Gen Z and Sustainable Diets: A Holistic Perspective.

Understanding Perceptions of and Engagement with the Social, Economic and Environmental Dimensions of a Sustainable Diet

By

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General Abstract

Current food production methods are causing wide scale degradation of the natural environment thus a shift towards more sustainable agricultural systems is essential in fighting the climate crisis. Understanding how Gen Z, a generation that will inherit the changing climate, relates to the social, economic and environmental aspects of a sustainable diet is important in ensuring they are aware how to make an impact with their dietary choices. This thesis aimed to gain a holistic understanding of Gen Z’s perceptions of and engagement with sustainable diets. Two studies were conducted online, examining Canadian youth between the ages of 18-25. The first study took an exploratory approach, aiming to understand what a sustainable diet means to Gen Z in their own words. The second study took a predictive approach, aiming to quantify and understand Gen Z’s action stages around a range of sustainable dietary behaviours, including the psychological and educational factors that influence their stage of change. Results from Study One highlighted that youth perceive behaviours centered around supporting their local community and reducing food waste to be effective for promoting a sustainable diet. In addition, over 60% of participants indicated that there were barriers preventing them from engaging in sustainable diets, such as cost. Results from Study Two revealed that a high food literacy score and a strong belief in the efficacy of a behaviour are the two most important predictors of being in an action stage for a range of sustainable dietary behaviours. Together these two studies provide a holistic overview of what sustainable diets mean to Gen Z, how they currently engage with sustainable diets, and ways to encourage action. The thesis also contributes to the scholarly literature on the use of TTM and TPB in assessing the factors that influence engagement with sustainable dietary behaviours. It also offers practical recommendations on how our results can be used to shape policy, educational interventions and marketing towards Gen Z.
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CC  Climate Change
GHG  Greenhouse Gas Emissions
TPB  The Theory of Planned Behaviour
TTM  The Transtheoretical Model of Behaviour
Chapter 1: General Introduction

1.0 General Introduction

The impact of agriculture on the global environment cannot be understated or ignored. Globally agriculture accounts for up to 37% of annual GHG emissions, including 50% of methane emissions and 75% of nitrogen emission (Lynch et al., 2021). From a Canadian perspective, 10% of the country’s total emissions are from agriculture and in some provinces, such as Manitoba and Saskatchewan, upwards of 30% of total emissions are related to agriculture (Canada, 2021; Fouli et al., 2022). However, GHG emissions are not the only indicator of environmental impact; globally upwards to 38% of the earth’s land is used for agriculture, with two thirds of that total being used solely for the rearing of livestock (Food and Agriculture Organization of the United Nations, 2020). In fact, agriculture’s greatest threat to the environment comes from freshwater use, with 87% of the world’s freshwater consumption coming from agriculture (Government of Canada, 2014). Not only does agriculture contribute to climate change (CC), it is one of the sectors to be hardest hit by the changing climate. With record breaking heat waves, unpredictable rain patterns, and increases in extreme weather events such as droughts, the predictable climate system that food production relies on are at risk (Elliott et al., 2014). As agriculture continues to threaten our global environment, food systems are forced to be maladaptive. With less consistent rain farmers must rely heavily on irrigation but a heavy reliance on irrigation continues to dwindle already stressed water systems (Elliott et al., 2014).

A transition to a more sustainable agriculture system is no longer optional but rather a necessity if we are to mitigate CC and feed a growing global population. Consumers have the potential to play an important role in this shift towards sustainable agriculture. In the past,
consumer demand has pushed niche sustainable markets into the mainstream. Looking at the case of organic agriculture, in 2008 there were only 11,000 certified organic farms in the United States, whereas in 2019 that number jumped to over 16,000, showing a 37% increase in just over a decade (Matlock, 2021). In 2019, organic food sales in the states reached an all-time high of $9.9 billion USD. Currently US consumer demand for organic food products is outpacing the US’ ability to produce enough to meet the demand (USDA ERS - Organic Market Summary and Trends, 2022). The case of organic agriculture demonstrates the sway that consumers hold over agricultural markets and leveraging their demand for more sustainable options may be a way to push sustainable agriculture forward.

Generation Z (Gen Z), born between the years of 1995-2012, represent a different type of consumer than previous generations. They are more sustainability orientated and they value factors such an environmental impact when making purchasing decisions (Dadija et al., 2019). Gen Z is also more educated and aware of environmental issues than previous generations and more likely to be involved in climate events such as protests (Tyson et al., 2021). In addition, they also show greater levels of concern about the climate crisis compared to older generations. Overall, 69% of Gen Z Americans feel anxiety about the climate crisis, compared to only 41% of baby boomers (Tyson et al., 2021). Some research has found that people who report high levels of eco-anxiety are more likely to engage in environmentally friendly behaviours and are more than twice as likely to report that they are motivated to change their behaviour in order to mitigate climate change (Clayton, 2020). However, climate anxiety may also lead to eco-paralysis, a fear based state that inhibits people from taking action or altering their behaviours (Albrecht, 2011). Research found that children who used problem-focused coping, which involves informing themselves about problems and working through them, show higher levels of
behavioural engagement and efficacy (Ojala, 2015). Therefore, ensuring that Gen Z is educated on the climate crisis and what they can do to make a difference is extremely important in ensuring that the anxiety they feel is translated into action rather than paralysis.

Engaging in sustainable dietary behaviours is one way in which Gen Z can engage in climate mitigation in their everyday lives. However, the concept of a sustainable diet cannot be simply defined, and more than environmental factors must be considered in the definition. In order for a food system to be sustainable it must consider the three pillars of sustainability: social sustainability, economic sustainability and environmental sustainability (Food and Agriculture Organization of the United Nations, 2018). In order to achieve this a food system must be profitable throughout (economic), have broad benefits for society (social), and have a positive or neutral impact on the natural environment (environmental) (Food and Agriculture Organization of the United Nation, 2018). This three pillar approach is mirrored in the new Canadian Food Policy (Government of Canada, 2020), highlighting the importance of addressing all three aspects of a sustainable diet. Yet, much of the literature and communication with consumers is focused solely on the environmental aspects of a sustainable diet (The Association of UK Dietitians, 2018). Because of this exclusive focus on environmental sustainability, consumers might not even be aware of the actions they can be engaging in to promote social and economic sustainability. If all three aspects of sustainability are equally important, that is something that should be indicated and communicated to consumers. Research is needed in order to understand what consumers know about behaviours related to environmental, social, and economic sustainability and how they enact these behaviours in their everyday lives.

Beyond understanding what consumers know about sustainable diets, there is a need to understand how to foster engagement with sustainable dietary habits, including the barriers and
facilitators of engagement. The Theory of Planned Behaviour (TPB) (Ajzen, 1991) has been applied extensively to understand healthy and sustainable dietary choices in adult populations (Biasini et al., 2021). TPB consists of three components, subjective norms, attitudes, and perceived control, which have been found to significantly predict behavioural intention (Biasini et al., 2021). Given the extensive literature around the predictive capacity of TPB and the lack of literature exclusively focusing on youth, the present research aims to understand the role of the three components of TPB on current engagement with sustainable dietary behaviours. However, TPB lacks a dimension specifically aimed at understanding the role of knowledge in predicting behaviour. Food literacy is a term that is used to describe food and nutrition skills and knowledge (Truman et al., 2017). Research has consistently found a small but significant relationship between both environmental and general knowledge and pro-environmental behaviour (Geiger et al., 2019). However, to the best of our knowledge there isn’t any research that aims to understand the role of food literacy in predicting engagement with sustainable dietary behaviours in the context of youth.

In addition to knowledge, the role of environmental concern has been identified as a significant predictor of pro-environmental behaviour (Rhead et al., 2015). The Food Sustainability Concern scale was developed to specifically measure the role of food sustainability concern in predicting behaviour (Grunert et al., 2014). This scale has not been applied in the context of youth and pro-environmental eating habits. The role that food sustainability concern may play in engagement with sustainable diets is currently unknown. The present research aims to fill the identified gaps by gaining a holistic understanding of what sustainable diets mean to youth and the factors that predict their engagement with sustainable diets.
1.1 Research Questions

The present research aimed to gain a holistic understanding of sustainable diets and youth. To accomplish this, the research was subdivided into two components (a) exploratory and (b) predictive. Study One took an exploratory approach in answering the following research questions:

(i) How does Gen Z describe a sustainable diet?
(ii) What are the most important food choice motivators for Gen Z?
(iii) What food behaviours does Gen Z perceive to be the most and least effective in promoting a sustainable diet?
(iv) What barriers prevent Gen Z from engaging in a sustainable diet?

Study Two aimed to predict motivations towards current actions stages of sustainable dietary behaviours through the following research questions:

(i) How do control, subjective norms and attitudes influence Gen Z’s engagement with sustainable dietary behaviours?
(ii) How does food literacy influence Gen Z’s engagement with sustainable dietary behaviours?
(iii) How does food sustainability concern influence Gen Z’s engagement with sustainable dietary behaviours?
(iv) How does a pro-environmental worldview influence Gen Z’s engagement with sustainable dietary behaviours?

1.1 Structure of the Thesis

This thesis is structured by manuscripts for publication, with the opening chapter framing the overall research background and underpinnings for both studies. Chapter 2 (Study One)
addresses the first set of research question through an exploratory approach; aiming to understand what sustainable diets mean to youth in their own words, as well as the behaviours that they perceive to be the most and least effective in promoting a sustainable diet. Chapter 3 (Study Two) addresses the second set of research questions through a predictive approach; aiming to understand how a variety of factors such as control, norms, and food literacy impact engagement with sustainable dietary behaviours. Study Two is theoretically grounded in the Theory of Planned Behaviour and the Transtheoretical Model of Behaviour. Both manuscripts will be sent for publication upon the completion of the thesis. The fourth and final chapter summarizes the main findings from both studies and provides an overarching conclusion on how the results relate to each other and their individual contributions. Recommendations for future research directions are also provided.

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Chapter 2: Study One: Gen Z: What does a sustainable diet mean to me? Exploring a sustainable diet in the words of youth

Abstract

Agricultural systems have a massive impact on the global environment. Between land use, water use, biodiversity loss, and greenhouse gas emissions, agriculture is one of the most dominant threats to the environment. Shifting towards a more sustainable food system is a necessity for achieving a sustainable future and feeding a growing population. In the past, agricultural movements that are born out of consumer demand have pushed sustainable practices forward. With their increased focus on sustainability issues, Gen Z poses itself as the perfect generation to advocate for sustainable food systems. In this exploratory study of 462 young adults between the ages 18-25, we administered an online survey to gain a holistic understanding of Gen Z and sustainable diets. Using an open response format, we aimed to determine what Gen Z perceives as a sustainable diet, what behaviours they can engage in to promote a sustainable diet, and what barriers prevent them from engaging. Other research objectives were to determine what behaviours they perceive to be the most and least effective in promoting a sustainable diet and the their most important motivators for food choice. Decreasing food waste, consuming local and seasonal produce and supporting local farmers were rated as the top three most important behaviours for promoting a sustainable diet. Whereas, reducing consumption of sugary drinks, reducing dairy consumption, and avoiding prepared/chopped produce were rated as the three least important behaviours. The majority of participants indicated that there were barriers towards engaging in a sustainable diet with cost overwhelming being the most important. These findings inform policy and marketing decisions and can aid in mobilizing youth to make sustainable dietary decisions.
1. Introduction

1.1 Background

Agricultural systems have a massive impact on the global environment, with agricultural production accounting for 21-37% of annual greenhouse gas (GHG) emissions, including 50% of global methane emissions and 75% of nitrogen emissions (Lynch et al., 2021). Between land use, water use, biodiversity loss, and GHG emissions, agriculture is one of the most dominant threats to the environment. Research also suggests that the environmental demand is only set to get worse, with some estimates stating we will need to double food production in the next 40 years to keep up with increasing demand (Davis et al., 2016; Godfray et al., 2010). Shifting towards a more sustainable food system is a necessity for achieving a sustainable future and feeding a growing population. Consumers can play an important role in this shift towards sustainable agriculture. Consumer demands have been shown to influence agricultural systems in the past, particularly with demands for increased traceability of products, reasonable prices, safety, and proper and sufficient labelling (Morita, 2004; Opara, 2003). Young adults have the potential to play a pivotal role in the shift towards sustainable diets. As Generation Z (born 1995 and later) enters the labour force and economy, they represent a different type of consumer than previous generations (Cameron & Pagnattaro, 2017). Consumer research in the fashion industry has shown that sustainability issues are important to Gen Z consumers (Gazzola et al., 2020) and in this age of environmentally informed consumers, sustainability is no longer optional (Su et al., 2019). In the past, agricultural movements that are born out of consumer demand have pushed sustainable practices forward and with their increased focus on sustainability issues, Gen Z poses itself as the perfect generation to advocate for sustainable food systems. Therefore, understanding Gen Z’s behaviours, attitudes, and beliefs around sustainable dietary habits is
extremely important to ensure they have the knowledge and resources to make sustainable dietary choices.

1.2 Literature

*Defining sustainable diets*

While it is established that agricultural systems need to shift towards a more sustainable framework and consumers can have an important role to play in that shift, it is far less established what is meant by a sustainable diet. There is currently no consensus on what can be defined as a sustainable diet and depending on one’s priorities and methods of assessment, the meaning of a sustainable diet can change. Previous food sustainability frameworks and measurement tools have simplified food sustainability into only the environmental impacts, such as reduced GHG emissions and land use (Goggins & Rau, 2016). However, this perspective ignores the societal, cultural, and economic factors that influence sustainability beyond environmental. With oversimplification, these frameworks run the risk of failing to capture the complexity of an environmentally sustainable diet. The three-pillar concept of sustainability states that social, economic, and environmental factors represent the three broad pillars of sustainability (Purvis et al., 2019). Due to the complex nature of food systems, in order for a system to be sustainable it must create positive impacts across all three dimensions of sustainability. While understanding the environmental aspects of food sustainability is important, it is often the aspect that is focused on the most when discussing food sustainability in the literature and in communications with consumers (The Association of UK Dietitians, 2018). Due to this exclusive focus on environmental sustainability, consumers might not even be aware that labels representing the social and economic aspects of sustainability are representing
sustainability characteristics. If all three aspects of sustainability are equally important, that is something that should be indicated and communicated to consumers.

*Food sustainability and consumers*

Previous research using Life Cycle Analysis, which is a method used to evaluate the environmental impact of a product through its lifecycle, found that avoiding air freighted foods, choosing organic, and reducing meat consumption had the overall highest environmental impact in terms of GHG emissions and land use (Hallström et al., 2015; Jungbluth et al., 2000; The Association of UK Dietitians, 2018). Some previous research has examined consumer perceptions of these and other sustainable dietary recommendations in relation to how important consumers find specific behaviours to be. A recent study by Culliford and Bradbury (2020) examined the perceived benefits of several food behaviours in adults from the UK and found that buying local, reducing consumption of air freighted foods, and reducing food waste were perceived as having the highest environmental benefit, whereas choosing organic produce and prioritising plant proteins were seen as having the lowest environmental impact. Other research has found that consumers consistently underestimate the importance of eating organic and reducing meat consumption (Lea & Worsley, 2008; Tobler et al., 2011) while also overestimating the importance of behaviours such as reducing food packaging and household composting (Lea & Worsley, 2008). This research suggests that there is a gap between what the literature states as being the most effective behaviours for reducing dietary impact and what consumers perceive as having the highest impact.

However, there is also research that suggests generational cohorts may have different perceptions around the environmental impact of food behaviours. Culliford and Bradbury (2020) found that participants under 35 were significantly more likely to perceive limiting red meat
consumption and prioritizing plant proteins as having a greater environmental benefit than did older adults. Research by Lea and Worsley (2008) also found that older cohorts were more likely to engage in behaviours like composting and purchasing local food rather than the behaviours younger cohorts engaged in such as using their own carryout bags, avoiding non-environmentally friendly packaging, purchasing organic foods, and lowering meat consumption. Other research focused on Generation Z notes that they are more environmentally motivated and are more educated on sustainable living than previous generations (Su et al., 2019). While there is research that notes generational differences in both overall environmental values and perceptions of sustainable diets, there is very little research that explicitly focuses on youth’s perceptions, attitudes, and knowledge of sustainable food behaviours.

Beyond the generational differences in consumer perceptions there are several other reasons why understanding youth perceptions of sustainable diets is important. First and foremost, youth will inherit the changing climate and their increased orientation towards sustainability makes them key actors in promoting sustainable lifestyles and adopting ecologically friendly habits (Dadija et al., 2019). In addition, youth have more flexible dietary habits than older adults (Whitelock & Ensaff, 2018) and the habits that they establish in their youth can remain consistent throughout their life (Movassagh et al., 2017). Therefore, if youth engage in sustainable dietary habits while they are younger there is the opportunity for it to become a habit throughout their life. Also, these habits, if picked up early in life, have the potential to be much more impactful across the lifespan than an adult who alters their dietary behaviours later in life. In addition, most of the research focused on understanding consumer perceptions of sustainable food takes a top-down approach, where participants are given pre-determined behaviours to reflect on rather than openly express their own perceptions of what
constitutes a sustainable diet. Gaining a holistic understanding of youth’s perceptions and attitudes around sustainable diets is both timely and important.

1.3 Current Study

The study is exploratory in nature and seeks to gain a holistic understanding of what a sustainable diet means to Gen Z. Using a quasi-mixed-methods approach with both qualitative and quantitative research questions, our primary research questions are (i) How does Gen Z describe a sustainable diet? (ii) What are the most important food motivators for Gen Z? (iii) What food behaviours does Gen Z perceive to be the most and least effective for promoting a sustainable diet? (iv) What barriers prevent Gen Z from engaging in a sustainable diet?

Identifying that behaviours that Gen Z perceives to be important for promoting a sustainable diet is crucial in understanding how Gen Z engages with sustainable food and the areas that can be targeted for further invention.

2 Methods and Materials

2.1 Participants

A representative geographic sample of Canadian youth was recruited through the online data collection company Dynata®. To be eligible, participants had to be between the ages of 18-25 and Canadian citizens or permanent residents. While the age range of Gen Z currently encompasses children outside of 18-25 (those born between 2005-2012), the age of consent in Ontario is 18 and therefore, was applied as the cut-off age. Participants completed a survey distributed through the Qualtrics platform and ethics clearance was granted through the Brock University Research Ethics Boards (# 20-326). A total of 462 useable responses were recorded, however, sample size differs depending on question and groups used for analysis. The average
age of survey participants was 22 years, with 57% of participants identifying as female, 40% identifying as male, and 2% as non-binary. In terms of education, 38% of participants completed high school and 59% completed or were enrolled in post-secondary education.

2.2 Measures

2.2.1 Food choice motivators

The importance of food choice motivators was assessed using a 6-point importance scale (1=not important at all, 5=extremely important, 6= no opinion (not included in analysis)). The list of 21 rated items was derived from three sources; nine commonly cited motivators (Steptoe et al., 1995), five adolescent-specific factors (Neumark-Sztainer et al., 1999), and five sustainability-specific factors (Corallo et al., 2019). Refer to Figure 1 for full list.

2.2.2 Open response: In the words of youth

Participants were asked two open response questions, (i) ‘what does a sustainable diet mean to you?’ and (ii) ‘what things can you do to make your diet more sustainable?’. For the first survey question, participants were given one large multi-line text box and for the second they were given 10 separate single line boxes where they were encouraged to list up to 10 behaviours. Responses were inductively coded by the primary researcher following the general inductive approach outlined by Thomas (2006), where responses were coded independently by the primary researcher alongside the creation of codebooks, where four codebooks were created (two for each question; one each for eco-centric and ego-centric responders). A second coder (a PhD affiliated with the Brock University Environmental Sustainability Research Centre) then deductively coded the questions based off the primary researcher’s codebooks. The primary researcher then compared and adjusted codes, the reliability of the two coders was assessed using Cohen’s Kappa. Full codebooks available in Appendix.
2.2.3 Ranking sustainable dietary behaviours

Participants were provided with a list of 15 sustainable dietary behaviours (available in Figure 2) representing the environmental, social, and economic aspects of sustainability (Association of UK Dieticians, 2018; Carlsson et al., 2017; Food and Agriculture Organization of the United Nations, 2018). The participants were asked to choose up to five behaviours from the list and rank them for how effective they are in promoting a sustainable diet. Participants were then asked to provide justification for their most effective choice. All behaviours that were not selected as participants’ most effective were carried forward to the next question where participants were asked to select up to five behaviours that they considered the least effective in promoting a sustainable diet. Finally, participants were also asked to provide justification for their least effective behaviour.

2.2.4 Barriers

Participants were asked if they perceived there to be barriers preventing them from engaging in a sustainable diet. If they selected yes, they were directed to an open response question where they were asked to describe any barriers that prevent them from engaging in a sustainable diet. Responses were inductively coded by the primary researcher following the general inductive coding approach and a codebook was created (refer to appendices 1-4).

2.3 Data treatment

Data were treated using Microsoft Excel Version 15.3 and analyzed using IBM SPSS Statistics for Windows, Version 25.0 (Armonk, NY). Inductive coding and descriptive statistics were conducting on Microsoft Excel. Chi squared tests of independence were used to determine group differences in ratings and importance.
3 Results

3.1 Food choice motivators

Participants were asked to rate how important a list of empirically identified motivators were on their food choices. These included general food choice motivators (e.g. familiarity), as well as adolescent-specific motivators (e.g. my parents) and sustainability-specific motivators (e.g. GHG emissions). Taste, health and price were the three most commonly rated as extremely important, followed by impact on nature, environmental sustainability, and GHG emissions. Profitability for farmers, my parents, and social media were the three lowest rated. Figure 1 displays the ratings for every behaviour surveyed, sorted by frequency of “extremely important” responses. No opinion responses are not shown or calculated in percentages.

![Figure 1. Food Choice Motivators in Gen Z (% of responses)](image-url)
3.2 Gender differences in food choice motivators

Previous research has found gender differences in the acquisition, preparation and consumption of food (Grzymisławska et al., 2020; Lee & Allen, 2021; Wardle et al., 2004). Research has also found that these gender differences can be examined both from a biological sex perspective and a cultural gender perspective. Given the extensive research on gender differences and food choice we aimed to see if there were any differences between genders in their importance ratings of motivators. Chi-squared tests of independence were run on the collapsed importance categories, sample sizes for each category differed and the range is presented (not/somewhat important (n=52-235), important (n=77-147), very/extremely important (n=120-301)) for each of the motivators. Overall, there were very few differences between men and women in their importance ratings, with the only significant difference being mood, $X^2 (3) = 6.19, p=.045$, with women more likely to assign a higher importance rating than men. Interestingly, weight control did not differ between the two groups $X^2 (3) = 2.26, p=.519$ and neither did health $X^2 (3) = 1.39, p=.708$, two factors that have been found to differ between genders (Wardle et al., 2004).

3.3 Open response categorization

Participants were asked two open response questions: “What does a sustainable diet mean to you?” and “What things can you do to make your diet more sustainable?”. Responses to the first question were categorized by how the respondents understood the question, as two very distinct themes emerged. Specifically, respondents were categorized as either eco-centric or ego-centric responders. Eco-centric responders understood the question in terms of a sustainable diet for the environment/an eco-friendly diet, whereas the ego-centric responders understood the
question in terms of a sustainable diet for oneself and one’s health (refer to Table 1 for criteria and examples). Cohen’s Kappa showed a strong interrater reliability, \( k = .808 \).

**Table 1. Eco-Centric vs Ego-Centric Responders**

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Categorization Criteria</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eco-Centric</strong></td>
<td>133 (29%)</td>
<td>Impact on the environment; GHG emissions; individual actions that relate to the environment (plant-based diet, plastic packaging); factors related to social or economic sustainability (eating local)</td>
<td>“Has minimal impact on the environment in terms of waste, energy, and resources”</td>
</tr>
<tr>
<td><strong>Ego-Centric</strong></td>
<td>155 (34%)</td>
<td>A personally healthy diet/lifestyle; healthy food choices; nutrition, long-term maintenance of diet; balanced diet</td>
<td>“Eating healthy including fruits and vegetables for a perfect balance of nutrients and protein” OR “It means a way to keep the diet up long term”</td>
</tr>
<tr>
<td><strong>Non-Categorizable</strong></td>
<td>172 (37.5%)</td>
<td>Response could not be coded or was not applicable</td>
<td>“Fruits/veggies, fibre, protein, carbs” (or anything similar that lists foods/food groups)</td>
</tr>
</tbody>
</table>

3.4 Sustainable diets: In the words of youth

These and all subsequent results only include participants classified as eco-centric, given that they understood the question in an environmental context, which relates to our hypotheses and study aims. The codebook, including categories, criteria, and counts, for ego-centric responders can be found in the appendices 2 and 4. Table 2 shows the eight most prevalent categories extracted from the open response question “what does a sustainable diet mean to
Responses were inductively coded by the primary researcher and validated by a second coder, with Cohen’s Kappa showing a fair interrater reliability, $k=.469$.

**Table 2.** “What does a sustainable diet mean to you” open response codebook

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Example</th>
<th>Count</th>
<th>% of responses (n=263)</th>
<th>% of responders (N=133)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental impact</td>
<td>Diet having reduced/no impact on the environment; diet helping the environment; foods being sustainably sourced</td>
<td>“A diet that has a positive impact on the environment”</td>
<td>69</td>
<td>26%</td>
<td>52%</td>
</tr>
<tr>
<td>Healthy</td>
<td>Diet being healthy and environmentally friendly</td>
<td>“A sustainable diet is one that is healthy and does not negatively impact the environment.”</td>
<td>43</td>
<td>16%</td>
<td>32%</td>
</tr>
<tr>
<td>Plant based/reduce meat consumption</td>
<td>Eating plant based; reducing/eliminating meat in diet</td>
<td>“A diet with plant based foods…” OR “Less meat consumption because it is contributing to greenhouse gas emission…” (sic)</td>
<td>20</td>
<td>8%</td>
<td>15%</td>
</tr>
<tr>
<td>Long term/available for future generations</td>
<td>Protecting land/resources for future generations; long-term sustainability of food system</td>
<td>“A sustainable diet to me means one that contributes to a healthy life for myself and future generations to come…”</td>
<td>18</td>
<td>7%</td>
<td>14%</td>
</tr>
<tr>
<td>Responsible consumption /sustainable replenishment</td>
<td>Eating mindfully/responsibly; foods can be replenished/grown/maintained sustainably;</td>
<td>“Consuming products that were derived from sources that will not deplete the ongoing supply of that product....”</td>
<td>16</td>
<td>6%</td>
<td>12%</td>
</tr>
<tr>
<td>Food security</td>
<td>Protecting or maintaining food/nutritional security</td>
<td>“Sustainable Diets are those diets with low environmental impacts that contribute to food and nutrition security”</td>
<td>13</td>
<td>5%</td>
<td>11%</td>
</tr>
</tbody>
</table>
and to healthy life for present and future generations.”

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Example</th>
<th>Count</th>
<th>% of categorizable responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local/fresh food</td>
<td>Eating local food; eating fresh food</td>
<td>“Eating locally grown and produced food…”</td>
<td>12</td>
<td>5%</td>
</tr>
<tr>
<td>Protects resources/land</td>
<td>Protecting resources; reducing harm to resources; respecting land; mentions a specific resource (water)</td>
<td>“A diet that includes food which…does not deplete soils and natural resources”</td>
<td>12</td>
<td>5%</td>
</tr>
</tbody>
</table>

Full codebook in appendix A.1. % of responses is the total number of responses that were categorized (each response could be coded into multiple categories).

There were three additional categories that touched upon social sustainability (cultural acceptability, ethical impacts, and animal welfare). However, there were only a total of 14 responses across all three categories. Only one category was focused on economic sustainability, and it had a total of two responses (not shown in table above, full codebook available in appendix A.1).

Table 3 shows the ten most prevalent categories extracted from the open response question “what things can you do to make your diet more sustainable?”. Cohen’s Kappa showed a fair interrater reliability, $k=.480$.

**Table 3.** “What things can you do to make your diet more sustainable” open response codebook
<table>
<thead>
<tr>
<th><strong>Grow/catch/forage food</strong></th>
<th>Gardening; growing/hunting/foraging for own food</th>
<th>“Plant a garden of your own” OR “Foraging”</th>
<th>30</th>
<th>7%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Avoid single use plastics</strong></td>
<td>Avoiding single use packaging/plastic; reducing plastic waste; using reusable packaging</td>
<td>“Avoid single-use plastic packaging”</td>
<td>28</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Eat more plants/fruits/vegetables</strong></td>
<td>Response mentioned: eating more plants/vegetables/fruits</td>
<td>“Eat more plants”</td>
<td>26</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Plant based/vegetarian/vegan/eat no meat</strong></td>
<td>Response mentioned: going plant based; following a veg diet; cutting out meat</td>
<td>“No meat”</td>
<td>26</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Reduce household/food waste</strong></td>
<td>Response mentioned: reducing household waste/food waste; reusing leftovers</td>
<td>“Reduce kitchen garbage”</td>
<td>24</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Organic/pesticide free</strong></td>
<td>Response mentioned: eating organically grown food; pesticide free food</td>
<td>“Organic food”</td>
<td>19</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Cook own meals/eat at home</strong></td>
<td>Response mentioned: cooking own meals; avoiding take out; cooking from scratch</td>
<td>“Cook more meals at home”</td>
<td>18</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Eat mindfully/responsibly/reduce consumption</strong></td>
<td>Response mentioned: eating mindfully; responsible consumption; reducing consumption overall</td>
<td>“Eat mindfully” OR “Buy only what I need”</td>
<td>11</td>
<td>3%</td>
</tr>
</tbody>
</table>

The % of responses represents the number of responses to the question; each participant could provide up to ten responses. Full codebook in appendix B.1.

There were two additional categories that addressed aspects of social sustainability (eat seasonable food and eat ethical food); however, the response count was low (with a total of 18 responses across the two categories). None of the additional categories addressed dimensions of economic sustainability.
3.5 Comparing social, environmental and economic sustainability

We were interested in examining the frequency in which participants would mention factors related to environmental, social, and economic sustainability in the open response questions. For the question, “what does a sustainable diet mean to you?”, ten of the coded categories (55%) represented environmental sustainability, six (33%) represented social sustainability, and one category (.5%) represented economic sustainability (with 12% of categories not categorizable). With respect to the number of total responses, environmental sustainability (n=156) was cited 3x as frequently as social sustainability (n=58).

Results were similar for the question “what things can you do to make your diet more sustainable?”. Eleven of the coded categories (50%) represented environmental sustainability, six (27%) represented social sustainability, and none represented economic sustainability. With respect to the number of total responses, 191 responses cited environmental sustainability, 144 cited social sustainability, and none cited economic sustainability.

3.6 Perceived barriers towards engaging in sustainable diets

Participants were asked if they perceived there to be barriers preventing them from engaging in sustainable dietary habits; 68% indicated that there were (n=90). If they stated yes, respondents were asked to explain in their own words what those barriers were (83 responded). Table 4 highlights the seven most prevalent categories extracted, with cost the most frequently identified barrier (59% of respondents).
Table 4. “Please describe any barriers that prevent you from engaging in sustainable dietary habits” open response codebook

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Examples</th>
<th>Count</th>
<th>% of categorizable responses (n=114)</th>
<th>% of responders (n= 83)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Cost of sustainable/ or healthy foods; financial restrictions</td>
<td>“I am a student and sustainable and ethical diets are more expensive.”</td>
<td>49</td>
<td>43%</td>
<td>59%</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Lack of accessibility; lack of choices; lack of seasonal availability</td>
<td>“Not enough access to sustainable foods in the small town i reside in”</td>
<td>16</td>
<td>14%</td>
<td>19%</td>
</tr>
<tr>
<td>Time/Convenience</td>
<td>Lack of time available for food preparation; the convenience of unsustainable/unhealthy foods; busy lifestyle</td>
<td>“lack of time and competing priorities:”</td>
<td>14</td>
<td>12%</td>
<td>17%</td>
</tr>
<tr>
<td>Lack of Consumer Control</td>
<td>Companies bearing responsibility; difficulty for consumers making sustainable decisions; flaws in the system out of their control</td>
<td>“Corporations packaging things excessively…”</td>
<td>9</td>
<td>8%</td>
<td>11%</td>
</tr>
<tr>
<td>Habit/Discipline</td>
<td>Poor self-discipline; poor lifestyle habits/choices</td>
<td>“Poor self-discipline, eating outside, and lack of self control”</td>
<td>7</td>
<td>6%</td>
<td>8%</td>
</tr>
<tr>
<td>Social Influence/Culture</td>
<td>Parental/peer influence; social media; advertisements</td>
<td>“I live with my family and it is hard to convince them to eat more sustainably…”</td>
<td>6</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>Taste/Cravings</td>
<td>Cravings; taste of food; enjoyment eating meat/unhealthy foods</td>
<td>“I like meat”</td>
<td>5</td>
<td>4%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Participants could respond to the question with as many barriers as they wanted. Response count is the % of total responses, responder count is the % of individual responders (participants could have their responses coded into multiple categories).

Full codebook in appendix C.
3.7 Perceptions of the least and most effective behaviours

Participants were asked to rank 15 behaviours that represent the social, economic, and environmental aspects of sustainability in terms of being the most and least effective in promoting a sustainable diet. Figure 2 shows rankings of the most effective behaviours (blue) and least effective behaviours (orange), by their frequency of citation in participants’ top five.

**Figure 2.** Ranking of the least and most effective behaviours for engaging in a sustainable diet (frequency of citation in top 5)

The most effective was *decreasing food waste* (59% of respondents mentioned in their top 5), followed by *consuming local and seasonal produce* (54%), *supporting local farmers* (52%), *reducing red meat consumption* (42%), and *choosing foods with limited packaging* (42%). Participants were asked to provide reasoning for their number one choice. These responses (data not shown) provide some insight into participants’ decision making and some key themes were extracted for the three most commonly chosen behaviours. Reasoning for *decreasing food waste* included reducing wasted resources (n=10), increasing food availability (n=9), and reducing waste related emissions (n=4). Reasoning for *consuming local and seasonal produce* included reducing air-freighted foods (n=26), supporting local farmers (n=20), and reducing red meat consumption (n=15).
produce included supporting the local economy/farmers (n=7) and reducing transportation emissions (n=13). Reasoning for supporting local farmers included supporting the local community (n=10), reducing transportation emissions (n=9), and supporting the local economy (n=4).

The most frequently selected least effective behaviour was a tie between reducing consumption of soft drinks and fruit juice and reducing dairy consumption (both mentioned by 56% of respondents somewhere in their top five). This was followed by avoiding pre-prepared/chopped produce (54%), avoiding highly perishable foods (40%), and choosing organic over conventional produce (37%).

3.8 Gender differences with respect to most and least effective behaviours

Previous research has found gender differences in overall pro-environmental behaviour and pro-environmental food choice, with women being more likely to purchase eco-friendly products and consume eco-friendly foods (Hunter et al., 2004; Laureti & Benedetti, 2018). Given this, we examined whether there were any gender differences in participants’ rankings of the most commonly cited least and most effective behaviours. Very few differences emerged for the latter. The top five most commonly chosen behaviours were the same across both groups, with the only differences lying in the order of the 3rd, 4th and 5th most commonly chosen behaviours, with women ranking supporting local farmers higher (3rd vs 4th) and reducing red meat consumption lower (5th vs 3rd). However, chi-squared tests were run to determine if there were group differences between those who included a specific behaviour anywhere in their top choices for most and least effective behaviours and those who did not. Results showed that there were no significant differences between gender categories in the survey. Similarly, few differences emerged between gender categories for the least effective behaviours. For the top five most
commonly chosen behaviours, four were the same between genders. The main difference
between the genders was that women included *organic over conventional produce* in their top
five and men included *purchasing fair trade*. However, chi-square tests revealed that there were
no significant differences.

### 4 Discussion

#### 4.1 Food choice motivators

Consistent with previous literature taste, health and price were rated as the most
important factors when making choices about food (Contento et al., 2006; Neumark-Sztainer et
al., 1999). However, we found that several factors relating to environmental sustainability are
also considered important by youth. Of the top ten highest ranked behaviours, four were related
to sustainability: impact on nature, environmental sustainability, GHG emission, and animal
welfare. These results indicate that Gen Z considers several factors related to the environment to
be important values when making decisions about food. However, that does not necessarily mean
that those values are carried forward into actual food choice. Research examining the attitude-
behaviour gap in sustainable food choice has found that values around food and behavioural
intention do not always equate to actual purchasing behaviour (Meyer & Simons, 2021). People
may indicate that sustainability is important to them when making food choices; however,
sustainability values often conflict with personal, external or situational influences. Therefore, in
practice, values not concerned with sustainability may conflict with and take precedence over
sustainability values (e.g., needing to purchase low-cost items vs. wanting to purchase organic).

We also found that some motivators that have been well established as important factors
influencing food choice were rated very low by our sample, including convenience, habit,
familiarity, and parental influence (Glanz et al., 1998; McKeown & Nelson, 2018; Neumark-
Sztainer et al., 1999; Steptoe and Wardle, 1999). This may suggest that youth are not able to accurately identify the factors that influence their actual everyday food choices or that these factors do not actually affect their food choice. Previous research has found that everyday choices are not necessarily based on logic and rational thought, but rather can be simplified by mental heuristics (Scheibehenne et al., 2007). Heuristics are unconscious cognitive shortcuts that permit us to make decisions easier, faster, and with less information. Research on food choice has found that a large proportion of food choices are made using simple heuristics as opposed to rational choice (Cohen & Babey, 2012). Therefore, participants may consciously value factors such as the environment over their parents’ influence, but that does not mean those rational values determine actual behaviour.

Given the extensive research on the influence of gender on food choice, we expected to see more gender differences in importance ratings of sustainable dietary behaviours. However, this was not the case, with mood motivator being the only significant difference between these two groups. Women were more likely to rate mood as important than men; however, whether that stems from the fact that mood actually influences women more or that women are generally more cognizant of how their emotions influence them remains to be determined. Previous research has found no difference between females and males in the prevalence of emotional eating amongst youth, meaning both genders likely engage equally in emotional eating (Nguyen-Rodriguez et al., 2009). However, the aforementioned study and others have reported that young men and women’s dietary choices are influenced by different moods, with women influenced more by stress and worry and men influenced more by confusion, anxiety and boredom (Bennett et al., 2013; Nguyen-Rodriguez et al., 2009).
4.2 Eco-centric vs ego-centric interpretations

There was a very distinct divide in our sample, with around half of our categorizable sample interpreting the question “what does a sustainable diet mean to you?” from an environmental perspective, whereas ‘ego-centric’ responders understood it from a personal health perspective. We chose to leave the word “environmental” out of the question to avoid biasing participants to only think about environmental aspects of sustainability. However, it is clear that communications around sustainability to youth must be made explicit to avoid any confusion.

However, this finding provides some important insights into communicating health and sustainability to youth as well future recommendation for the phrasing of research questions. First and foremost, these results highlight that assumptions cannot be made around using the term ‘sustainability’ in research with youth. For future research we recommend providing participants with a clear definition of sustainability or a sustainable diet in order to avoid confusion and misinterpretation. In addition, the results highlight that there are aspects of a sustainable diet that were mentioned by both responder groups, such as reducing meat consumption and eating more plants. This demonstrates that these behaviours are understood to be important for promoting a sustainable diet as well as promoting personal health. Some sustainability behaviours were exclusively mentioned by each of the groups, with eco-centric responders highlighting actions such as eating local, and ego-centric responders highlighting behaviours such as drinking more water and reducing sugar intake. These results demonstrate that some aspects of a sustainable diet are better understood through a health, rather than an environmental lens. Health was rated as the second most important motivator for food choice in our sample, therefore, promoting sustainability through both environmental and health lenses
may be an effective approach when communicating with this generation. In addition, it is important that health is connected not only to the environmental benefits but also the social and economic benefits. For example, research has shown that fresh fruit and vegetables begin to diminish in nutritional quality within 48 hours to 3 days of harvest, depending on the crop (Rickman et al., 2007). Therefore, purchasing local and fresh produce has both health benefits through increased nutritional quality of food and social and economic sustainability benefits through increased support for local farmers and the local community. This approach of promoting both the health and environmental benefits of dietary choices is already gaining traction in policy and education. In 2020, Canada published their first ever food policy report which is aimed at promoting both healthy and sustainable diets, with an emphasis on social, economic and environmental sustainability (Government of Canada, 2020).

4.3 Sustainable diets- In the words of youth

It is apparent that eco-centric responders are relatively knowledgeable about what constitutes a sustainable diet, particularly the environmental and social dimensions. When comparing the open response questions to our list of sustainable dietary behaviours, nearly every behaviour was mentioned by our sample. We aimed to examine if there were differences in the frequency of behaviours representing social, economic, and environmental sustainability. Behaviours representing the environmental aspects of sustainability were the most frequently mentioned, however, factors demonstrating social sustainability were also common. The second open response question asked participants to list actions they can take to make their diet more sustainable; notable themes and observations are discussed below.

*Eat local*
Eating local was the most mentioned behaviour and included specific recommendations like “purchase food from local farmers” or “buy food at farmers’ markets” as well as more general responses such as “eat local”. Eating local is an important aspect of social sustainability, as it provides new job opportunities (especially for young people), boosts farmers’ self-esteem and helps foster relationships between rural and urban people (Stein & Santini, 2021). In addition, a direct connection between farmers and consumers can promote the development of trust and social capital, which in turn creates a sense of local identity and community. While generalizations cannot be made given the divide between eco-centric and ego-centric responders, when it comes to the eco-centric responders, eating local is at the forefront of their minds when they think about sustainable diets. Messaging aimed at promoting local food can help push them towards these options.

**Meat reduction vs. replacement**

Given the negative impact of intensively farmed meat on the environment, targeting a reduction of red meat is an important behaviour for promoting a sustainable diet. In our sample, reducing meat consumption was the second most mentioned behaviour, indicating that Gen Z is aware of the environmental impact of meat. Switching to a plant-based diet was also frequently mentioned; however, it was cited approx. 50% less frequently than meat reduction. There is an extensive body of literature highlighting consumer barriers towards adopting plant based diets, which identifies factors such as enjoying the taste of meat and unwillingness to significantly alter eating habits (Lea & Worsley, 2003). These sentiments were also echoed when we asked our participants about their perceived barriers towards adopting sustainable diets, with sensory dimensions such as enjoying the taste of red meat frequently mentioned. In addition, vegetarian/vegan (veg*) diets are difficult to maintain in the long term. For instance, a study of
11,000 US adults found that 85% of vegetarians and 70% of vegans eventually return to eating meat (Asher et al., 2014). Given the barriers towards adopting fully plant-based diets, a high veg* diet dropout rate, and our results demonstrating a preference for meat reduction over replacement, policy aimed at encouraging meat reduction may be more effective.

Growing, hunting, foraging and personal connections to food

To our surprise, behaviours related to gardening/hunting/foraging were the 3rd most commonly mentioned and were cited more frequently than switching to a plant-based diet. In the food sustainability literature, behaviours such as gardening or hunting are rarely mentioned as important for promoting a sustainable diet, therefore, these results provide some unique insights. These results suggest that a personal connection to food, such as the connection that one develops while gardening, is important to Gen Z. This emphasis on a personal connection to food may be a useful way to promote education around food systems and sustainable food. Research has found positive relationships between food literacy and gardening, with gardeners on average having higher food literacy scores (Grubb & Vogl, 2019). Food literacy has been linked to diet quality and ability to make healthier food choices (Park et al., 2020), and therefore, is an important concept to promote in youth. Given that lack of information around sustainable diets was identified as a barrier towards sustainable consumption in our sample, education is an essential component in promoting sustainable diets. Encouraging young adults to develop personal connections to their food through gardening/foraging/hunting is one way in which they can engage with sustainable diets while also increasing their knowledge around food.

4.4 Barriers towards engagement

Most of our sample indicated that there were barriers preventing them from engaging in sustainable dietary habits. Price was overwhelmingly the most common identified (59%),
followed by accessibility (19%). These results indicate that cost is at the forefront of youth’s mind when thinking about sustainable diets and is simply something that cannot be overlooked when considering the needs of Gen Z. These results are consistent with previous literature which has identified cost and product availability as two important barriers in the consumption of organic foods (Massey et al., 2018). Taste/cravings and social influence/culture were also identified as barriers by our sample, also consistent with previous literature (Reisch & Gwozdz, 2011). The results are the first that can be found in the literature that ask youth to describe in their own words the barriers that prevent them from engaging in sustainable diets, and they provide us with unique insights on how to increase engagement with sustainable diets. With cost, accessibility, and lack of information identified as barriers, campaigns targeted around these specific factors can help increase the uptake of sustainable dietary habits in youth. For example, our results highlighted that local food is an important aspect of a sustainable diet to Gen Z, but the perception that local food is more expensive inhibits them from purchasing. However, research has found that there is no conclusive evidence that local produce is actually more expensive than non-local options (Stein & Santini, 2021). Therefore, in-store campaigns that highlight local produce at a lower or equal price point to non-local options could be an effective way to target Gen Z.

4.5 Perceptions of the least and most effective behaviours

Previous research has found that almost one quarter of the global GHG emissions related to food come from food that is wasted, either through the supply chain or by consumers (Poore & Nemecek, 2018). From a Canadian perspective, around 40% of the food produced in Canada yearly is wasted, and over 50% of that waste happens on a consumer level in the home (Poore & Nemecek, 2018). In our sample, youth were able to accurately identify reducing food waste as a
high impact behaviour for promoting a sustainable diet. However, avoiding air freight and highly perishable foods are aspects of reducing food waste, as waste happens both in transportation and on the consumer level. So, while participants were able to identify reducing food waste as important, they rated these two behaviours directly related to this as ineffective for promoting a sustainable diet. This may suggest that they are unaware of some of the actual behaviours they can be engaging in to reduce food waste.

The reduction of red meat consumption is another high impact behaviour, with over half of Canadian agricultural emissions coming from animal production and the majority of methane emissions from beef and dairy cattle (Kebreab et al., 2006). On one end, our sample rated reducing red meat consumption in the top five most effective behaviours, suggesting they are aware of the environmental impact of beef consumption. However, on the other, reducing dairy consumption was rated as the least effective behaviour (tied with reducing soft drinks). While the impact of dairy cattle is significantly less than beef cattle, the Canadian dairy industry still accounts for 20% of livestock related emissions (Vergé et al., 2013). These results suggest that while youth are aware that red meat production is environmentally damaging, they are unable to make the connection between the environmental impact of ruminants and dairy production. We are unsure why reducing dairy consumption was perceived to be an ineffective behaviour by our sample. It could be because there has been significant messaging around the environmental impact of beef, and dairy has been spared from broad public criticism. The Canadian Dairy industry has also launched several sustainability campaigns in recent years. These campaigns pose the Canadian dairy sector as a world leader in sustainable production, while presenting misleading statistics that serve to confuse consumers about the environmental impact of dairy production (Dairy Farmers of Canada, 2020). Future research in the form of focus groups and
interviews is needed to follow up on these results and gain a deeper understanding of Gen Z’s perceptions of meat and dairy consumption. Future research could also aim to look at whether this finding is consistent in an American sample, while also examining the differences across states.

Reducing the consumption of soft drinks and fruit juice was rated as the least effective behaviour by our sample (tied with reducing dairy) despite the fact that sugary drinks are the third largest contribution to dietary GHG emissions (The Association of UK Dietitians, 2018). Overall, youth underestimate the environmental impact of cutting sugary drinks out of their diet, which makes it a good example of a behaviour that should be targeted from a health perspective, given the known health impact of too much sugar (Bleich & Vercammen, 2018; Prada et al., 2021). While efforts should be made to increase knowledge about the environmental impact of sugary drinks, targeting this behaviour through a health lens may prove to be more effective in reducing consumption.

Our results revealed that youth frequently associate a sustainable diet with behaviours related to both environmental and social sustainability. Social sustainability behaviours particularly related to supporting the local community were relevant in our sample. Consuming local/seasonal produce and supporting local farmers were rated as the second and third most effective behaviours. Some preliminary studies have examined how COVID-19 has changed consumers eating habits, particularly in relation to eating local food. They have found an increased demand for local products and consumer belief that supporting local food systems will help support the local economy (Palau-Saumell et al., 2021). We asked participants their reasoning for their most and least effective behaviours selected. Examining the responses for consuming local/seasonable and supporting local farmers, COVID was not directly mentioned by
any of our participants, however, supporting the local community and economy were frequently cited. These responses also highlight another key point; while the economic components of sustainability were generally overlooked in our open response questions, participants were able to relate behaviours that overtly represent social sustainability, such as supporting local, to the economic benefits as well.

5 Conclusion

To the best of our knowledge this is the first study that seeks to determine what a sustainable diet means to Gen Z in their own words, and what behaviours they perceive to be effective and ineffective in promoting a sustainable diet. We examined a range of behaviours that represent social, environmental, and economic sustainability to gain a deeper understanding of how youth understand and relate to the three pillars of a sustainable diet. Our results demonstrate that, to an extent, Gen Z is educated and aware of many of the individual-level actions that constitute a sustainable diet, particularly behaviours that represent the environmental and social aspects. They recognize the importance of supporting local food systems, reducing food waste, and red meat consumption, but underestimate the environmental impact of dairy and sugar. However, messaging around sustainable diets must be made clear to avoid confusion around what the word “sustainability” is communicating. These results demonstrate the areas of sustainability that are well understood by Gen Z, while also highlighting the behaviours that need more focus and direct messaging. Our results also confirm that taste, price, health, and environmental sustainability are important motivators for food choice by Gen Z, which is consistent with previous research on youth. Given the unique divide in our sample between eco-centric and ego-centric responders and this generation’s emphasis on health, targeting sustainability behaviours from both environmental and health perspectives may be an effective
marketing and education strategy. The split in interpretation of our open responses questions was one limitation of the present study as it reduced our sample size of useable responses. In the future we strongly recommend providing a definition of sustainability alongside open response questions in order to prevent ambiguity and confusion. Overall, this exploratory research provides unique insights and a holistic perspective on what a sustainable diet means to Gen Z. More research is needed to understand sustainability and Gen Z, particularly the factors that influence how they engage with sustainable diets and how best to promote and maintain sustainable diets in this generation.

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## Appendix

### Appendix A.1 What does a sustainable diet mean to you?

**Eco-Centric Codebook**
(Responses coded as eco-centric only)

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Example</th>
<th>Enviro, social or economic sustainability</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal or reduced environmental impact/sustainably produced or sourced</td>
<td>Response mentioned: diet having reduced impact on the environment or diet helping the environment; food being sustainably sourced/produced; having an environmentally friendly diet; food being generally good for the environment</td>
<td>“A diet that has a positive impact on the environment”</td>
<td>Enviro</td>
<td>69</td>
</tr>
<tr>
<td>Healthy</td>
<td>Response mentioned: Diet being healthy and environmentally friendly</td>
<td>“A sustainable diet is one that is healthy and does not negatively impact the environment.”</td>
<td>N/C</td>
<td>43</td>
</tr>
<tr>
<td>Plant based/reduce meat consumption</td>
<td>Response mentioned: eating plant based; reducing/eliminating meat in diet</td>
<td>“A diet with plant based foods…” OR “Less meat consumption because it is contributing to greenhouse gas emission…(sic)”</td>
<td>Enviro</td>
<td>20</td>
</tr>
<tr>
<td>Long term/available for future generations</td>
<td>Response mentioned: protecting land/resources for future generations; long-term sustainability of food system</td>
<td>“A sustainable diet to me means one that contributes to a healthy life for myself and future generations to come…”</td>
<td>Social</td>
<td>18</td>
</tr>
<tr>
<td>Responsible/sustainable consumption</td>
<td>Response mentioned: eating mindfully/responsibly; eating foods that can be replenished/grown/maintained sustainably; recognizing</td>
<td>“Consuming products that were derived from sources that will not deplete the ongoing</td>
<td>Enviro</td>
<td>16</td>
</tr>
<tr>
<td>Category</td>
<td>Response</td>
<td>Statement</td>
<td>Category</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>Food security</td>
<td>Response mentioned: protecting/maintaining food or nutritional security</td>
<td>“Sustainable Diets are those diets with low environmental impacts that contribute to food and nutrition security and to healthy life for present and future generations.”</td>
<td>Social</td>
<td></td>
</tr>
<tr>
<td>Local/fresh food</td>
<td>Response mentioned: eating local food; eating fresh food</td>
<td>“Eating locally grown and produced food…”</td>
<td>Social</td>
<td></td>
</tr>
<tr>
<td>Resources/respects land</td>
<td>Response mentioned: protecting resources; reducing harm to resources; respecting land; a specific resource (water)</td>
<td>“A diet that includes food which production and transportation has a moderate impact on the environment and does not deplete soils and natural resources”</td>
<td>Enviro</td>
<td></td>
</tr>
<tr>
<td>Social impacts/ethics</td>
<td>Response mentioned: social impacts (e.g. workers’ rights); being ethically responsible/ethics</td>
<td>“Healthy, organic food with ethically sourced food.”</td>
<td>Social</td>
<td></td>
</tr>
<tr>
<td>GHG emissions/carbon footprint</td>
<td>Response mentioned: reducing greenhouse gas emissions or carbon footprint</td>
<td>“a sustainable diet is a diet that uses the least amount waste and reduces your carbon footprint…”</td>
<td>Enviro</td>
<td></td>
</tr>
<tr>
<td>Food waste reduction</td>
<td>Response mentioned reducing waste/by-products</td>
<td>“This also means reducing food waste and food packaging waste…”</td>
<td>Enviro</td>
<td></td>
</tr>
<tr>
<td>Limited packaging/plastic</td>
<td>Response mentioned: packaging; reducing plastic</td>
<td>“organic foods, less packaging”</td>
<td>Enviro</td>
<td></td>
</tr>
<tr>
<td>Organically grown food/no pesticides/antibiotics</td>
<td>Response mentioned: organically grown food; pesticide use; antibiotic use</td>
<td>“An organic plate of food that is bought from local businesses and uses local ingredients”</td>
<td>Enviro</td>
<td></td>
</tr>
<tr>
<td>Protocols</td>
<td>Response mentioned: protecting biodiversity; encouraging biodiversity in farming; protecting/maintaining ecosystems</td>
<td>“… These diets include ones that are protective and respectful towards our ecosystem”</td>
<td>Enviro</td>
<td>5</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Animal welfare</td>
<td>Response mentioned animal welfare; harm reduction for animals; removal of animals from farming system</td>
<td>“a diet that doesn't harm animals or the environment”</td>
<td>Social</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>Response mentions growing own food; cost or affordability of food; sustainability of food ingredients</td>
<td>“…gardening my own produce….” OR “using sustainable ingredients”</td>
<td>N/C</td>
<td>4</td>
</tr>
<tr>
<td>Economically fair</td>
<td>Response mentioned: economic fairness; economic sustainability</td>
<td>“choosing foods that can be sustained environmentally, socially and economically over time without significant damage to the above.”</td>
<td>Economic</td>
<td>3</td>
</tr>
<tr>
<td>Culturally acceptable</td>
<td>Response mentioned culture</td>
<td>“Food sourced through ethical means farms that encourage biodiversity, respect of the land and Indigenous practices.”</td>
<td>Social</td>
<td>2</td>
</tr>
</tbody>
</table>
Appendix A.2

*What does a sustainable diet mean to you?*

**Ego-Centric Codebook**
(Responses coded as ego-centric only)

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Example</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy foods (unprocessed/natural) /lifestyle</td>
<td>Response mentioned: healthy eating; eating unprocessed/natural food; healthy lifestyle habits</td>
<td>“health food and lots of water” OR “a diet consisting of a variety of foods offering great taste and nutritional value.”</td>
<td>91</td>
</tr>
<tr>
<td>Balanced foods/nutrients/lifestyle, eating in moderation</td>
<td>Response mentioned: eating foods in moderation; a balanced diet; following the food guide</td>
<td>“A healthy and well balanced diet”</td>
<td>43</td>
</tr>
<tr>
<td>Easily maintainable diet/long-term diet</td>
<td>Response mentioned: long term maintenance of diet; easy maintenance</td>
<td>“A diet that can be done for a consistent time”</td>
<td>35</td>
</tr>
<tr>
<td>Cost/price of food</td>
<td>Response mentioned: the cost of food; the price of food being sustainable/manageable; eating within your price range</td>
<td>“Something that is affordable and healthy”</td>
<td>10</td>
</tr>
<tr>
<td>Weight control/lose weight/dieting</td>
<td>Response mentioned: dieting to lose weight; calorie restriction</td>
<td>“Eating less calories than you burn”</td>
<td>7</td>
</tr>
</tbody>
</table>
Appendix B.1
What things can you do to make your diet more sustainable?
Eco-Centric Codebook
(Responses coded as eco-centric only)

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Example</th>
<th>Enviro, social or economic sustainability</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local food</td>
<td>Response mentioned: buying local food; supporting local farmers; purchasing from farmers markets</td>
<td>“Purchase food from local farmers”</td>
<td>Social</td>
<td>69</td>
</tr>
<tr>
<td>Meat reduction/dairy reduction</td>
<td>Response mentioned: reducing meat consumption; reducing dairy consumption; reducing consumption of animal products</td>
<td>“Eat less meat”</td>
<td>Enviro</td>
<td>50</td>
</tr>
<tr>
<td>Garden/grow food/catch or hunt food/forage food</td>
<td>Response mentioned: Gardening; growing/hunting/foraging for own food</td>
<td>“Plant a garden of your own” OR “Foraging”</td>
<td>Social</td>
<td>30</td>
</tr>
<tr>
<td>Single use packaging/plastic packaging</td>
<td>Response mentioned: avoiding single use packaging/plastic; reducing plastic waste; using reusable packaging</td>
<td>“Avoid single-use plastic packaging”</td>
<td>Enviro</td>
<td>28</td>
</tr>
<tr>
<td>Eat more plants/fruits/vegetables</td>
<td>Response mentioned: eating more plants/vegetables/fruits</td>
<td>“Eat more plants”</td>
<td>N/C</td>
<td>26</td>
</tr>
<tr>
<td>Plant based/vegetarian/vegan/eat no meat</td>
<td>Response mentioned: going plant based; following a veg diet; cutting out meat</td>
<td>“No meat”</td>
<td>Enviro</td>
<td>26</td>
</tr>
<tr>
<td>Reduce household/food waste</td>
<td>Response mentioned: reducing household waste/ food waste; reusing leftovers</td>
<td>“Reduce kitchen garbage”</td>
<td>Enviro</td>
<td>24</td>
</tr>
<tr>
<td>Reduce processed food/ eat natural foods</td>
<td>Response mentioned: reducing processed</td>
<td>“Eat simple foods” OR</td>
<td>Enviro</td>
<td>21</td>
</tr>
<tr>
<td>Category</td>
<td>Response mentioned</td>
<td>Tag</td>
<td>Score</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td>--------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Organic/pesticide free</td>
<td>Response mentioned: eating organically grown food; pesticide free food</td>
<td>Enviro</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Cook own meals/eat at home</td>
<td>Response mentioned: cooking own meals; avoiding take out; cooking from scratch</td>
<td>Social</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Eat mindfully/responsibly/reduce consumption</td>
<td>Response mentioned: eating mindfully; responsible consumption; reducing consumption overall</td>
<td>N/C</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Eat healthy foods</td>
<td>Response mentioned: eating healthy foods</td>
<td>N/C</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Educated choices/research choices</td>
<td>Response mentioned: making educated choices; researching choices</td>
<td>Social</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Eat seasonal produce/fresh food</td>
<td>Response mentioned: eating seasonal produce; fresh foods</td>
<td>Social</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Environmentally friendly food/ethical food</td>
<td>Response mentioned eating environmentally friendly/ethical food</td>
<td>Social</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Response mentioned: fair trade; greenwashing; traceability; sugar reduction; supporting sustainable brands/producers; animal welfare</td>
<td>N/C</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Avoid resource intensive foods/food grown in resource scare areas</td>
<td>Response mentioned: reducing consumption of resource intensive</td>
<td>Enviro</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Activity</td>
<td>Response</td>
<td>Score</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>----------</td>
<td>----------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Environmental sustainability</td>
<td>Eat sustainably sourced meat/seafood</td>
<td>Response mentioned: consuming sustainable seafood; consuming sustainably sourced meat; grass fed meat</td>
<td>“Grass fed beef” OR “Buy certified seafood”</td>
<td>Enviro 6</td>
</tr>
<tr>
<td>Environmental sustainability</td>
<td>Other sustainable household behaviours</td>
<td>Response mentioned: other sustainable household behaviours not related to food (e.g. recycling, using less water)</td>
<td>“Recycle”</td>
<td>Enviro 5</td>
</tr>
<tr>
<td>Environmental sustainability</td>
<td>Eat a variety of foods</td>
<td>Response mentioned: eating a variety of foods</td>
<td>“Eat a variety of foods”</td>
<td>N/C 4</td>
</tr>
<tr>
<td>Environmental sustainability</td>
<td>Compost</td>
<td>Response mentioned: composting</td>
<td>“Composting leftovers”</td>
<td>Enviro 3</td>
</tr>
<tr>
<td>Environmental sustainability</td>
<td>Non-GMO food</td>
<td>Response mentioned: non-gmo food</td>
<td>“GMO free”</td>
<td>Enviro 2</td>
</tr>
</tbody>
</table>
Appendix B.2

*What does a sustainable diet mean to you?*

**Ego-Centric Codebook**
(Responses coded as ego-centric only)

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Example</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat healthy/maintain a consistent healthy diet</td>
<td>Response mentioned: eating healthy; following a healthy diet; maintaining healthy eating habits/sticking to diet; eating regular meals/routine</td>
<td>“Eating filling foods” OR “Healthy foods” OR “Eat regular meals”</td>
<td>63</td>
</tr>
<tr>
<td>Exercise</td>
<td>Response mentioned: exercise</td>
<td>“Exercise”</td>
<td>53</td>
</tr>
<tr>
<td>Other</td>
<td>Response mentioned: organic food; eating within limits; eating variety of foods; eating whole grains/fibre</td>
<td>“Not spending out of your limits” OR “Eat more grains”</td>
<td>53</td>
</tr>
<tr>
<td>Eat vegetables/fruits</td>
<td>Response mentioned: eating fruits/vegetables</td>
<td>“Eat more vegetables”</td>
<td>46</td>
</tr>
<tr>
<td>Drink water</td>
<td>Response mentioned: drinking water</td>
<td>“Drink lots of water”</td>
<td>32</td>
</tr>
<tr>
<td>Reduce sugar</td>
<td>Response mentioned: reducing sugar consumption</td>
<td>“Eat less sugar food”</td>
<td>27</td>
</tr>
<tr>
<td>Reduce junk food</td>
<td>Response mentioned: reducing junk food consumption</td>
<td>“Less junk food”</td>
<td>25</td>
</tr>
<tr>
<td>Eat meat/high protein diet</td>
<td>Response mentioned: eating protein/meat; eating low carb diet</td>
<td>“Food with low carbs” OR “Eat meat”</td>
<td>21</td>
</tr>
<tr>
<td>Reduce consumption overall/portion foods</td>
<td>Response mentioned: reducing overall consumption; portioning foods</td>
<td>“Eat less food in general”</td>
<td>19</td>
</tr>
<tr>
<td>Plan meals</td>
<td>Response mentioned: planning meals</td>
<td>“Meal plan”</td>
<td>18</td>
</tr>
<tr>
<td>Eat mindfully/intuitively Or balanced diet</td>
<td>Response mentioned: eating mindfully/intuitively; researching diet trends; eating a balanced diet</td>
<td>“Balanced food groups” OR “Mindful eating”</td>
<td>16</td>
</tr>
<tr>
<td>Diet Behaviour</td>
<td>Response mentioned:</td>
<td>Action Suggested</td>
<td>Count</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>----------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Cook meals at home/eat out less</td>
<td>eating at home; avoiding fast food</td>
<td>“Eat less fast food”</td>
<td>13</td>
</tr>
<tr>
<td>Lose weight/count calories</td>
<td>weight loss; counting calories</td>
<td>“Count calories”</td>
<td>11</td>
</tr>
<tr>
<td>Reduce meat consumption</td>
<td>reducing meat consumption</td>
<td>“Eat less meat”</td>
<td>9</td>
</tr>
<tr>
<td>Other health behaviours</td>
<td>other health behaviours not related to diet</td>
<td>“Sleeping patterns”</td>
<td>6</td>
</tr>
</tbody>
</table>
Appendix C

What barriers prevent you from engaging in sustainable dietary habits?

Eco-Centric Codebook
(Responses coded as eco-centric only)

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Examples</th>
<th>Count</th>
<th>% of categorizable responses (n=114)</th>
<th>% of responders (n=83)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Response mentioned the cost of sustainable/healthy foods; financial restrictions</td>
<td>“I am a student and sustainable and ethical diets are more expensive.”</td>
<td>49</td>
<td>43%</td>
<td>59%</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Response mentioned a lack of accessibility; lack of choices; lack of seasonal availability</td>
<td>“Not enough access to sustainable foods in the small town I reside in”</td>
<td>16</td>
<td>14%</td>
<td>19%</td>
</tr>
<tr>
<td>Time/Convenience</td>
<td>Response mentioned a lack of time available for food preparation; the convenience of unsustainable/unhealthy foods; busy lifestyle</td>
<td>“lack of time and competing priorities:”</td>
<td>14</td>
<td>12%</td>
<td>17%</td>
</tr>
<tr>
<td>Lack of Consumer Control</td>
<td>Response mentioned companies bearing responsibility; difficulty for consumers making sustainable decisions; flaws in the system out of their control</td>
<td>“Corporations packaging things excessively…”</td>
<td>9</td>
<td>8%</td>
<td>11%</td>
</tr>
<tr>
<td>Habit/Discipline</td>
<td>Response mentioned poor self-discipline; poor lifestyle habits/choices</td>
<td>“Poor self-discipline, eating outside, and lack of self control”</td>
<td>7</td>
<td>6%</td>
<td>8%</td>
</tr>
<tr>
<td>Social Influence/Culture</td>
<td>Response mentioned parental/peer influence; social media; advertisements</td>
<td>“I live with my family and it is hard to convince them”</td>
<td>6</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>Category</td>
<td>Response</td>
<td>Code</td>
<td>%</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>------</td>
<td>----</td>
<td>----</td>
<td></td>
</tr>
<tr>
<td>Taste/Cravings</td>
<td>Response mentions cravings; taste of food; enjoyment eating meat/unhealthy foods</td>
<td>5</td>
<td>4%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“I like meat”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of Information</td>
<td>Response mentions lack of knowledge; lack of information about food</td>
<td>4</td>
<td>4%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Knowledge barriers, misinformation and greenwashing”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health/Dietary Limitations</td>
<td>Response mentions health/dietary restrictions</td>
<td>4</td>
<td>4%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“i suffer from and eating disorder so most of my food choices directly relate to that factor”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix D: Survey Text

Demographics
Q1: What is your current age?
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- Other

Q2: What is your gender?
- Female
- Male
- Non-binary/third gender
- Prefer not to say

Q3: What is your political affiliation?
- Conservative Party
- Green Party
- Le Bloc Québécois
- (4) Liberal Party
- (5) New Democratic Party
- (6) None/Would not vote
- (7) Other

Open Ended

Q4 (Open Ended): What does a sustainable diet mean to you? (Diet is defined as the food and drink habitually consumed by a person or a group).

Q5 (Open Ended): What things can you do to make your diet more sustainable?

Rating Behaviours

Q6a. Please select the five behaviours that you believe are the MOST effective for promoting a sustainable diet (all behaviours not chosen carried over to Q7)
- Avoiding air-freighted foods
- Choosing organic over conventional produce
- Reducing red meat consumption
- Reducing dairy consumption
- Consuming local and seasonal produce
- Decreasing food waste
- Choosing foods with limited packaging
- Avoiding pre-prepared/chopped produce
- Reducing consumption of soft drinks and fruit juice
- Purchasing fair trade products
- Supporting farmers rights
- Supporting animal welfare
- Consuming food produced with fair labour conditions
- Supporting food traceability and transparency

Q6b. Why do you believe that ___(#1 most effective behaviour)___ is the most effective behaviour for promoting a sustainable diet?

Q7. Please select the five behaviours that you believe are the LEAST effective for promoting a sustainable diet (all behaviours not chosen carried over to Q7)
- Avoiding air-freighted foods
- Choosing organic over conventional produce
- Reducing red meat consumption
- Reducing dairy consumption
- Consuming local and seasonal produce
- Decreasing food waste
- Choosing foods with limited packaging
- Avoiding pre-prepared/chopped produce
- Reducing consumption of soft drinks and fruit juice
- Purchasing fair trade products
- Supporting farmers rights
- Supporting animal welfare
- Consuming food produced with fair labour conditions
- Supporting food traceability and transparency

Q7b. Why do you believe that ___(#1 least effective behaviour)___ is the least effective behaviour for promoting a sustainable diet?

Food Choice Values

Q8: Please indicate how important the following factors are to you when deciding what to eat. Scale options: not important at all, somewhat important, important, very important, extremely important, no opinion
- Health
- Mood
- Taste
- Convenience
- Habit
- Naturalness
- Price
Q9: Do you believe there are barriers that prevent you from engaging in sustainable dietary habits?
   o Yes
   o No

Q10: (If Q20 Yes is selected)
Open ended: please describe any barriers that prevent you from engaging in sustainable dietary habits.
Chapter 3: Study Two: Modeling Sustainable Food Choice in Generation Z from a Social, Economic and Environmental Perspective

Abstract

The impact that agriculture has on the global environment is far reaching. Between water use, greenhouse gas emissions, and land use, agriculture is one of the most environmentally damaging industries on the planet. In order to address the climate crisis, a shift must be made towards a more sustainable food system. One way to anchor change in the system is through the demands of consumers. Gen Z, with their increased focus on environmental issues, pose themselves as the perfect generation to engage in sustainable food systems. In this study of 733 young Canadians, we administered an online survey in order to gain an understanding of youth’s current action stage of a range of sustainable dietary behaviours and the psychological and educational factors that influence engagement. The Transtheoretical Model of Behaviour was used to assess current behavioural involvement with sustainable dietary behaviours, quantifying behavioural change as a series of stages. The Theory of Planned Behaviour was applied to understand the role of subjective norms, attitudes, and control. The role of food sustainability concern, pro-ecological worldview, and food literacy were also assessed. A multinomial regression was used to predict action stage. The two behaviours with the highest level of current engagement were decreasing food waste and reducing consumption of soft drinks and fruit juice. The two behaviours with the lowest level of current engagement were reducing dairy consumption and reducing red meat consumption had the highest proportion of respondents not willing to engage in the behaviour. Food literacy and attitudes towards a specific behaviours were found to be the greatest predictors of both action and inaction. These findings inform policy and education and can be used to encourage Gen Z’s engagement with sustainable dietary behaviours.
1 Introduction

1.1 Background

Agriculture is one of the most environmentally demanding industries on the planet, accounting for 70% of freshwater use and 35% of global greenhouse gas emissions (GHG) (Foley et al., 2011; Lynch et al., 2021). The current pressure that agriculture puts on the earth’s resources is destabilizing the earth system and pushing us over several planetary boundaries (Campbell et al., 2017). A sustainable food system that takes into account the social, economic, and environmental aspects of sustainability is a necessity if we are to feed a growing population and avoid further destabilization of the planet.

Investments in sustainable development were previously mainly driven by legal requirements for environmental protection or resource efficiency, however, in recent years consumer demand for sustainable products has pushed the market forward (Kostadinova, 2016). In the organic food sector, consistent consumer demand has driven this niche market into the mainstream, to the point where there aren’t enough organic farmers to meet the US market demand (USDA ERS - Organic Market Summary and Trends, 2022). Generation Z is more environmentally conscious and sustainability orientated than previous generations and this carries over into what they value when making purchasing decisions (Dabija et al., 2019). This increased focus on environmental issues aligns Gen Z as the perfect generation to advocate for sustainable food systems. Therefore, understanding their perceptions of sustainable dietary habits and what drives them to adopt those habits is essential in ensuring they have the knowledge and resources to make sustainable decisions. The current research aimed to quantify what behaviours Gen Z perceived to be important in promoting a sustainable diet, the behaviours that they are currently engaging with, and the factors that influence their engagement.
Social, economic and environmental indicators

Food systems are complex social and economic systems that inevitably rely on and impact the global environment. Recently communications around sustainable diets have stressed not only the environmental indicators but the lesser seen and considered social and economic indicators. The Food and Agriculture Organization of the United Nations (FAO) uses the three pillar approach in defining a sustainable food system. If a food system is to be sustainable it must consider economic indicators such as profitability throughout the entire supply chain, social indicators such as welfare and safety of workers, and environmental indicators such GHG emissions and water use (Food and Agriculture Organization of the United Nations, 2018; Nicholls & Drewnowski, 2021). This approach has been mirrored in Canada’s first ever Food Policy report, which highlights that approaches combining social, health, environmental, and economic components as equally necessary for tackling the complex issues of agriculture (Government of Canada, 2020). However, despite this emphasis on a need to incorporate all of three dimensions of a sustainable diet, they are often targeted in isolation (Government of Canada, 2020). Research that aims to quantify sustainable diets also often fails to capture the complexity of sustainable food systems, often focusing on measurable environmental indicators. Life Cycle Analysis (LCA) is a common method used to assess the environmental impact of food systems however, it completely fails to consider social and economic indicators of sustainability such as working conditions and animal welfare (Notarnicola et al., 2017). In addition, many studies examining consumer perceptions of sustainable diets fail to incorporate the outward indicators of social and economic sustainability such as animal welfare, food traceability and transparency, and fair labour conditions (Jones et al., 2016). Therefore, research is needed in
order to understand how consumers understand and interact with all dimensions of a sustainable diet.

**Barriers towards engagement**

Identifying barriers that influence sustainable consumption as well as examining how those barriers predict current sustainable food behaviours is an important aspect of understanding sustainable diets and youth. Previous research has examined the perceived barriers towards adopting environmentally friendly food habits in young adults, finding that high price, poor supply, lack of knowledge, and perceived difficulty in making climate friendly food choices were important barriers (Mäkiniemi & Vainio, 2014). Many of these barriers are centered around a lack of knowledge and an inability to mobilize knowledge. Food knowledge can be conceptualized within a food literacy framework; food literacy is term used to describe the idea of proficiency in food related skills and knowledge (Truman et al., 2017). While the framework traditionally examines nutrition and health literacy, frameworks have been expanded to include social, economic, and environmental effects of food literacy (Park et al., 2020). There is limited research on the association between food literacy and dietary intake and habits; however, preliminary research has found associations between food literacy and diet quality (Park et al., 2020). Research on food literacy and youth has found that while adolescents understand food literacy is important for making healthy food choices, they have low levels of knowledge and low confidence in applying that knowledge (Ronto et al., 2016). There is currently a gap in the literature on understanding how food literacy may be a barrier or facilitator of engagement with sustainability dietary behaviours.
Predicting engagement

Along with barriers there are also facilitators that can predict engagement with sustainable diets. Previous research has found concern for the environment to be an indirect predictor of pro-environmental behaviour (Albayrak et al., 2013; Jekria & Daud, 2016) and can be used to predict engagement with sustainable diets. The Food Sustainability Concern scale created by Grunert et al. (2013) aims to go beyond general measures of environmental concern, aiming to measure concern about a range of environmental, social, and economic aspects of food sustainability. Previous research using the food sustainability concern scale examined the role of concern in relation to use of sustainability labels. Results showed that consumers who expressed higher concern about food sustainability were more likely to use sustainability labels, such as fair trade, when purchasing food (Grunert et al., 2013). However, the relationship between label use and food sustainability concern was not very strong, suggesting a gap between concern and action. To the best of our knowledge, no research has measured the role food sustainability concern has in predicting current engagement with social, environmental, and economic sustainable dietary behaviours. Understanding the role of concern about food sustainability for predicting behaviours is an important contribution to the literature and general understanding of Gen Z’s engagement with sustainable diets.

1.2 Theoretical Frameworks

1.2.1 Theory of Planned Behaviour: Social norms, attitudes, and control

While research has found that youth hold more favorable opinions of sustainable agricultural practices like organic produce, they are actually not more likely to purchase them than older consumers (Aertsens et al., 2009). Therefore, understanding what translates beliefs into action and the barriers that hinder action is important. The Theory of Planned Behaviour
TPB is a psychological theory that aims to understand intention to perform a behaviour through attitudes, perceived behavioural control, and subjective norms (Ajzen, 1991). Research on TPB and pro-environmental behaviour has found that together these three aspects can predict intention to perform a behaviour with high accuracy (Armitage & Conner, 2001; Biasini et al., 2021). This theory has been applied to food choice research extensively in the past and has also been used to understand sustainable food choice in relation to organic food (Aertsens et al., 2009).

TPB is extremely applicable to research on youth and food choice for a few key reasons. With regards to control, youth are living with their parents for longer and have less independent control over their food choices. Since 2001, the number of young adults living with their parents in Canada has increased by 20.3%, with 35.7% of young adults between the ages of 20-34 living with at least one parent in 2016 (S. C. Government of Canada, 2017). In addition, statistics indicate that in 80% of American households, mothers are the primary grocery shoppers and food preppers (U.S Bureau of Labor Statistics, 2015). Therefore, with more young adults living with their parents for longer, the degree of control they have over their dietary choices is less than if they were living independently. In addition, recent research on young Canadians found that 42% of their meals were either ready-to-eat or prepared outside of the home (Wiggers et al., 2018). Therefore, understanding how much control youth have over their food choices is important in understanding their behaviours around sustainable dietary habits.

In addition, the dietary habits of youth living at home are not only shaped by the degree of control that they have, but also the subjective norms of the people around them. Research has found that the food choices of parental figures at home have the strongest influence on adolescents dietary behaviours (McKeown & Nelson, 2018). Therefore, the eating behaviours and norms of adults and parents in a household can have a significant impact on youth.
addition to subjective norms, attitudes are also an important predictor of behaviour. Research on organic food purchasers has found that attitudes around organic foods are significantly correlated with consumers intention to purchase organic foods (Dean et al., 2008). A recent meta-analysis found that attitude is the most recurrent significant predictor of sustainable behaviours (Biasini et al., 2021). Therefore, understanding the attitudes that youth have around the purchasing of sustainable foods should be considered.

Using the TPB, this research will aim to understand how subjective norms, perceived control, and attitudes influence engagement with sustainable dietary habits. Given the extensive body of literature validating the use of the TPB for examining food choice and the lack of research specifically focused on young adults, the present study aims to fill the gap in understanding sustainable food choice in youth.

1.2.2 The Transtheoretical Model of Behaviour

In addition to understanding perceptions around sustainable diets, the present research aims to understand how youth currently engage with sustainable dietary behaviours and the factors that influence their engagement. The Transtheoretical Model of Behavioural Change (TTM) can be used to examine current behavioural involvement (Prochaska & Velicer, 1997). Unlike other behavioural theories that view change as a singular even, TTM views change as a process that involves a series of stages. One moves through the stages in the process of behavioural change, starting with precontemplation (unwilling to change) and ending with action (engaging in behaviour). TTM has been used extensively to examine health behaviours but is has also been applied within a sustainability context. Tobler et al. (2011) used TTM to examine willingness to consume environmentally friendly food while investigating the role of predictors, such as environmental motives and food-related attitudes. Pickering et al., (2020) also used the
TTM to examine youth’s engagement with high and low impact sustainable behaviours, but was not exclusively focused on dietary habits. The concept of behavioural change as a series of stages rather a singular event will highlight the behaviours that youth are already comfortable engaging in, the behaviours they want to engage in but do not know how to, and the behaviours they are unwilling to uptake.

1.2.3 Integrating the Theory of Planned Behaviour and the Transtheoretical Model of Behaviour

Together the TPB and TTM will be used as the theoretical background for the study. TPB typically has two outcome variables that are studied, intention to engage in a desired behaviour and actual engagement with that behaviour. Those two outcomes can be quantified within TTM with the contemplation and preparation stages representing intention to engage in a behaviour and the action and maintenance stages representing actual behavioural engagement. By applying TTM instead of a singular measure of intention and behaviour there is an added layer of nuance that can be understood for the data. For example, looking at the intention construct which is measured through contemplation and preparation, a distinct difference can be made between these two groups: both groups have an intention to engage in a desired behaviour but those in the contemplation stage feel as if they need more information to engage and those in the preparation stage feel they already have enough information to engage. Therefore, by applying the TTM we can tailor intervention strategies to the specific stage of change that one is in while also understanding the behaviours that participants feel they need more information about to translate intention into action.

In addition to integrating TTM into the intention/behaviour construct of TPB, we are also applying three additional variables into TPB: Food Literacy, Food Sustainability Concern, and Pro-Ecological Worldview (NEP). The NEP has been applied with the TPB extensively in the
past in order to understand the role of ecological worldviews on pro-environmental behaviour with mixed findings on its predictive power (Gansser & Reich, 2022; Goh et al., 2017; Hoeksma et al., 2017). However, The Food Literacy Scale (Park et al., 2020) and the Food Sustainability Concern Scale (Grunert et al., 2014) have not been applied within TPB, therefore making their application in this context relatively explorative.

1.3 Research questions and hypotheses

The goal of the current study is to examine youth’s current engagement with a range of dietary behaviours related to the social, economic, and environmental aspects of sustainability. Therefore, our primary objectives are to (i) examine youth’s current level of engagement with 15 sustainable dietary behaviours using the TTM to measure stages of readiness to change, (ii) examine youth’s current perceptions around the efficacy of sustainable dietary behaviours and (iii) determine the factors that predict engagement with sustainable dietary behaviours through the application of the TPB and additional predictors. We hypothesize that participants who have high dietary control (H1), strong subjective norms around eating sustainable food (H2), a pro-environmental worldview (H3), strong personal beliefs around the efficacy of specific behaviours (H4), high food literacy (H5), and high food sustainability concern (H6) will be more likely to be in the action stage of sustainable behaviours. For H5, while to the best of our knowledge there is no research that examines the effect of food literacy on sustainable dietary engagement, there is a well-established relationship between increases in sustainability knowledge and sustainability behaviour (Heeren et al., 2016; Janmaimool & Khajohnmanee, 2019; van de Wetering et al., 2022). Therefore, we are able to hypothesize that increases in food literacy knowledge would increase sustainability behaviours.
2. Materials and Methods

2.1 Study design and recruitment

Individuals were recruited through the online data collection company, Dynata® in July 2021. To be eligible, participants had to be between the ages of 18-25 and Canadian citizens or permanent residents. The age range was chosen for the purpose of examining Generation Z, born between the years 1995-2012. Canada was chosen as the target demographic because of the high amount of personal GHG emissions, with the average household emission 4.1 tonnes per year, which is 2-4x greater than countries such as Germany or the U.K. (S. C. Government of Canada, 2021) Participants completed the online survey on the Qualtrics® platform and ethics clearance was granted through the Brock University Research Ethics Board (# 20-326).

2.2 Measures

2.2.1 Current Engagement with sustainable dietary behaviors

Participants were presented with a list of 15 behaviors derived from previous literature that represent social, economic and environmental aspects of sustainability (Appendix) (Carlsson et al., 2017; Culliford & Bradbury, 2020; Food and Agriculture Organization of the United Nations, 2018; The Association of UK Dietitians, 2018) and were asked to rate their current engagement with the following behaviours: avoiding air-freighted foods, choosing organic over conventional produce, reducing red meat consumption, reducing dairy consumption, purchasing local and seasonal produce, reducing food waste, choosing foods with limited packaging, avoiding pre-prepared/chopped produce, avoiding highly perishable food, avoiding soft drinks and fruit juice, purchasing fair trade, supporting animal welfare, supporting fair labour, supporting food transparency and supporting local farmers. Response options followed the approach of Pickering et al. (2020) and are grounded in the TTM: I am not doing this and I am
not willing to (precontemplation); *I would like to do this, but I do not know how* (contemplation); *I would like to do this, and I already know how to start* (preparation); *I am doing this already* (action).

2.2.2 Perceptions of sustainable dietary behaviours

Participants were asked to rate their agreement with the following statement “______ is an effective behavior for promoting a sustainable diet” for all 15 behaviours (Appendix). Response options were on a 5-point Likert scale, ranging from strongly disagree to strongly agree. This measure will be used as the attitude construct for TPB in our model with the intention of understanding how one’s attitude towards a specific behaviour influences their engagement with that behaviour.

2.2.3 Control

A composite control score was created from participants’ responses to three questions. Participants were first asked how much control they have over the food purchased in their household with the following response options: full control, a lot of control, a moderate amount of control, a little control or no control. A number ranging from 1-5 was assigned to their response, 5 for full control and 1 for no control. They were also asked who buys most of the food that they eat at home with the following response options: my parents/caretakers, my roommates, my partner, myself, and other. A number was also assigned to their responses: 1.5 for myself, 1 for my partner, 0.5 for my roommates and my parents/caretakers, and 0 for other. Participants were also asked the % of food that they eat inside the home (opposed to fast-food/restaurants) with the following response options: 100%, 75%, 50%, 25% and 0%. A numerical value was also assigned to the response: 2 for 100% and 75%, 1 for 50% and 25% and 0 for 0%. The numerical values were then summed to create a control score. The control scores
were then divided into relatively even thirds creating categories for high (n=249), medium (n=114) and low control (n=251).

2.2.4 Subjective norms

A measure for subjective norms was adapted from Pickering et al. (2020), in which participants were asked to rate their agreement with the following four questions: those around me believe buying sustainable food is important, those around me make it a priority to choose sustainable foods, my close friends and family members would appreciate if I bought sustainable foods, and my parents/caretakers often buy and cook with sustainable foods. Response options were on a 5-point Likert scale, ranging from strongly disagree to strongly agree. Their responses were summed and averaged to create a subjective norm score.

2.2.5 Food literacy

The Food Literacy Scale developed by Park et al. (2020) was adapted to fit a Canadian context and then applied. The measure was comprised of twenty-five questions in which participants rated their agreement on a 5-point Likert scale, ranging from strongly agree to strongly disagree (E.g. I am aware of how different food transportation methods impact the environment and society). Individual questions were assigned a numerical value and a food literacy score was created. Full measure in appendix.

2.2.6 Food sustainability concern

The Food Sustainability Concern Scale developed by Grunert et al. (2014) was used, comprised of ten statements related to food sustainability issues in which participants rated their level of concern, ranging from 1 (not concerned at all) – 7 (extremely concerned) (E.g. the use of pesticides in food production). Responses to individual questions were summed and averaged to create a food sustainability concern score. Full measure in appendix.

2.2.7 New ecological paradigm- shortened
The shortened and revised NEP scale by Whitmarsh (2011) was used, which is comprised of six statements in which participants rated their level of agreement with on a 5-point Likert scale, ranging from strongly agree to strongly disagree (E.g. *humans have the right to modify the natural environment to suit their needs*). Each question was assigned a numerical value, with 1= strongly disagree and 5= strongly agree, with two questions reverse coded. These individual scores were summed and averaged and a NEP score was created. Full measure in appendix.

2.2.8 Other measures

Demographics were collected including age, gender, province, political orientation and income. Diet type was also asked with the following response options: *Non-vegetarian, flexitarian, pescetarian, vegetarian* and *vegan*. Participants were also asked how often they consume red meat and white meat with the following response options: *never, a few times a month, once a week, a few times a week, once a day, and with every meal*.

2.3 Data treatment

Data were treated using Microsoft Excel Version 15.3 and analyzed using IBM SPSS Statistics for Windows, Version 25.0 (Armonk, NY). Perceptions of sustainable dietary behaviours and current engagement were summarised with descriptive statistics; these summary statistics were used to describe different stages of action for each behaviour and agreement that those behaviours are effective in promoting a sustainable diet. Multinomial logistic regression analysis was used to determine the role of control, subjective norms, attitude towards the behaviour, food literacy, food sustainability concern, and pro-ecological worldview in predicting action stages for the fifteen behaviours assessed, following the approach by Pickering et al. (2021) as described fully in Section 3.3.2.
3 Results

3.1 General characteristics

Seven hundred and thirty-three responses were recorded. The following exclusion criteria was applied: completed less than 75% of the survey, completed the survey in under 120 seconds (median completion time was 462 seconds), or did not answer the main research questions. After exclusion, six hundred and fourteen responses remained. Participants were a representative sample of Canadian youth with regards to provincial breakdown, however, females were slightly over represented in relation to Canadian census data (59% vs 51%) (S. C. Government of Canada, 2020b). Gender, political affiliation, age, and living situation were recorded for demographics (Table 1). Diet type and meat consumption habits were also recorded (Table 2).
Table 1. Demographic Breakdown

<table>
<thead>
<tr>
<th></th>
<th>n (613-614)</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>363</td>
<td>59%</td>
</tr>
<tr>
<td>Male</td>
<td>231</td>
<td>37%</td>
</tr>
<tr>
<td>Non-Binary/Third Gender</td>
<td>16</td>
<td>3%</td>
</tr>
<tr>
<td>Prefer Not to Say</td>
<td>4</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Political Affiliation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liberal</td>
<td>347</td>
<td>57%</td>
</tr>
<tr>
<td>Moderate</td>
<td>189</td>
<td>31%</td>
</tr>
<tr>
<td>Conservative</td>
<td>76</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-19</td>
<td>117</td>
<td>19%</td>
</tr>
<tr>
<td>20-21</td>
<td>193</td>
<td>31%</td>
</tr>
<tr>
<td>22-23</td>
<td>140</td>
<td>23%</td>
</tr>
<tr>
<td>24-25</td>
<td>164</td>
<td>27%</td>
</tr>
<tr>
<td><strong>Living Situation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living with parents</td>
<td>240</td>
<td>39%</td>
</tr>
<tr>
<td>Living with a partner</td>
<td>133</td>
<td>22%</td>
</tr>
<tr>
<td>Living alone</td>
<td>132</td>
<td>21%</td>
</tr>
<tr>
<td>Living with roommates</td>
<td>85</td>
<td>14%</td>
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</tbody>
</table>

Table 2. Diet Type and Meat Consumption Habits

<table>
<thead>
<tr>
<th></th>
<th>n (613-614)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diet Type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Vegetarian</td>
<td>450</td>
<td>73%</td>
</tr>
<tr>
<td>Vegetarian</td>
<td>60</td>
<td>10%</td>
</tr>
<tr>
<td>Flexitarian</td>
<td>55</td>
<td>9%</td>
</tr>
<tr>
<td>Vegan</td>
<td>26</td>
<td>4%</td>
</tr>
<tr>
<td>Pescetarian</td>
<td>22</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Red Meat Consumption</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>66</td>
<td>11%</td>
</tr>
<tr>
<td>A few times a month</td>
<td>70</td>
<td>12%</td>
</tr>
<tr>
<td>Once a week</td>
<td>70</td>
<td>11%</td>
</tr>
<tr>
<td>A few times a week</td>
<td>219</td>
<td>35%</td>
</tr>
<tr>
<td>Once a day</td>
<td>103</td>
<td>17%</td>
</tr>
<tr>
<td>With every meal</td>
<td>58</td>
<td>9%</td>
</tr>
<tr>
<td><strong>White Meat Consumption</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>51</td>
<td>8%</td>
</tr>
<tr>
<td>A few times a month</td>
<td>51</td>
<td>8%</td>
</tr>
<tr>
<td>Once a week</td>
<td>47</td>
<td>8%</td>
</tr>
<tr>
<td>A few times a week</td>
<td>295</td>
<td>48%</td>
</tr>
<tr>
<td>Once a day</td>
<td>104</td>
<td>17%</td>
</tr>
</tbody>
</table>
3.2 Sustainable dietary Behaviours: perceptions and engagement

3.2.1 Current engagement with sustainable dietary behaviours

Participants were asked to indicate their current level of engagement with a list of 15 behaviours related to a sustainable diet and their perception of how important each behaviour was in promoting a sustainable diet. Figure 1 demonstrates the current level of engagement for all 15 behaviours.

![Figure 1. Current level of engagement with sustainable dietary behaviours](image)

- **Decreasing food waste** had the highest number of participants in the action stage (n=221, 36%), followed by **reducing consumption of soft drinks and fruit juice** (n=217, 35%) and **consuming local and seasonal produce** (n=208, 34%). **Avoiding air-freighted foods** had the lowest number of participants in the action stage (n=106, 17%), followed by **supporting food traceability and transparency** (n=115, 19%). **Reducing dairy consumption** had the highest number of participants in the precontemplation stage (n=160, 26%) followed by **reducing red...**
meat consumption (n=138, 22%) and avoiding air-freighted foods (n=119, 19%). Figure 1 demonstrates the current level of engagement for all 15 behaviours.

3.2.2 Perceptions of sustainable dietary behaviours

Participants were asked to rate their agreement with the following statement for each behaviour, “_______ is an effective behaviour in promoting a sustainable diet”. Figure 2 displays the ratings for all 15 behaviours.

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
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</thead>
<tbody>
<tr>
<td>Supporting local farmers</td>
<td>Disagree</td>
<td>Neither agree nor disagree</td>
<td>Agree</td>
<td></td>
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<tr>
<td>Decreasing food waste</td>
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<tr>
<td>Consuming local and seasonal produce</td>
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<tr>
<td>Choosing foods with limited packaging</td>
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<td>Consuming food produced with fair labour conditions</td>
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<tr>
<td>Supporting animal welfare</td>
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<tr>
<td>Supporting food traceability and transparency</td>
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<tr>
<td>Purchasing fair trade products</td>
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<tr>
<td>Reducing consumption of soft drinks and fruit juice</td>
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<td>Choosing organic over conventional produce</td>
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<td>Reducing red meat consumption</td>
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<td>Avoiding highly perishable foods</td>
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<tr>
<td>Avoiding pre-prepared/chopped produce</td>
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<tr>
<td>Avoiding air-freighted</td>
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<tr>
<td>Reducing dairy consumption</td>
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<td></td>
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</tr>
</tbody>
</table>

**Figure 2.** Perceptions of sustainable dietary behaviours.

“_______ is an effective behaviour for promoting a sustainable diet”, 5-point Likert scale with categories condensed (strongly/moderately disagree, neither agree nor disagree, strongly/moderately disagree).

*Supporting local farmers* had the highest amount of agreement that the behaviour was effective (71% strongly/moderately agree) followed by *reducing food waste* (71%) and *consuming local and seasonal produce* (65%). *Reducing dairy consumption* had the lowest level of agreement (50%) followed by *avoiding air-freighted foods* (50%) and *avoiding pre-prepared/chopped produce* (53%).
3.3 Predicting behaviour

We aimed to understand how food sustainability concern, food literacy, subjective norms, the NEP, control and attitudes influence current engagement with sustainable dietary behaviours. The mean and SD of the predictor variables are presented in Table 2. Control was entered as a categorical variable and a mean and SD could not be calculated. Attitude was measured through 15 individual questions (one for each individual sustainable dietary behaviour), means and SDs for each variable are available in the appendix.

<table>
<thead>
<tr>
<th>Table 3. Means and Standard Deviations of Predictor Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Food Sustainability Concern</td>
</tr>
<tr>
<td>Food Literacy</td>
</tr>
<tr>
<td>Subjective Norms</td>
</tr>
<tr>
<td>New Ecological Paradigm</td>
</tr>
</tbody>
</table>

3.3.1 Spearmen correlation between predictors

We sought to understand how beliefs, knowledge and other factors influenced current engagement with sustainable dietary behaviours. The TTM was used to assess current engagement with behaviours. Several predictors were used including subjective norms, perceived control, attitude towards a behaviour, Food Literacy, Food Sustainability Concern, and the New Ecological Paradigm- Shortened (NEP). Overall, all of the predictors were correlated with each other and uniquely we found a strong correlation between food literacy and subjective norms around eating sustainable food ($r=.582, p > .001$) Table 2 demonstrates the correlations between predictors. Attitudes were not included in this correlation matrix because 15 attitude measures were captured (one for each sustainable dietary behaviour) and therefore, a single attitude score was not measured.
Table 4. Correlations Between Predictor Variables

<table>
<thead>
<tr>
<th></th>
<th>Subjective Norms</th>
<th>Perceived Control</th>
<th>NEP</th>
<th>Food Literacy</th>
<th>Food Sustainability Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective Norms</td>
<td>---</td>
<td>.112*</td>
<td>ns</td>
<td>.582**</td>
<td>.351**</td>
</tr>
<tr>
<td>Perceived Control</td>
<td>.112**</td>
<td>---</td>
<td>ns</td>
<td>.241**</td>
<td>.217**</td>
</tr>
<tr>
<td>NEP</td>
<td>ns</td>
<td>ns</td>
<td>---</td>
<td>.087*</td>
<td>.347**</td>
</tr>
<tr>
<td>Food Literacy</td>
<td>.582**</td>
<td>.241**</td>
<td>.087*</td>
<td>---</td>
<td>.574**</td>
</tr>
<tr>
<td>Food Sustainability Concern</td>
<td>.351**</td>
<td>.217**</td>
<td>.347**</td>
<td>.574**</td>
<td>---</td>
</tr>
</tbody>
</table>

Spearman rho correlation. * sig. at 0.05, ** sig. at 0.01.

3.3.2 Multinomial logistic regression

Our analyses followed the approach of Pickering et al (2020), where multinomial logistic regressions were run for each behaviour comparing the participants in the action and precontemplation stages to those in the change stages (contemplation or preparation). Predictors related to our hypotheses were hierarchically forced into the model (subjective norms, control and attitude towards the behaviour). Exploratory predictors were entered using a stepwise backward removal method (food sustainability concern, food literacy and NEP). All predictor variables with the exception of control were entered as continuous values, with control entered as a categorical variable (high, medium or low, with medium as the reference category). Table 3 shows the findings for all of the multinomial regressions.
### Table 5. Summary of findings from multinomial regression for predicting action stages for sustainable dietary behaviours.

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Action Stage</th>
<th>Behavioural Efficacy</th>
<th>Subjective Norms</th>
<th>Perceived Control</th>
<th>Food Literacy</th>
<th>Food Sustainability Concern</th>
<th>Pro-Ecological Worldview (NEP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B OR</td>
<td>B OR</td>
<td>B OR</td>
<td>B OR</td>
<td>B OR</td>
<td>B OR</td>
</tr>
<tr>
<td>Avoiding Air-Freighted Foods</td>
<td>A</td>
<td>.27* 1.31</td>
<td>.07* 1.07</td>
<td>.68* 1.97</td>
<td>.02* 1.02</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.55** .58</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Choosing Organic Over Conventional Produce</td>
<td>A</td>
<td>ns</td>
<td>ns</td>
<td>.79* 2.19</td>
<td>.03** 1.03</td>
<td>NA</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.65** .52</td>
<td>-.06* .94</td>
<td>ns</td>
<td>ns</td>
<td>NA</td>
<td>.06* 1.06</td>
</tr>
<tr>
<td>Reducing Red Meat Consumption</td>
<td>A</td>
<td>.48** 1.61</td>
<td>ns</td>
<td>ns</td>
<td>NA</td>
<td>NA</td>
<td>.11** 1.12</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.67** .51</td>
<td>ns</td>
<td>ns</td>
<td>NA</td>
<td>NA</td>
<td>.08* 1.08</td>
</tr>
<tr>
<td>Reducing Dairy Consumption</td>
<td>A</td>
<td>.56** 1.75</td>
<td>ns</td>
<td>ns</td>
<td>NA</td>
<td>NA</td>
<td>.97** 1.10</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.76** .47</td>
<td>ns</td>
<td>ns</td>
<td>NA</td>
<td>NA</td>
<td>.14** 1.09</td>
</tr>
<tr>
<td>Purchasing Local and Seasonal Produce</td>
<td>A</td>
<td>.38** 1.47</td>
<td>ns</td>
<td>ns</td>
<td>.41** 1.04</td>
<td>ns</td>
<td>.08* 1.08</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.48* .6</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>-.03* .97</td>
<td>ns</td>
</tr>
<tr>
<td>Reducing Food Waste</td>
<td>A</td>
<td>.55** 1.73</td>
<td>ns</td>
<td>ns</td>
<td>.03** 1.03</td>
<td>ns</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>-.05** .95</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Choosing foods with limited packaging</td>
<td>A</td>
<td>.28* 1.32</td>
<td>ns</td>
<td>ns</td>
<td>.02* 1.02</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.60** .55</td>
<td>ns</td>
<td>ns</td>
<td>-.03* .98</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Avoiding Pre-Prepared/Chopped Produce</td>
<td>A</td>
<td>.45** 1.57</td>
<td>ns</td>
<td>ns</td>
<td>.03** 1.03</td>
<td>NA</td>
<td>.09** 1.09</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.37** .69</td>
<td>ns</td>
<td>ns</td>
<td>-.03** .97</td>
<td>NA</td>
<td>.10** 1.11</td>
</tr>
<tr>
<td>Avoiding Highly Perishable Food</td>
<td>A</td>
<td>.31* 1.36</td>
<td>.05* 1.01</td>
<td>ns</td>
<td>.02* 1.01</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.59* .55</td>
<td>ns</td>
<td>ns</td>
<td>-.02* .98</td>
<td>NA</td>
<td>.08* 1.08</td>
</tr>
<tr>
<td>Avoiding Soft Drinks and Fruit Juice</td>
<td>A</td>
<td>.24* 1.28</td>
<td>ns</td>
<td>ns</td>
<td>.03** 1.03</td>
<td>NA</td>
<td>.09** 1.10</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.29* .74</td>
<td>ns</td>
<td>ns</td>
<td>-.02* .98</td>
<td>NA</td>
<td>.07* 1.07</td>
</tr>
<tr>
<td>Purchasing Fair Trade</td>
<td>A</td>
<td>.32* 1.37</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>-.03* .97</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Supporting Animal Welfare</td>
<td>A</td>
<td>.26* 1.29</td>
<td>ns</td>
<td>ns</td>
<td>.03** 1.03</td>
<td>NA</td>
<td>.05* 1.05</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.65** .52</td>
<td>ns</td>
<td>ns</td>
<td>-.02* .98</td>
<td>NA</td>
<td>-.08** .92</td>
</tr>
<tr>
<td>Supporting Fair Labour</td>
<td>A</td>
<td>.26* 1.30</td>
<td>ns</td>
<td>ns</td>
<td>.03** 1.03</td>
<td>NA</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>-.49** .61</td>
<td>ns</td>
<td>ns</td>
<td>-.03* .97</td>
<td>NA</td>
<td>-.12** .88</td>
</tr>
<tr>
<td>Supporting Food Transparency</td>
<td>A</td>
<td>.28* 1.30</td>
<td>.09* 1.11</td>
<td>.73* 2.07</td>
<td>.03* 1.03</td>
<td>NA</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>-.03* .97</td>
<td>NA</td>
<td>.07* 93</td>
</tr>
<tr>
<td>Supporting Local Farmers</td>
<td>A</td>
<td>.46** 1.58</td>
<td>.05* 1.05</td>
<td>ns</td>
<td>.03* 1.03</td>
<td>ns</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>P/C</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>-.03* .97</td>
<td>NS</td>
<td>NA</td>
</tr>
</tbody>
</table>
Participants in the Action Stage (A) were compared to participants in the precontemplation stage (P/C). ns, not significant; NA, not assessed in model. Reference category for regression as change stages (contemplation/preparation).

3.3.2.1 Behavioural efficacy

How effective the participants perceived each behaviour to be in promoting a sustainable diet was the most important and consistent predictor in all of our models. Behavioural efficacy was significant for both action and precontemplation for every behaviour except choosing organic over conventional produce, which was only significant for precontemplation and reducing food waste, supporting food transparency, supporting local farmers, and choosing fair trade products which were only significant for action. Therefore, while behavioural efficacy proved to be important for predicting both action and inaction, it was more predictive for being in the action stage than the pre-contemplation stage. In summary, having a positive attitude towards the behaviour predicted being in the action stage over a change stage and having a negative attitude predicted being in the precontemplation stage over a change stage.

3.3.2.2 Norms and control

Subjective norms predicted being in the action stage for five behaviours: avoiding air-freighted foods, reducing red meat consumption, avoiding highly perishable foods, supporting food transparency and supporting local farmers. For all of these behaviours, having positive social norms around eating sustainable food predicted being in the action stage over a change stage. However, social norms only predicted being in the precontemplation stage for one behaviour, choosing organic over conventional produce, where having a negative attitude towards the behaviour predicted being in precontemplation over a change stage. Surprisingly, control was only significant in predicting action for three behaviours: avoiding air-freighted foods, choosing organic over conventional produce and supporting food transparency.
However, when control was significant it was the strongest and most influential predictor in the model, suggesting its importance as a predictor. For all significant relationships, having high control predicted being in the action stage compared to those with medium control, control did not significantly predict being in the precontemplation stage for any of the behaviours.

3.3.2.3 Food literacy

Food literacy was another important predictor in almost all of the models, predicting being in the action stage for every behaviour except reducing red meat consumption, reducing dairy consumption and purchasing fair trade. With the exception of these three behaviours, in all of our models a higher food literacy score predicted being in the action stage over a change stage. In addition, food literacy predicted being in the precontemplation stage for the following behaviours: choosing foods with limited packaging, avoiding pre-prepared/chopped produce, avoiding soft drinks and fruit juice, supporting animal welfare, supporting fair labour, supporting food transparency and supporting local farmers. For all significant relationships, a lower food literacy score predicted being in precontemplation over a change stage.

3.3.2.4 Food sustainability concern

Food sustainability concern did not predict being in the action stage for any of the behaviours however, it did predict being in precontemplation for purchasing local and seasonal produce, reducing food waste, avoiding highly perishable foods and purchasing fair trade. For these four behaviours having a low food sustainability concern score significantly predicted being in the precontemplation stage over a change stage.

3.3.2.5 Pro-ecological worldview

Having a pro-ecological worldview significantly predicted being in the action stage for the following behaviours: reducing red meat consumption, reducing dairy consumption,
purchasing local and seasonal produce, avoiding pre-prepared/chopped produce, avoiding soft drinks and fruit juice, and supporting animal welfare. For all of the behaviours, having a higher NEP score significantly predicted being in the action stage. The NEP also predicted being in the precontemplation stage for the following behaviours: choosing organic over conventional produce, reducing red meat consumption, reducing dairy consumption, avoiding pre-prepared/chopped produce, avoiding soft drinks and fruit juice, supporting animal welfare, and supporting food transparency. Interestingly, having a lower NEP score only predicted being in precontemplation for the last three behaviours, supporting animal welfare, supporting food transparency, and supporting local farmers. For the other four behaviours, the NEP was significant in the opposite direction, where a higher NEP score actually predicted being in precontemplation over a change stage. Therefore, for 4 out of the 7 behaviours that the NEP predicted, having a higher score predicted being in either the action or precontemplation stage opposed to a change stage.

4. Discussion

4.2 Current engagement with and perceptions of sustainable dietary behaviours

4.2.1 Reducing red meat and dairy

Reducing dairy consumption (26%) and reducing red meat consumption (22%) had the highest proportion of participants in the pre-contemplation stage (unwilling to engage in the behaviour). While efforts have been made to reduce the impact of animal agriculture in Canada, 53% of Canadian agricultural emissions are related to livestock production, with 31% of that coming from beef cattle and 12% coming from dairy (Fouli et al., 2022). Given that over half of Canadian agricultural emissions come from animal agriculture, both reduction of meat and dairy is needed to reduce agricultural emissions. However, our results indicate that these two high
impact behaviours have the highest proportion of respondents unwilling to engage in them. In addition, only 50% of participants agreed that reducing dairy consumption was effective for promoting a sustainable diet, making it the behaviour with the lowest level of agreement, and only 55% of participants agreed that reducing red meat consumption was effective.

Comparing supporting local farmers to reducing red meat consumption, both of these behaviours had the same number of participants indicate that they were in the action stage. The difference in these behaviours lies in the precontemplation stage (P/C), with significantly more participants in the P/C stage for reducing red meat consumption compared to supporting local farmers. These results are also similar when you compare the actions stages for reducing dairy consumption to choosing foods with limited packaging. Despite a similar number of participants in the action stages for each behaviour, significantly more participants were in the P/C stage for reducing dairy consumption opposed to choosing foods with limited packaging.

Comparing both of these results demonstrates that the behaviours related to animal agriculture carry a heavier sense of opposition. Even with an equal number of participants in the action stages, the behaviours not related to animal agriculture had far more participants who were willing to change their behaviours. In addition, one can see that the issue is not with awareness, as reducing dairy consumption and reducing red meat consumption had the lowest proportion of participants indicate that they don’t know how to engage in these behaviours. Together, this suggests that it is not a matter of not being educated on the impact of these behaviours or not knowing how to enact them in their daily lives, but rather an overall unwillingness to alter their eating habits around meat and dairy. This is consistent with previous literature which has consistently found that only a small minority of people are willing to alter their meat eating habits for environmental reasons (Sanchez-Sabate & Sabaté, 2019).
4.2.2 Decreasing food waste and related behaviours

*Decreasing food waste* had the highest proportion of participants already engaging in the behaviour and also had the highest agreement that it was an effective behaviour. Food waste is currently a massive global issue and the majority of food waste happens on a consumer level, with over 50% of Canadian food waste happening at home (Poore & Nemecek, 2018). Research has also found that young adults and students tend to report higher levels of food waste than older adults (Grainger et al., 2018). Given the significant impact that wasted food has on the environment and higher levels of food waste in youth, youth awareness and engagement with this behaviour is important. However, looking at two specific behaviours related to food waste, *avoiding air-freighted foods* and *avoiding highly perishable foods* engagement and awareness is significantly less. In Canada, 92% of imported fruits and vegetables travel over 1500km to reach consumers (Kissinger, 2012) and in the Global North much of the food waste is either directly or indirectly related to these complex and distant supply chains, even if that waste actually happens on the consumer level (MacRae et al., 2016). These supply chains have led to a constant availability of fresh food (despite regional specific seasonality) at consistently low prices, therefore, creating an overall perception of an abundance of fresh food. Together all of these factors indirectly contribute to the amount of food waste seen on the consumer level (MacRae et al., 2016). While our sample identified food waste as a prevalent issue, *avoiding air freighted foods* had the lowest proportion of participants in the action stage and was tied for first with the
lowest overall agreement that it’s an effective behaviour for promoting a sustainable diet. However, this discrepancy seems to be coming from a lack of knowledge, considering that 40% of participants indicated that they are not aware how to engage in this behaviour. In Canada, companies are required to indicate the country of origin for a food product, however, labels such as transportation methods are voluntary and not regulated (C. F. I. A. Government of Canada, 2012). Without adequate labelling, consumers have no means to tell how their food got to their plate and are not able to make accurate judgments and decisions around buying air-freighted foods.

Fruits and vegetables have the greatest food miles of any foods consumed in Canada (Kissinger, 2012) and they are the most likely foods to be sent into the compost bin, with over 50% of EU food waste coming directly from foods and vegetables (De Laurentiis et al., 2018). In our sample, only 9% of participants indicated they were unwilling to engage in reducing food waste, however, 19% indicated that they were unwilling to avoid highly perishable foods. Given the fact that the majority of food wasted is highly perishable products such as fruits and vegetables, this discrepancy may highlight that consumers are not aware of the actual behaviours they can be engaging in to reduce food waste. These results highlight that more research is needed on what food waste means to consumers and the behaviours that they currently engage in to reduce waste. Food waste is a large and complex issue, tied to many parts of the supply chain as well as consumer behaviour and understanding this issue from the perspective of the specific behaviours consumers engage in will provide a much needed layer of intricacy to the topic.

4.2.3 Supporting local

Participants were asked about two behaviours related to supporting local food systems, supporting local farmers and consuming local and seasonal produce. Overall participants agreed
that supporting local farmers and consuming local and seasonal produce were effective behaviours for promoting a sustainable diet. Supporting local farmers had lowest proportion of participants indicate they are not willing to engage in the behaviour and had a high percentage of participants already in the action stage. Consuming local and seasonal produce had similar levels of engagement in the action stage and a low number of participants completely unwilling to engage. When it comes to the sustainability of local food, the benefit does not necessarily come from GHG emissions or environmental indicators, but rather the social and economic benefits. Local food can help contribute to rural development and a sense of community and selling in local markets can be of great financial benefit for some farmers (Stein & Santini, 2021). Consuming local food and engaging with the local food system can also connect consumers to the region, both ecologically and culturally (Sims, 2009). While we are unsure how the COVID-19 pandemic may have influenced our sample’s perception of the importance of local food, research has found that the pandemic has drastically altered local food systems. The pandemic has led to greater citizen involvement in local food systems and has pushed both retailers and policy-makers to pay greater attention to local food (Nemes et al., 2021). COVID may have brought local food systems into consumer awareness but keeping the momentum going and sustaining engagement with these systems is the next challenge. Convenience will always be a driving force for consumers and ensuring that niche foods (like organic and local) are available in supermarkets, are clearly labelled, and have a minimal price markup are all essential factors in ensuring the continued consumer support of these systems (Hjelmar, 2011).
4.3 Predicting behaviour

4.3.1 Behavioural efficacy

Consistent with H4, participant’s perceptions of the efficacy of a specific behaviour significantly predicted their current engagement with that behaviour for almost all outcomes, with a few exceptions. For all of the behaviours except choosing organic over conventional produce, believing that the behaviour was effective positively predicted being in the action stage over a change stage. In addition, having a negative attitude towards a specific behaviour predicted being in the precontemplation stage for all of the behaviours except reducing food waste, supporting local farmers, purchasing fair trade and supporting food transparency. However, for supporting local farmers and reducing food waste less than 10% of participants indicated that they do not perceive these behaviours to be effective. The lack of participants holding negative attitudes about these behaviours could explain why having a negative attitude towards these behaviours did not predict being in the precontemplation stage. In addition, for purchasing fair trade and supporting food transparency the majority of participants were in the change stages as opposed to action or precontemplation. Therefore, the lack of participants in precontemplation and action stages could explain why perceptions of these behaviours did not predict inaction. These results are consistent with previous research and the theoretical background of this study, where attitude towards a specific behaviour has been shown to be an important predictor of that behaviour (Armitage & Conner, 2001; Biasini et al., 2021). While increasing knowledge around behaviours is important in promoting attitude change, research has found that information related to both cognitive (what we believe) and affective (what we feel) factors is important in shaping our attitudes (Pooley & O’Connor, 2000). Therefore, educational campaigns targeted at youth that highlight cognitive aspects such as accurate information about
the environmental impact of a behaviour and affective aspects such as increased empathy for workers or the planet, are important in promoting attitude change and ultimately uptake of behaviours.

It is also important to note that for this study we chose to measure attitudes towards a specific behaviour rather than a more general measure of attitudes towards sustainable foods. Therefore, our chosen method makes our measure of attitudes conceptually very similar to our outcome variables of engagement with the specific behaviours. This poses itself as a possible limitation and a recommendation for future analyses could be creating an average attitude score towards all of the behaviours and understanding the influence of the average attitude towards the measured behaviours.

4.3.2 Food literacy and food sustainability concern

Consistent with H5, having a higher food literacy score predicted being in the action stage over a change stage for most behaviours. In addition, having a lower food literacy score predicted being in the precontemplation stage for 7 out of the 15 behaviours. The food literacy scale administered in this study was designed by Park et al. (2020) and it aimed to integrate both food system and food sustainability knowledge into a single scale; it also aimed to incorporate the social, economic, and environmental effects of food literacy, making it a comprehensive and novel tool for our research. To the best of our knowledge, this scale has not been applied in any studies that aimed to examine the role of food literacy and engagement with sustainable dietary behaviours. Our finding that food literacy is a significant predictor in engagement with sustainable dietary habits is both novel and important. Previous research has identified that food literacy skills are lacking in young adults and the majority are not confident applying any of their knowledge due to an overall low level of confidence in their food skills (Ronto et al., 2016).
Despite this identified knowledge gap, youth are interested in developing food skills (Ronto et al., 2016). However, they have been presented with very little opportunity to do so due to the decline of food and nutritional education both at school and at home (Ronto et al., 2016). Given the important role food literacy plays on engagement with sustainable dietary behaviours, instilling strong food literacy skills in youth through education and engagement is important in ensuring the younger generations have the knowledge they need to make informed choices.

*The Food Sustainability Concern Scale* (FSC) by Grunert et al. (2014) was another measure used in our model. Previous research has found FSC to be a significant predictor in understanding of sustainability labels, however, it is not understood how this measure can be applied to predicting current behaviours around sustainable diets (Grunert et al., 2014). FSC was not significant for predicting action for any our behaviours, therefore, failing to confirm H6; however, having a lower FSC score did predict being in the precontemplation stage for *purchasing local and seasonal product, reducing food waste, avoiding highly perishable foods* and *purchasing fair trade*. Previous research looking at environmental concern and environmental action has found that concern alone is not a strong predictor of pro-environmental behaviour (Bamberg, 2003). Some theories suggest that environmental concern acts indirectly on behaviour, where environmental concern acts as an easily accessible heuristic that people may use when they have to make quick decisions (Bamberg, 2003). Heuristics are unconscious mental shortcuts that permit us to make decisions easier and faster (Scheibehenne et al., 2007). Most of our everyday choices are based on these mental heuristics rather than rational and logical thought. In the case of food choice, research has found that we rely heavily on heuristics, making decisions about food very quickly and without weighing all of the options or consequences of our choices (Cohen & Babey, 2012). For example, one could look at the case of
two shoppers being presented with an organic label while grocery shopping. One shopper who has strong environmental concern may already have a mental heuristic in place to quickly favor the choice that aligns with their environmental concern. When they made that choice to purchase the organic product, they may not have undergone an entirely cognitive process where they weigh the environmental benefits, but their underlying environmental concern acts indirectly through an unconscious heuristic. However, more research is needed to empirically test these hypotheses and theoretical frameworks. Our research highlights that food sustainability concern does not directly influence engaging in sustainable dietary behaviours, however, the mediating role that FSC may play is unknown.

4.3.3 Control and subjective norms

The final two behaviours in our model are both components of the TPB: subjective norms and control. Subjective norms significantly predicted being in the action stage for avoiding air-freighted foods, reducing red meat consumption, avoiding highly perishable foods, supporting food transparency and supporting local farmers. For all of the significant outcomes, having stronger subjective norms around consuming sustainable foods positively predicted being in the action stage over a change stage. In addition, having low subjective norms predicted being in the precontemplation stage for only a single behaviour, choosing organic over conventional produce. These findings partially support H2, as subjective norms predicted behaviour for 6 out of 15 behaviours. This finding is consistent with previous literature which has found that while subjective norms are significant predictors of intention and behaviour, they are a less consistent and reliable predictor than attitudes (Biasini et al., 2021).

To our surprise, control only predicted being in the action stage for three behaviours avoiding air-freighted foods, choosing organic over conventional produce and supporting food
transparency. For all of the behaviours, participants were categorized as having low, medium or high control and for the regression medium was set as the reference group. Therefore, for all significant relationships having high control in comparison to medium control predicted being in the action stage. Having low control compared to medium control did not significantly predict any outcomes and control was not significant for being in the precontemplation stage for any of the behaviours. However, despite the fact that control was only significant for three behaviours, when control was significant in the model it was the strongest and most robust predictor. Together these findings do suggest that control plays a significant role in predicting behaviour for certain behaviours. Therefore, these findings partially support H1, as control was only significant for three behaviours but was strongly predictive when it was significant. This partially goes against previous research which has found control to be significant in predicting pro-environmental behaviour (Pickering et al., 2021; Trivedi et al., 2018). There are two possible explanations as to why control did not predict engagement to the extent that we expected it to. First, control was the only variable in our model that was entered as a categorical rather than continuous variable, which can cause a considerable loss of power in the model (Royston et al., 2006). In addition, we measured the amount of control participants have over their food choices rather than other approaches which have measured locus of control and the extent to which people believe their individual actions can make a difference (Pickering et al., 2021), which may prove to be a more robust measure.

4.3.4 Pro-environmental worldview: new ecological paradigm (NEP)

The final variable in our model was the NEP, which significantly predicted being in the action and precontemplation stage for several behaviours. These findings partially support H3, where having a strong pro-environmental view positively predicted being in an action stage over
a change stage. However, for some of the behaviours having a high NEP score predicted being in P/C and for other behaviours having a low NEP score predicted being in P/C. While the direction of the relationship varies, our results indicate that having a high NEP score predicts being on either end of the spectrum, already acting or completely unwilling to act, opposed to being in a change stage. This is a novel and unexpected finding that has several possible explanations. The first explanation being that the NEP is simply not a good measure for predicting pro-environmental behaviour, with recent research highlighting issues with internal consistency and generalizability of the scale (Hawcroft and Milfont, 2010; Rosa et al., 2022). However, research on sustainable food choice has found that while pro-environmental values do impact food choice, there are a multitude of other factors that conflict with those values, such as price and the preferences of other household members (Meyer and Simons, 2021). Therefore, there could be other variables influencing the relationship between the NEP and participants current action stage for sustainable dietary behaviours.

5. Conclusions

The purpose of this study was to examine youth’s current perceptions of and engagement with a variety of behaviours that constitute a sustainable diet from an environmental, economic, and social perspective. We also aimed to examine the influence of several predictors on current engagement with these behaviours, using the TTM to examine current engagement.

The finding that reducing dairy consumption and reducing red meat had the highest proportion of participants unwilling to engage in the behaviours is extremely important. Given the impact that animal agriculture has on the planet and the high amount of GHG emission associated with these behaviours (Hallström et al., 2015), engagement in these behaviours has the potential to make a strong impact. This finding that youth are unwilling to alter these
behaviours needs to be explored further, including a greater understanding as to why reducing red meat and dairy consumption are met with such heavy opposition and the most effective way to sway their engagement.

Overall, participants attitudes towards a specific behaviour and their food literacy score were the most consistent and important predictors in our model, highlighting the importance of education on increasing uptake of sustainable dietary behaviours. Environmental education has been shown to influence children’s pro-environmental attitudes in the past, particularly with younger students being more responsive to attitude shifts than older students (Liefländer & Bogner, 2014). Education that specifically aims to target the development of food literacy skills in youth could prove to be effective, given the importance of both attitudes and food literacy in our sample. Previous research has identified a lack of food and nutrition education as one of the main drivers of poor diet quality in adolescents (Ronto et al., 2016); therefore, education that aims to facilitate food literacy in youth starting at a young age may be most of the most effective ways to increase awareness and engagement with sustainable dietary behaviours.

Our research builds upon existing knowledge of youth perceptions of and engagement with a variety of sustainable dietary behaviours, while taking a holistic perspective and incorporating social, economic and environmental aspects of sustainability. The present research demonstrates the behaviours that youth believe to be the most effective and their current action stage associated with those behaviours. This informs us where youth are already engaging in sustainable diets and the dimensions of sustainable diets that they are unaware of or unwilling to engage in. In addition, we gained a deeper understanding of the psychological and educational predictors of engagement with sustainable diets. Uniquely, our results highlight the importance of food literacy in predicting current action stages with sustainable dietary behaviours. These
results can be used to advocate for the extension of food literacy programs in schools, which may be one of the most effective things we can do to ensure that youth have the knowledge they need to make educated and responsible decisions around food.

References


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Appendix

Appendix A: Attitudes towards sustainable dietary behaviours means and standard deviations

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoiding air-freighted foods</td>
<td>3.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Choosing organic over conventional produce</td>
<td>3.6</td>
<td>1.1</td>
</tr>
<tr>
<td>Reducing red meat consumption</td>
<td>3.6</td>
<td>1.2</td>
</tr>
<tr>
<td>Reducing dairy consumption</td>
<td>3.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Consuming local and seasonal produce</td>
<td>3.8</td>
<td>1.1</td>
</tr>
<tr>
<td>Decreasing food waste</td>
<td>4.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Choosing foods with limited packaging</td>
<td>3.8</td>
<td>1.1</td>
</tr>
<tr>
<td>Avoiding pre-prepared/chopped produce</td>
<td>3.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Avoiding highly perishable foods</td>
<td>3.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Reducing consumption of soft drinks and fruit juice</td>
<td>3.6</td>
<td>1.2</td>
</tr>
<tr>
<td>Purchasing fair trade products</td>
<td>3.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Supporting local farmers</td>
<td>4.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Supporting animal welfare</td>
<td>3.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Consuming food produced with fair labour conditions</td>
<td>3.8</td>
<td>1.1</td>
</tr>
<tr>
<td>Supporting food traceability and transparency</td>
<td>3.7</td>
<td>1.1</td>
</tr>
</tbody>
</table>
Appendix B: Survey Text

Demographics

Q1: What is your highest level of education?
   - No formal qualification
   - High School Diploma
   - Apprenticeship or Trades Certificate or Diploma
   - College, CÉGEP, or other non-University Certificate or Diploma
   - University Certificate, Diploma or Degree below the Bachelor Level
   - University Certificate, Diploma or Degree at the Bachelor Level
   - University Graduate Degree

Q2: What is your current age?
   - 18
   - 19
   - 20
   - 21
   - 22
   - 23
   - 24
   - 25

Q3: What is your gender?
   - Female
   - Male
   - Non-binary/third gender
   - Prefer not to say

Q4: What is your political affiliation?
   - Conservative Party
   - Green Party
   - Le Bloc Québécois
   - Liberal Party
   - New Democratic Party
   - None/Would not vote
   - Other

Q5: How would you describe your political beliefs?
   - Extremely Liberal
   - Slightly liberal
   - Liberal
   - Moderate
Q6: What is your annual household income?
   - $0-$25,000
   - $25,001-$50,000
   - $50,001-$75,000
   - $75,001-$100,000
   - $100,001-$200,000
   - $200,000+

Q7: Which best describes your diet?
   - Non-vegetarian
   - Vegetarian
   - Vegan
   - Pescetarian
   - Flexitarian

Q8: Which best describes your current living situation?
   - Living alone
   - Living with roommates
   - Living with a partner
   - Living with parents
   - Other

Q9: How often do you consume meat?
   - With every meal
   - Once a day
   - Once a week
   - A few times a week
   - A few times a month
   - A few times a year
   - Never

Q10: Please rate your agreement with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoiding air-freighted foods</td>
<td></td>
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<tr>
<td>Choosing organic over conventional produce</td>
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<td>Reducing red meat consumption</td>
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<td>Reducing dairy consumption</td>
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<tr>
<td>Consuming local and seasonal produce</td>
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<tr>
<td>Decreasing food waste</td>
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<td>Choosing foods with limited packaging</td>
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<td>Avoiding pre-prepared/chopped produce</td>
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<td>Avoiding highly perishable foods</td>
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<tr>
<td>Reducing consumption of soft drinks and fruit juice</td>
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<tr>
<td>Purchasing fair trade products</td>
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<tr>
<td>Supporting farmers rights</td>
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<tr>
<td>Supporting animal welfare</td>
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<tr>
<td>Consuming food produced with fair labour conditions</td>
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<tr>
<td>Supporting traceability and transparency</td>
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</tbody>
</table>

Q11: How often do you engage in the following sustainable dietary behaviours?

<table>
<thead>
<tr>
<th></th>
<th>I am not doing this and I am not willing to</th>
<th>I would like to do this but I do not know how to start</th>
<th>I would like to do this and I already know how to start</th>
<th>I am already doing this</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoiding air-freighted foods</td>
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<tr>
<td>Choosing organic over conventional produce</td>
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<tr>
<td>Reducing red meat consumption</td>
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<tr>
<td>Reducing dairy consumption</td>
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<tr>
<td>Consuming local and seasonal produce</td>
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<td>Choosing foods with limited packaging</td>
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<td>Avoiding pre-prepared/chopped produce</td>
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<tr>
<td>Avoiding highly perishable foods</td>
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</tbody>
</table>
Reducing consumption of soft drinks and fruit juice
Purchasing fair trade products
Supporting farmers rights
Supporting animal welfare
Consuming food produced with fair labour conditions
Supporting traceability and transparency

Q12: How often do you make food choices based around sustainability?
(1) Never
(2) Rarely
(3) Sometimes
(4) Often
(5) Most of the time
(6) Always

Food Literacy (Park et al. 2020)

Q13: Rank your agreement with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can explain the pros and cons of my usual diet</td>
<td></td>
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<tr>
<td>I usually cook and store food with care, as I am cautious of food poisoning</td>
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<tr>
<td>I usually check the shelf life of food</td>
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<tr>
<td>I try to get accurate information about food and health</td>
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<tr>
<td>I can determine the condition of food hygiene by watching the</td>
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<tr>
<td>meal preparation and cooking process.</td>
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<tr>
<td>I store food in a way that maintains food quality.</td>
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<tr>
<td>I can talk about the pros and cons of Canadian food culture</td>
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<tr>
<td>I usually check for the genetically modified organism label on food products</td>
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<tr>
<td>I usually check for the agricultural food certification (organic, pesticide free, etc.) label.</td>
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<tr>
<td>I usually check the ingredients in processed foods, such as food content, food additives, etc.</td>
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<tr>
<td>I can find information about food production, such as the “animal welfare” certification for meat and eggs</td>
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<tr>
<td>I usually check for the food’s country of origin.</td>
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<tr>
<td>I usually select food based on nutrition labels.</td>
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<tr>
<td>I am aware of how different food transportation methods impact the environment and society</td>
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<tr>
<td>If I have any questions about food issues, I can find accurate information from</td>
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<tr>
<td>expertise or reliable organizations</td>
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<tr>
<td>I can find information on the various distribution methods, such as local food.</td>
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<tr>
<td>I can buy food in an efficient way that saves money, time, etc.</td>
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<tr>
<td>I can look up or ask about various ways to judge the quality (taste, freshness, etc.) of food.</td>
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<tr>
<td>I can determine whether food is necessary for me by watching/reading food advertisements.</td>
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<tr>
<td>I usually try to reduce food waste.</td>
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<tr>
<td>I am aware of the environmental impact of food waste and take care when disposing of it.</td>
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<tr>
<td>I can find out the exact methods for recycling food packaging and food waste</td>
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<tr>
<td>I can prepare nutritionally balanced meals.</td>
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<tr>
<td>I can find food or a menu that suits my health and circumstances (time, place, costs, etc.).</td>
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<tr>
<td>I usually try to eat a variety of food groups, including grains, fish, meat, vegetables, fruits, milk, etc.</td>
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</table>
**Food Sustainability Concern**

Q14: How concerned are you about protecting the environment?

<table>
<thead>
<tr>
<th></th>
<th>1- Only Slightly Concerned</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7- Extremely Concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>The use of pesticides in food production</td>
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<td>The amount of food waste</td>
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<td>The use of child labor in food production</td>
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<tr>
<td>Poor working conditions</td>
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<tr>
<td>Carbon emissions caused by food production and transportation</td>
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<tr>
<td>Deforestation</td>
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<tr>
<td>Packaging that is not recyclable</td>
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<tr>
<td>Pollution during food transportation</td>
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<tr>
<td>Using too much of the world’s natural resources for food production</td>
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<tr>
<td>Poor treatment of animals in food production</td>
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</tbody>
</table>
Theory of Planned Behaviour

Control

Q16: What percentage of meals do you eat inside the house (opposed to fast-food/takeout)?
   - 0%
   - 25%
   - 50%
   - 75%
   - 100%

Q17: Who does the majority of purchasing of food in your household?
   - Myself
   - My partner
   - My roommates
   - My parents/caretakers
   - Other

Q18: How much control do you have over the food purchased and cooked in your household?
   - No control
   - Very little control
   - Some control
   - A lot of control
   - Full control

Subjective Norms

Q19: Rank your agreement with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree Nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Those around me believe that buying sustainable food is important</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Those around me make it a priority to choose sustainable foods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My close friends and family members would appreciate if I bought</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sustainable foods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My parents/caretakers often buy and cook with sustainable foods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Growing up, my parents/caretakers made it a priority to purchase and cook with sustainable foods.

**Q20: New Ecological Paradigm- Revised (Dunlap et al., 2000)**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Mildly Disagree</th>
<th>Unsure</th>
<th>Mildly Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humans have the right to modify the natural environment to suit their needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humans are seriously abusing the environment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plants and animals have as much right as humans to exist.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The balance of nature is strong enough to cope with the impacts of modern industrial nations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humans were meant to rule over the rest of nature.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The balance of nature is very delicate and easily upset.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Chapter 4: Summary and Discussion

Agriculture impacts the natural world on a grander scale than any other industry, using 70% of global freshwater, 50% of habitable land and releasing 25% of total GHG emissions (Ritchie & Roser, 2020). In addition, agriculture employed around a quarter of the global population in 2019 (FAO, 2021). Existing within complex social-ecological systems that involve interactions between humans and the natural world (Allen et al., 2014), sustainable agriculture must be good for people and the planet. Consumers make choices about food multiple times a day, therefore, choosing and advocating for sustainable foods can have a major impact on how products are being produced. While many factors such as government regulations impact food production, market forces always have been and always will be a driver in the way food chains are developed (Grunert, 2011).

Study One aimed to understand what a sustainable diet means to youth in their own words while also understanding how effective youth perceive behaviours that relate to the social, economic, and environmental dimensions of a sustainable diet. It also investigated the food choice motivators that are important to Gen Z and barriers that they perceive to be impacting their ability to engage in a sustainable diet. Results from the open response questions highlight that youth are able to identify a range of behaviours that constitute social and environmental dimensions of sustainability such as eating local, reducing red meat consumption, and reducing household waste. Some unique insights were also provided such as their emphasis on gardening/hunting/foraging, cooking their own meals and taking a mindful approach to eating. However, behaviours that referenced economic factors of sustainability were largely missing in the open response questions, highlighting a need to communicate this dimension of sustainability and the behaviours related to it, such as profitability for farmers and equal distribution of profits throughout the supply chain (Heller & Keoleian, 2000).
Consistent with previous research, taste, health, and price were rated as the most important food choice motivators for Gen Z. Impact on nature, environmental sustainability, and GHG emissions were the next three motivators with the highest importance ratings. These results highlight the importance of environmental motivators when making food choices for Gen Z. However, the majority of our sample indicated that there were barriers preventing them from engaging in sustainable dietary behaviours, with cost, accessibility and convenience identified as the most prevalent. These results demonstrate that while environmental factors such as GHG emissions and impact on nature are important to Gen Z when making food choices, they perceive there to be barriers impacting their ability to act on these values. Ensuring that sustainable options are affordable, accessible and convenient is essential in ensuring that Gen Z’s values are translated into action. This can be done by having products clearly visible/labelled, available at local supermarkets, and with a minimal price markup compared to conventional products (Hjelmar, 2011). These measures will ensure that barriers towards sustainable consumption identified by this generation, such as cost, accessibility, and lack of knowledge (Study 1), are effectively countered.

Finally, we examined youth perceptions of the effectiveness of a range of behaviours demonstrating the social, economic and environmental dimensions of a sustainable diet. Decreasing food waste, consuming local and seasonal produce, and supporting local farmers were perceived to be the most effective in promoting a sustainable diet. Reducing dairy consumption, reducing soft drinks and fruit juice, and avoiding pre-prepared/chopped foods were viewed as ineffective. Dairy production accounts for 20% of Canadian livestock emissions, making up a significant portion of Canada’s overall agricultural emissions (Vergé et al., 2013). There seems a lack of awareness in Gen Z about the environmental impact of dairy, making this
one of the most important findings, given the high emissions associated with this behaviour. Research has found that vegan diets omitting both dairy and meat were associated with a 53% drop in dietary GHG emissions, whereas, vegetarian diets omitting only meat were associated with a 24% drop in dietary emissions (Meier & Christen, 2013). A large amount of this discrepancy in GHG emission could be attributed specifically to the reduction in nitrogen and phosphorus in a vegan diet, which are directly tied to dairy production. This research highlights the high dietary GHG emissions associated with dairy consumption and the importance of dairy reduction in a sustainable diet. Our findings demonstrate a lack of awareness and engagement with dairy reduction in Gen Z, therefore, highlighting that education around the dietary impacts of dairy and outreach encouraging reduction is needed.

Study Two integrates sustainable food choice into two theoretical frameworks, The Theory of Planned Behaviour (TPB) and the Transtheoretical Model of Behaviour (TTM). The purpose of the study was to understand youths current action stage with a variety of sustainable dietary behaviours as well as the factors that influence their stage of change. Stage of change was measured using the TTM, which examined readiness to change as incremental stages that one progress through. TPB was applied to examine the effects of control, subjective norms and attitudes on engagement. The role of a pro-ecological worldview, food sustainability concern and food literacy was also examined.

Decreasing food waste and reducing consumption of soft drinks and fruit juice had the highest portion of participants in the action stage, already engaging. Reducing meat consumption and reducing dairy consumption had the highest proportion of participants in the precontemplation stage, unwilling to engage. Tying together the results of Study One and Study Two, an interesting perspective emerges from these results. Participants indicated that reducing
consumption of soft drinks and fruit juice was an ineffective behaviour for promoting sustainability, however, it was one of the behaviours with the highest level of current engagement. On the other end, participants indicated that reducing red meat consumption was an effective behaviour and mentioned it frequently in open response questions, however, the majority of participants were unwilling to engage to reduce red meat consumption. These results suggest a disconnect between what youth think about sustainable diets and what they actually do. In the case of sugar reduction, youth may not view reducing sugar in their diets as something that benefits the environment but they are still engaging in the behaviour. Therefore, the high level of engagement with this behaviour is most likely not motivated by environmental reasons but rather something entirely different, such as health. This finding emphasises that the most effective way to promote engagement with certain dietary behaviours, such as sugar reduction, may not be through communicating the environmental benefits but rather should focus on other factors such as health benefits. In the case of meat reduction, these results highlight that understanding the environmental impact of a product does not always translate into action. Youth may be aware that reducing meat consumption is important for reducing their dietary impact but they are still largely unwilling to engage in meat reduction. This demonstrates that methods of promoting engagement, beyond increasing knowledge, are important in translating knowledge into action.

Consistent with previous research on TPB and food choice, attitude towards a behaviour was the most powerful predictor in all of our models (McDermott et al., 2015). These results add to the well-established body of literature validating the use of TPB to explain food choice, demonstrating that targeting attitude change is an effective way to promote behavioural change. Food literacy was the second most important and consistent predictor in our models, significantly predicting action and inaction for most behaviours. Previous research has found positive
associations between food literacy and adolescent’ dietary intake (Ronto, 2016); however, to the best of our knowledge, no research has examined how food literacy influences engagement with sustainable dietary behaviours. Therefore, this finding is a unique contribution to the literature and has implications for policy and intervention strategies.

Surprisingly, control was only significant in predicting engagement with a few behaviours, such as choosing organic over conventional produce; however, when it was significant it was the most powerful predictor in the model. Therefore, while the impact was less than expected our results still highlight the importance of control in predicting engagement. For the present research, we chose to examine control as a measure of the amount of control youth had over their food choice, rather than Locus of Control (LOC), which assess the extent that youth believe they, opposed to external forces, have control over the outcome of events in their lives (Rotter, 1966). LOC with respect to environmental actions has been used as a predictor for engagement with sustainable behaviours in previous research and may be a more robust measure (Pickering et al., 2021).

Subjective norms were less impactful than expected and food sustainability concern was only significant for predicting inaction for a small number of behaviours. However, both of these predictors were correlated with food literacy, which was significant in almost all of our models. The food literacy measure used in this study, developed by Park et al. (2020), aimed to incorporate all food system dimensions including production, processing, distribution, planning/management, selection, preparation/cooking, intake, and disposal. Therefore, the measure of food sustainability concern may have been redundant, given that perceptions of food production and selection were measured through food literacy. The results also suggest that food literacy and subjective norms around sustainable food are related. Previous research has found
that food learning that happens at home, particularly through mothers, is where Canadian youth
develop most of their food literacy skills (Colatruiglio & Slater, 2016). Clearly demonstrating a
connection between subjective norms around sustainable/healthy food and food literacy skills.
Further research is needed to further understand this connection between subjective norms and
food literacy, particularly the role that parents play in shaping food literacy at home and how
subjective norms relate to the different dimensions of food literacy.

Finally, a pro-ecological worldview was significant for predicting inaction and action for
around half of the behaviours but in a direction that was not expected. It was the only variable in
our model where having a higher score predicted both action and inaction, suggesting a pro-
ecological view makes people more likely to in a definitive state of inaction or action, rather than
the transition stages.

Overall, the present research further validates the use of TPB to understand food choice,
highlighting the important of attitude and to a lesser extent control and subjective norms.
However, our finding around the importance of food literacy in sustainable food choice
demonstrates the importance of knowledge when making decisions around food. This finding has
been demonstrated in other areas of sustainable choice, with research on green hotel
accommodations also demonstrating that knowledge is an important factor in choosing eco-
friendly accommodations (Nimri et al., 2020). These results highlight that knowledge is an
important predictor of behaviour that is currently not addressed in TPB. Given the result that
food literacy was a more consistent predictor in our models than both control and subjective
norms, the role of knowledge may be a useful contribution to TPB frameworks.

The present research also further validates the use of TTM for examining food choice.
We were able to determine the behaviours that youth are already engaging in, the behaviours
they are unwilling to engage in, and the behaviours that they would like to engage in but do not have enough knowledge to do so. This approach allows us to make inferences about the behaviours youth feel comfortable engaging in and the behaviours that require further intervention. Applying TTM with the context of TPB also allows us to understand effective ways to intervene, therefore, providing insight on both where intervention is needed and how to intervene.

There are few limitations of the present research. First, the misunderstanding of the question *what does a sustainable diet mean to you?* is a limitation because there were two distinct interpretations of the question which inevitably split our sample size of useable responses in half. This misunderstanding of the question led to a significantly smaller sample size than anticipated. Another limitation comes from the design of the survey, we aimed to capture what a sustainable diet means to youth in their own words with open responses, however, the amount of intricacy and detail captured is limited with open response questions. In order to gain a deeper understanding of sustainable diets in the words of Gen Z, research utilizing focus groups or interviews would be a useful contribution. Finally, the present research narrowly focused on Canadian youth, future research is needed to expand on these results in other countries and cultures.

This thesis contributes to the growing body of literature on consumers and sustainable diets both by building on existing theories in the field and also integrating new measures, such as food literacy and food sustainability concern. The exploratory aspect of this thesis provides much needed insights on what a sustainable diet means to Gen Z in their own words as well as the behaviours they perceive to be the most and least effective for promoting a sustainable diet. The predictive aspect situates the present research in a theoretical framework aiming to understand
the factors that drive behavioural change. By taking both an exploratory and predictive approach we were able to gain unique insights into what a sustainable diet means to Gen Z while also grounding the work in existing theories in the field. In terms of scholarly contributions, this is the first study to extensively examine what a sustainable diet is to Gen Z, how they engage with sustainable diets, and what influences their engagement with sustainable diets. In addition, we integrated not only environmental indicators of sustainability but also social and economic indicators, which provides unique insights on how Gen Z interacts with all dimensions of a sustainable diet.

Beyond the scholarly contributions, the findings from this thesis have implications for informing policy and education around sustainable dietary behaviours. Study One highlights the behaviours that youth feel are the most and least effective in promoting a sustainable diet, which demonstrates their current thinking around sustainable diets while also highlighting which behaviours need to be focused on in educational and outreach campaigns. Our results highlight that youth associate sustainable food with their local community, with a strong emphasis on supporting local food and farmers. They also advocate for personal involvement in their food systems, with an emphasis on gardening, hunting and foraging. These findings indicate that engaging youth personally with their food is important in fostering sustainable dietary choices. Programs that focus on engaging with local food production, such as farm tours and visits, as well as community or school gardens where youth can experience growing their own food would be extremely beneficial for this generation. Gardening has also been shown to foster food literacy skills in adults (Grubb & Vogl, 2019), which was identified as an important predictor of engagement with sustainable diets in Study Two. Given the research that highlights a lack of food literacy skills in young adults as well as a lack of confidence in applying their knowledge to
food choice (Ronto et al., 2016), campaigns and policy aimed at fostering food literacy may be extremely effective in promoting sustainable diets in youth. Currently, formal education focused on fostering food literacy skills in children is underfunded within educational institutions (Colatruglio & Slater, 2016; Ronto et al., 2017). Our research highlights the importance of food literacy in making sustainable food choices and can be used to advocate for expansion of in school food literacy programs. In Ontario, food literacy is included in the elementary health curriculum (Ontario & Ministry of Education, 2019), however, it is notably absent from high school health programs. Research has found that children learn food literacy skills best under the age of 12 and in-between the ages of 13-18 (Lavelle et al., 2016), therefore, it is essential that these programs are carried forward throughout high school, a time in which they are emerging into adulthood.

**Conclusions and Recommendations**

July 2022 has seen some of the hottest days ever recorded, with the U.K shattering previous heat records and hitting temperatures of over 104 degrees (Samenow & Feuerstein, 2022). In the midst of these heat waves, the Secretary General of the United Nations was quoted saying “We have no choice. Collective action or collective suicide” when discussing the climate crisis at the 2022 Petersburg Climate Dialogue (Harvey & correspondent, 2022). Given the widespread effect that agriculture has on the global environment, a shift towards more sustainable food systems is one of the more impactful things that can be done to address the climate crisis. Consumers can play an extremely important role in influencing the adoption of sustainable practices, with consumer demand driving practices such as increased traceability of products and sufficient labelling (Morita, 2004; Opara, 2003).
Beyond the impact of consumer demand changing practices, educated consumers who care about how their purchases impact the planet can play other important roles in pushing sustainability forward. Research has found that Gen Z is already the most active generation addressing CC on social media. They are talking more about the need for climate action, seeing more climate content online, and doing more to get involved in issues through volunteering and protests (Tyson et al., 2021). Gen Z finds themselves at the forefront of climate action and tapping into this momentum to ensure that Gen Z is sharing accurate and useful information as well as engaging with climate action in impactful ways is important. For a generation who has seen multiple financial crises, a degrading natural world, and a global pandemic, advocacy for a better future may be one of the most powerful ways they can act.

Our results highlight a generation that cares about how their purchases and dietary choices impact the environment. We highlight the behaviours that youth are already comfortable engaging in, such as reducing food waste and supporting local, as well as the behaviours that they are unwilling to transition away from without additional nudging, such as reducing meat and dairy consumption. Our results also highlight that fostering food literacy and education aimed at shaping attitudes may be useful ways to nudge behaviour in a desired direction. In addition, this thesis provides insights on how to best influence the behaviours of Gen Z both through their self-identified barriers and the factors that have been found to influence engagement, such as food literacy. Together these results create a holistic picture of sustainable diets, from both an exploratory and predictive perspective.

Given the exploratory nature of Study One, there are several recommendations for future research based on specific findings. We gauged the behaviours that Gen Z perceive to be the most and least effective in promoting a sustainable diet, which provided perspective on their
current perceptions of these behaviours. Further research is needed to understand why they perceive certain behaviours to be effective and others as ineffective. Specifically, over 50% of our sample indicated that they perceive reducing dairy consumption as ineffective for promoting a sustainable diet. Further research is needed to understand young adult’s perceptions of the environmental impact of dairy and why they perceive it to be an ineffective behaviour. In addition, Study Two found that reducing dairy consumption had one of the lowest level of current engagement. Therefore, future research is needed to understand the most effective ways to encourage engagement with this high impact sustainable behaviour.

Another finding that should be explored further is around food waste, with almost 60% of our sample indicating that reducing food waste was an effective behaviour. However, behaviours directly related to reducing food waste such as avoiding pre-prepared/chopped produce and avoiding highly perishable foods were rated as ineffective. Therefore, research is needed on what behaviours young adults associate with reducing food waste and how they enact reductions of food waste in their everyday lives.

Previous research has found differences between generations in terms of willingness to pay for green products and environmental values (Su et al., 2019). However, to the best of our knowledge there is currently no research that aims to understand the generational differences in perceptions of and engagement with sustainable dietary behaviours. Particularly, more research focused on open ended questions, interviews, and focus groups could contribute to an understanding of what sustainable diets are to the different generations in their own words. Understanding the behaviours that the generations associate with sustainability and how they currently engage with those behaviours is important in understanding the most effective ways to target each generation. Research that takes a bottom-up approach in understanding sustainable
diets across the generations is currently unexplored and would be an extremely useful contribution.

The present research specifically focused on Canadian youth and much of the literature focused on consumers and sustainable diets is from North America and the EU (Biasini et al., 2021). More research is needed on youth in countries with high rates of beef consumption, such as Brazil and Argentina, which are two countries with the highest per capita beef consumption (OECD and Food and Agriculture Organization of the United Nations, 2022). Understanding how perceptions of and engagement with sustainable diets differs across countries and cultures is an important contribution currently missing from the literature. The present research delivers a holistic perspective of sustainable diets and Gen Z in Canada, however, diets are extremely cultural and understanding how sustainability differs across cultures within Gen Z should be explored.

From a practical standpoint, the results from this study can be used to understand what behaviours Gen Z are engaging in, the barriers that hinder their engagement, and how to further foster engagement. Putting the results from both studies together, suggestions for how policy directed at youth and sustainable diets may be structured. Programs focused on fostering food literacy and attitude changes in youth should be considered to increase engagement. It is also important that youth’s self-identified barriers are addressed when marketing, such as cost and convenience. Encouraging engagement with sustainable diets in youth starts long before they step foot in a grocery store and focusing on ensuring youth have the food literacy skills they need to make sustainable choices is the first step in fostering engagement. Once youth have the necessary skills and knowledge, marketing and promotion can be used to ensure that the skills they have developed translate into purchasing decisions.
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