



Future images of youth on food systems transformation– study with the Finnish high school students

Minna Kaljonen^{a,*}, Vilja Varho^{b,2}, Kirsi Sonck-Rautio^{c,3}, Roosa Ritola^{a,d,4},
Anni Savikurki^{e,f}

^a Finnish Environment Institute, Latokartanonkaari 11, Helsinki 00790, Finland

^b Natural Resources Institute Finland, Latokartanonkaari 9, Helsinki 00790, Finland

^c University of Turku, Arcanuminkuja 1, Turku 20500, Finland

^d City of Tampere, Education and culture services, Basic Education, Frenckellinaukio 2 B, P.O. Box 487, Tampere 33101, Finland

^e Ministry of Agriculture and Forestry, P.O.Box 30, 00023 Government, Finland

^f E2 Research, Kalevankatu 4, 00100 Helsinki, Finland

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ABSTRACT

Although youth have been recognized as an increasingly important group in sustainable development, their participation in the existing practices of food policy and societal decision-making is still limited. This paper analyses future images of youth to better understand how young people assess future trajectories of food systems, and what they see important in terms of sustainability. The future images were collected as essays from 123 high school students from Finland. The results comprise of six different future images: BAU+, conscious consumer, back to the roots, strict regulation, technology solves sustainability problems and food for survival. The future images of youth question the continued growth narrative by emphasizing technological transformation, consumer responsibility and local food systems as solutions to sustainability problems. Dystopian image is also present in the future images of youth, calling attention to issues worth saving in our current food systems. The exploration of the future images of youth contributes to the Dator's future typology contextualizing them to the food systems. The results point towards strengthening of futures literacy both in food policy and in education. Futures literacy is needed to act upon challenges faced in a more inclusive manner, whilst building agency in the meantime.

1. Introduction

“First, healthy and sustainable diets consist of a greater and nutritionally adequate proportion of plant foods relative to animal-sourced foods. Second, they contain minimal quantities of ultra-processed discretionary foods. Third, the limited quantity of animal-sourced foods that can be included in diets should be produced more sustainably and humanely — that is, ‘less and

* Corresponding author.

E-mail addresses: minna.kaljonen@syke.fi (M. Kaljonen), vilja.varho@luke.fi (V. Varho), kirsi.sonck-rautio@abo.fi (K. Sonck-Rautio), roosa.ritola@tampere.fi (R. Ritola), anni.savikurki@gov.fi (A. Savikurki).

¹ <https://orcid.org/0000-0001-8067-2402>

² <https://orcid.org/0000-0003-3301-4209>

³ <https://orcid.org/0000-0001-5267-8882>

⁴ <https://orcid.org/0009-0000-5551-8155>

better' meat and dairy — to limit environmental pressures. We understand that these principles entail tensions and trade-offs, and that they don't apply equally across the globe. — But fundamentally, we want to encourage a transition to plant-rich diets — especially in G20 countries — while limiting ultra-processed foods. Plant-rich diets are essential for meeting both health and environmental goals, and contribute to increased food security in the face of a growing global population as resources are then used to produce nutritious foods for direct human consumption. Rather than appearing as a set of prescribed meals, these principles should be adapted to different regions and cultures in correspondence to national, local and Indigenous knowledge systems. They should also work in support of decentralized and smallholder farming practices.” (Trewern et al., 2021, p.746)

The youth pledge published in the United Nations Food Systems Summit (UNFSS) in 2021 calls attention to healthy sustainable diets as a top priority in food systems transformation. The youth pledge was formulated via consultation process and was signed by over 25,000 young people, representing youth from every continent (Trewern et al., 2021). It questions the central role of livestock in the food production and consumption systems, especially in the G20 countries. The production of meat utilizes increasing proportion of land suitable for cultivation (Foley et al., 2011), whilst the increasing consumption of red and processed meat has impacts on health in complex ways (Bodirsky et al., 2020; Swinburn et al., 2019). FAO (2023) has estimated that the dominant quantified hidden costs of food systems are arising from dietary patterns to our health. Rightfully, the youth pledge underlines the need for regional and cultural adaptations, with special attention to the strengthening of the position of decentralized and smallholder farming practices.

We take the youth pledge as a welcomed sign in giving more attention to the voices of youth in the development of sustainable food systems. Although youth have been recognized increasingly in the discussion and implementation of sustainable development (GSDDR, 2023; Meyer, 2016; Piselli et al., 2019), their participation are given only limited attention in the existing practices of food policy (Piselli et al., 2019; Huttunen et al., 2022) and societal participation more generally (Cuevas-Parra, 2021; Han & Ahn, 2020). Also, in food systems research youth has been most often treated as an object of research rather than an active subject of food systems change (Kaljonen et al., 2019). Children and youth are usually studied as vulnerable groups to e.g. unhealthy food environments or malnutrition (e.g. Downs & Demmler, 2020). However, youth and children should also be seen as active agents in society (Oinonen & Paloniemi, 2023; Percy-Smith & Burns, 2013; Rättilä & Honkatukia, 2023).

The trajectories of food systems evolve at a rapid pace. The need for transformation has been acknowledged broadly (FAO, 2023; IPCC, 2019; IPES-Food, 2016; SAPEA, 2020), but different actors tend to disagree on the future trajectories (Béné, 2022; Herzon et al., 2023; Rööös et al., 2023). Dator (2009) has synthesized the most common ways of imagining futures into generic types of “Continued growth”, “Collapse”, “Discipline”, and “Transformation”. These generic future types resonate well with food systems futures discussion as well. The “Continued growth” is still embraced in the official discussion and policies, although the rhetoric around “Transformations” is starting to take over (European Commission, 2020; 2024). Likewise, the image of “Collapse” is gaining more attention in the media space, highlighting the negative social and environmental impacts of food production and consumption. The “Disciplined” image directs attention to individuals' need to find deeper meaning in life and acknowledge the role of food for personal and social wellbeing.

The generic future types proposed by Dator call attention to critical futures literacy highlighting the different political undertones in how we foresee plausible, preferable and desirable futures (Mangnus et al., 2021). Mangnus et al. (2021, 5) define critical food literacy as “an ability to distinguish between different types of imaginary futures and how those futures come into being, as well as the reflexive capacity to reflect on how futures imagined differently also lead to different outcomes—and different literacies”. We claim that such futures literacy is essential in times of great transformations, such as food systems are facing now (Benton, 2023; Brunori et al., 2024). A critical scrutiny of diverse futures is detrimental for explicating the political choices made today on the future trajectories of food systems (Mangnus et al., 2021). Extending the different types of imaginary futures necessitates also expanding the scope of imaginaries to those of youth, who will face the outcomes of yesterdays' decisions (Rättilä & Honkatukia, 2023).

In what follows, we examine what we can learn from youth with respect to futures literacy. We examine the future images of youth in Finland and reflect them against the Dator's generic future types. We start by explicating our approach and methodology, emphasizing the need for more inclusive approaches in the development of futures literacy. We describe six future images of youth highlighting different development trajectories for sustainable food systems. We show how the future images of youth question the continued growth narrative of the current food system by emphasizing technological transformation, consumer responsibility and local food systems as solutions to the current sustainability problems. Dystopian image is also present in the future images of youth, calling attention to issues worth saving in our food systems. The exploration of the future images of youth contribute to the Dator's (2009) typology contextualizing them to the food systems. The future images of youth, lack more detailed and critical understanding of agency, which calls further attention in the development of critical food futures literacy.

2. Exploring the future images of youth

Foresight, scenarios, future visions and images have been utilized in food systems research to build collective understanding of future trajectories for sustainable food systems (e.g. Agyemang et al., 2022; Cusworth et al., 2021; Hamilton et al., 2020; Hebinck et al., 2018; Kaljonen & Rikkonen, 2004; Lorenz et al., 2025; Rööös et al., 2023; Sellberg et al., 2020). Despite the growing number of studies on future food systems transformation, future images of youth have been studied much less.⁴ It is, in fact, still relatively rare to study

⁴ In contrast, the attitudes, behaviors and meanings of sustainability, food or food environments to youth (e.g., Fountain et al., 2021; Fischer et al., 2017; Yadav, 2016) have been studied much more by social sciences, nutrition and environmental sciences.

the views of the youth in futures studies in general, although there has been an increase in such studies in the 2000s. Examples include [Gidley and Inayatullah \(2002\)](#) book with results from different parts of the world, and articles about the methods of reaching out and analyzing youth views ([Barelli et al., 2022](#); [Mandich et al., 2024](#)), to name just a few. Empirical studies have focused on youth's views about topics that can be expected to have relevance to them, such as [Varho and Tapio \(2013\)](#) on transport and [Jones \(2023\)](#) on climate change.

Youth marks a social transition period when an individual shifts from childhood into responsibilities of upcoming adulthood ([Neufeld et al., 2022](#)). This transition period is significant not only for the youth themselves, but for the whole society, as youth may assist in bringing forward perspectives that may stay hidden otherwise. As [Rättälä and Honkatukia \(2023\)](#) underline, young people's engagement with society are often informal and mundane. They do not have direct access to decision-making or right to vote in parliamentary elections, for example. In this article, we examine how imagining and writing about future of sustainable food systems could help giving recognition to the values and meanings important for youth that might otherwise stay hidden in food policy. In the meantime, we acknowledge that youth should by no means be treated as a homogeneous group. As [Glover and Sumberg \(2020\)](#) remind, many of the constraints in the food system apply intergenerationally. In learning from the future images of youth, it is, hence, important also to see the current situations, as well as the possible and preferable futures as multiple.

It is common in futures research to differentiate between possible, plausible, probable and preferred futures ([Gall et al., 2022](#); [Hancock & Bezold, 1994](#); [Mangnus et al., 2021](#)). Future images are a key tool in futures research. They are "snapshots" of possible futures, and do not include the steps to reach these states as scenarios do. Future images differ from visions, which typically are desirable future states, constructed by an organisation to direct its actions. In comparison, future images can also be dystopic and often are most interesting when there are several future images to compare. The future images can reveal what people currently value, fear or hope for, as well as what they consider possible for the future. In this way, by examining future images, we can understand the pressures of the present ([Kaljonen et al., 2012](#); [Tuominen et al., 2014](#); [Varho & Tapio, 2013](#)) and act upon them in a more informed manner ([Dator, 2009](#)).

[Rubin and Linturi \(2001\)](#) define future images as mental tools that deal with possible future states. They emphasise that the images reflect what we consider right or wrong, or important or irrelevant, and that the images change over time, reflecting our experiences, identities and knowledge. [Rubin \(2013\)](#) also defines future images to be systemic in nature. According to [Bell \(1997\)](#) our images of future influence our actions in present, and therefore shape the future (also [Mangnus et al., 2021](#)). Bell emphasises how societal change takes place as continuous interplay of knowledge and action, and action is shaped by our thoughts and expectations regarding alternative futures. [Mäkelä et al. \(2022\)](#) argue that future images and their power can be interpreted from at least three points of view. First, thoughts about the future can in themselves be seen as independent or influencing factors in policy and decision making. Second, thoughts, values and future images influence societal development through shaping our identities and justifying different interests (also [Aligica, 2011](#)). Third, as the models we have of the world are connected to ideas, interests and ideologies, the construction and interpretation of future images can help to understand the prerequisites of change.

In this way engaging with futures is always also "an intervention into the present" and "an attempt to shape coming times" ([Andersson, 2018, p.4](#)). With their concept of futures literacy, [Mangnus et al. \(2021\)](#) point especially to this critical and empowering function of diverse future images. "Reflexive futures literacy includes being able to articulate the differences between different types of futuring, being aware of the social and imaginative effects of particular futuring practices [...] Secondly, and perhaps most importantly, reflexive futures literacy facilitates asking the right questions at the right time, ensuring that our understanding and collective sense-making of the future is informed by the right metrics, careful staging, and the right type of ideological power."

In what follows we use future images as a mean to support reflective and critical literacy of food systems futures. The well-known futures typology of [Dator \(2009\)](#) offers a powerful tool for reflection. In his enquiry, he has distinguished the most common futures images held by people and organisations into "Continued growth", "Collapse", "Discipline", and "Transformation". The image of "Collapse" takes a critical view on "Continued Growth" highlighting its social and environmental impacts. There may be many different reasons for collapse that people fear: economic, environmental, resource, moral, ideological, or a failure of will or imagination. All of these might cause our fragile, over-extended, and heavily interconnected globalized world to collapse, or to return to a "lower" stage of "development" than it currently is. Dator names the third alternative future generically "Discipline", or a "Disciplined Society". It often arises when people feel that continued economic growth is either undesirable or unsustainable. According to this image, we should reorient, and discipline, our lives around a set of fundamental values – natural, spiritual, religious, political, or cultural – and find a deeper purpose in life than consumerism and the pursuit of wealth. The fourth alternative future focuses on the powerfully transforming power of technology. This fourth future sees technological development as a savior of many of the problems of today, anticipating transformation of all life, including humanity from its present form into a new "posthuman" form. ([Dator, 2009, pp. 8–10.](#))

Although these future images drawn by Dator move on a generic level, they can assist us in interpreting the different ways of imagining futures, also for sustainable food systems. In what follows, we study what kinds of future images Finnish youth see possible. We reflect the future images of youth against the generic futures types and distinguish the specificities in relation food systems change. The aim of the analysis is to foster critical futures literacy in food systems transformation. More detailed understanding of future images of different actors in society, including youth, will help us to explicate their different underpinnings and outcomes ([Fanzo et al., 2020](#); [McGreevy et al., 2022](#)).

3. Empirical data and analysis

We collected the future images of youth in a form of essays. We collaborated with six different high schools around Finland. Four of

the schools located in cities (Helsinki, Tampere and two in Lappeenranta), whereas two of the schools located in rural municipalities of Kurikka and Salla (Fig. 1). Some of the students from Lappeenranta lived in the surrounding rural communities. The essays were written in spring 2021 as an assignment given by their geography, Finnish or health education teacher. Teachers gave the following instructions to the students: “Write ca. 1 page text where you imagine food and eating in Finland in 2050. Consider how responding to environmental and sustainability issues affects food production and consumption. You may discuss, e.g., what foods are eaten, what kinds of raw materials they are made of, where and with whom food is eaten, how and where food is produced, where food is bought or how it is delivered and how food is packed. Be bold! In 2050 you are nearly 50 years of age.” After the writing, one of us researchers gave a lecture on sustainable food systems.

We received in total 123 essays (Table 1).⁵ The participating students were between 15 and 18 years old. Out of the total 123 students, 66 percent identified as female, 32 percent as male and two percent as other or not specified genders. Participation was voluntary and not all students chose to participate. All participating students were given a written consent by their parents. The essays were written during the COVID-19 pandemic, which may have influenced the content of the essays. Students mentioned the pandemic explicitly in some of the essays, but it may have influenced the content of the future images also other ways. For example, they may have been more aware of the way countries interact with one another, how important hygiene and food safety are, and how food deliveries may increase in future.

We utilized the well-established PESTEC framework to analyze and differentiate the future images (Aguilar, 1967; Brennan & Sisk, 2014; Dufva, 2022). Through PESTEC, it is possible to analyze changes in political, economic, societal, ecological, technological, and cultural spheres (Table 2). In the context of food system, these could include, e.g., agricultural, nutritional and environmental policies (P), changes in food markets (E), urban-rural relations (S), technological development in production and food processing (T), environmental changes affecting food production (E), and social practices and meanings of eating (C). The definitions and lines between each sphere are deliberately loose, so that all envisioned changes in the food system can be included. We utilized the framework to evaluate which issues youth identify as important in future food systems.

The researchers each analyzed a set of essays, using NVivo. A preliminary coding list was prepared using the different elements of PESTEC, such as “food industry”, “logistics”, “retail” and “packaging” in the economic field. New codes were introduced during the coding, and sometimes merged in a later coding round. The interpretations and the refining of the analysis frame was carried out in joint meetings. Each researcher was assigned sets of text excerpts that were given the same code (e.g., all excerpts coded “climate change” were given to one researcher while another analyzed excerpts coded “dietary changes”). From these text sets the researchers identified alternative futures states of the given theme, or a qualitative variable. The results were gathered into a futures table (cf. Varho & Tapio, 2013).

In a researcher workshop, the cells of the futures table were rearranged so that each column described one image of future. This is a creative process that relies on researchers’ intuition of what future developments align together. As there were usually fewer than six alternative states for a variable, not all future images covered the same variables. The future images were written into short narratives and translated into English. These narratives were developed by the researchers through a de- and reconstruction of over hundred student essays. The futures table and the narratives were compiled with a joint effort of all authors, which helped us to challenge and question the impact of own preconceptions and values in the making of the future images.

We analysed the essays as snapshots of possible futures imagined by youth. In the Finnish National Curriculum “building a sustainable future” is mentioned as one of the transversal competences that should be developed as part of the subjects taught at school. The teachers utilised the future essays writing as one way of building these competences and of sustainability education. Our position as visiting researchers, does not allow us to analyse the contribution of essay writing to the building of the competences. It is, however, important to note, that in Finland food economics and health and nutrition education are compulsory for all in secondary school. The right to wholesome school meal is inclusive for all and they are central means for food education as well (Pellikka & Taivalmaa, 2019). Both of these subjects are critical ingredients in developing food literacy at school (Truman et al., 2017) and could be utilised more prominently for building sustainable competencies as well (Kaljonen et al., 2019; Peltola et al., 2020).

4. Results: future images for sustainable food 2050

In their essays the Finnish high school students thought and wrote about the future food systems via major development trajectories. We were able to distinguish six different future images which are summarized in Table 3.

4.1. BAU+ : Current trends continue and strengthen

In the first future image, many of the current trends continue and strengthen, with regards to efficiency, environment and convenience. There is meat consumption, but animal production becomes more ethical, and there is more organic food. Dietary changes are slow and difficult due to existing values and norms: “Food production will be similar to present. The difference is that farms become larger, and they become massive corporations. In Finland, farms will be joining together and producing according to a certain pattern” (Essay from Kurikka).

Cultured meat and plant-based proteins often taste like meat. Convenience is valued: ready-made meals are favored and eating in

⁵ The essays written in the Finnish, geography and health education class differed a bit in length and style. The essays written in the Finnish class were more lengthy narratives in comparison to others.

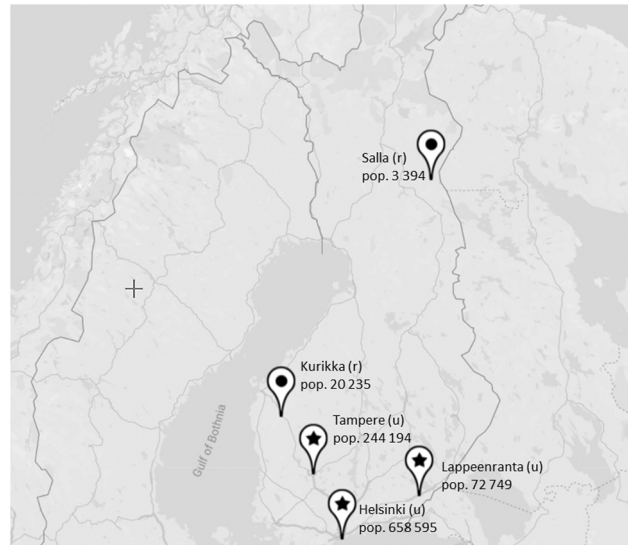


Fig. 1. The location of the participating schools.

Table 1
Number of students participating in essay writing per location.

| Location of the school | Number of participants |
|--------------------------------|------------------------|
| Helsinki (urban) | 33 |
| Kurikka (rural) | 9 |
| Lappeenranta (urban and rural) | 62 |
| Salla (rural) | 6 |
| Tampere (urban) | 13 |
| Total | 123 |

Table 2
Examples of variables searched for in the texts, using a PESTEC table.

| | Policy | Economic | Social | Technology | Environment | Culture |
|----------|--|---|----------------------------------|--|------------------------------|----------------------------|
| Examples | agricultural, nutritional and environmental policy | food markets, food industry, retail, food prices, logistics | rural development, age structure | food production and processing technologies, packaging | climate change, biodiversity | social practices of eating |

(fast-food) restaurants increases, as well as ordering in, as written by a student in Lappeenranta: “I believe that [eating and buying food will not change much, but] the production of fast-food will increase and therefore people eat more out than in. There is all the time more fast-food restaurants so their number must be really great in 2050. [...] it will surely be easier to buy food online than now” (Essay from Lappeenranta).

In agriculture, the central paradigm is efficiency. Technology reduces the need for human labor in agriculture. Farm size grows, and farms resemble one another. New crop species and GMO plants are in use, which help in reducing the environmental footprint of food production. But, as evident from the writings of a student from Lappeenranta, there is still demand for meat dishes that are considered traditional: “Environment will surely be taken into account in food production. However, some foods will not change much, so we will hopefully still get meat dishes and not just some fava beans or soy” (Essay from Lappeenranta).

Food waste is reduced, so that surplus food is used increasingly as raw material or energy, such as biofuels in transport. Circular economy and recycling gains traction in food chain operations. Food packages are recyclable and often made of recycled materials. Packages have clear recycling instructions and recycling increases in households, but packaging still relies heavily on plastic because of its low cost.

4.2. Conscious consumer drives the change towards more sustainable diets

One of the most prominent future images by high school students is driven by a conscious consumer. In this image, plant-based diets become a new normal amongst the consumers. “In Finland, only few keep eating meat. Vegetarian food and different kinds of meat replacements have taken over. Vegetables are eaten more than ever” (Essay from Helsinki).

Table 3
Future images of sustainable food 2050 by Finnish high school students.

| | Social | Technology | Environment | Economy | Policy | Culture and values |
|------------------------------------|--|--|---|---|---|--|
| BAU+ | Dietary changes are slow and difficult to achieve; Online shopping, restaurant eating and ready-made meals diminish cooking together | Reduces need for human labor in production and delivery; Packaging relies on plastic but is recyclable | People have better knowledge on sustainable food production and consumption; Organic farming increases | Efficiency in production increases; Circular economy and recycling in food chain operations increases; GMOs and new plant breeds in use | Regulation of sustainable production is emphasized; Incremental changes to current policies | Efficiency and convenience is valued |
| Conscious consumer | Youth with conscious consumption is a driver for change; Eating together is valued, but people have individualised diets; Experimenting with multicultural foods; Vegan food becomes gourmet; The taste of meat is no longer desirable | Technologies and novel plant-based products are used to leverage dietary changes; Tailored foods are delivered to homes | Health and environment are interlinked for sustainable diets; Global food security and planetary health raise worries | Radical reduction in meat production and consumption; Demand for novel plant-based products is high and they are readily available in markets; International trade is diminished for securing right to food | Regulation of ethical food production; International food aid | Ethical consumption; Planetary health; Global equity |
| Back to the roots | Community farming and farming in cities increases; Everyone has access to locally produced fresh food; Home food and cooking together is valued; People move to countryside | Organic production and home-grown food are valued; Minimal packaging of food | Food miles are minimized; Land-use is optimized so that people in cities can source their foods from the regions nearby; Fishing and hunting increase | Domestic and local food is available for all; Farming becomes more profitable | Support to Finnish producers and production | Self-sufficiency; Naturalness; Livelihood of farmers |
| Strict regulation | Red meat is only available to rich people and eaten only as festive food | New food delivery mechanisms such as automatons; Biodegradable packaging | Climate change is taken under control with the help of strict regulation | Food is produced in laboratories and indoors; Meat is sold only in specific shops and restaurants; Meat is produced in large units | Consumption of meat is regulated strictly via taxes and quotas; Production of meat is allowed only for few species | Environment and animal welfare |
| Technology solves | Diets and food preferences are highly individualized; Food can be eaten and delivered anywhere; Cooking with family has disappeared | Technological solutions used to develop tasty meat substitutes, including artificial meat; Algae and other novel sources of plant-based foods are taken into use; Agriculture is developed to depend less on variations in weather and climate; Robots are in active use in all food operations from field cultivation to delivery and cooking | The number of cultivated fields is radically reduced; Abandoned fields are reforested | Cloning, cellular agriculture and other Finnish food innovations spread and succeed globally | | Environment; Technological progress |
| Dystopia: Food for survival | Societal distress and inequality on rise; Democracy is in danger; Wellbeing is lost | Real food is replaced with tasteless laboratory products, which turn taste into a luxury experience | Nature is pumped empty; Impossible to feed all since, climate change has destroyed arable land; Food shortages and wars are common | Animals are raised in centers under supervision; Globally current food crops are available only for rich, while others get something grown quickly; Food prices rise | Consumption of food is controlled heavily, esp. red meat; People have been assigned individualised diets, which are monitored and regulated | Survival of many is prioritized, at the expense of quality of life |

Vegan food becomes gourmet, and vegetarian food is based on a wide range of raw materials. The taste of meat seems odd to most people, and the remaining meat comes from strictly monitored ethical organic production. The use of insect protein increases. People value health and recognize the importance of food in maintaining it. “As the consumption of vegetables has increased and the attraction to fast-food ended at the same time as meat consumption, people’s quality of life has increased. This means that for example the emergence of cardio - vascular diseases in Finland and elsewhere in the world has decreased steadily over the past years. Obesity is not a problem in any country either” (Essay from Helsinki).

The ethical quality of food is an important criterion as well, including minimizing environmental impacts, enhancing animal welfare and global food security. People value eating together, but they have individual diets. Tailored foods are delivered straight to homes.

Multicultural values and openness to experimentation enrich the variety of dishes in Finland. Internationally, the focus is on securing enough and sufficiently cheap food for everyone. Poorer countries focus on domestic food production rather than food exports, international food aid ensures that all have enough food. People are less selfish and recognize the impact of diets on the world. Climate change has been avoided through ordinary citizens’ actions. “Food around the world could be distributed more equally so that, for example, food shortages in developing countries could be resolved at least to some extent. Also, shipping of food around the world and finding new species would help in making diets more diverse” (Essay from Lappeenranta).

4.3. *Back to the roots*

The central values of this future image are self-sufficiency, naturalness, and wellbeing of farmers. “There are a lot of cultivated fields all around Finland. Food is no longer transported from the other side of the world to our tables. I grow different vegetables and herbs myself in my yard. There are shared vegetable gardens in the city that create community spirit. Climate impacts have been reduced significantly through domestic production” (Essay from Helsinki).

Domestic food is available to all, and all are guaranteed an opportunity to produce food for themselves or buy locally produced food. Food in stores is fresh, and transporting it produces less emissions, as the food is often locally produced. Consumers wish to support Finnish farms and entrepreneurs. Community farming and farming in cities increases, but there is also migration to the countryside. Home cooking and eating together is valued. There is still some meat consumption, but it is all either organically produced or game. Hunting and fishing increase. There is less packaging of food, people use their own containers, bags and baskets when shopping, and packaging is rather minimalistic. “Local food does not need to be transported long distances from other countries, so it does not pollute so much. I believe that food will be bought from shops also in the future. If the local food is favored more, shops will have more products from private [small] companies and less from big chains. Food will also be bought more from the producers directly” (Essay from Lappeenranta).

4.4. *Strict regulation mitigate climate impacts and reduce meat consumption*

The driver in this future image is increased regulation. In particular, the consumption of meat is regulated strictly. Meat is taxed heavily, and there are also restrictions and quotas for buying meat, or even food in general: “Access to meat products will be restricted in the future, for example by increasing taxes and stringent legislation – meat consumption restrictions could be similar to those of emission restrictions concerning vehicles” (Essay from Tampere).

Specific meat shops exist to control meat consumption. There has been talk about banning meat altogether, but it is feared to lead to illegal markets. Meat is only eaten during special occasions, if at all. Red meat is only available to rich people, chicken and fish more widely. Meat production is strictly controlled and centralized. In some areas, the regulation has led to having no restaurants or supermarkets, but instead, food is given in small batches from automates or governmental organizations. “So the final outcome is that all the original and authentic will be replaced by weird and special substitutes. Peculiar restrictions will be issued and peoples’ eating habits and diets are strictly monitored. Everything will be manufactured in laboratories with heavy regulations and many people lose their income” (Essay from Helsinki).

Food waste avoidance is prioritized. Use of plastic in food packaging is frowned upon and it is expensive. Cardboard and new biodegradable, bio-based materials replace it. Climate change has been avoided through various forms of regulation.

4.5. *Technology solves*

Technology was strongly represented in the future images of youth. In this future image technological development is seen as an answer to environmental challenges: “With technology, we can solve many of the climate change related issues, but the question is will it also raise new set of problems? I hope that in the future, we will find a best way for the world to eat ecologically” (Essay from Helsinki). More sustainable, ethical, climate friendly and delicious foods are developed. Through technology, meat is substituted with products made from insects, bacteria and stem cells, resembling the taste and mouthfeel of meat: “In 2050 food could be bought from some sort of cell shops, where everyone could buy the cells suitable for their households. Maybe in 2050 there will even be a ‘cloning machine’ in the corner of my kitchen, that will copy the potato or meat cell I bought from the market” (Essay from Tampere).

New plant species, such as algae, are taken to food production. Food is produced in laboratories and indoors, taking advantage of cloning, cellular agriculture and other new technologies, but also reinventing some past farming know-how and techniques to new situations. Agriculture is no longer so dependent on weather. Primary production is possible also in cities. The need for cultivated area is reduced, and fields are reforested. The remaining fields are farmed by robots, “Food production will be nearly completely automated,

and it will not require many people. Robots will bring food from fields to shops and people are only needed to monitor them” (Essay from Lappeenranta).

Technology has enabled individualized diets, nutrition meters, and healthier foods. Intelligent house appliances manage food purchases so that food waste is avoided. Robots gather foods from stores and restaurants and bring them to homes, or wherever one wants to eat. Food is not prepared together at home. Food packages are made of new materials, and can be e.g., eatable or used as fertilizers in gardens.

4.6. *Dystopia: food for survival*

Several students described also dystopic and authoritarian futures. This image can be interpreted as a counter narrative for the technological image. In this vision, environmental degradation, regulation and technological development leads to dystopia, where people have lost their relation to food. “As I gather, meat is still sold in the dark alleys of the cities and one piece of pork is as worth a lot of money. It’s been peculiar to tell my children how easy it was to buy meat 30 years ago” (Essay from Helsinki).

People have been assigned diets that are monitored. Red meat is regulated and restricted. Animals are raised in centralized, guarded facilities. “Real” food is replaced with laboratory products that are either tasteless or their bad taste is disguised with seasoning. Vitamins and other nutrients are supplemented as pills. “Energy is now gained in the form of pills which nowadays form the majority of our daily diets. Meat production was stopped all together around ten years ago, and with the climate change impacts, a large proportion of Earth is inhabitable” (Essay from Helsinki).

Replacing food with pills turns real taste experiences into luxury that is searched from traditional cuisine when possible. Many people do not know how to cook anymore. Globally, current food crops are restricted to the rich alone, and others get something quickly grown, like seaweed. It is difficult to feed all people, as climate change has destroyed farming possibilities and fields. Nature has been “pumped empty”. Food shortages and wars are common, the price of food rises, and it is not always available. Food is packed in very durable packages, because it is valuable, it is being hoarded and it needs to be edible for long. Regulations were introduced as answer to the problems, but the change was too quick and authoritarian, leading to anger and rebellion. Democracy is in danger. Population is in decline in Finland. Dystopian future images draw a dark picture of the future of Finland: “If I would travel in time to 2050 in Finland, I’d only find sadness and depression. People are pale from hunger and malnutrition. Food is heavily regulated due to population growth and to prevent pollution, over-production, cruelty to animals and other issues” (Essay from Helsinki).

5. Discussion

The exploration of the future images of food systems by Finnish youth reveal several development trajectories. Although the future images show great variation, it is possible to identify themes and concerns that are unique to the Finnish youth in the early 2020 s. Importantly, the Finnish youth see global climate change as a central driver for change, but the future images differ in their solutions. Conscious consumer, technological development and locally based food systems represent different solutions to sustainability dilemmas. The future images of Finnish youth echo the generic futures types as identified by Dator (2009). The future of “Continued growth”, is reflected in the BAU+ image with rather conventional view of the future as a continuation of the current trends. However, as also noted by Dator, the thinking in terms of “Collapse” has gained prominence in the future images of the Finnish youth. Global climate change, which is seen to accelerate, is strongly reflected in the “Dystopian” image, but is also a driving force behind the more benign future images.

The transformative, “Technology solves”, image presents another prominent future image of the Finnish youth. This is similar to technology-driven meat substitute discussion (Sexton et al., 2019) and techno-optimism held in society more general (Johnston, 2020). In the essays, youth saw technology as a key solution to sustainability problems and considered technological solutions throughout the whole food system in nuanced ways, from production to food processing and from distribution to retail. The Finnish youth also brought disruptive perspectives to the role of technology in the future food systems. Food may become distanced from conventional agriculture, and automation completely changes the way we buy and prepare food. In this future image, novel food innovations and solutions become central components of future food systems. Similar to more general societal discussion (EIT Food, 2024), the novel plant-based products and innovations got a lot of positive attention in the future images of youth. The novel food innovations are needed to reduce the consumption of animal-based products, in particular.

Youth, however, imagined risks in the technological development as well. The “Transformation” and “Collapse” trajectories evolve hand-in-hand in the imaginaries of youth. The “Dystopian” future image emerges as a counter narrative to Dator’s ideal “Transformation” trajectory. In the “Dystopian” image of the Finnish youth, technology disrupts our relation to food. Some of the dystopian images fear the collapse of traditional values, quality of nutrition and culinary experiences central to food. The social and cultural aspects and traditions of shared meals and food production were valued among the youth (Fischler, 2011), and some of the technological solutions, such as pills or take away foods, were seen as a threat to them. In the most “Dystopian” future images, the food is eaten alone as pills. The “Collapse” may also call for more stringent regulation, when access to food, or meat, becomes limited.

Another opposing reaction to the technological utopia was the future image of “Back to the Roots”, which sees food systems revolving back to more local systems, where food is produced and consumed in a more community-based manner, not only in rural areas but also in cities. This future image shares some commonalities with the “Discipline” image by Dator (2009), but even more with “Back to the Future” image, developed by Inayatullah (2008). In this image there is a yearning for traditional, simpler times and hierarchies. “Back to the Roots” does not represent a complete nostalgia, or rejection of existing trends, but it does focus on human connection to the production of food. In this future image of youth, it is not only the farmers but also city dwellers who are active in the

production of food. Emphasis on domestic food production, locally produced food and short value chains are indications of lower hierarchies and lesser complexity of the society, as described by Inayatullah. The future images of rural youth gave more attention to the livelihoods of farmers in this respect. These future images of youth follow the same vein as those created by adult citizens and experts (see Benton, 2019; Kirveennummi et al., 2008), noting the prospective benefits of technological developments but also critically acknowledging the threats technology fixes can propose.

The most common future image, amongst the Finnish youth was, however, the one which emphasizes conscious consumer as a driver for change. This image can be seen to represent a “Disciplinary society”, where people start to act against “Continued growth”. This future image is perhaps the easiest to imagine for youth, as they practice their agency in food system mostly as consumers (Glover & Sumberg, 2020; Hebinck et al., 2018). The public discussion also puts lots of emphasis in consumer choices and green consumerism in food markets (Barnett et al., 2005). The Finnish youth underline, however, the global responsibility of consumers in the building of more sustainable food systems. For many young people it was almost self-evident that a conscious consumer would choose healthy and sustainable food and reduce meat consumption. This future image is, hence, by no means without contradiction. Although it criticizes the “Continued growth” narrative, it places all political action on the shoulders of consumers, and markets. All in all, youth gave only little detailed attention to the regulation in their future images, except when access to food gets limited.

The Finnish youth see reductions in meat production and consumption as central means to tackle climate change. In this respect, the youths’ views complement those of expert scenarios: business as usual in terms of protein production, or food systems is general, does not seem like a plausible option (EIT Food, 2024; IPCC, 2019). The future images of youth consider this issue, however, in a complex manner causing also societal, and individual, distress. Again, here the different future orientations around “Continued Growth”, “Transformation”, “Collapse”, and “Discipline” show the direction. The conscious consumers are ready to reduce meat consumption also for the sake of their own health; whilst too much regulation is seen to raise upheaval and societal opposition. In the localized food systems, animals are seen to have a more positive role also in future. These differences in future images show that youth are by no means a homogenic group.

The futures typology set out by Dator (2009) helps to interpret the future orientations of youth with regards to food systems transformation. The critique towards the “Continued Growth” is the most prominent amongst the Finnish youth, but it takes several different trajectories as shown by the results. The trajectories are not too well developed with respect to agency and policies though. All in all, the views on political action or development of legislation were less developed in the future images of youth. The details of how to change agricultural support systems or national nutrition recommendations guiding the provision of school meals, for example, were unfamiliar to many. This echoes the strong market driven logic in the functioning of the food systems (Clapp, 2023). More nuanced scenarios, which help to target actions and responsibilities, are hence clearly needed to make the future images realizable. Such scenarios would help to develop critical food futures literacies. The complex dynamics of food systems functioning, including the concentration of power (Clapp, 2023), make such food futures literacies urgent (Fanzo et al., 2020). This is also the only reasonable way of taming the dystopian images of future held amongst youth.

The future images explored here represent the ones held by high school students in a western affluent society. It is important, hence, to reflect, and extend the study of youths’ images, across socio-economic groups and different contexts. Learning across future images held in Europe or between the Global North and South, is important for the development of futures literacy and agency for action. The Finnish youth, for example, acknowledged their global responsibility, but evaluated the sustainable solutions largely from the perspective of Northern food systems and responsibilities of conscious consumers. Furthermore, a better account for socio-economic differences in the future images of youth is needed to develop the food literacy and capacities for change.

6. Conclusions

In this article we have examined future images of Finnish youth on sustainable food systems. The images created by youth question the prevailing paradigm of continued growth and examine in detail the transformative role of technologies, conscious consumers and of local food systems. The trajectories foreseen in the future images of the Finnish youth are emergent in the current societal discussion and development around sustainable food systems. The images are, however, not the ones driving the food policy decision-making of today (Asquith et al., 2022). In this sense the imaginaries can be called transformative.

The results of the study call greater attention to diverse critical futures, and food, literacies. The perspectives of youth can provide novel perspectives on the developmental trajectories, also with respect to dystopias. Dystopias direct attention also to those issues worth saving in our current system. Youth clearly value the social and cultural meaning of food, the shared meals, local food production, and healthiness of food, seeing them as also being under threat. The results point towards strengthening of critical food futures literacy both in food policy and education. Futures literacy is needed to act upon challenges faced in a more inclusive manner, whilst building agency in the meantime. The dystopian images held by youth make this urgent.

CRedit authorship contribution statement

Kaljonen Minna: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Varho Vilja:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Sonck-Rautio Kirsi:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. **Ritola Roosa:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis. **Savikurki Anni:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis.

Declaration of Competing Interest

The authors have nothing to declare.

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