

The impact of Sustainability focused Cooking Workshops on Dalhousie Students

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Abstract

Earth is experiencing a great climate change event caused mainly by human actions. One of the main sources contributing to our greenhouse gas emissions in Canada is agriculture. Agriculture accounts for 10% of Canada's emissions through excessive fertilizer use, fossil fuel use, and methane released by livestock (Government of Canada, 2023). Our study sought to educate students on their dietary environmental impacts and grocery shopping choices so that they could lead more sustainable lives. Understanding the effects of your impacts and how you can reduce them is the first step to creating change. Two separate workshops were held at the Loaded Ladle kitchen, where students were told about how they could reduce their environmental impacts through their diet choices while they cooked a meal. Two surveys were done in addition to these workshops, one before the workshop and one a week following the workshop. The key findings of our study were that the sustainable cooking workshops had a statistically significant positive effect on the students' eating and grocery shopping habits. Although some results showed a negative change, the students' overall sustainability scores increased following the workshop. To better understand if these findings would apply to the student population at large, we believe another study should be done with a larger sample size. Educating students on the environmental impacts of their food choices is an easy but important step in reducing our future impacts.

Key Terms

Climate change; Emissions reduction; Flexitarian; Meatless Mondays; Sustainable diet choices

Introduction

In the face of climate change, it has been made clear Canadians need to cut down their carbon emissions. Most Canadian greenhouse gas (GHG) emissions are a result of the oil and gas

and transportation sectors as these account for 28% and 22% respectively and the agricultural sector for 10% (Government of Canada, 2023). However, if the entire food system is considered it is estimated the emissions profile is as much as one-third of Canadian GHG emissions (Crippa, et al., 2021 & Poore & Nemecek, 2018). Thus, as the food system in Canada contributes significantly to climate change, substantial changes are required to curb emissions. To do so, Canadians need to consider how their diet choices may result in significant GHG emissions. However, many factors determine what foods people decide to eat.

A shift to a more plant-based diet is a simple way for individuals to reduce their carbon footprint and make more sustainable choices (Klosse, 2019). Yet, most Canadians consume high-impact foods, like beef and other animal products regularly; consequently, 75% of the carbon emitted from Canadian diets comes from animal products, of which 47% is from ruminant meat (Auclair & Burgos, 2021). Hence, a diet that is primarily vegetables, whole grains, and pulses and limiting or eliminating meat fish, and animal products is the most environmentally conscious diet (Franchini, et al., 2023). However, only 7.6% and 4.6% of Canadians are vegetarian and vegan, respectively (Blair, 2024). The lack of knowledge regarding sustainable diet choices and the cultural and social significance of meat is identified as a primary barrier to making diet changes (Deliens, et al., 2014). Employing cooking workshops has been recognized as an effective and accessible avenue for educating people on incorporating plant-based meals into their daily lives (Whitener, et al., 2021).

The food culture on Dalhousie campuses is one of the factors that influences students' food choices. Creating environments that foster and help expand sustainable choices can raise awareness and facilitate change (Franchini et al., 2023). Critics believe many people avoid

adopting plant-based diets because of the cultural and social value of meat (Beverland 2014). Demonstrating the ease and benefits of a diet that is mostly plant-based has been proven to create habit changes; the social determinants of food choice include social settings, what peers are eating influence what individuals choose to eat (Food Choices, 2006). Therefore, we connected with The Loaded Ladle, a free food source on campus to conduct a cooking workshop that educates attendees on how to implement a more sustainable diet into their routine. The Loaded Ladle materialized from La Via Campesina, a global peasant movement pursuing the right that all people deserve healthy, culturally appropriate, and nutritional food through sustainable and moral production methods (Loaded Ladle's Core Principles, n.d.). They have four lunches a week on the Studley Campus and two breakfasts on the Sexton campus (Loaded Ladle's Core Principles, n.d.). Everything they serve is plant-based and gluten-friendly, which allows them to provide meals with lower GHG emissions. The objective of this project is to provide students with an opportunity to explore sustainable dietary options, which focus on plant-based choices, and determine if cooking workshops can effectively influence students to make more sustainable choices.

Methods

Workshop Format

Two cooking workshops were conducted to maximize sample size as well as productivity as we managed the size of the space, we had available to us. We used two separate groups of nine and eight students respectively to yield a sample of 17 students. The selected participants were respondents to a survey posted on flyers digitally (Appendix 1). Respondents were selected based on eligibility for the workshops, and the recruitment survey closed once the target eligible

sample size had been met. Recruitment surveys collected basic personal information (first name, last initial, age, program, animal-based diet choices, and year of education).

To collect our data, we required a group of (17) participants to:

- A) Participate in one of the two cooking workshops.
- B) Complete a survey upon arrival at the workshop.
- C) Complete the same survey exactly one week after completing the workshop.

Surveys

The entrance and exit surveys were the only means of data collection for this experiment. Entrance and exit surveys were completed anonymously, with an identifier that allows us to compare participants' entrance surveys to their exit surveys. There were 8 close-ended and one open-ended question. The survey questions reflected the goals of the project by addressing topics that are fundamental to our research question. The survey questions included topics regarding sustainable eating habits, grocery shopping choices, moral obligations, and perceptions (Appendix 2).

Entry surveys were conducted in an online/in-person manner, with time being dedicated at the beginning of the workshop for participants to fill out surveys on an online service (Google Forms). The exit survey was also completed online and was sent to participants via email. To ensure 100% of participants replied, we gave away a raffle prize as an incentive. Entry surveys were compared with exit surveys to determine changes in the sustainability of participants' eating habits. To quantify the changes in eating habits, responses to close-ended survey questions were assigned sustainability score values, where responses were assigned values corresponding to the sustainability of that option (Table 1).

Sustainability Scores

All sustainability scores were in this format (score ranges from 1-5). The sustainability scores of each respondent were summed up and recorded for each survey. Each respondent was assessed individually for the change in their overall (summed) sustainability scores. Each question was weighted equally, and a positive change in sustainability score between the two surveys indicated a change towards more sustainable eating habits for that respondent.

To assess the change in sustainability scores from the pre-and post-workshop surveys surrounding participants' plant-based eating and consumerism habits, we ran a paired t-test. To statistically compare the difference, the F and P values and the degree of freedom were calculated using Excel for each figure, respectively. Statistical analysis was performed for the overall averages, and questions with significant or minimal change. The statistical analysis was completed in Excel.

Discussions

During the workshops, we talked about a variety of ideas surrounding sustainable cooking to get participants engaged with the topic. Some of these ideas included easy switches to plant-based meals, participants' favorite cooking workshops, how to reuse vegetable scraps, and meatless Mondays. Following the workshops, an infographic (Appendix 3) was distributed to participants outlining the Meatless Monday campaign. There was a QR code linked to their website, with easy access to many simple plant-based meals aimed at people who consume meat.

Results

Overall Change in Participants Average Sustainability Scores

The results for the average sustainability scores have calculated the change from the pre and post-workshop surveys as demonstrated in Figure 1. Mean (+SD) values were calculated and illustrated. On average, the sustainability score of the pre-workshop survey was 3.25, and the

average score of the post-workshop survey was 3.54, 9 percent higher than the scores of the pre-workshop survey. The statistical analyses for the paired t-test showed significant values for the change in sustainability scores ($t = -3.46$, $df = 16$, $p = 0.003$, Fig 1), allowing us to reject the null hypothesis that there is no change between workshops.

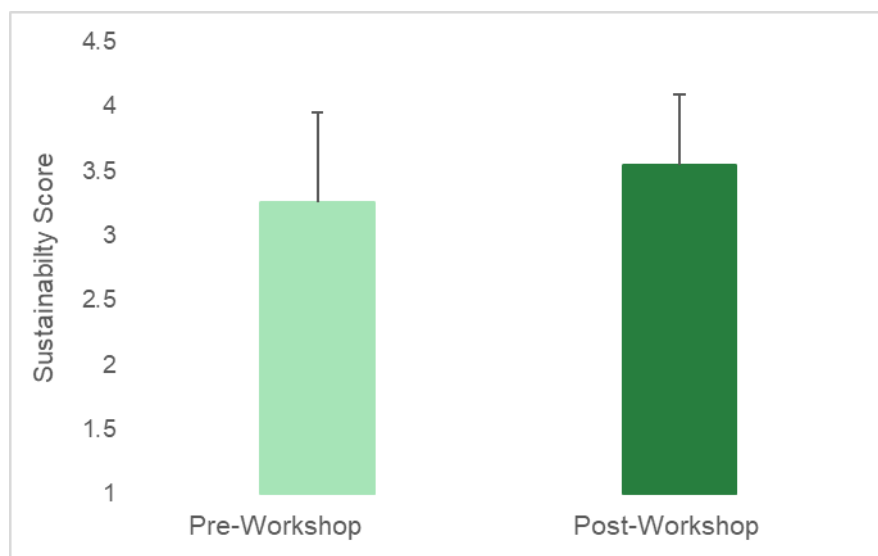


Figure 1 Mean (+SD) of the pre and post-workshop sustainability scores. Sample size ($n = 17$).

Significant Change in Education and Sustainable Grocery Shopping

Question 1 asked participants the following: My university education at Dalhousie has informed me on how to make more sustainable grocery shopping choices. The change in responses from the pre and post-workshop surveys are shown in Figure 2. The most answered responses in the pre-workshop survey were disagree and neutral, while they were disagree and agree in the post-workshop survey. There was an average change in sustainability score of 0.94 from the pre to post. The statistical analyses for the paired t-test showed significant values for the change in sustainability scores ($t = -2.99$, $df = 16$, $p = 0.0086$, Fig 2), allowing us to reject the null hypothesis.

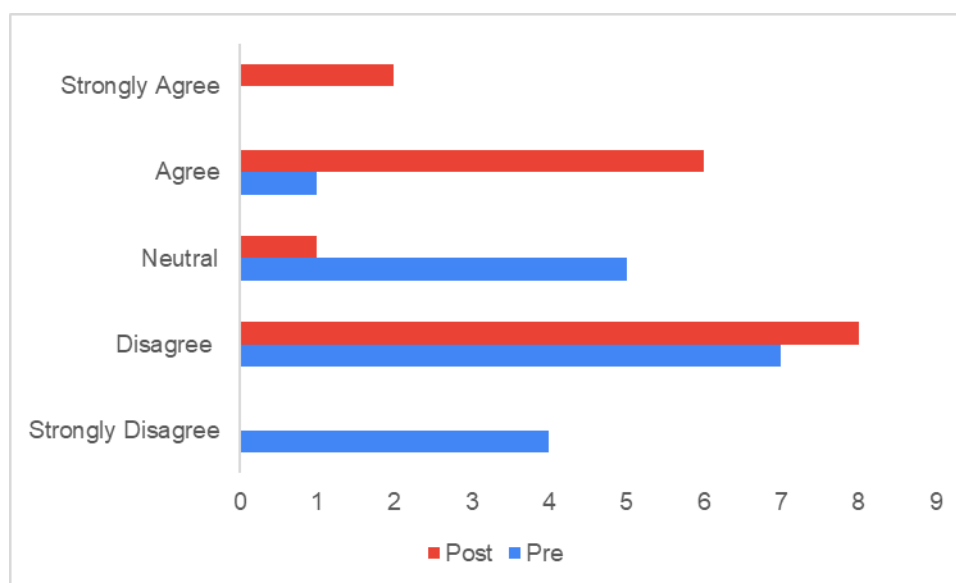


Figure 2 Results of question 1, “My university education at Dalhousie has informed me on how to make more sustainable grocery shopping choices,” from the pre and post-workshop survey. Sample size (n=17).

Change in Environmental Impacts and Grocery Shopping

Question 5 asked participants the following: Do environmental impacts influence your grocery shopping choices? The change in responses from the pre and post-workshop surveys are shown in Figure 3. The most answered responses in the pre-workshop survey were sometimes and rarely, while they were sometimes and often in the post-workshop survey. There was an average change in sustainability score of 0.41 from the pre to post. The statistical analyses for the paired t-test showed significant values for the change in sustainability scores ($t = -3.04$, $df = 16$, $p = 0.0077$, Fig 3), allowing us to reject the null hypothesis.

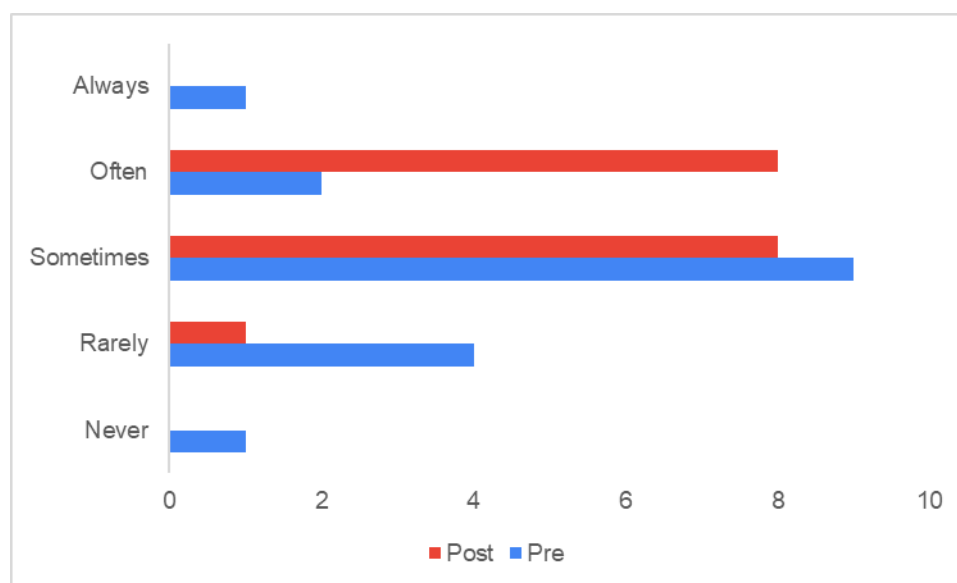


Figure 3 Results of question 5, “Do environmental impacts influence your grocery shopping choices?” from the pre and post-workshop survey. Sample size (n=17).

Change in Meatless Protein Consumption

Question 3 asked participants the following: How often do you consume meatless proteins? (i.e. tofu, chickpeas, lentils, eggs, etc.) The change in responses from the pre and post-workshop surveys are shown in Figure 4. The most answered responses in both the pre and post-workshop surveys were daily and weekly. There was an average change in sustainability score of -0.24 from the pre to post. The statistical analyses for the paired t-test showed insignificant values for the change in sustainability scores ($t= 1.29$, $df= 16$, $p= 0.22$, Fig 4), allowing us to accept the null hypothesis.

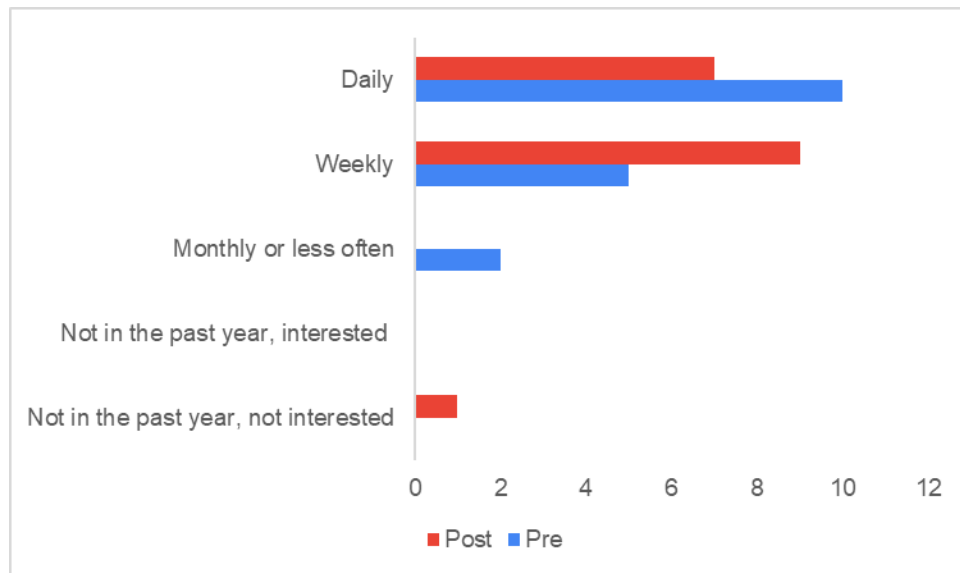


Figure 4 Results of question 3, “How often do you consume meatless proteins? (i.e. tofu, chickpeas, lentils, eggs, etc.)” from the pre and post-workshop survey. Sample size (n=17).

Perceptions on Sustainable Diets

Question 9 was an open-ended question that asked participants the following: In your opinion, what do you consider a sustainable diet? The change in responses from the pre and post-workshop surveys are shown in Figure 5. Sources of food were predominately mentioned in the pre-workshop survey, while the impacts of diet types were mentioned more in the post.



Figure 6 Results of question 9, “In your opinion, what do you consider a sustainable diet?” from the pre (left) and post (right) workshop surveys. More frequently answered words appear larger. Sample size (n=17).

Discussion

Student perceptions of food sustainability were changed after our workshops. Our findings suggest that universities would benefit from a broader implementation of workshops that focus on food literacy and food sustainability, allowing university students to lower their individual carbon footprints through a priority shift towards more carbon-neutral food options. The variation in question-to-question responses from before and after the workshops can provide meaningful insight into what changed in the perspectives of our participants.

The question that saw the largest shift in responses was Q1, which read: My university education at Dalhousie has informed me on how to make more sustainable grocery shopping choices. We can infer that information on making sustainable food choices is not made available to students at Dalhousie who do not study sustainability or environmental science. We attribute this to the high number of negative pre-workshop responses, where the majority of responses were either “disagree” or “strongly disagree” (Figure 2). The distinct change in responses indicates that the workshops were successful in making this information available to the participants, which was a secondary goal of this study. We conclude that Dalhousie can make steps towards making information on sustainable eating more accessible to students who are not already exposed to this information through their degree programs. Voluntary workshops such as ours make this information available, however, the integration of food sustainability lenses into accredited courses would provide additional structure and increased exposure.

The next most changed was Q5 regarding the influence of sustainability in participants' food shopping. Students' changes in responses could reflect a shift in the priority of sustainability during food selection when weighed against health, cost, convenience, or other considerations. Previous studies have found that health and taste are primary motivating factors in the shopping habits of university students (Migliorini et al. 2020).

Exposing students to information gives them the means to make direct, conscious decisions regarding sustainable eating. However indirect, positive effects on sustainability have been found with regards to food literacy, as technical cooking skills and knowledge is shown to contribute to minimizing the ecological footprint of one's food consumption (Yoojin et al. 2022). We see this connection as an avenue for future research, as there is limited research relating university-sponsored cooking workshops to food literacy and its effect on sustainability.

Limitations

Our research contained various limitations which are listed below, along with some suggestions for future improvement:

Selection bias

A consequence of our recruitment strategy was a bias that favored selecting participants whom we have personal connections with. Since recruitment information was distributed via social media and word-of-mouth, many of the participants were friends or colleagues of the four of us. As a result, it's possible that our participants were more engaged with the workshops than randomly selected individuals. An invitation link randomly distributed via email would be one possible solution to this selection bias.

Sample size constrained

As previously mentioned, we were able to achieve roughly 5% of the sample size that would be considered representative of the study population within a 95% confidence interval. With time as a limiting factor, more workshops over more time would allow us to incorporate more students for a larger sample size. We were also limited by the space we had at LL, so access to a larger space with more equipment would allow for more students per workshop, further increasing the potential sample size.

Data collection

The data collection method we used was subjective by design. We had participants self-report in surveys that measured their perceptions of food sustainability. It's unclear whether the change in perception will reflect a change in buying habits. To get an understanding of how participants' purchasing patterns change, grocery audits could be conducted to reveal this information. Audits were out of the picture for us, as they are time-consuming and have certain ethical concerns, however, they would give us more concrete results on the measurable impacts of our workshops.

Conclusions

There was a significant positive shift in sustainability scores from before and after the workshops were held. On average participants had a sustainability score change of 0.287. When leading the workshop, students must be informed of the proper handling of knives and commercial stoves to prevent any injury. Holding sustainable cooking workshops in the future could be beneficial to Dalhousie's students' ability to make sustainable food shopping and diet choices. We recommend that a larger study be done to solidify these findings for the student body at large. If a larger study were to find the same results, then we believe it would be in Dalhousie's best interest for their students to implement it into their regular programming. It is

thought that no other schools in Canada are offering a workshop of this nature and Dalhousie could pave the way in educating students on sustainable eating habits. The workshops did not have a significant cost since the ingredients were sourced from the Loaded Ladle so implementing them more widely wouldn't have a large impact on the school's funds.

Acknowledgments

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Tables and Figures

Question	Responses	Sustainability score
My university education at Dalhousie has informed me on how to make more sustainable grocery shopping choices.	D) Strongly agree	- 5
	E) Agree	- 4
	F) Neutral	- 3
	G) Disagree	- 2
	H) Strongly disagree	- 1

Table 1 Sustainability scores associated with survey questions to quantify results from pre and post-workshop surveys.

	<i>Pre-Workshop</i>	<i>Post Workshop</i>
Mean	3.257352941	3.544117647
Variance	0.520450368	0.326056985
Observations	17	17
Pearson Correlation	0.885778627	
Hypothesized Mean Difference	0	
df	16	
t Stat	-3.460690387	
P(T<=t) one-tail	0.001610032	
t Critical one-tail	1.745883676	
P(T<=t) two-tail	0.003220063	
t Critical two-tail	2.119905299	

Table 2 Statistical analyses were performed to calculate the difference in means from the pre and post-workshop surveys using a paired t-test with a critical value of 0.05 in Excel.

Appendix 1

Recruitment Poster posted digitally.

Sustainasquad & Green Cuisine Crash Course

the Loaded Ladle

Sustainable Cooking Class

**AVAILABLE TO STUDENTS:
SECOND YEAR AND ABOVE
+ CONSUME MEAT
REGULARLY**

Eligibility Survey:
Link Available at bottom of
page*

**MARCH 11TH
6-8PM
OR
MARCH 12TH
7-9 PM**

**FREE IF
ELIGIBLE**

This research was approved by the Department of Earth and Environmental Sciences
at Dalhousie University
Link: https://docs.google.com/forms/d/1ZImc08_gxHwJqnyNAlbvmhE2PI-cMOS2pxENVk_hYal/viewform?ts=65e71dab&edit_requested=true

Appendix 2

Pre and Post-Workshop Survey

1. My university education at Dalhousie has informed me on how to make more sustainable grocery shopping choices.
 - a. Strongly agree, Agree, Neutral, Disagree, Strongly disagree.
2. How many meals do you prepare at home on a weekly basis? (including breakfast, lunch, and dinner)
 - a. 0-5, 6-10, 11-15, 16-20, 21+
3. How often do you consume meatless proteins? (i.e. tofu, chickpeas, lentils, eggs, etc.)
 - a. I consume them daily, I consume them weekly, I consume them monthly or less often, I did not consume them over the past year, but I'm interested to try them, I did not consume them over the past year, and I'm not interested to try them.
4. What percentage of your protein intake comes from plant-based/vegetarian sources?
 - a. 0-20, 21-40, 41-60, 61-80, 81-100.
5. Do environmental impacts influence your grocery shopping choices?
 - a. Never, Rarely, Sometimes, Often, Always.
6. I would consider switching to a plant-based/vegetarian diet.
 - a. Strongly agree, Agree, Neutral, Disagree, Strongly disagree.
7. I am confident in making sustainable food choices.
 - a. Strongly agree, Agree, Neutral, Disagree, Strongly disagree.
8. I have a moral obligation to make sustainable food choices.
 - a. Strongly agree, Agree, Neutral, Disagree, Strongly disagree.
9. In your opinion what would you consider a sustainable diet?

a. Short Answer

Appendix 3

Meatless Monday infographic with embedded QR code that is linked to the Meatless Monday Campaign's website.

