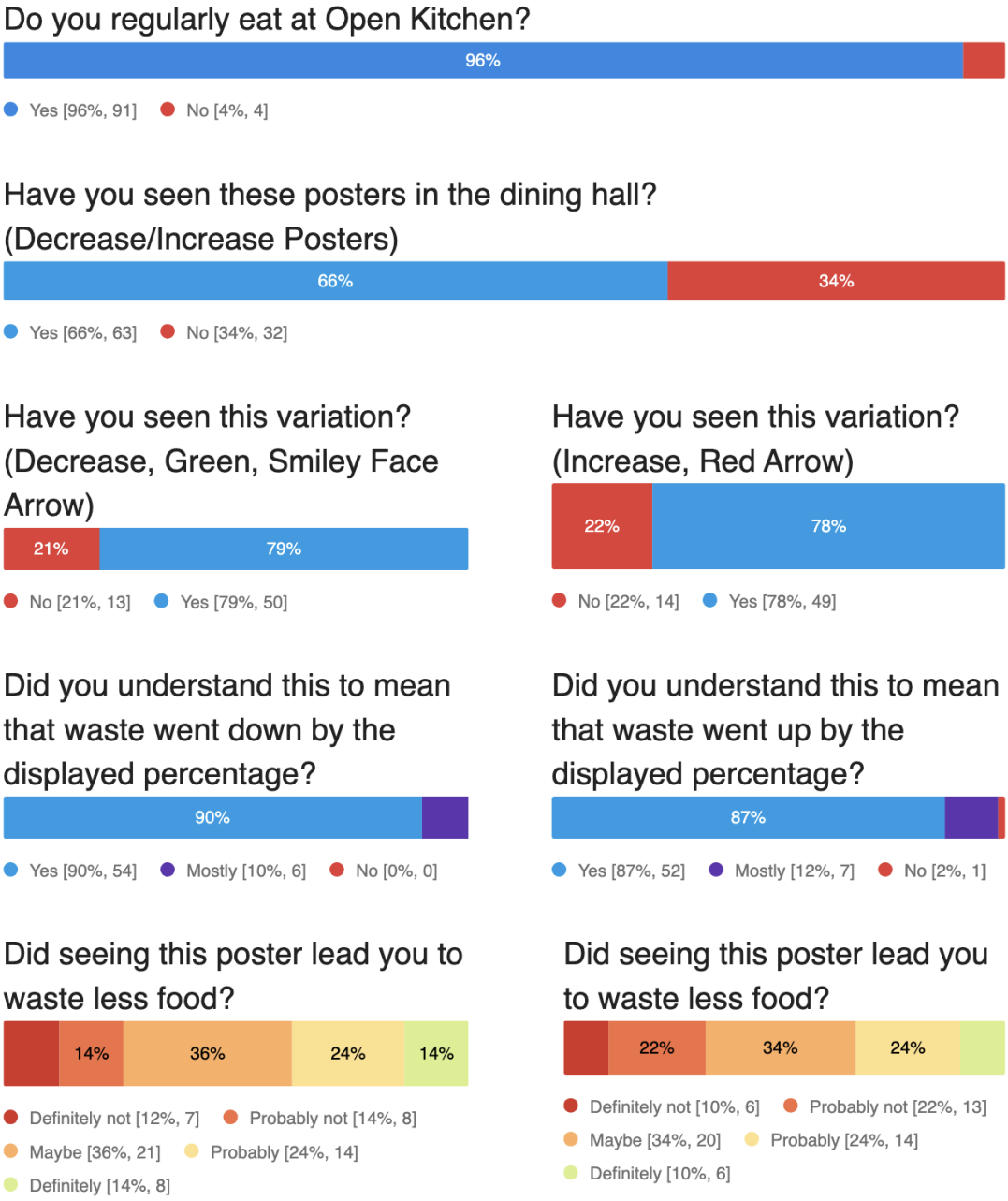

Figure C2. Survey Results