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Student Research Report

What Factors Affect University of British Columbia Students' Lunch Preferences?

Yi Jun Xiao, Yunxia Lin, Yihan Wang, Weilun Sun

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Group: WIP

Member: Yijun Xiao, Yunxia Lin, Yihan Wang, and Weilun Sun

What Factors Affect University of British Columbia Students' Lunch Preferences?

Executive Summary

This study investigates food factors that affect (University of British Columbia) students' lunch preferences. We hypothesised that UBC students would rate three factors – calories, freshness of food and sugar content – as more important than other three factors – organic, vegetables or meat, and taste. We also hypothesized that individuals who chose calories, freshness, and sugar content as the most important factors would have different percentages of meat dishes, average calories and average sugar content per dish in their lunch choices as compared to students who chose organic, vegetables, and taste as the most important factors. 208 UBC students were recruited on campus and online survey. We measured the percentage of meat dish(es), the average calories and sugar content per dish. There was a significant difference between taste and participants' preference of average calorie content per dish, and it was found that participants who ranked taste as the most important factor consume the highest calorie meals. Our results did not support our hypotheses. Based on the results, UBC food services could consider offering tasty foods that meet their goals (more tasty foods that are low calories, low sugar content and fresh).

Introduction

There have been several studies done over the years on students' food preferences and what factors may influence their choices. Packaging, branding and labeling can have a significant influence on our experience of food (Gemma et al., 2016). To examine the effect of labeling calories on consumers' food choices, previous researchers looked at the idea of healthy and unhealthy quick service restaurants and how participants chose their meals when the calorie content was made available. There was evidence showed that disclosing the calorie information did affected food choices of the participants (Wei et al., 2013). Other study also conducted a study analyzing calorie information may influence participants' lunch food choices, and the study found that taste is the second most important factors that would influence participants lunch choices (Blanck et al., 2009). Majority of the consumers preferred the sweetest samples (Rødbotten et al.,2009). Moreover, vegetable or meat were also considerable factors for participants when making food decisions. The effects of labelling the food product as vegetarian or containing meat would affect non-vegetarian eaters in their food choices. They found that when the nutritional information was provided, more students would pick the vegetarian option as it contained less fat and calories. (Albashir et al., 2016) Based on a review of previous researches, we predicted that calories, taste, vegetable or meat-intake and sugar content were considerable factors that might affect consumers' food preferences.

Research Question

What factors affect UBC students' lunch preference?

Hypothesis

Based on past research, we hypothesized that UBC students will rate these three factors – calories, freshness of food and sugar content –as more important than other three factors – organic or not, vegetables or meat and taste. We also hypothesized that student who choose calories, freshness, and sugar content as the most important factors will have different percentages of meat dishes, average calories per dish, and average sugar content per dish in their lunch choices from people who choose organic, vegetables, and taste as the most important factors.

Participants

208 UBC students ($M_{age} = 22.42$, $SD = 4.58$) were recruited to participate in our study. The majority of the participants were female (63%), followed by males (35%), and a small percentage identified as others (1%) (Appendix A). In terms of ethnicity, the majority of students who responded to the survey were Asian/Pacific Islander (61%), the next highest being Caucasian at 26% and then Hispanic/African American/multiple ethnicity make up the remaining

13% of participants (Appendix B). Further information on participants are provided in the Appendix (Appendix C-G).

Conditions

There were six conditions which are factors affect participants' lunch preference: calories, freshness of the food, the sugar content, organic or not organic, vegetables or meat and taste. Next, participants had to rank these 7 factors according to how important they were (1 = not important, 7 = very important) when making their lunch decisions. Our preliminary data analysis revealed that only 7 participants rated organic food as an important factor, thereafter, this factor was removed.

Measures

We calculated the percentage of the meat dishes each participant chose, the average calories per dish each participant chose and the average sugar content per dish each participant chose. After calculation, the mean percentage of meat dishes each participant chose is 22% (SD=0.21). The mean of average calories per dish each participant chose measured in Cal is 286.85 with a standard deviation of 108.89 Cal. Also the mean of average sugar content per dish each participant chose measured in g is 11.11, with a standard deviation of 6.99 g.

Procedure

208 survey responses were obtained from UBC students through social media and seven different locations across campus from March 7th to 19th. The seven locations were Marine Drive common block, the AMS Nest, Irving library, the Henry Angus Building, the Buchanan Building, Student Union Building and the Bookstore. Participants were asked to complete the form consisting of 3 close-ended questions collecting participants lunch preference on different food, and factors that affect food choice, as well as 9 other questions related to demographics (Appendix H). Question 1 collected data of participants' lunch choices. Question 2 and 3 collected data of factors that influenced participants' lunch preferences. Two different versions of questions were provided in order to reduce participant response bias. The next 9 questions were demographic questions – age, race, food allergies, diet and exercise etc.

We obtained calories and sugar content information from MyFitnessPal database and the official websites of Tim Hortons and Subway. Then, we calculated every participants' percentage of meat dishes, the average calorie content per dish and the average sugar content per dish. We used one-way ANOVA to test statistical significance.

Results

Appendix I indicates the percentages of meat dish(es) participants chosen in their meal; as for example, participants who were concerned about freshness of foods preferred the most number of meat dish(es) in their meals. Appendix J describes the average sugar per dish a participant chosen; as for example, participants who were concerned about taste selected a dish which has an average of 12.50 g of sugar. Appendix K describes the average calories per dish a participant chosen; as for example, participants who were concerned about taste selected a dish which have an average of 293.09 calories.

We performed three one-way between group ANOVA tests on the three different measures: the average of meat dish(es) (Appendix L), the average sugar content (Appendix M) per participant and the average calories per participant (Appendix N). Based on Appendix L, a

one-way between groups ANOVA revealed that there is no significant effect of food factors on participants' selection of meal dish(es) in their meal, $F(4, 204) = 1.80, p = 0.131, \eta^2 = 0.034$. Based on Appendix M, a one-way between groups ANOVA revealed that there is no significant effect of food factors on participants' selection of meal dish(es) in their meal, $F(4, 204) = 1.796, p = 0.131, \eta^2 = 0.034$. Based on Appendix N, a one-way between groups ANOVA revealed a significant main effect of the food factors on the average calories in the meal of each participants $F(4, 204) = 2.57, p = .039, \eta^2 = 0.048$. Post hoc comparisons using Tukey's *HSD* test indicated that the average calories in a meal for each participants who chosen taste as their limiting factors for food preference ($M = 303.01, SD = 112.40$) were significantly higher than the average calories in a meal for each participants who chosen vegan (vegetarian) as their limiting factors for food preference ($M = 233.56, SD = 94.44$) ($p = .02$). No other comparisons are found to be significant.

Discussion

Our primary interest was to investigate how food factors affect students lunch consumption preference. There were no significant effect of the five food factors (calories, Freshness of food, vegetarian or meat, taste and sugar content) on participants' preference of percentage of meat dishes in the meals and average sugar content per dish. There were a significant difference that affect the of the five food factors on participants' preference of average calorie content per dish, and based on Post hoc comparisons using Tukey's *HSD* test, it was found that participants who ranked taste as the most important factor consume the highest calorie meals. It was initially hypothesized UBC students will rate these three factors – calories, freshness of food and sugar content - as more important than other three factors – organic or not, vegetables or meat and taste. Next, it was also hypothesized that student who choose calories, freshness, and sugar content as the most important factors will have different percentages of meat dishes, average calories per dish, and average sugar content per dish in their lunch choices from people who choose organic, vegetables, and taste as the most important factors. Thus, our results did not support for UBC students.

There is no significant difference between the five factors and the percentage of meat dish(es) because the standard deviation of the percentage of meat dish(es) is low ($SD=0.21$), indicating the factors did not influenced on the selection of meat dish(es) because participants who are concerned about the five factors have similar preference on the selection of meat dish(es). This may indicates Figure 2 which describes the average sugar content per dish each participant chose organized reviews that participants who concerns about sugar content chose the lowest sugar content per dish (9.62g of sugar per dish), but there is no significant result between sugar content and the average sugar content per dish each participant chose may suggest that participants which has most Asian/Pacific Islander backgrounds have a preference for less sweet foods in general. This is supported with low standard deviation of average sugar content per dish each participant chose ($SD=6.99$ g of sugar) as compared with a large standard deviation of average calories per dish each participants chose ($SD = 112.40$ Calories). From figure 3, It is also witnessed that people who are concerned about calories did not picked the least average of calories per dish, and Burton, Howlett and Tangari (2009) provides an alternative explanation for it. Burton, Howlett and Tangari (2009) conducted three experiments to study factors that influences consumers' food preference, and results indicate that consumers are not good at estimating foods' fat, sodium and calories content. As a result, consumers underestimate the calorie levels of their fast food purchases (Burton et al., 2009).

From the percentage of meat dish(es), it was reviewed that most participants preferred vegetable dish(es). This can have environmental sustainability application. According to Greenhouse Gas Inventory Data Explorer from United States Environmental Protection Agency, agriculture produced 9% of greenhouse gas emissions in 2017 (Zhao, 2018). We know that meat farming and production will produce more carbon emission compared to plant-based food. Therefore, from an environmental sustainability aspect, producing plant-based food is more environmentally friendly as a result of the reduced carbon emission when compared to meat-based produce. Thus, if we produce and consume less meat-based food in favor of plant-based food for each meal, we would produce less carbon emission. This reduction of carbon emission may mitigate some climate change, such as the greenhouse effect. For the betterment of our environment, a reduced consumption and therefore production of meat would positively impact sustainability efforts. From figure 3, It is also witnessed that people who are concerned about calories did not pick, and it is resulted from people's underestimation of calories on foods. This acknowledgment can have bad health implication because it is widely understood that less sugar could improve our health ("Eat less sugar to quickly boost health", 2017). Researchers suggest that diets high in simple sugars, specifically fructose, increase the rate at which sugar is converted to fat and liver fat. Excessive sugar consumption may increase obesity and body fat percentage. Therefore, students should place more focus on the sugar content percentages that make up a food product on top of the taste, calories and freshness of the food.

There were a few limitations with our research. First, one factor was excluded for One-way between group ANOVA because we only had a small sample of 7 participants who mentioned it as a consideration factor. Second, 60% of our sample consisted were UBC students of Asian/Pacific Island backgrounds, so this can affect the representative of our sample. Third, since we offered too many choices in the first survey question about their lunch food choices, participants may not be able to cognitively read through and process all of the options available. Next, beverage options were not separated into a different category, this might have influenced participants' consideration of all the other food related factors available. Forth, because different conditions were not mutually exclusive and independent of each other, many participants ranked multiple conditions as equally important. Questions two and questions three allowed participants to choose more than one food factors that influenced their food preference, so this resulted in inability to conduct One-way between group ANOVA. As a result, some food factors of participants who chose more than one food factors were taken away for the purpose of conducting inferential statistic; as for example, participants who chosen freshness of food and calories of foods, and one factor is randomly selected for future analysis. Lastly, we only had three questions that directly address our research interest. We may provide more direct problems towards our study rather than demographics. These limitations might have undermined our results and should therefore be corrected for in future replications.

Recommendations for Clients

The UBC population is increasingly made up of student with Asian/Pacific Islander background, offering more ethnic food choices in UBC's food services could be an option as a vast majority of students would prefer those meals. Besides, in an effort to explore future school lunch programs, UBC's food program coordinators may consider these three factors, calories, freshness of the food, and the taste, when making future changes. For instance, the school cafe could offer more healthy lunch choices for students, such as low calorie dishes, green food, fresh

fruits and salads, and some other tasty Asian/Pacific Islander food options. It is good to see that now UBC have more and more Asian/Pacific Islander food served around campus. Moreover, if UBC can also list the calories and sugar content of the food in all cafe menu, it may be beneficial towards those students, who really cared about calories and sugar content, to make a better choice of the food. In addition, school program coordinators may put some promote information of the benefits of freshness of food or green food in school's bulletin boards, which may help students establish the knowledge of having a health meal in school.

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Appendix

Appendix A

What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	133	63.3	63.3	63.3
	Male	74	35.2	35.2	98.6
	Other	3	1.4	1.4	100.0
	Total	210	100.0	100.0	

Appendix B

Which race/ethnicity best describes you? (Please choose only one.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	American Indian or Alaskan Native	2	1.0	1.0	1.0
	Asian/Pacific Islander	128	61.0	61.0	61.9
	Black or African American	5	2.4	2.4	64.3
	Hispanic	6	2.9	2.9	67.1
	Multiple ethnicity /other (Please specify)	14	6.7	6.7	73.8

White /Caucasian	55	26.2	26.2	100.0
Total	210	100.0	100.0	

Appendix C

What is your age?

N	Valid	210
	Missin g	0
Mean		22.42
Median		22.00
Mode		22
Std. Deviation		4.581
Variance		20.982
Minimum		18
Maximum		78

Appendix D

Do you have any food allergy?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Gluten	1	.5	.5	.5
	Milk	8	3.8	3.8	4.3
	none	153	72.9	72.9	77.1
	Nuts	6	2.9	2.9	80.0
	Others	33	15.7	15.7	95.7
	Seafood	9	4.3	4.3	100.0
	Total	210	100.0	100.0	

In terms of food allergy, majority of participants (73%) do not have any food allergy. 4% of participants are allergy to seafood while 4% of participants are allergy to milk, 3% of participants are allergy to nuts and 0.5% of participants are allergy to gluten, the rest 15.7% of participants were grouped into other allergies.

Appendix E

Are you currently under any medical condition?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	196	93.3	93.3	93.3
	Yes	14	6.7	6.7	100.0
	Total	210	100.0	100.0	

Among all the participants, 6.7% of them are currently under medical conditions.

Appendix F

How many times do you do exercises monthly?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Around 4-10 times	86	41.0	41.0	41.0
	Less than 4	68	32.4	32.4	73.3
	More than 10 times	56	26.7	26.7	100.0
	Total	210	100.0	100.0	

27% of participants were exercising more than 10 times monthly and 32% were doing exercise less than 4.

Appendix G

Are you planning to gain or lose weight?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	82	39.0	39.0	39.0
	Yes, plan to gain weight	29	13.8	13.8	52.9
	Yes, plan to lose weight	99	47.1	47.1	100.0
	Total	210	100.0	100.0	

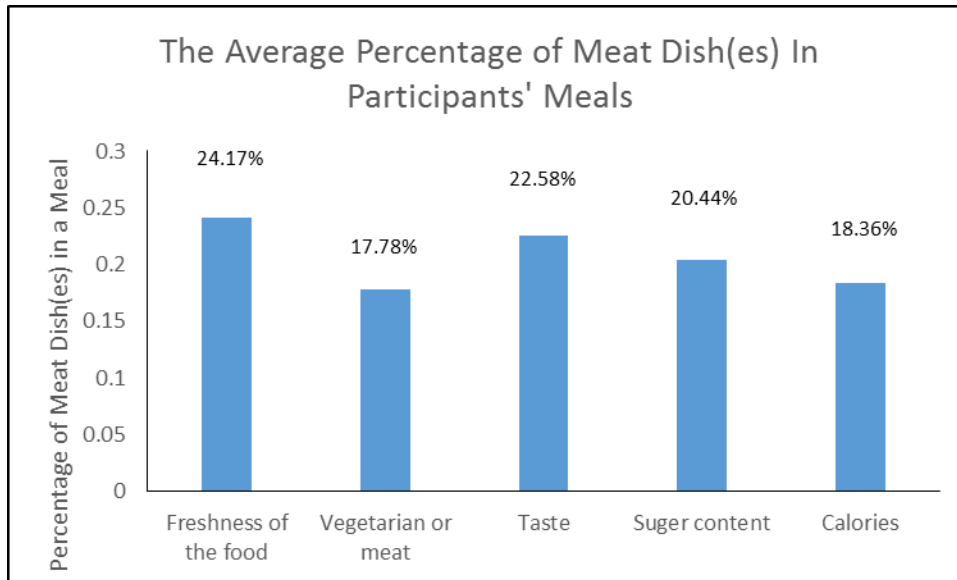
In addition, 61% of participants were planning control or maintain their weight, in which, 47% of them were planning to lose weight and 14% of them were planning to gain weight.

Appendix H

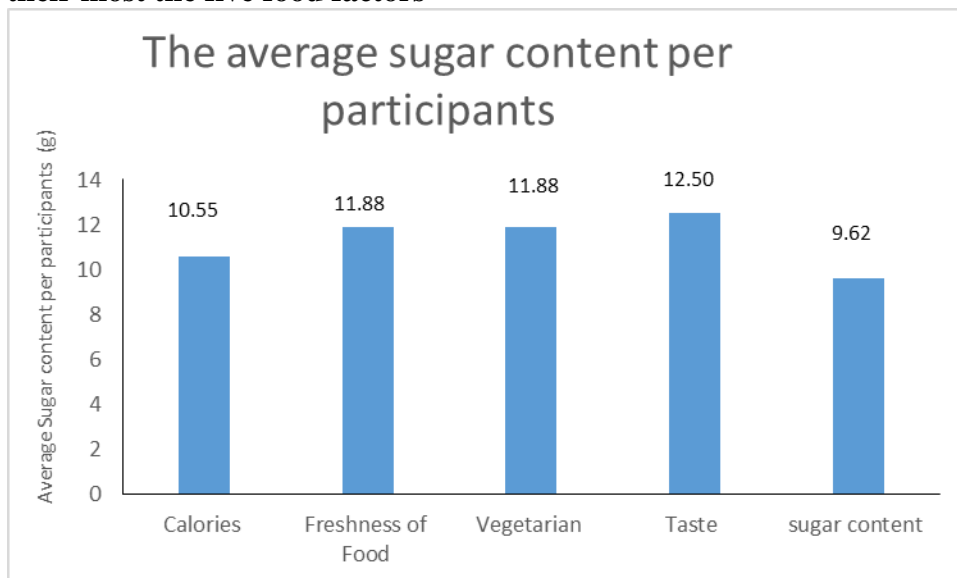
Survey Questions

1. Imagine you are having a lunch break at UBC. Choose what you will normally order for lunch from the following menu, regardless of the budget. (No need to choose from all categories, and you have a maximum 5 choices)
Seasonal Fruit, Veggie Salads, Meat Salads, Meat Wrap, Veggie Wrap, Meat Entrée, Veggie Entrée, Daily soup, Sushi Roll, Udon or Ramen, Pizza, Burger, Rice-based food, Cakes, Potato chips, Cookies, Donuts, Ice Cream, Energy Bar, Muffin, Chocolate Bars, Mixed Nuts, Water, Fresh fruit juice, Tea, Coffee, Soft Drink, Milk
2. What factors do you consider when you make your lunch choices
Calories, Freshness of the Food, Organic or not organic food, Vegetarian or meat, Taste, Sugar content
3. For each factor, rate on a scale from 1 to 7, 1=not important at all to my decision, 7=very important to my decision
4. What is your gender?
Female, male, other
5. What is your age?
6. Year of study
7. Which race/ethnicity best describes you? (Please choose only one.)
American Indian or Alaskan Native, Asian/Pacific Islander, Black or African American, Hispanic, White/Caucasian Multiple ethnicity/Other(please specify)
8. Do you have any food allergy?
Gluten, Milk, Nuts, Seafood, None, Others
9. Are you currently under any medical condition?
Yes, No
10. If yes, does it affect your daily diet?
Yes, No
11. How many times do you do exercises monthly?
Less than 4, Around 4-10 times, More than 10 times
12. Are you planning to gain or lose weight?
Yes, plan to gain weight
Yes, plan to lose weight
No

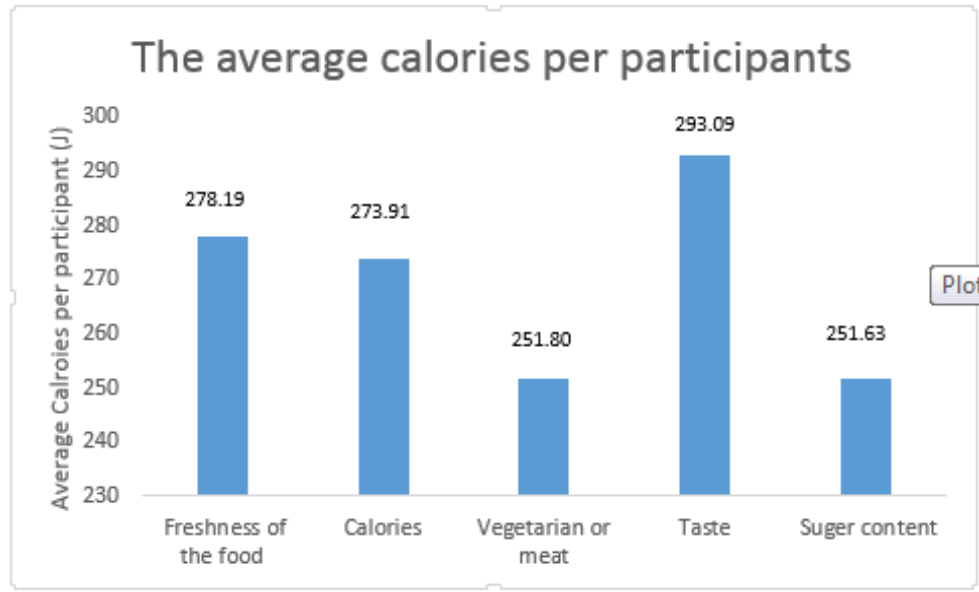
Appendix I: The percentage of meat dish(es) each participant chose organized based on the five food factors



Appendix J: The average sugar content per dish each participant chose organized based on their most the five food factors



Appendix K: The average calories content per dish each participant chose organized based on their most concerned factor.



Appendix L

Descriptive Statistics

Dependent Variable: meat dish

Food factor	Mean	Std. Deviation	N
Calories	.18787878 7878788	.14050003 4662842	22
Fresh	.23412698 4126984	.25249305 3942733	42
Sugar	.20000000 0000000	.23904572 1866879	8
Taste	.23893939 3939394	.20110902 0909477	110
Vegan	.12592592 5925926	.19333628 0555196	27
Total	.21650717 7033493	.20938191 5185089	209

Tests of Between-Subjects Effects

Dependent Variable: meat dish

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.310 ^a	4	.078	1.796	.131	.034
Intercept	4.051	1	4.051	93.825	.000	.315

food factor	.310	4	.078	1.796	.131	.034
Error	8.809	204	.043			
Total	18.916	209				
Corrected Total	9.119	208				

a. R Squared = .034 (Adjusted R Squared = .015)

Appendix M

Descriptive Statistics

Dependent Variable: average sugar content

Food factor	Mean	Std. Deviation	N
Calories	10.3614	4.93072	22
Fresh	12.5298	6.85417	42
Sugar	10.1250	9.33251	8
Taste	10.4883	6.20002	110
Vegan	12.3537	10.22761	27
Total	11.1122	6.98388	209

Tests of Between-Subjects Effects

Dependent Variable: average sugar content

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	189.035 ^a	4	47.259	.968	.426	.019
Intercept	12979.331	1	12979.331	265.947	.000	.566
Food factor	189.035	4	47.259	.968	.426	.019
Error	9956.072	204	48.804			
Total	35952.860	209				
Corrected Total	10145.107	208				

a. R Squared = .019 (Adjusted R Squared = -.001)

Appendix N

Tests of Between-Subjects Effects

Dependent Variable: average calories

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	118157.66 8 ^a	4	29539.417	2.566	.039	.048
Intercept	7843258.4 18	1	7843258.4 18	681.44 7	.000	.770
food factor	118157.66 8	4	29539.417	2.566	.039	.048
Error	2347980.9 85	204	11509.711			
Total	19663648. 099	209				
Corrected Total	2466138.6 53	208				

a. R Squared = .048 (Adjusted R Squared = .029)