



# **Limitations and opportunities in changing pupils' food choice behavior towards more healthy and sustainable food choices**

**An inquiry into five schools in the Achterhoek region**

Mila Beumer

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## Colophon

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Author:	Mila Beumer
Student number:	s1026941
Date:	August 24, 2022
University:	Radboud University Nijmegen School of Management
Supervisors university:	Prof. dr. A. Lagendijk Dr. A. C. van Veen
Internship company:	Smaakacademie Achterhoek (SAA)
Supervisors internship:	M. Steverink J. Steverink

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I hope you enjoy reading my thesis.

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## Summary

Overweight among children can be seen as a huge problem in society. Also, unsustainable western food systems are related to global climate change. Children spend a lot of time in school environments; therefore, this study is on food consumption of youth in this environment. This study aims to get insight into limitations associated with changing food choice behavior of pupils at secondary and vocational schools in the Achterhoek region towards making more healthy and sustainable food choices. The final purpose of this study is to provide schools with advice on opportunities to overcome these limitations with regard to healthy and sustainable nutrition at school.

This study uses the Social Cognitive Theory (SCT) and the Theory of Planned Behavior (TPB). The qualitative research is conducted using semi-structured interviews with pupils, school employees, and canteen employees. Three central topics are discussed, all in relation to healthy and sustainable nutrition at school: pupils' food choice behavior, current policies and practices in school canteens, and current policies and practices in education.

The results show several factors that limit pupils in choosing (more) healthy and sustainable nutrition at school. The most important limiting factors for pupils are the lack of knowledge of healthy and sustainable foods and the high prices of these foods in school canteens. Next to this, some schools based their canteen policy on national recommendations for the concept 'Gezonde Schoolkantine' of the Voedingscentrum, and therefore offering a certain percentage of 'healthy' nutrition. Little to no attention is given to sustainable nutrition in school canteens. Furthermore, education about healthy nutrition is limited to government policy, which includes education on the 'Schijf van Vijf' on secondary schools. Lastly, sustainable nutrition is only educated in specific study directions.

Based on the results, advice on opportunities for interventions is given to secondary and vocational schools in the Achterhoek region, for influencing pupils' food choice behavior towards making more healthy and sustainable food choices. The most important recommendation is to develop national policy on including healthy and sustainable nutrition in canteens and education. As developing such policy will take time, schools should not wait for this policy but should already start obtaining knowledge on healthy and sustainable nutrition to change their current practices.

As knowledge on healthy and sustainable nutrition is minimal or even lacking among pupils, the topic of healthy and sustainable nutrition should be integrated in education programs, in theory as well as practical lessons. More knowledge about the importance of these topics can positively influence their food choice behavior towards making more healthy and sustainable food choices. Furthermore, schools should invest in healthy and sustainable nutrition in their canteens. Current assortments should be reconsidered, and unhealthy and unsustainable nutrition should be replaced by healthy and sustainable nutrition. The recommendations of the Voedingscentrum can be used for this purpose. In order to keep pupils at school, and not leave the schoolyard to buy (cheaper) food at supermarkets nearby, the assortment in school canteens should be optimized in terms of price and taste. Offering healthy and sustainable foods for an affordable price makes it easier for pupils to choose these foods over less healthy alternatives which are currently often cheaper. If necessary, the government should support schools with subsidies.

Given the fact that negative impacts of current unhealthy and unsustainable food systems are still increasing on a global scale, the current study contributes to solving a worldwide problem. Future research could go beyond the Achterhoek region and could include external food environments, such as supermarkets and home situations of pupils.

**Keywords:** healthy and sustainable nutrition, food choice behavior, school canteen, education, school policy

## Table of contents

Colophon .....	2
Acknowledgement.....	3
Summary .....	4
Table of contents.....	6
1   Introduction .....	9
1.1   Research problem.....	9
1.2   Scientific and societal relevance.....	10
1.3   Research aim and research questions .....	11
2   Literature review .....	12
2.1   Behavior related to food choices among young people.....	12
2.2   The role of education in changing food choice behavior .....	14
2.3   The role of policy in changing food choice behavior .....	16
2.4   The role of school canteens in changing food choice behavior .....	17
3   Theoretical and conceptual framework .....	18
3.1   Research philosophy.....	18
3.2   Theoretical frameworks.....	19
3.3   Definitions and conceptual model.....	20
3.3.1 Definitions .....	20
3.3.2 Conceptual model .....	22
4   Methodology .....	25
4.1   Research strategy .....	25
4.2   Research methods, data collection and data analysis.....	25
4.2.1 Research methods and data collection .....	25
4.2.2 Data analysis.....	27
4.3   Reliability and validity.....	27
4.3.1 Reliability .....	27
4.3.2 Validity.....	27
4.4   Operationalization .....	28
4.4.1 Food choice behavior of pupils .....	28
4.4.2 School canteen policies and practices.....	30
4.4.3 Education policies and practices .....	31
4.4.4 Opportunities .....	31
4.4.5 Limitations and opportunities .....	31

5   Results.....	32
5.1   Food choice behavior.....	32
5.1.1 Knowledge .....	32
5.1.2 Attitude.....	33
5.1.3 Subjective norms .....	34
5.1.4 Perceived behavioral control.....	34
5.1.5 Food choices.....	35
5.1.6 Intentions .....	35
5.1.7 Overview Food choice behavior .....	37
5.2   Policies and practices canteen.....	38
5.2.1 School canteen policy.....	38
5.2.2 School canteen practices.....	40
5.3   Policies and practices education .....	44
5.3.1 Education at S1.....	44
5.3.2 Education at S2.....	46
5.3.3 Education at S3.....	47
5.3.4 Education at S4.....	49
5.3.5 Education at S5.....	50
5.4   Problems and opportunities .....	52
5.4.1 Problems and opportunities at S1.....	52
5.4.2 Problems and opportunities at S2.....	54
5.4.3 Problems and opportunities at S3.....	55
5.4.4 Problems and opportunities at S4.....	58
5.4.5 Problems and opportunities at S5.....	60
6   Conclusion and recommendations .....	62
6.1 Conclusions of sub questions 1-3 .....	62
6.2 Conclusions main question and recommendations .....	64
7   Discussion .....	65
7.1 Limitations .....	65
7.2 Future research .....	66
8   References .....	68
Appendices .....	77
Appendix 1: Overview participating schools .....	77
Appendix 2: Overview interviewees per school.....	78

Appendix 3: Codes .....	79
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# 1 | Introduction

This chapter explains the research problem and the relevance of this study. It also discusses the aims of the study and the research questions.

## 1.1 | Research problem

Over the past few decades, food environments have changed enormously (St-Onge, Keller, & Heymsfield, 2003). Some environmental influences that affect eating behaviors are the changing nature of the food supply, increased reliance on foods consumed away from home, food prices and food advertising, marketing and promotion (French, Story, & Jeffrey, 2001). Although food systems have the potential to nurture human health and support environmental sustainability, they currently threaten both (Willet et al., 2019). Providing a growing global population with healthy diets from sustainable food systems can be seen as an immense challenge.

The current western food system cannot be called sustainable, given escalating rates of land use, excessive food miles, food scares and food insecurity, the spread of fast food culture, and increasing food waste – all of which have consequences for global climate change, shortage of raw materials and loss of biodiversity (Sustainable Development Commission [SDC], 2009; Foley et al., 2005; Willet et al., 2019; Steffen et al., 2015). These developments are reason for concern, because emissions arising from the production and consumption of unsustainable nutrition are acknowledged as a major contributor to climate change (O'Neill, Clear, Friday, & Hazes, 2019).

Other major worldwide problems are overweight and obesity among children, both of which are steadily increasing on global scale (Kubik, Lytle, & Fulkerson, 2005; Lanigan, 2011; Afshin et al., 2017; Trentinaglia, Parolini, Donzelli, & Olper, 2021). In the Netherlands, the proportion overweight is relatively high in the Achterhoek region compared to other Dutch regions (Alkas, 2019; CBS, 2019; CBS, 2022; Van der A, Hiemstra, & Deuning, n.d.; Rosman, 2019). The lack of healthy food intake amongst young people can be considered as a huge problem (Fordyce-Voorham, 2011). In the Netherlands, many young people have poor eating habits and most calories, arguably unhealthy food, are consumed during school hours within the school environment (Hermans, Smit, Van den Broek, Evenhuis, & Veldhuis, 2020). Investigating school environments can be useful to tackle this problem, because the eating environment has an effect on the way children eat (Nielsen, Siega-Riz, & Popkin, 2002). Investing in food education during high school can be an effective way to create healthier food habits during adolescence, which can extend to adulthood. Furthermore, Derqui, Fernandez and Fayos (2018) highlight the importance of the internal school environment by pointing out how canteens impact the food skills, nutrition, and sustainability habits amongst the younger generation.

There is reason for concern, because environmental and health problems are currently still increasing while school programs on health and sustainability are appearing. As mentioned, current food systems play an important role with regard to the current environmental and health problems. Since young people spend much of their time at school, the current study examines what limits progress in getting pupils to make more healthy and sustainable food choices at school, and what opportunities exist to overcome the limitations. The Dutch Achterhoek region is the research area of the current study, because this region requires particular attention due to the relatively high proportion overweight in

this region compared to other Dutch regions (Alkas, 2019; CBS, 2019; CBS, 2022; Van der A et al., n.d.; Rosman, 2019).

## 1.2 | Scientific and societal relevance

Rising incomes and urbanization are driving a global dietary transition in which traditional diets are replaced by diets higher in refined fats, refined sugars, meats and oils (Tilman & Clark, 2014). If unchecked, these dietary trends will be a major contributor to global land clearing and the estimated 80 per cent increase in global agricultural greenhouse gas emissions from food production by 2050. Furthermore, these dietary shifts greatly increase the incidence of coronary heart disease, type two diabetes, and other chronic non-communicable diseases that lower global life expectancies.

Based on these trends, Willet et al. (2019) argue that a global transformation of the food system is urgently needed, because much of the world's population is inadequately nourished and many environmental systems and processes are pushed beyond safe boundaries by food production. Given that negative impacts on human beings as well as on the planet still increase, promoting healthier and more sustainable food choices and better diets have been a new multidisciplinary research impulse (Chen & Antonelli, 2020; Asioli et al., 2017; Grunert, 2011; Hansen, Sørensen, & Eriksen, 2018; Hoek, Pearson, James, Lawrence, & Friel, 2017; Aertsens, Verbeke, Mondelaers, & Van Huylenbroeck, 2009).

The health of people and the health of the planet cannot be considered in isolation, these aspects go hand-in-hand (Askew, 2022). Both internationally and nationally in the Netherlands, studies into the link between healthy and sustainable food are already gaining ground (Raghoebar et al., 2022; Brink et al., 2019; Food and Agriculture Organization & World Health Organization, 2019; European Public Health Association, 2017; Mertens, Van 't Veer, Hiddink, Steijns, & Kuijsten, 2016; Nelson, Hamm, Hu, Abrams, & Griffin, 2016). The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future (United Nations, 2015). However, international research shows that existing nutrition guidelines in Europe (the 'Schijf van Vijf' in the Netherlands) still focus too much on health aspects for consumers and insufficient on the health of the planet (Hilhorst, 2022). Society can make a positive contribution to the UN Sustainable Development Goals by prioritizing foods that are nutritious and healthy, environmentally friendly, affordable, and socially and culturally acceptable (Askew, 2022). Promoting healthier and more sustainable dietary patterns, rooted in food choices at individual level, has been recognized as a potential and crucial solution of environmental problems (Chen & Antonelli, 2020; Tilman & Clark, 2014). However, current practices make limited progress, because negative impacts on health and the planet are still increasing. For this reason, this study investigates the limitations and opportunities of practices with regard to healthy as well as sustainable food choices.

Given the ongoing worldwide environmental problems related to food production and consumption, and the fact that overweight and obesity among children are steadily increasing on global scale, the focus of the current study is on food choices of youth (Sustainable Development Commission [SDC], 2009; Foley et al., 2005; Willet et al., 2019; Steffen et al., 2015; Kubik et al., 2005; Lanigan, 2011; Afshin et al., 2017; Trentinaglia et al., 2021). Influencing food choices among young people can lead to

changes that influence not only their own life but also that of their parents, family and peers (Ma, 2015; Story, Nannery, & Schwartz, 2009). Thus, outcomes of the current study may contribute not only to changing food choices towards more healthy and sustainable ones among youth, but also the food choices of their family and friends. In this way this study can contribute to broader societal change towards more healthy and sustainable food consumption. Eventually, this could contribute to the improvement of health and sustainability in the Achterhoek region and beyond.

Given that adolescents spend a considerable proportion of their time at school, schools can play an efficient and effective role in reaching a large segment of young people (Poti & Popkin, 2011; Story, Kaphingst, & French, 2006; Roe, Hunt, Bradshaw, & Rayner, 1997). Currently, a gap can be found in Dutch studies on nutrition at school that use a broad view on schools including students, school staff and external parties as well as the use of interventions; often there is a lack of collaboration between all these relevant actors, as concluded in a study in Apeldoorn (De Brabander et al., 2021). Jallinoja (2019) shows the complexity and interconnectedness of the phenomena of food consumption, food environments, food culture and food policy. She points at the importance of studying both consumer choices, social environments and policy-level actors. These aspects can be used in research on nutrition and food consumption, food and health policy development, and in building healthier and more sustainable environments. De Brabander et al. (2021) show the importance of involving end users (pupils) in the development of interventions. They also argue that canteens play a unique role within the school environment. Since the proportion overweight is relatively high in the Achterhoek region compared to other Dutch regions, this study is conducted at schools in the Achterhoek (Alkas, 2019; CBS, 2019; CBS, 2022; Van der A et al., n.d.; Rosman, 2019). Currently, there are no studies that have included policy, canteens, education, and food culture at schools in relation to the food choices pupils make at schools in the Achterhoek region (Alkas, 2019; CBS, 2019; CBS, 2022; Van der A et al., n.d.; Rosman, 2019). This broad view on the food environment of schools in relation to food choice behavior of pupils, specific in one region (the Achterhoek), makes this study unique. In this way, the results of this study contribute to existing scientific knowledge on the topics of healthy and sustainable nutrition, school (food) environments, pupils' food choices at school, and opportunities for interventions to change pupils' food choices.

### 1.3 | Research aim and research questions

The main aim of this study is to get insight into limitations associated with changing food choice behavior of pupils at secondary and vocational schools in the Achterhoek region towards more healthy and sustainable food choices, and to explore the opportunities to overcome these limitations. The central question for this study is:

What explains the limited progress in changing food choice behavior of pupils at secondary and vocational schools in the Achterhoek region towards more healthy and sustainable food choices, and what are opportunities to overcome these limitations?

To achieve the main aim, this study has multiple additional aims. The first one is to get insight into the current food choice behavior of pupils in the Achterhoek region regarding healthy and sustainable nutrition and the reasons for the limited change in this behavior. Secondly, the aim is to investigate current policies and practices at schools in the Achterhoek region, in terms of canteens. Thirdly, the aim is to investigate current policies and practices at schools in the Achterhoek region, in terms of education. The fourth aim is to explore among pupils and school employees in the Achterhoek region what could be opportunities for interventions to influence pupils' behavior towards making more healthy and sustainable food choices. Based on these aims, and to be able to answer the main research question, the following sub-questions are developed:

1. What explains the limited change of the food choice behavior of pupils regarding healthy and sustainable nutrition at secondary and vocational schools in the Achterhoek region?
2. What policies and practices do secondary and vocational schools in the Achterhoek region have with regard to healthy and sustainable nutrition in canteens?
3. What policies and practices do secondary and vocational schools in the Achterhoek region have with regard to healthy and sustainable nutrition in education?
4. According to pupils and school employees, what are opportunities for interventions to change the food choice behavior of pupils towards making healthier and more sustainable food choices at secondary and vocational schools in the Achterhoek region?

Eventually, the purpose of this study is to provide schools in the Achterhoek region with advice on possible interventions that could influence pupils towards making more healthy and sustainable food choices. Furthermore, policy makers on regional or national level may use the findings of this study in changing or developing policies on nutrition (guidelines) for schools, in terms of canteens and education.

## 2 | Literature review

This chapter reviews existing relevant literature for the current study. The review is divided into four parts. Firstly, studies on food choice behavior among young people, also in relation to their (school) environment, are discussed. Secondly, literature on the role of education in (changing) food choice behavior is reviewed. Thirdly, the role of policy in (changing) food choice behavior is discussed. This is followed by the fourth part, on the role of school canteens.

### 2.1 | Behavior related to food choices among young people

This section reviews existing literature on behavior related to food choices among young people, also related to health, sustainability, and school environments. First of all, food consumption behavior can be understood as a socio-cultural routine or 'social practice'; consumers do not think thoroughly every time they go grocery shopping, for example, but when performing these activities, they often fall back to routines (De Krom, Vonk, & Muilwijk, 2020). Many of these routines are performed in similar ways by different people; the routines are not so much individual routines, but collective, socio-cultural routines. 'Food routines' do not exist separate from other routines; they are intertwined to routines

related to work, leisure or the household (De Krom et al., 2020). For example, people enjoy a drink and something to eat with their teammates after exercise. In this way other routines influence which consumption routines people perform.

In their study, Neumark-Sztainer, Story, Perry and Casey (1999) used focus-group discussions with adolescents to investigate factors that are perceived as influencing food choices of adolescents. The factors included hunger and food cravings, appeal of food, time considerations of adolescents and parents, convenience of food, food availability, parental influence on eating behaviors (including the culture or religion of the family), benefits of foods (including health), situation-specific factors, mood, body image, habit, cost, media, and vegetarian beliefs. Barriers to eating more fruits, vegetables, and dairy products and eating fewer high-fat foods turned out to include a lack of sense of urgency about personal health in relation to other concerns, and taste preferences for other foods. Suggestions for helping adolescents to eat a more healthful diet are: making healthful food taste and look better, limiting the availability of unhealthful options, making healthful food more available and convenient, teaching children good eating habits at an early age, and changing social norms to make it “cool” to eat healthfully. The study suggests that if programs to improve adolescent nutrition are to be effective, they need to address a broad range of factors, in particular environmental factors like the increased availability and promotion of appealing, convenient foods within homes, schools, and restaurants.

Another study investigated food choice behavior among high school senior students (Bissonnette & Contento, 2001). It investigated adolescents' perspectives about the environmental impacts of food production practices and whether these perspectives are related to their food choice. Food choice was operationalized as purchase and consumption of organic foods and locally grown foods. Variables of an expanded Theory of Planned Behavior (TPB) were measured, including beliefs, attitudes, perceived social influences, motivation to comply, perceived behavioral control, self-identity, perceived responsibility, behavioral intention, and behavior. It is concluded that there is a need to make the environmental impact of food production practices salient to adolescents through both cognitive and experiential approaches.

Furthermore, Vermeir and Verbeke (2008) investigated sustainable food consumption among young adults in Belgium. To gain a better insight into sustainable consumption, they analyzed the attitudes and behavior as well as the role of individual characteristics like confidence and values related to sustainable products. The analysis focuses on exploring the influence of determinants as hypothesized in the Theory of Planned Behavior (TPB) on sustainable consumption intention in general, and specifically depending on consumer's perceived confidence and personal values. Half of the variance in intention to consume sustainable dairy was explained by the combination of personal attitudes, perceived social influences, perceived consumer effectiveness and perceived availability. The study provides public policy and marketing recommendations for stimulating sustainable food consumption among young adults. For example, raising consumers' awareness of the issues involved within food production needs to be targeted accordingly. This may be in terms of matching the messages about sustainable food production to the recipient group.

Moreover, Bosco, Joassart-Marcelli and O'Neal (2017) aimed at a better understanding of how young people's relationship to food is highly influenced by emotional and visceral geographies in different settings. The results show that food provided at school was universally disliked and rejected, to the

point that young people preferred to feel hunger rather than eat what was given to them. Individual visceral reactions to school food were further reaffirmed by interactions and conversations with schoolmates and friends, linking the emotional geographies of eating to the crucial role played by social relations in shaping young people's understandings of and reactions to different types of food in different places.

Another study shows that when choosing foods from the school cafeteria, taste and getting a lot for their money are important to most students (Shannon, Story, Fulkerson, & French, 2009). Females, and students who think about their health and weight more frequently when deciding what to eat, are more likely to report greater interest in labeling and nutrition information and availability of low-fat foods in the school cafeteria. The findings suggest that efforts to promote low-fat foods to adolescents need to address the taste of low-fat foods, availability of low-fat options, and point-of-purchase labeling of low-fat foods. Focusing on the value and cost of low-fat foods may offer a key strategy for promoting low-fat foods to students that are less interested in health and nutrition.

Lastly, Hermans et al. (2020) argue that many adolescents in the Netherlands have poor eating habits, and they consume most calories, arguably from unhealthy food, during school hours within the school. A study at American schools also shows a relation between the availability of snacks and drinks sold in schools and students' high intake of total calories, soft drinks, total fat and saturated fat, and lower intake of fruits and vegetables (Story et al., 2009). Hermans et al. (2020) argue that investing in food education during high school can be an effective way to create healthier food habits among adolescents, which can extend to their adulthood. Derqui et al. (2018) also highlight the importance of the internal school environment by pointing out how canteens impact the food skills, nutrition, and sustainability habits amongst the younger generation.

## 2.2 | The role of education in changing food choice behavior

This section discusses existing studies on the role of education in (changing) food choices among pupils, related to health and sustainability. As mentioned, Hermans et al. (2020) argue that investing in food education during high school can be an effective way to create healthier food habits among adolescents. Another study shows that nutrition educators play key roles in shifting consumer demand and cultural norms about food choices (Rothpletz-Puglia, Fredericks, Dreker, Patusco, & Ziegler, 2022). By recognizing the challenges of the current food environment and by partnering with governments, legislators, schools, and industries to address these challenges, nutrition education can play an integral role in decreasing lifetime risks of chronic disease, obesity, and other adverse health outcomes related to diet and food choices. By shifting norms about kids' food toward healthy food that both adults and children can enjoy, nutrition educators can promote healthy social and behavior changes at the individual, family, and community levels.

With regard to healthy nutrition, the effectiveness of a school-based healthy eating intervention program (the Healthy Highway Program) for improving healthy eating knowledge and healthy food choice behavior among elementary school students is examined (Jung, Huang, Eagan, & Oldenburg, 2018). This study is conducted using the Social Cognitive Theory (SCT) in healthy eating promotion strategies at school. The program aimed at helping students raise the value of good health and

nutrition, develop practical skills for reading food labels, identify the benefits of adopting healthy eating patterns and make healthy food choices through observation and hand-on experiences. After intervention, significantly more students improved their healthy eating literacy by telling 'healthy (green light) and unhealthy (red light)' foods among their daily food choices. After the intervention more first and second graders began to perceive French fries as 'red' food, for example. Similar changes appeared among third to fifth graders regarding banana, broccoli, bacon and green beans. Positive intervention effects were found at the school lunch food choice behavior too. According to Jung et al. (2018), the positive findings of their study can be attributed to the effective program design and curriculum content as well as to the educational workshops organized for teachers who volunteered to implement the Healthy Highway Programs into their classroom curricula.

Furthermore, a recent review study aimed to verify the recommendations on sustainability in school feeding policies and the sustainability practices adopted in schools (Dos Santos, Da Costa Maynard, Zandonadi, Raposo, & Botelho, 2022). Recommendations for purchasing sustainable food (here defined as organic, local, and seasonal food), nutrition education focused on sustainability, and reducing food waste were found frequently. This reinforces the need to stimulate managers' view for the priority that should be given to this theme, so that education for sustainability is universally part of curricula. The importance of education in enabling individuals to promote sustainable development is reaffirmed in Sustainable Development Goal 4 (SDG 4). This fourth goal is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (United Nations, n.d.). The review study concludes that the development of assessment instruments can help monitor the evolution of sustainable strategies at schools and the main barriers and potentialities related to their implementation (Dos Santos et al., 2022).

An existing example of a sustainability program that schools can sign up for is the Whole School Approach to Sustainability (WSA); this international program provides a framework for re-orienting and redesigning education considering emerging global sustainability challenges (Mathie & Wals; 2022; Wals & Mathie, 2022). It invites a holistic, systemic, co-creative and reflexive effort by all stakeholders involved in education to engage students in complex sustainability challenges.

Lastly, Prescott et al. (2019) investigated the impact of a student-driven sustainable food systems education and promotion intervention on adolescent school lunch selection, consumption, and waste behaviors. Sixth grade science teachers at secondary schools implemented a standards-based curriculum on sustainable food systems, addressing the environmental impacts of food choices and food waste. The sixth-grade students had to share their food systems knowledge with their seventh and eighth grade counterparts through a cafeteria promotional campaign to discourage food waste. Monthly plate waste assessments were used to evaluate changes in vegetable consumption and overall plate waste using a digital photography method. At the start, the intervention students consumed significantly less vegetables relative to the control group. This disparity was eliminated after the actual intervention. Five months later, follow-up research showed that the intervention group wasted significantly less salad bar vegetables compared to the control group. Based on the findings, Prescott et al. (2019) suggest that food systems education could be used to promote improved dietary behaviors among adolescent youth.

## 2.3 | The role of policy in changing food choice behavior

Planbureau voor de Leefomgeving (PBL) reported about changing food consumption and how policy can stimulate the sustainability of food consumption (De Krom et al., 2020). Consumption routines are influenced by consumers and by other actors such as companies, social organizations, influencers and governments. Therefore, changing food consumption requires a collective effort; consumers cannot do this alone. The report highlights the added value of a coordinated and simultaneous use of policy instruments to make food routines receptive to sustainability. The use of policy instruments will be most effective if they are not regarded as isolated instruments but are implemented jointly and in conjunction with each other.

The importance of collective effort also became clear in a recent Dutch study among high schools in Apeldoorn (De Brabander et al., 2021). This study aimed at (advice towards) the realization of a healthy and sustainable school environment. This study is carried out in collaboration with students, school staff and external parties in several high schools in Apeldoorn. They concluded that there was a lack of collaboration between relevant stakeholders which all aim to make the school environment healthier and more sustainable. A healthy and sustainable school environment can be facilitated if the municipality, school staff and students find a way of being aware of each other's goals, preferences, ideas and resources. Support in terms of human and material resources from the municipality of Apeldoorn was advised to be needed for schools to realize an active working group that focuses on health and sustainability in the school. This working group preferably includes a staff member of the GGD, canteen managers and food retailers. Importance is given to actors understanding each other's current situation, needs and vision of a healthy and sustainable school environment, and actors having a platform to regularly come together in dialogue. Following these advices would ensure all actors to be motivated to implement and support interventions related to health and sustainability. After all, the collaboration of the different actors is considered crucial to move forward towards the realization of a healthy and sustainable school environment.

Furthermore, Anttila, Rytkönen, Kankaanpää, Tolvanen and Lahti (2015) analyzed the effects of the national recommendation of the Finnish National Board of Education (FNBE) and the National Institute for Health and Welfare (THL) in 2007: Finnish upper comprehensive schools should not sell sweet products, and snacks provided or sold should be nutritionally appropriate. Anttila et al. (2015) aimed to find out how the national recommendation changed the schools' selling of sweet products. They showed that the national recommendation was effective in decreasing sales of sweet products in schools. The recommendation seems to be an effective tool in making the school environment healthier without increasing inequalities. Based on this, they concluded that it is possible to improve school environments by means of national recommendation. However, they argue that other actions are needed both inside and outside schools in order to decrease the total consumption of sweet products among adolescents. In another research on six middle schools in a midsized western city, the purpose was to determine whether there are associations between an altered school food environment and food choices of middle school students both in and outside of school (Wordell, Daratha, Mandal, Bindler, & Butkus, 2012). The results of the study point at a positive association between a modified school food environment and student food behavior in and outside school. They argue that policies related to the school food environment are an important strategy to address the obesity epidemic.



Moreover, in their study among American children, Story et al. (2009) investigated the role of schools in obesity prevention efforts. They argue that health and education success are intertwined: schools cannot achieve their primary mission of education if students are not healthy and fit. Schools have an unparalleled opportunity to promote children's health by creating an environment in which children eat healthy foods, engage in regular physical activity, and learn lifelong skills for healthy eating and active living. Story et al. (2009) argue that stronger policies are needed to provide healthier meals to students at schools; limit their access to low-nutrient, energy-dense foods during the school day; and increase the frequency, intensity, and duration of physical activity at school.

Lastly, with regard to sustainability, an international program 'Eco-Schools' exists for schools working with pupils on sustainable thinking and doing (Eco-Schools, n.d.-a). The core of Eco-Schools is that students are central. Therefore, they are the heart of the so-called 'Eco team'. This is a group of students that works on making the school more sustainable from the inside out. Together they give substance to the Eco-Schools motto 'student-led change'. They are supported in this by adults, such as teachers and the concierge. Other parties inside and outside the school can also be involved. Schools that work on the (five) pillars of Eco-Schools are eligible for the Green Flag (Eco-Schools, n.d.-b). This is the international quality mark for sustainable schools, and it takes about two years to obtain the Green Flag. With a portfolio, the Eco team has to show what it has done. In order to maintain the Green Flag, a school needs to continue developing and a new audit takes place every two years.

## 2.4 | The role of school canteens in changing food choice behavior

This section discusses existing literature on the role of school canteens in (changing) food choice behavior of pupils. As became clear in the previous paragraphs, the food offerings at school can play a role in the food choice behavior of pupils at school. For example, Derqui et al. (2018) highlight the importance of the internal school environment by pointing out how canteens impact the food skills, nutrition, and sustainability habits amongst the younger generation.

Nudging is one way in which food choices could be influenced in school canteens. Nudging refers to interventions that organize the choice architecture in order to alter people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives (Broers, De Breuker, Van den Broucke, & Luminet, 2017). As a strategy to encourage healthy behavior, nudging can serve as a complement to health education. An example of a nudge that aims to increase certain food choices, is placing healthy foods at a closer distance compared with unhealthy foods, so that it is easier for consumers to reach them (Hollands et al., 2013). However, the empirical evidence regarding the effectiveness of nudging as a way to influence food choice remains contradictory (Broers et al., 2017). To address this issue, a systematic review and meta-analysis was conducted to test the effects of nudging to encourage people to select more fruit and vegetables (Broers et al., 2017). The study shows that nudging interventions that aim to increase fruit and/or vegetable choice/sales/servings have a moderately significant effect. The largest effect is found for altering placement and combined nudges.

There are already programs for canteens that schools and caterers can sign up for. In the Netherlands, the Voedingscentrum (Nutrition Center) developed a program 'De Gezonde School' (the healthy

school), wherein the concept 'De Gezonde Schoolkantine' (the healthy school canteen) is included. The Voedingscentrum offers consumers and professionals scientific and independent information on healthy, safe and more sustainable food choices (Voedingscentrum, n.d.-a). For this, Voedingscentrum receives a subsidy from the Dutch government, and accepts no money from companies. Already since 2003, hundreds of schools have been working on making their school canteens healthier according to the guidelines the Voedingscentrum developed for these programs (Voedingscentrum, n.d.-b). By signing an ambition declaration, a school shows that it is committed to realizing a healthy school canteen. A school can achieve 'Schoolkantine Schalen' (school canteen scales), being 'silver', 'gold' or 'ideal', depending on the assortment. A silver canteen contains at least 60 percent of 'better' choices according to the 'Schijf van Vijf' of the Voedingscentrum, a golden canteen at least 80 percent, and an ideal canteen satisfies 100 percent.

The 'Schijf van Vijf' is a well-known education model from the Voedingscentrum, which is also used for the guidelines for 'De Gezonde Schoolkantine' (Voedingscentrum, n.d.-a). This is a model with five parts with healthy nutrition, which stimulates to choose more sustainable nutrition. In short, the five parts are:

- Vegetables and fruit: a lot of vegetables and fruit
  - Spread and cooking fats: soft or liquid spread and cooking fats
  - Dairy, nuts, fish, legumes, meat and egg: enough dairy, like milk, yogurt and cheese; less meat and more plant-based; varying with fish, legumes, nuts, eggs and vegetarian products
  - Bread, grain products and potatoes: mainly whole-wheat, like whole wheat bread, whole wheat pasta and couscous, and brown rice
  - Drinks: enough tap water, tea and coffee
- (Voedingscentrum, n.d.-c)

According to the Voedingscentrum, following their advice within these parts, makes people consume enough nutrients, consume products that bring along health advances and eat rather environment friendly (Voedingscentrum, n.d.-d).

### 3 | Theoretical and conceptual framework

This chapter discusses the research philosophy, theoretical frameworks and conceptual framework for this study.

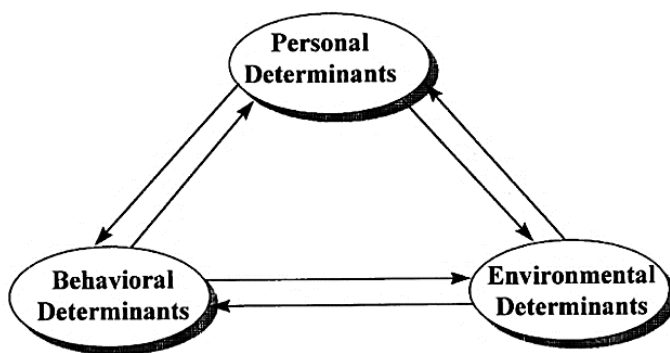
#### 3.1 | Research philosophy

This study investigates individual behavior and experiences regarding healthy and sustainable nutrition. As this results in subjective research data, the research philosophy of this study is interpretivism. Interpretivists consider the subject matter of the social sciences (people and institutions) to be fundamentally different from the natural sciences (Moon & Blackman, 2014). Instead of seeking to identify regularities or establish laws that explain human behavior, interpretivists seek to understand by looking at individual cases to trace the development of phenomena, typically in

a qualitative way (Crotty, 1998). Furthermore, interpretivist approaches make explicit scientists' perspectives and biases that influence data collection and analysis (Patton, 2002).

### 3.2 | Theoretical frameworks

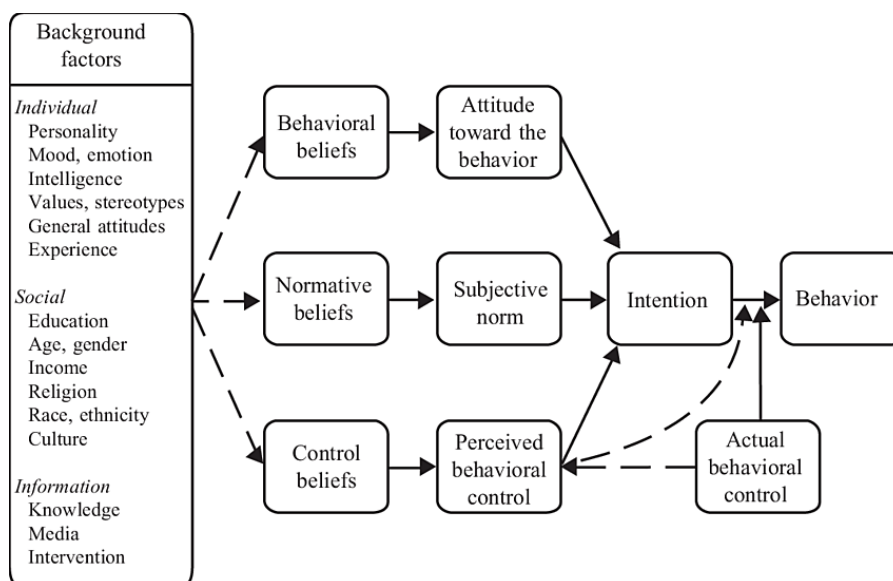
To gain insight into current practices at schools in the Achterhoek region, the food choice behavior of pupils, and how this behavior could be influenced, multiple theoretical frameworks are considered. A theory that can be useful to get insight into food choice behavior of pupils at schools, is the Social Cognitive Theory (SCT). This theory started as the Social Learning Theory (SLT) by Albert Bandura, and it was developed into the SCT in 1986 (LaMorte, 2019). The SCT posits that learning occurs in a social context with a dynamic and reciprocal interaction of three factors: person, environment and behavior (LaMorte, 2019; Bandura, 1986; Bandura, 2001; Bandura, 2004). Given the emphasis on the individual and the environment, SCT has been widely used in health promotion. An example of a study by Jung et al. (2018) is discussed in section 2.2. Figure 1 illustrates a basic model with the factors of the SCT (Bandura, 2001). This shows the interconnectedness of behavior, person and environment.



**Figure 1. Factors Social Cognitive Theory** (Bandura, 2001)

This theory about the interconnectedness of environment, person and behavior fits the discussed literature that exists on food choice behavior of pupils and the role of education, policy and canteens in this (chapter 2). In the current study, the environment is the school environment (also including school policy and practices in canteens and education), the behavior is food choice behavior of pupils, and the persons are individual pupils (with personal factors like knowledge, attitude and taste).

Another useful theory is the Theory of Planned Behavior (TPB) (Ajzen, 1991). This theory was also used in some studies discussed in the literature review on food choice behavior in section 2.1 (Bissonnette & Contento, 2001; Vermeir & Verbeke, 2008). In short, intentions to perform behaviors can be predicted from attitudes toward a behavior, subjective norms, and perceived behavioral control (Ajzen, 1991). In the next section (3.3.1) these three concepts are described in more detail (Table 2). The TPB states that behavioral achievement depends on both intention and behavioral control; intentions, together with perceptions of behavioral control, account for considerable variance in actual behavior (LaMorte, 2019; Azjen, 1991). Later, the framework of this theory was expanded with background factors that can be of influence on attitude, subjective norm and perceived behavioral control, as illustrated in Figure 2 (Ajzen & Fishbein, 2005).



**Figure 2. The Theory of Planned Behavior (TPB), expanded with background factors** (Ajzen & Fishbein, 2005)

The expansion makes the framework even more relevant for the current study, because including the background factors and their relations to the other concepts, as presented in the TPB, can be helpful in understanding on what pupils base their attitudes, subjective norms, perceived behavioral control, intention and actual food choices. With information on background factors, it could be easier to intervene in the right places to change behavior. This can be useful in the current study, which aims to investigate what limits progress in changing food choice behavior of pupils towards making more healthy and sustainable food choices, and how to overcome these limitations with interventions.

### 3.3 | Definitions and conceptual model

This section gives definitions of relevant concepts and illustrates the conceptual framework for this study.

#### 3.3.1 Definitions

In conducting this study, some concepts might need clarification. A core concept in this study is ‘healthy nutrition’. Nutritious and healthy food is providing beneficial nutrients (e.g., vitamins, minerals, dietary fiber) and limiting potentially harmful elements (e.g., saturated fats, sodium, sugars) (Neufeld, Hendriks, & Hugas, 2021; Voedingscentrum, 2017). As stated in the United Nations Food Systems Summit 2021, a healthy diet is health-promoting and disease-preventing (Neufeld et al., 2021). It provides an adequate amount of nutrients and health-promoting substances from nutritious foods, without excess, and avoids the consumption of health-damaging substances.

Another core concept in this study is ‘sustainable nutrition’. In the Brundtland Report by the World Commission on Environment and Development (1987), sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Given this, choosing sustainable nutrition involves selecting

foods that are healthy for our bodies and the environment (National Cleantech Conference & Exhibition, 2019). These are foods that provide a balanced diet for the body but also facilitate the conservation of the environment. These foods are grown and processed in a manner that does not harm the environment or compromise its ability to meet the needs of future generations. Furthermore, Visseren-Hamakers (2020) argues that animal considerations are often neglected in discussions on sustainable development. She argues that the definition of sustainable development must be broadened to include the interest of the individual animal, and that the best way to do so is the addition of an eighteenth Sustainable Development Goal on animal health, welfare and rights. In this manner, it becomes explicit that attention for the individual animal is an integral aspect of sustainable development. Independent and transparent knowledge about animal welfare, measured as independent needs for the animal itself, can be seen as essential in the search for and realization of a sustainable future (Wageningen University & Research, 2020).

Since the health of people and the health of the planet go hand-in-hand, the concepts ‘healthy nutrition’ and ‘sustainable nutrition’ cannot be considered in isolation (Askew, 2022). Therefore, this study investigates both, also in combination (healthy and sustainable nutrition). Raghoobar et al. (2022) published an overview with definitions of a healthy diet, sustainable diets, and a healthy and sustainable diet in the Netherlands. Table 1 shows the translated overview.

**Table 1. Definitions of healthy diet and sustainable diets in the Netherlands** (Raghoobar et al., 2022)

Concept	Definition
<b>Healthy diet</b> according to the Gezondheidsraad (Gezondheidsraad, 2015; Voedingscentrum, n.d.-e), summarized by RIVM (2021)	In a healthy diet, we do not eat too much or too little and we eat mostly plant-based and few animal products. A healthy menu is rich in vegetables, fruits, legumes, nuts, fish, whole grain products, contains plenty of low-fat dairy products, and is low in red and processed meats, alcoholic and sugary drinks salt and saturated fatty acids. In addition, a healthy diet also contains enough and also not too many nutrients.
<b>Sustainable diets</b> according to the Food and Agricultural Organization (FAO) of the VN (Voedingscentrum, n.d.-f)	Sustainable food patterns are food patterns with a low environmental impact that contribute to food security and health for current and future generations. Meeting the needs of the world's population means that enough, varied, healthy and safe food is available and that it is distributed fairly.
<b>Healthy and sustainable diet</b> according to the FAO and World Health Organization (WHO) (Food and Agriculture Organization & World Health Organization, 2019)	Healthy and sustainable diets are diets that support all aspects of individual health and well-being; have low environmental pressure and impacts; are accessible, affordable, safe, and equitable; and are culturally acceptable.

Furthermore, this study defines ‘food choice behavior’ more broadly than only food choices; it also includes attitude, subjective norms, perceived behavioral control and the intention to behave a certain way (as proposed in the TPB). Also, the background factor knowledge is included. Table 2 shows the definitions of three core concepts of the TPB: attitude, subjective norms and perceived behavioral control.

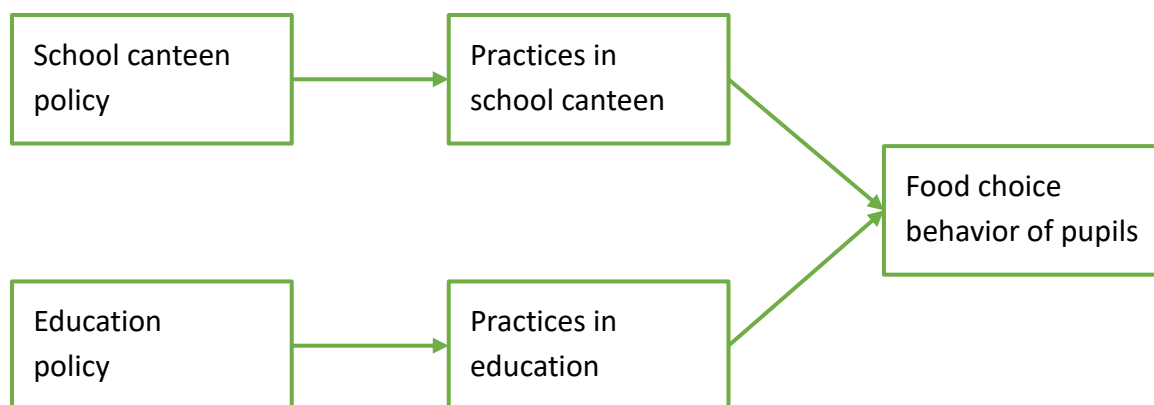
**Table 2. Definitions of three core concepts of the Theory of Planned Behavior (TPB) (LaMorte, 2019)**

Concept	Definition
<b>Attitude</b>	The degree to which a person has a favorable or unfavorable evaluation of the behavior of interest. It entails a consideration of the outcomes of performing the behavior.
<b>Subjective norms</b>	The belief about whether most people approve or disapprove of the behavior. It relates to a person's beliefs about whether people of importance to the person think he/she should engage in the behavior.
<b>Perceived behavioral control</b>	A person's perception of the ease or difficulty of performing the behavior of interest. This varies across situations and actions, resulting in a person having varying perceptions of behavioral control depending on the situation.

Lastly, pupils' food choice behavior within the school environment is investigated. The school food environment includes all spaces, infrastructure, and conditions inside and around the school premises where food is available, obtained, purchased and/or consumed (Food and Agriculture Organization of the United Nations, n.d.). A healthy school food environment allows and encourages the school community (children, families, school staff, etc.) to make food choices that are consistent with better diets and improved wellbeing (Food and Agriculture Organization of the United Nations, n.d.). A distinction can be made between internal and external school environments (De Brabander et al., 2021). The internal environment includes infrastructure, education activities, curriculum, canteen, policy, vending machines, teachers and students. The external environment includes parents, municipality, organizations involved in food activities, green spaces and food producers and providers. The internal environment is influenced by the external environment. By gaining insight into these environments, possible places where interventions can be implemented become clear.

### 3.3.2 Conceptual model

This section introduces the conceptual model for this study (Figure 3), followed by an explanation of the concepts and the proposed relationships. The conceptual model is based on existing literature (chapter 2) and existing theories (chapter 3.2). The current study brings together this existing scientific knowledge into one model, in order to investigate how pupils' food choice behavior in the Achterhoek region is influenced. Figure 3 illustrates this conceptual model. The operationalization section (section 4.4) provides a more detailed explanation of what this study investigates per concept, and how this relates to the research questions.



**Figure 3. Conceptual model**

The concept ‘school canteen policy’ includes national or school specific guidelines about what products should be in the assortment in canteens. For example, schools can sign up for the Gezonde Schoolkantine program of the Voedingscentrum (Voedingscentrum, n.d.-b). In this case schools have to follow the guidelines from the Voedingscentrum. Furthermore, school policy can also include contracts between schools and their food suppliers. Lastly, schools can prohibit certain foods in their school policy. This study considers these policies within the concept of ‘school canteen policy’. School canteen policies can influence practices in school canteens (see sections 2.3 and 2.4). According to Story et al. (2009) policies are needed to provide healthier meals to students at schools, for example by limiting their access to low-nutrient, energy-dense foods during the school day. In the current study, ‘practices in school canteen’ include what, where and how foods are offered in canteens and in vending machines. It also includes whether nudging is applied or not. Next, such practices in canteens can influence the food choice behavior of pupils at school (see sections 2.3 and 2.4). Anttila et al. (2015) show in their study on the effects of a national recommendation for Finnish upper comprehensive schools (i.e. not selling sweet products, and snacks provided or sold should be nutritionally appropriate), that following the national recommendation in practice turned out to be effective in decreasing sales of sweet products in schools. Furthermore, Wordell et al. (2012) found a positive association between a modified school food environment and student food behavior in and outside school. They argue that policies related to the school food environment are an important strategy to address the obesity epidemic.

In terms of education, ‘policy on education’ includes what should be educated about. This can be determined in education programs, for example. Education policies influence the practices in education (i.e. what is educated about healthy and sustainable nutrition). Next, as illustrated in the conceptual model, practices in education can influence food choice behavior of pupils. This proposed relation is based on existing literature (see section 2.2). For example, Rothpletz-Puglia et al. (2022) argue that by recognizing the challenges of the current food environment and by partnering with governments, legislators, schools, and industries to address these challenges, nutrition education can play an integral role in decreasing lifetime risks of chronic disease, obesity, and other adverse health outcomes related to diet and food choices. By shifting norms about kids’ food toward healthy food that both adults and children can enjoy, nutrition educators can promote healthy social and behavior changes at the individual, family, and community levels. Furthermore, Jung et al. (2018) investigated a program aimed at helping students raise the value of good health and nutrition, develop practical skills for reading food labels, identify the benefits of adopting healthy eating patterns and make healthy

food choices through observation and hand-on experiences. After intervention, significant more students improved their healthy eating literacy by telling 'healthy (green light) and unhealthy (red light)' foods among their daily food choices. Similar changes happened among third to fifth graders. Positive intervention effects were found at the school lunch food choice behavior too. Jun, Huang, Eagan and Oldenburg (2018) argue that the positive findings of their study can be attributed to the effective program design and curriculum content as well as to the educational workshops organized for teachers who volunteered to implement the programs into their classroom curricula.

As illustrated in the conceptual model, canteen practices as well as education practices can influence food choice behavior (FCB) of pupils, regarding healthy and sustainable nutrition. In this study, FCB is the overarching term for the principles of the Theory of Planned Behavior (TPB), including attitudes, subjective norms, perceived behavioral control, intention, and the actual food choices. Also the background factor knowledge is considered within the FCB concept. This is pupils' knowledge of healthy and sustainable nutrition. Multiple studies exist on food choice behavior (see section 2.1). For example, Neumark-Sztainer et al. (1999) found that barriers to eating more fruits, vegetables, and dairy products and eating fewer high-fat foods include a lack of sense of urgency about personal health in relation to other concerns, and taste preferences for other foods. Suggestions for helping adolescents eat a more healthful diet, include making healthful food taste and look better, limiting the availability of unhealthful options, making healthful food more available and convenient, teaching children good eating habits at an early age, and changing social norms to make it "cool" to eat healthfully. Furthermore, Bissonnette and Contento (2001) investigated adolescents' perspectives about the environmental impacts of food production practices and whether these perspectives are related to their food choice. Variables of an expanded Theory of Planned Behavior (TPB) were measured, including beliefs, attitudes, perceived social influences, motivation to comply, perceived behavioral control, self-identity, perceived responsibility, behavioral intention, and behavior. They concluded that there is a need to make the environmental impact of food production practices salient to adolescents through both cognitive and experiential approaches. Lastly, Vermeir and Verbeke (2008) investigated the attitudes and behavior as well as the role of individual characteristics, like confidence and values related to sustainable products. The focus of the analysis is on exploring the influence of determinants as hypothesized in the Theory of Planned Behavior (TPB) on sustainable consumption intention in general, and specifically depending on consumer's perceived confidence and personal values. Half of the variance in intention to consume sustainable dairy was explained by the combination of personal attitudes, perceived social influences, perceived consumer effectiveness and perceived availability. In addition, different levels of confidence and value orientation yield different strengths of the determinants. The findings yield public policy and marketing recommendations for stimulating sustainable food consumption among young adults.



## 4 | Methodology

This methodology chapter explains the research strategy, research methods, reliability, validity, and the operationalization for this study.

### 4.1 | Research strategy

This study uses a qualitative research approach. Qualitative data are non-numerical units of information, for example statements, images (photos, posters), and text or interview fragments (Van Thiel, 2014). This study uses interviews to obtain research data.

### 4.2 | Research methods, data collection and data analysis

#### 4.2.1 Research methods and data collection

The first step in this study was gathering literature on the topic of food choice behavior, especially among youth. Next to this, literature on the role of schools in influencing this behavior is reviewed, focusing on (school) policies, canteens and education. Based on this literature review, some existing theories and frameworks are explored. Finally, the conceptual framework is illustrated.

The next step is conducting the research in practice, at schools in the Achterhoek region. The focus of this study is on secondary and vocational schools, because most primary schools do not have canteens where pupils can choose and purchase their own foods, which is a central element in the current study. Furthermore, the study is written for Smaakacademie Achterhoek (SAA), a knowledge institute in Silvolde in the Achterhoek region with a learning community for Achterhoek Food. Education, entrepreneurs and experts work together and combine old and new knowledge about a more sustainable and healthier 'food system' (Smaakacademie Achterhoek, 2022). The purpose of SAA is to inspire participants about healthier, more sustainable and regional food, aiming at structurally introducing more sustainable, healthy and regional food into current education. Because this study is written for SAA, the secondary and vocational schools within their network were contacted with an invitation to participate in the study. Eventually, five schools signed up to participate. Thus, the research is conducted at five schools in the Achterhoek region. An overview with characteristics of the participating schools can be found in Appendix 1. As can be seen, the schools differ in the number of locations. Also, the education types differ, in terms of level of education and whether the schools are secondary or vocational.

At the five schools, the data is collected with interviews. A qualitative interview is a data collection method where an interviewer asks questions to an interviewee either face-to-face or at a distance (DiCicco-Bloom & Crabtree, 2006). Semi-structured interviews (SSI) with pupils and employees at the schools are used to get insight into the school policy, education practices, canteen practices and pupils' food choice behavior. The interviews are also used to get insight into the underlying thoughts and experiences of pupils and school employees on these topics. Usually, the SSI employs a blend of closed- and open-ended questions, often accompanied by follow-up 'why' or 'how' questions (Adams, 2015). In the SSI, an interview guide or topic list is used as a guideline (Van Thiel, 2014). This guide lists a

number of topics that a researcher wishes to discuss or gives a set of questions prepared earlier. In this way the dialogue can meander around the topics on the agenda (Adams, 2015). In the current study the interviews are prepared with a set of questions (in Dutch). The questions are mainly based on the literature review and the theoretical framework. In the interview guide, the introduction is followed by different questions depending on the kind of interviewee. The three main themes discussed are policy, education and canteen. Firstly, there are questions for school employees with knowledge of policy (interview guide part A). This includes policy on education about nutrition at school (part A1) and policy on practices in school canteens (part A2). Secondly, there are questions for educators who teach about nutrition (part B). Thirdly, there are questions about the school canteen (part C). This part is divided into questions for people working in canteens (part C1) and questions for caterers, in case the school canteen is run by a caterer (part C2). Lastly, there are some questions prepared for interviews with pupils (part D), about their food choice behavior. The interviews with pupils take place in groups, because group interviews bring the benefits of discovering collective perspectives, the synthesis and validation of ideas, the involvement of diverse groups of pupils and the possibility to include a large(r) number of participants (Gibbs, 2012).

All interviews have the same components. It starts with an introduction of the study, interviewer and interviewee(s). Then part A, B, C, or D of the interview guide is chosen with the corresponding substantive questions. With these questions, sub questions 1-3 of this study can be answered. Then questions are asked about the 'future' regarding opportunities for healthy and sustainable food choices among pupils at school. Here the opportunities for interventions are discussed. With these questions, sub question 4 of this study can be answered. Lastly, the interviews all end with closing questions, for example on additional comments of the interviewee. The operationalization section (section 4.4) discusses in more detail what kind of interview questions are asked per research question.

In semi-structured interviews, the order in which the questions are asked can vary, depending on the way in which the conversation develops (Van Thiel, 2014). This is also the case in the current study. Since beforehand it was not exactly known what knowledge and expertise all interviewees would have, sometimes one interviewee had answers on multiple parts of the interview guide. At other schools more respondents needed to be interviewed to gather all required research data. As a result, the number of interviews differs per school. Also, some interviewees just had additional information. In these cases, the prepared questions are not all asked, but the interview guide served as a list with topics that could be discussed. In general, in all interviews follow-up questions were asked when more clarification on a topic was needed.

All schools are visited for the interviews. As preferred, most interviews are conducted face to face during the school visit. In face-to-face interviews, the interaction between the interviewer and the interviewee is always direct and with no delays due to possible technical disruptions in digital interviews (Saarijärvi & Bratt, 2021). Furthermore, in face-to-face interviews body language, facial expressions, and other non-verbal social signals are obvious to the interviewer. Another advantage is that the physical meeting can increase the possibility of creating a safe and comfortable atmosphere. However, at some schools not all interviewees were available on the day of the school visit. For this reason, some interviews were conducted digitally, via Microsoft Teams or telephone calls.

In the end, a total of 32 interviews were conducted. An overview with the number of interviews and the kind of interviewees per school can be found in Appendix 2. While the interviews with school employees were supposed to be one-on-one, in some cases another school employee with additional knowledge and information joined the interview. Also, at some schools more pupils were available and willing to participate than at other schools. Therefore, the number of pupils interviewed varies between the participating schools.

#### 4.2.2 Data analysis

All interviews are recorded with approval of the interviewees. Also, notes are made during interviews. The recorded voice data is transcribed afterwards. In these transcripts all interviewees are anonymized using initials or random letters. To make sure they cannot be tracked, also locations and names of schools are anonymized. After this, all transcripts are coded and analyzed with the Software 'Atlas.ti' (version 22). Codes were made before starting the coding, based on the research questions, literature review and theoretical frameworks. In Appendix 3 an overview is given with all codes. The operationalization section (section 4.4) discusses in more detail what codes are used to answer the research questions of this study.

### 4.3 | Reliability and validity

To ensure reliability and validity in this study, several aspects are taken into account. This section discusses how the reliability and validity are ensured in this study.

#### 4.3.1 Reliability

To ensure reliability in the study, several aspects need to be controlled for. The reliability of a study is a function of the accuracy and the consistency with which the variables are measured (Van Thiel, 2014). Accuracy refers in particular to the measurement instruments that are used, such as questionnaires or observation schemes. The current study uses semi-structured interviews. In order to collect data on underlying reasons of interviewees, sometimes more specific follow-up questions are used next to the questions in the interview guide. In this way more accurate answers are retrieved, which results in a more reliable outcome of this study. Furthermore, feedback moments are included during interviews, to check whether the interpretations and conclusions of the interviewer correspond with the ideas of the interviewees or not. This check prevents false conclusions.

Consistency revolves around the idea of repeatability: under similar circumstances the same measurement will lead to similar results (Van Thiel, 2014). For this, a logbook is kept during all research steps. Also, personal information on the interviewees and information on the participating schools (Appendix 1) are gathered to be able to repeat the study and get similar results.

#### 4.3.2 Validity

Two basic types of validity can be distinguished: internal validity and external validity. Internal validity refers to the cogency of the study itself; whether the researcher really measured the effect he/she intended to measure or not (Van Thiel, 2014). For this, the correspondence between the conceptual framework and the used research methods to measure the concepts is checked. Also, theoretical and

abstract concepts were translated into terms that pupils and school employees understand during the interviews. In this way it is ensured that interviewees understand the research topics and that the concepts are measured right.

Furthermore, external validity describes the extent to which a study can be generalized (Van Thiel, 2014). This means: do research results also hold for other persons, institutions, moments in time or locations? In the current study, one way in which this can be achieved is by including as many schools, pupils and interviewees as feasible in time, so that the sample is bigger and more representable. In this way generalizations in the conclusion will probably be more accurate.

## 4.4 | Operationalization

This section discusses how the concepts as proposed in the conceptual framework (Figure 3) are investigated. It shows what codes are used during the data analysis, to help answer the research questions based on the collected data (the answers of the interviewees). Before starting the coding, codes are made. In Appendix 3 an overview of all codes is given. These codes are based on the research questions, literature review, and theoretical and conceptual frameworks.

### 4.4.1 Food choice behavior of pupils

To get insight into what limits the progress in changing the food choice behavior of pupils at schools in the Achterhoek region towards more healthy and sustainable food choices, this study investigates their current food choice behavior (FCB) (sub question 1). As it is important to understand why pupils make certain food choices, the following concepts of the Theory of Planned Behavior (TPB) are considered: attitudes, subjective norms, perceived behavioral control, intention, and their actual food choices. Pupils' knowledge of healthy and sustainable nutrition is investigated here too. Table 3 gives an overview of the operationalization of the concept 'food choice behavior of pupils'.

**Table 3. Food choice behavior: concept, interview data and codes**

Concept	Data from interviews	Codes
<b>Food choice behavior of pupils</b>	<ul style="list-style-type: none"> <li>- <b>Knowledge:</b> pupils' knowledge of healthy, sustainable, and healthy &amp; sustainable nutrition. And how they know this.</li> <li>- <b>Attitudes:</b> pupils' thoughts about healthy and sustainable nutrition. And whether they think it is important or not.</li> <li>- <b>Subjective norms:</b> whether pupils consider the opinions or approval of friends or classmates important while making their own food choices. And whether it is more likely that pupils want and buy certain foods too when friends or classmates do.</li> <li>- <b>Perceived behavioral control:</b> whether pupils think it is difficult for them to make (more) healthy and sustainable food choices, or not. And why.</li> <li>- <b>Food choice:</b> if pupils buy their own foods on school days, where they buy it, and whether they choose healthy and/or sustainable foods or not.</li> <li>- <b>Intention:</b> whether pupils intend to choose (more) healthy and sustainable foods</li> </ul>	<ul style="list-style-type: none"> <li>- FCB</li> <li>- (un)healthy nutrition</li> <li>- (un)sustainable nutrition</li> <li>- Healthy and sustainable</li> </ul>

The interpretation of the data from the interviews is based on the Theory of Planned Behavior (TPB). Pupils' knowledge of healthy and sustainable nutrition is measured by comparing the information from interviews to the definitions of healthy, sustainable, and healthy and sustainable nutrition (see section 3.3.1). It is important to measure what interviewees know about healthy and sustainable nutrition, because all their answers about healthy and sustainable nutrition are based on this knowledge. Knowledge of healthy and sustainable nutrition is assumed to be related to pupils' attitude, social norms and perceived behavioral control (as proposed in the TPB, section 3.2). For example, knowledge of healthy and sustainable foods influences the attitude towards these foods, which influences the intention to choose these foods.

Pupils' intention to eat (more) healthy and sustainable foods is based on their attitudes, social norms and perceived behavioral control. Firstly, the intention to make more healthy and sustainable food choices can be the outcome of having positive attitudes towards these foods, for example the attitude that consuming healthy and sustainable nutrition is important for your health and for the planet. Secondly, an example of a social norm among pupils can be that eating unhealthy and unsustainable foods is cool, while eating healthy and sustainable foods is not (see section 2.1). Social norms about consuming healthy and sustainable nutrition being cool are expected to result in the intention of pupils to make more healthy and sustainable food choices. Thirdly, it is expected that pupils have the intention to eat more healthy and sustainable foods when pupils think it is not difficult for them to

consume these foods (perceived behavioral control), for example because they think these foods are cheap and tasty (see section 2.1).

After all, the intention to make certain food choices is assumed to be related to the actual behavior of making certain food choices (see TPB, Figure 2). The intention to choose more healthy and sustainable foods is expected to result in more healthy and sustainable food choices.

#### 4.4.2 School canteen policies and practices

Table 4 gives an overview of the operationalization of the concepts ‘school canteen policy’ and ‘school canteen practices’. This is used to answer sub question 2.

**Table 4. School canteen policies and practices: concepts, interview data and codes**

Concept	Data from interviews	Codes
<b>School canteen policy</b>	<ul style="list-style-type: none"> <li>- Contracts of schools with external parties (such as suppliers and caterers)</li> <li>- Who decides on the canteen assortment</li> <li>- Existing financial agreements</li> <li>- How food prices are set</li> <li>- What guidelines have to be followed regarding the canteen assortment, with regard to healthy and sustainable nutrition (like ‘Gezonde Schoolkantine’)</li> <li>- Prohibited nutrition at school</li> </ul>	<ul style="list-style-type: none"> <li>- Policy canteen</li> <li>- Canteen healthy</li> <li>- Canteen sustainable</li> <li>- Healthy and sustainable</li> </ul>
<b>School canteen practices</b>	<ul style="list-style-type: none"> <li>- Who decides on the canteen assortment</li> <li>- If and what healthy and sustainable foods are offered at school</li> <li>- The presentation and/or promotion of healthy and sustainable foods (e.g. use of nudging)</li> <li>- How food prices are set</li> </ul>	<ul style="list-style-type: none"> <li>- (un)healthy nutrition</li> <li>- (un)sustainable nutrition</li> <li>- Healthy and sustainable</li> </ul>

It is assumed that more school canteen policy on healthy and sustainable nutrition at school results in more healthy and sustainable foods in school canteens (practices). Furthermore, the school canteen practices are expected to influence pupils’ food choice behavior at school (see sections 2.3, 2.4 and 3.3.2). For example, offering more healthy and sustainable foods in canteens can result in more healthy and sustainable food choices of pupils at school.

#### 4.4.3 Education policies and practices

Table 5 gives an overview of the operationalization of the concepts ‘education policy’ and ‘practices in education’. This is used to answer sub question 3.

**Table 5. Education policies and practices: concepts, interview data and codes**

Concept	Data from interviews	Codes
<b>Education policy</b>	<ul style="list-style-type: none"><li>- Existing (school) policy about the content of education programs regarding healthy and sustainable nutrition</li></ul>	<ul style="list-style-type: none"><li>- Policy education</li><li>- (un)healthy nutrition</li><li>- (un)sustainable nutrition</li><li>- Healthy and sustainable</li></ul>
<b>Practices in education</b>	<ul style="list-style-type: none"><li>- What is educated about healthy and sustainable nutrition</li></ul>	<ul style="list-style-type: none"><li>- Education healthy</li><li>- Education sustainable</li><li>- (un)healthy nutrition</li><li>- (un)sustainable nutrition</li><li>- Healthy and sustainable</li></ul>

It is assumed that more education policy on healthy and sustainable nutrition results in more education on healthy and sustainable nutrition at school (practices). Furthermore, practices in education are expected to influence pupils’ food choice behavior at school (see sections 2.2 and 3.3.2). For example, offering more education on healthy and sustainable foods can result in more healthy and sustainable food choices of pupils at school.

#### 4.4.4 Opportunities

For answering sub question 4, all interviewees were asked to come up with ideas for interventions that can influence pupils to make more healthy and sustainable food choices at school. These opportunities were coded with the code ‘opportunity’. Furthermore, it is asked who is responsible to intervene and make sure pupils make healthier and more sustainable food choices in the future. In the data analysis this information was coded with the code ‘responsibility’.

#### 4.4.5 Limitations and opportunities

In order to answer the main research question, the answers to the sub questions are used. As proposed in the conceptual model (section 3.3.2), policies and practices in canteens and education can influence food choice behavior of pupils, i.e. their knowledge, attitudes, social norms, perceived behavioral control, intention, and actual food choices. For this reason, the limited progress in changing pupils’ food choice behavior towards more healthy and sustainable food choices can possibly be explained by the limited availability and/or limited effectiveness of policies and practices in canteens and education.

Throughout all answers of interviewees, limitations related to pupils' food choice behavior with regard to health and sustainability, are coded with the code 'problem'. For example, when pupils think that healthy and sustainable foods are too expensive in school canteens, compared to unhealthy and unsustainable foods, this limits their purchases of these foods (their actual food choices). Also, the code 'opportunity' is sometimes used in addition to the code 'problem', because where there is a limitation (problem), there often also is an opportunity to overcome a limitation.

Limitations and opportunities stated in existing literature as well as in interviews, are used to answer the main question of this study. Research data with the code 'responsibility' is also used here, because in recommending possible interventions it is important to consider who is responsible to intervene and to ensure pupils make more healthy and more sustainable food choices at school.

## 5 | Results

This chapter discusses the collected data for this study. The results are discussed per concept, as presented in the conceptual framework. Quotes from interviewees are used to illustrate or support the text. These quotes are translated from Dutch to English. In some of these quotes, clarifying additional information is added between brackets ([example]). Furthermore, the investigated schools are abbreviated: S1 (School 1), S2 (School 2), et cetera.

### 5.1 | Food choice behavior

In this section on food choice behavior of pupils, the collected data is divided into six determinants: knowledge, attitude, subjective norms, perceived behavioral control, actual food choices at school and intentions. Also, limitations are discussed to get insight into what limits the progress of changing pupils' food choice behavior towards making more healthy and sustainable food choices. The last paragraph of this section gives an overview with the summarized outcomes for food choice behavior.

#### 5.1.1 Knowledge

In general, knowledge of healthy and sustainable nutrition is rather low among the interviewed pupils. While most pupils do know something about healthy food, knowledge about sustainable food is very low or even totally lacking. Furthermore, the combination of healthy nutrition and sustainable nutrition says nothing to almost all pupils.

Regarding healthy food, the most mentioned aspects are vegetables and fruit. Most pupils are familiar with the 'Schijf van Vijf' (from Voedingscentrum), but they do not have knowledge on the details of this concept.

Sustainable nutrition does not say a lot to most of the interviewed pupils. Some pupils do not know anything about it and a few pupils mention nature (at S4) or the environment (at S1, S2 and S4) when they think about sustainable nutrition. Some pupils hesitate and mention organic food, for example (at S4 and S5). However, the knowledge about sustainable food is very limited. An exception here is



S1, which is a school with a so-called 'Green profile'. Sustainability is a central theme at this school (as S1 is affiliated with the Eco-Schools concept). At S1 all interviewed pupils are familiar with the concept 'sustainable nutrition'. Here pupils refer to the environment and growing your own vegetables.

By examining to what extent teachers of the course 'Zorg & Welzijn' (ZW; care and well-being) at S3 think pupils have sufficient knowledge of healthy and sustainable food, they argue the following:

Teacher ZW 1 at S3: "When I look at the population, what I have experienced so far, that is extremely low, what they have in terms of knowledge."

Interviewer: "For both?" [healthy and sustainable nutrition]

Teacher 1 ZW at S3: "For... Well, I dare... I do say for both, yes, I say for both, but sustainability is totally out of the question."

Teacher 2 ZW at S3: "Yes. I think with healthy food, they could list quite a few there. (...) I think there is still room in there, but I think they are somewhat aware of that. (...) But sustainability, I do not think they have that. (...) If we already do not have that [have much knowledge of sustainable nutrition]."

Teacher ZW 1 at S3: "Yes. No, I do not think that is an issue [for pupils]."

Teacher ZW 2 at S3: "On the other hand, sometimes (...) you also have conversations, that they also have a lot in the supermarket with those stickers on it saying 'today 50%'. (...) But I do not think they [pupils] make a link with that [sustainability]."

Teacher ZW 1 at S3: "No. With sustainability." (...)

Teacher ZW 2 at S3: "If you were to say it, they would think 'oh well', but then they would not think any further."

These findings are supported by school employees at the other schools; they think pupils have limited knowledge on healthy nutrition and minimal to no knowledge on sustainable nutrition.

### 5.1.2 Attitude

The attitudes of pupils towards healthy and sustainable nutrition vary among the schools. When asking pupils about their opinion about the importance of healthy and/or sustainable nutrition, pupils at S2 do not have a clear opinion on healthy and sustainable nutrition, while at S5 an interviewed pupil stated that it is boring. However, among all interviewed pupils at the five schools, most pupils think healthy food is important, but they do not care much about sustainability. Some pupils mention that they think sustainable nutrition is important, but they do not really take it into account:

Pupil 1 at S4: "Well, I do think healthy food is important, but sustainable eating not very much or so. Sustainable is important, but yes..."

Pupil 2 at S4: "For the environment."

Pupil 1 at S4: "For the environment, yes, but I do not really take that into account."

Interviewer: "And you do more with healthy food?"

Pupil 1 at S4: "Yes."

At S1 pupils think healthy as well as sustainable nutrition is important. A pupil at S1 stated the following about the importance of sustainable nutrition:

Pupil at S1: "I think it is better that people are involved with it. Because it is about our world. I think that nowadays we are destroying our world quite a bit with all the substances and the gasses that are coming in everywhere. (...) And that it is just good if we pay attention."

Another pupil at S1 agrees to the importance of sustainable nutrition, but argues that people should not pay too much attention to it:

Pupil at S1: "It is important, but you should not pay too much attention to it, I think. Because if you really, really pay too much attention to it, then you start to have a little hesitation, or something in that direction."

Interviewer: "It has to remain fun?"

Pupil at S1: "Yes, yes it does."

Overall, attitudes on healthy and sustainable nutrition differ among pupils. In general, healthy nutrition is considered rather important. With regard to sustainable nutrition, some pupils think it is not very important, while others think it is (e.g. for the environment).

### 5.1.3 Subjective norms

With regard to subjective norms, all interviewed pupils report that they do not think about the opinions of others when choosing their own foods. However, some interviewed employees at the schools argue that they think peer pressure could influence food choices of pupils. An example is given by a pedagogical employee at S1:

Pedagogical employee at S1: "I think it is a bit of seeing and being seen at this age, isn't it. You also often see here that at a certain point a boy empties his lunch box at the end of the day, and then has bought popcorn and cola and things like that in the meantime. No, it is often with a group 'yes, okay if three of those five go, yes then I will go anyway, then I will buy that too, then I will not eat my bread.'"

Interviewer: "So peer pressure actually?"

Pedagogical employee at S1: "Yes. I think that plays a big part. That is also what you sometimes hear from the young people: 'Let me empty my lunch box, then at least they [parents] will think that I have eaten my food.'"

Pupils themselves think it could be that if they see friends or classmates buying unhealthy (or unsustainable) foods, they might feel like buying these foods too, just because they like the food. But they do not think this is peer pressure, as explained by pupils at S5:

Interviewer: "If you do see that others choose something unhealthy, buy something like candy or soda, do you feel like it more?"

Pupil 1 at S5: "Yes."

Interviewer: "And are you going to buy it sooner?"

Pupil 1 at S5: "Yes, I will."

Interviewer: "Peer pressure is it? Or does it just make you feel like it?"

Pupil 1 at S5: "Just that you feel like it, when you see it."

Pupil 2 at S5: "Peer pressure is a big word, but it is kind of... standing in front of you and then you think 'I really feel like having that food too'."

### 5.1.4 Perceived behavioral control

Most pupils agree that they think eating healthy foods is not very difficult. Some pupils argue it is easy when it is tasty. Regarding sustainable food they have different opinions. Eating sustainable foods is

considered harder. One reason for this is that you have to look into the origin of these foods. Most pupils agree to the following statement with regard to choosing healthy and sustainable nutrition:

Pupil at S4: "Sustainable is difficult, I think. Healthy not. Because sustainable... If you want to eat something nice you do not really pay attention to whether it is sustainable or not."

In general, pupils often think that healthy and sustainable food is expensive, which makes it harder for them to buy these foods over unhealthy and unsustainable foods that are often cheaper. Thus, the high(er) price of healthy and sustainable foods is considered a limiting factor in what pupils choose to eat, because pupils choose cheap food over expensive foods. An example is given by pupils at S1, who argue that they buy foods outside school because of the price of the products:

Pupil at S1: "For example, a sandwich at the Coop [a supermarket nearby S1] ... I think you can get 4 sandwiches [from the Coop] for the money you spend here [on one sandwich in the school canteen], for example. But it is healthier [at school]. But people often do not think much about that."

#### 5.1.5 Food choices

With regard to the actual food choices of pupils, all pupils are content with their current diet. Most pupils think they eat rather healthy, and they are content with the amount of healthy food they consume, while some pupils think they could eat somewhat healthier. A pupil at S1 said the following about purchasing foods in the school canteen:

Pupil at S1: "What I think a little bit myself at school, usually that it [foods in the canteen] is kind of healthy, and they always say that, so then I do not necessarily pay attention to it [whether the food she chooses is healthy and/or sustainable]."

Regarding sustainable nutrition, pupils do not take sustainability into account while choosing their foods.

Looking at the purchases in the school canteens, there is great variety among pupils. First of all, many interviewed pupils do not buy a lot at school, mostly because they think it is too expensive. Instead, pupils take their food from home and/or they buy food in supermarkets nearby their school. At S1 a pupil argues that he always takes his food from home. Very occasionally he does buy something at school, but when he does, he does not really pay attention to whether the food is healthy and/or sustainable. This corresponds with the answer of pupils at S3 who do buy food at school sometimes, but argue that they do not pay attention to whether it is healthy and sustainable too. Lastly, the school canteens of S1 and S4 have a water point, which is frequently used by a lot of pupils.

#### 5.1.6 Intentions

The intentions to make (more) healthy and sustainable food choices, differ among the interviewed pupils. As mentioned in the previous paragraph, most pupils think they already eat rather healthy or healthy enough. For this reason, they are not intended to change this. A pupil at S3 argues that it depends. He wants to keep eating what he does now, but if he gets really sick then he would eat healthier, for example.

Furthermore, a shared opinion among many interviewed pupils is that they would choose more healthy and/or sustainable foods at school if these foods were cheaper (as discussed in section 5.1.4 on perceived behavioral control). Price is a limiting factor here. All pupils agree on the fact that healthy food is too expensive in their opinion, not only at school but also in supermarkets. An example is given by pupils at S3:

Pupil 1 at S3: "When you go to the supermarket, they have these pieces of mango fruit..."

Pupil 2 at S3: "Yes, that's very expensive too."

Pupil 1 at S3: "... I really like that, but you already pay 3.50 / 4 euros for that, so I think, yes, I am not going to buy that."

Interviewer: "So it is really just the price?"

Pupil 2 at S3: "Yes."

Pupil 1 at S3: "Otherwise I would have bought it."

Pupil 3 at S3: "Smoothie, or something like that, is also so expensive."

Pupil 2 at S3: "A small bowl of raspberries contains very little, and you pay 3 euros for it."

Pupil 1 at S3: "Even if it is just very tasty, (...) I do not buy that because it is so expensive."

Regarding sustainable nutrition, some pupils argue that they could eat more sustainable foods for the sake of the environment. At S1 most pupils argue for eating more sustainable foods:

Pupil 1 at S1: "I just want my kids to be able to just walk happily on this globe later on as well. Then I think we can all help a little bit with that. That everyone later on just still, yeah..."

Pupil 2 at S1: "Yes. If everyone would just lend a hand, with sustainable food, then things would already be much better."

However, in general most interviewed pupils do not have the intention to change their food choices towards more sustainable ones.

### 5.1.7 Overview Food choice behavior

Table 6 gives an overview with the summarized outcomes for all determinants of food choice behavior of pupils.

**Table 6. Summarizes outcomes for all determinants of food choice behavior of pupils.**

Concept	Summarized outcomes
<b>Knowledge</b>	<ul style="list-style-type: none"> <li>- Limited knowledge on healthy nutrition: mainly vegetables and fruits, and 'Schijf van Vijf' (Voedingscentrum) also mentioned regularly.</li> <li>- Minimal to no knowledge on sustainable nutrition (environment is mentioned sometimes), with an exception for S1 where sustainability is a central theme at school.</li> <li>- The combination of healthy nutrition and sustainable nutrition says nothing to almost all pupils.</li> </ul>
<b>Attitude</b>	<ul style="list-style-type: none"> <li>- Attitudes on healthy and sustainable nutrition differ among pupils.</li> <li>- In general, healthy nutrition is considered rather important.</li> <li>- Some pupils think sustainable nutrition is not very important, while others think it is important for the environment (e.g. for the environment).</li> </ul>
<b>Subjective norms</b>	<ul style="list-style-type: none"> <li>- Pupils agree that opinions or approval of friends or classmates do not influence their own food choices.</li> <li>- Seeing others buy or eat certain foods can make pupils feel like buying it too, but they do not think there is peer pressure.</li> <li>- However, some school employees think peer pressure is often the case among pupils.</li> </ul>
<b>Perceived behavioral control</b>	<ul style="list-style-type: none"> <li>- Consuming healthy nutrition is considered not very difficult, if it is tasty and cheap.</li> <li>- Consuming sustainable nutrition is considered hard.</li> <li>- High price of healthy and sustainable foods is considered a limiting factor; this makes it harder for pupils to choose these foods over cheaper unhealthy and unsustainable foods.</li> </ul>
<b>Food choices</b>	<ul style="list-style-type: none"> <li>- All pupils are content with their current diet.</li> <li>- Most pupils think they eat rather healthy, while some think they could eat somewhat healthier.</li> <li>- Pupils do not take sustainability into account while choosing their foods.</li> <li>- Many pupils do not buy a lot at school, mostly because they think it is too expensive (limiting factor). Instead, pupils take their food from home and/or they buy food in supermarkets nearby their school.</li> </ul>
<b>Intention</b>	<ul style="list-style-type: none"> <li>- Most pupils think they already eat rather healthy or healthy enough. For this reason, they do not have the intention to change this.</li> <li>- A shared opinion among many pupils is that they would consume more healthy and/or sustainable nutrition at school if these options were cheaper. All pupils think that healthy food is too expensive, not only at school but also in supermarkets.</li> <li>- Regarding sustainable nutrition, some pupils think that they could consume more sustainable nutrition for the sake of the environment, but most pupils do not have the intention to change their food choices towards more sustainable ones.</li> </ul>

## 5.2 | Policies and practices canteen

This section discusses the collected data on current policies and practices in school canteens.

### 5.2.1 School canteen policy

For the concept 'school canteen policy' this study investigates what guidelines and policies exist on what is sold with regard to healthy and sustainable nutrition (e.g. in contracts with external parties), who decides on the assortment and prices in the school canteens, and what is prohibited in the schools. It turns out that the policy and the amount of guidelines/rules on nutrition differ among the schools. For this reason, this paragraph discusses the findings per school. Firstly, the policy on what is sold is discussed per school. Secondly, policies on prohibited nutrition are discussed per school.

#### ***Policy on what is sold***

The school canteen at S1 is run by a small extern caterer. There is a contract between the caterer and S1. The school does not want the caterer to offer too much unhealthy foods, but besides this requirement, there is not much policy on the assortment or finances. The assortment is determined by the caterer, but changes in the assortment are always in consultation with the school (with the head concierge). Thus, the caterer never changes the assortment without approval of the school. The caterer bases her assortment mainly on supply and demand. The main reason for this is that it prevents food from having to be thrown away, which is advantageous from a sustainable as well as financial point of view. The caterer also keeps an eye on the guidelines of 'Gezonde Schoolkantine' of the Voedingscentrum. The caterer and S1 are not attached to this concept and there is no policy on this, but the caterer uses the guidelines for inspiration. Sometimes she takes the guidelines into account, but she also has to pay attention to what pupils want because of her margin of profit. Lastly, the caterer has a supplier who delivers ingredients weekly, but she also buys some products in local supermarkets or at a wholesaler in case this is cheaper than what her main supplier offers. A few ingredients are home grown, like arugula.

The canteen at S2 is run by the school itself, mainly by one canteen employee. A few years ago, S2 was attached to the concept 'Formula Break Point', focusing on healthy nutrition at school. Now S2 is not attached to this concept anymore, but the canteen assortment is still partly based on it. Currently, there are no fixed guidelines or policies on healthy or sustainable foods; the canteen employee is free to choose what to offer in the canteen. However, changes in the assortment are in deliberation with the facility manager at school. The school has a contract with one big wholesaler, because this wholesaler was connected to the 'Formula Break Point'. For this reason, most ingredients and products are still ordered there. However, the school is free to buy additional products elsewhere too. S2 also has two other suppliers for the drinks and the bakery products.

At school S3 and S4 there are external caterers. S5 has an external caterer too, except for one location where a project is going on with students running the canteen. S3, S4 and S5 are all attached to the concept of 'Gezonde Schoolkantine' of the Voedingscentrum. Thus, all extern caterers have to follow the guidelines of the Voedingscentrum in the school canteens and vending machines. These schools aim for a 'Golden scale'. Therefore, they offer at least 80 percent 'healthy' foods and drinks according to the guidelines of the Voedingscentrum. 20 percent of the assortment is 'less healthy' according to the guidelines of the Voedingscentrum.

At one location of S5 students run the canteen. This project is in the starting phase and a professional canteen employee is still working in the canteen to help the students. There is no policy on foods that should be offered, but the students are supervised by the canteen employee and some teachers.

At S5, the Service Specialist Facility (SSF) argues that the combination of healthy and sustainable is not part of the policy at S5 right now; it is only handled separately:

SSF at S5: "We do not concern ourselves with that."

Interviewer: "Is it more separate, healthy and sustainable?"

SSF at S5: "Yes. (...) indeed, you put it very well. We are working on health, with the guidelines of the Voedingscentrum. And sustainable: we have a Sustainable project group within S5, which includes waste, the climate, landscaping, transport, mobility..."

Interviewer: "And focused on food? Or isn't there?" [policy that includes sustainable food]

SSF at S5: "Nutrition is not included at the moment, but of course I am in it myself. And eventually I got involved, so to speak, because I looked at the packaging and that sort of thing. And in terms of sustainability, in any case, we are also looking at 'okay, what is the food waste at the locations?' and to get a better grip on this."

### ***Policy on prohibited nutrition***

Regarding policy at school on prohibited nutrition, at S1 a few rules exist. Examples are not eating in class, not leaving the schoolyard for first and second graders and a ban on energy drinks. However, pupils as well as employees agree on the fact that these rules are not followed as they should. A pedagogical employee argues:

Pedagogical employee at S1: "I notice right now here, the first and second graders are very much into the energy and chips; they go to the Coop, while in the rules they are not allowed to leave the square (...) but go anyway."

The caterer at S1 argues for more school rules in order to get pupils eat healthier at school:

Caterer at S1: "I sometimes see fries come in there, (...) Then it is fetched and then it is eaten in the canteen. Then I think: if you [S1] really want to go to a healthy school canteen, then in turn I say 'then you should also ban that'.

At S2 there are several prohibited foods at school. Examples are pizza, chips, energy drinks and foods from McDonalds. Pupils agree that some of the rules could be taken off because it is quite a lot. At S3 pupils are not allowed to eat in class. Some teachers also forbid drinking in class. The consumption of energy drinks is prohibited, which is known among most pupils. Some pupils also argue that big packs of Fristi and chewing gum are prohibited. Other pupils also think eating chips is prohibited, but the facility manager at S3 says this is difficult because of existing contracts and the supermarkets nearby:

Facility manager at S3: "We had in the school rules that we were not allowed to have large bags of chips in the school, and no large bags of candy. But I am having some sort of discussion with (...) [the caterer] about that, that we have to offer everything that is in that vending machine [which is based on the guidelines of the Voedingscentrum], so I cannot get rid of that now. If you walk past it, you can see what is in it; so there are chips bags in it. But that is because we are still tied to the contract [with the caterer]. But I would prefer not to see that in the school again. Of course, you can never completely prevent it, because there is a supermarket nearby that they can also walk to during the break, at least from the second year.

Yes, then you cannot prevent them from bringing in a bag of chips once. But we do not really want bulk packaging at school.”

At S4 the only ban is on ordering hot meals to be delivered at school:

Chief concierge at S4: “In that period of Corona, nothing was open, no eateries open, they [pupils] were not allowed to eat there, and then they even came here with hot food. We even tolerated that a bit for a while because we were only banning, banning, banning. But at some point we had to turn back, because it just got so extreme.”

At last, at S5 there are no rules about certain nutrition that is prohibited at school.

### 5.2.2 School canteen practices

This paragraph discusses the nutrition that is offered in the school canteens. In general, the opinions of interviewees differ regarding healthy and sustainable foods in the canteens. Therefore, the findings are discussed per school.

#### ***School 1 (S1)***

At S1, where the canteen is run by an external caterer, mainly paninis and sandwiches are sold. There are several types of paninis: panini chicken satay, panini pesto-mozzarella-tomato, panini ham-cheese, and panini salami. The sandwiches are: cream cheese with brie and cucumber, ‘broodje gezond’ (a so-called healthy sandwich), also without ham, sandwich egg-bacon, cream cheese sandwich with cucumber and often filet sandwiches. Sometimes salmon or tuna sandwiches and hot chicken sandwiches out of the oven are also sold. Lastly, there is a water point in the canteen.

At S1, pupils agree on the fact that the food in the canteen is all rather healthy. The caterer agrees, but she thinks it would be possible to make it even more healthy. However, this could only be done if pupils buy more healthy foods, which is not the case:

Caterer S1: “I bring it up every time and I try every time to offer all that fruit and that yogurt, but we just notice, and I notice that myself at the school... I had a whole discussion with it [S1] recently... I do want it all, but the pupils have to buy it too.”

With regard to sustainable foods, the caterer tries to use as much own grown ingredients as possible:

Caterer S1: “My daughter is a bit working on that. She is busy with a vegetable garden. And it is also like arugula... Products that I actually use [for catering], she is now trying to grow.”

However, the vast majority of ingredients are bought from a supplier, where the caterer has no say and knowledge of the sustainability of these ingredients. Furthermore, because of the lack of space on the counter in the canteen, there is not much promotion or nudging for certain foods possible. There is room for a few products, to show the assortment, but the rest has to be stored in the refrigerators.

#### ***School 2 (S2)***

At S2 the canteen is run by the school itself. The canteen employee does not have to follow certain guidelines with regard to healthy or sustainable products. She still uses some instructions on what to offer from the ‘Formula Break Point’ concept the school used to be attached to, and she thinks the sandwiches they sell right now are still quite healthy. She is in favor of healthy foods. Therefore, she



did try to offer salads for example, but most pupils did not buy these. Smoothies were not bought either, because these were too expensive for pupils (compared to the supermarket). S2 also has one vending machine with mostly sugar free drinks. Next to this, some 'unhealthy' foods are offered on purpose, according to the interviewed teacher HBR (Hospitality industry, Bakery & Recreation) and the facility manager:

Teacher HBR at S2: "If you are talking about sustainability; we have made choices, in the canteen, if you look for example at the residual waste... They get a sandwich at Lidl [supermarket nearby S2] and then a plastic bag goes into such a paper brown bag. Well, they [these bags] are dropped along the entire route from Lidl to the school. We did not want that, because the environment also suffered from it, we are bothered by it, it does not look nice. So we also indicated 'okay, you know, fine, pupils go to Lidl for such and such products, for example a croissant or a cheese stick, something like that; then we will also include it in our assortment, in the hope that pupils will buy it from us, so that they do not need that paper bag, so that the paper bag does not end up on the street, and so that we keep the students in the school.' (...) It is more expensive here, yes, (...) but a student does not have to walk. So sometimes they make that choice to stay here. As a result, at least less waste is on the street. So that is not necessarily a healthy choice, but if you look at sustainability, there is definitely something in common. And I think that is also a limiting factor. Because sometimes you have to make a trade-off between sustainability and health, because you are dependent on several parties."

According to the facility manager at S2, health comes first, but they do also think about sustainability at school. However, sustainable nutrition does not get much attention at S2. There is no attention for the origin of the product used in the canteen, except for the eggs that come from a local farmer near S2. The attention with regard to sustainability mainly goes to sustainability of packaging of the food at school as well as on the streets (as the quote above makes clear). Furthermore, waste of products is prevented as much as possible. S2 has a restaurant next to the canteen counter for example, where the products and meals cooked in class are sold (for pupils Hospitality industry, Bakery and Recreation (HBR)). Sometimes these products are also sold in the canteen when the restaurant is closed or in case there is any food left.

Lastly, all foods in the canteen are placed on the counter, without paying attention to a specific place for more or less healthy and/or sustainable products. There is no promotion or nudging for more healthy and/or sustainable products at school.

### ***School 3 (S3)***

S3 is attached to the concept 'Gezonde Schoolkantine', thus the extern caterer is obliged to follow the guidelines of the Voedingscentrum in the canteen and vending machines. The school has a so-called 'Golden scale' from the Voedingscentrum. Complying with the contract, the caterer should determine the assortment in deliberation with the school. Following the guidelines of the Voedingscentrum, healthier nutrition is offered in front of the counter, and less healthy choices are offered behind. A caterer employee thinks that the assortment is rather healthy because everything is approved by the Voedingscentrum. She often gets requests from pupils for more unhealthy foods. However, some pupils at S3 argue that the school promotes itself to have a 'healthy canteen', but that the canteen is not very healthy. Some pupils even say almost all nutrition is unhealthy. Furthermore, they argue that

the healthy foods are too expensive compared to the less healthy foods. In the following quotes the pupils elaborate on these topics:

Pupil 1 at S3: "You know what I also think, there may be those healthy sandwiches, but that is another four euros. And then that unhealthy one is very cheap."

Interviewer: "Healthy is actually too expensive?"

Pupil 1 at S3: "Yes."

Pupil 2 at S3: "Yes, sorry, then they want you to eat healthy but then they will make everything expensive. Would you rather buy that? No."

Pupil 1 at S3: "They also said, seriously, at the open day 'this school has a healthy canteen', well that is healthy [sarcastic]."

Pupil 2 at S3: "Very healthy [sarcastic]."

Pupil 1 at S3: "They sometimes have fruit or something, but one banana, very expensive."

The facility manager is not completely content with the assortment at S3 too. According to her, a limiting factor is the contract of S3 with the caterer who has to follow the guidelines of the Voedingscentrum with 20% 'less healthy' nutrition (following the 'Golden scale' guidelines for the 'Gezonde Schoolkantine' of the Voedingscentrum). The facility manager thinks these 20% products are unhealthy and she likes to see less of these products. However, S3 cannot change this right now, because of the contract with the caterer that runs until next year:

Facility manager S3: "I would really prefer to have no more vending machines in the school with soft drinks and crisp bags and those kinds of things. But because we still have a contract with them [caterer], we cannot get rid of that, and we have to offer the range that is currently available. And so that is what I said, that 20% is kind of unhealthy; that is according to the guidelines of the Voedingscentrum." (...)

Interviewer: "So basically you are stuck with that caterer and that contract, but you would really like to have more healthy and less unhealthy [nutrition in the canteen], if I understand correctly?"

Facility manager S3: "Yes. But still according to those guidelines [of the Voedingscentrum]. But maybe in the future [when the current contract has expired] we will say 'we do not want a caterer at all, but we will take care of some sandwiches ourselves with our pupils from 'Dienst en Producten' [Service and Products] or from HBR, that we will eventually sell'. That could also be. So, we are not tied to a caterer."

According to the facility manager, in the future the school wants to do more with the concept 'Gezonde School'. The plan is to do this when they move to another location next year. This is also the moment the school will decide to keep the caterer or run their own canteen, because then the contract expires.

Lastly, in the canteen at S3 there is no attention for sustainable nutrition. The caterer employee does not have much knowledge on this topic. Like S2, also at S3 sustainable packaging is something attention is given to. Instead of plastic packaging and forks, S3 is using paper ones.

#### ***School 4 (S4)***

At S4 there is a water point in the school canteen. Just like S3, S4 is also attached to the Gezonde Schoolkantine from the Voedingscentrum, aiming for the 'Golden scale'. Therefore, a certain percentage (80) must be 'healthy nutrition' (approved by the Voedingscentrum). The rest (20 percent)

could be 'less healthy'; for example, the school is allowed to offer salt popcorn and light products. Just like the facility manager at S3, at S4 the caterer employees are not sure about the health of the products they sell while following the guidelines of the Voedingscentrum. They refer to light products without sugars but with all kinds of sweeteners, for example. They think these products are not healthy.

With regard to sustainable nutrition, S4 is quite similar to S3. A caterer employee argues that they do not give attention to sustainable nutrition, but they do try to minimize waste. To prevent food waste, the last break they sell empty and on Friday afternoon foods sandwiches are sometimes discounted. The employee states:

Caterer employee at S4: "We are not working on that [sustainable nutrition]. To that extent, we are sustainable in that we try to keep as little waste as possible every day. This is also a form of sustainability, that we do not have to throw away anything as much as possible. Like the last break, we really do sell empty too, because we then say 'otherwise we have to throw away too much'."

With regard to the origin of the foods, a caterer employee argues that most of the foods come from far, which is not sustainable:

Caterer employee at S4: "The products come to us from far away because our supplier is located in Brabant. So, he drives here once a week with our products, which is not exactly a sustainable form of... (...) Yes, the dairy here comes from local farmers. We have been doing that recently. So, there is already a change in that."

Thus, the only product that does not come from a big supplier is the dairy. The caterer employees agree that the foods should be much more sustainable at school, but that it is difficult. This is because of the irregular opening of the school and therefore the canteen, due to school holidays. This makes regular orders from local farmers difficult. Also, according to the caterer employees, sustainable nutrition comes often with a price tag and pupils cannot afford it.

### ***School 5 (S5)***

Lastly, at S5 the canteens are run by the school and all locations are attached to the 'Gezonde Schoolkantine' concept of the Voedingscentrum, except for one location. The locations that are attached to 'Gezonde Schoolkantine', follow the guidelines of the Voedingscentrum. This also means certain placing of foods, where healthier foods are placed in better places than less healthy foods (for example at eye level). A pupil states the following about healthy and less healthy products in the canteen:

Pupil at S5: "I do not know how healthy you want to call a 'broodje gezond' (healthy sandwich), but they have that. And then usually snacks, something like croquette or whatever."

With regard to sustainability, the service specialist facility (SSF) at S5 mentions vegetarian options. However, he does hesitate about the health and sustainability of some of these products:

SSF at S5: "Vegetarian products, of course, also need a whole treatment and a whole lot of happening, so... But that is just how I look at it myself. It is always a bit of a question of 'what is sustainable?'"

Interviewer: “Because where does all that come from again, in terms of origin and sustainability?”

SSF at S5: “Yes. How many e-numbers and how many... Should I call it supplements or whatever. What has been put in it all, so to speak. (...) I have talked to the Voedingscentrum about it sometimes. Because the Voedingscentrum really says 'this much is the predicate', that this is more sustainable. That is right, but in terms of health that is also the question because very often it has a lot of salt in it. And of course that is not very conducive either.”

Furthermore, S5 has a contract with a wholesaler for all their products, but this wholesaler cannot meet all wishes of S5. In the contract a part does include sustainability, like ‘How is it delivered?’ and ‘Is it a supplier from reasonably nearby?’

On the location where pupils run the canteen (with supervision and help of canteen employees), there are no guidelines or rules regarding healthy and sustainable nutrition. In terms of healthy nutrition, a canteen employee is sure that the assortment is healthier now than it was before the students ran the canteen. Before they had candy vending machines and unhealthy foods. For example, they had sausage rolls and ‘appelflappen’ at 10 o’clock in the morning, but they do not sell this anymore according to the canteen employee. However, some pupils state sometimes there is a chicken snack from the fryer in the morning at 10 o’clock. Other examples of nutrition in the current canteen are: ‘broodje gezond’, filet sandwich, wraps with vegetables (like cucumber, lettuce, tomato), Breakers and homemade smoothies (instead of Fristi that was sold before). In this canteen there is no specific place for certain foods. With regard to sustainability, all packaging is made of paper now, which was plastic before. Sustainable nutrition is a topic the students have been concerned with lately. They are, for example, searching for local products. However, this is all just in the starting phase.

### 5.3 | Policies and practices education

At all interviewed schools there is some kind of education about nutrition, but the amount and content on healthy and sustainable nutrition differs. In this section the results regarding education on healthy and sustainable nutrition is discussed per school.

#### 5.3.1 Education at S1

In contrast to all other schools, at the investigated location of S1 sustainability is a central theme in all practices at school. The school is connected to the ‘Whole School Approach to Sustainability’. For this reason, the Sustainable Development Goals are kept in mind at school and also a project week ‘Make Earth Cool Again’ was organized recently (MECA-week). The MECA-week is a project week of year 1 in which the practical subjects were entirely devoted to sustainability, but also in connection with ‘AVO’ subjects (general subjects like mathematics, history, geography, et cetera). Here, sustainability is discussed in a broad and activating way. It is discussed in relation to cosmetics, packaging, and production processes of jeans, for example. With regard to sustainable nutrition, there were all kinds of assignments that students could choose from. For example, there was a taste test in which the differences between a vegetarian ‘bitterbal’ versus a meat ‘bitterbal’ were discussed.

In lower classes pupils have a course called 'Groene Wereld Oriëntatie' (GWO; Green World Orientation). According to a pupil at S1, pupils learn how to eat healthy. In practical lessons GWO pupils also cook sometimes. For example, they have to make a healthy meal and learn about fats, dairy, proteins, and what you should consume more and what less. In this way pupils learn what nutrition is healthy. Next to this, in first class there is a course called 'Eetbare Tuin' (Edible Garden). Around the school is a vegetable garden that is maintained by first graders. They maintain it and afterwards they can use the ingredients themselves. A teacher Biology and GWO says the following about this:

Teacher Biology and GWO at S1: "We prefer things that are made here locally. We use no pesticides, no fertilizers, we do everything manually. And we have tap water now, but that will be recycled water in the future. So, we think sustainability, and locality, and without toxins, are increasingly important. And that is also becoming more widely accepted. In the beginning it was 'oh, what a hassle', and now we actually think it is normal."

In year 3 there is also a lesson theme called 'Van boer tot bord' (from farmer to plate), a theme in which a whole production process of a meal is investigated. An example is given by a teacher at S1:

Teacher Biology and GWO at S1: "We went to a biodynamic farm, and then they had to replace part of that whole product with organic things, to make a CO2 reduction. And they had to tell that in a presentation. So that is part of it. (...) Imagine, a farmer produces, and you collect it from the farmer, and you go there by bicycle, your CO2 is of course very low because you are using very little fossil fuels. But if you collect it from the supermarket, for example, then of course there is a whole chain before the supermarket. The farmer who initiates a transport, that goes to the auction, that goes to... Well, that is a lot. But they [pupils] have to make it transparent, that is a whole process, what we see then. And then it also becomes clear, if you have a picture of 'hey, how many steps are in between', or you get it yourself directly from your neighborhood. (...) And Corona has also brought into focus how dependent we actually are on the global economy. And also of all the transport that did not exist at the time. Then it became really clear 'hey, that comes from far away'. And now with Ukraine [that is in war] it is also very clear; our grain... (...) That is in our theme 3 in grade 2, 'From farmer to plate' is the name of that lesson theme."

Besides the course Biology in which nutrition is also discussed to some extent, S1 has a so-called 'Green profile', and upper graders can choose between five 'green worlds', of which one is 'Gezonde Wereld' (Healthy World). Here, themes like the 'Schijf van Vijf', healthy nutrition, sustainability and local production are discussed. According to a teacher of Biology and GWO, the importance of these themes has partly become clear through 'Eco-Schools', but also because of societal awareness.

In school policy, there is a so-called 'Integrale Opdracht' (IO; integral assignment) in which is defined what should be educated, also with regard to nutrition. In an IO, all theories come together in a target assignment on which they will be assessed. The content varies from making something to explaining or presenting. Furthermore, pupils need to follow their 'PTA' (Programma van Toetsing en Afsluiting), which is a so-called 'programm of testing and closure'. The desired competencies are nationally agreed on, but S1 also is attached to Eco-School and therefore has a 'Green Flag'. To achieve this flag, they also need to fulfill some additional requirements. Pupils have influence on this; they do a so-called Eco-scan every year. The supervising teacher only has a facilitating role in this process. The pupils point out what goes very well at school, but also what can be improved. The school staff follow most of the

advice of Eco-School pupils. In this way the school is working on sustainability from different points of view. As agreed on at S1, sustainability is something they do not want as a separate part in all their practical lessons. Therefore, it is integrated everywhere, i.e. also discussing separating waste and less energy consumption. Although this is also experienced this way among interviewed pupils, a teacher GWO and Gezonde Wereld (GW) is still critical about the integration of sustainability topics:

Teacher GWO and GW at S1: "The MECA-week; I personally thought it was really great, really amazing, but then it has to be followed up. (...) How does that become a part of education?"

Teacher and mentor at S1: "And of course we are already doing a lot of it."

Teacher GWO and GW at S1: "Yes, but it is all separate."

Teacher and mentor at S1: "Yes, separate..."

Teacher GWO and GW at S1: "Separate pieces. We are doing something about waste, what you see here, waste separation. (...) And also getting an insight into what it all costs, in terms of pollution, to make something."

### 5.3.2 Education at S2

S2 does not pay a lot of attention to healthy and sustainable nutrition in education. At this school, education is mainly based on the policy in terms of the exam material. When asking a teacher HBR (Hospitality industry, Bakery and Recreation) whether attention is given to healthy nutrition in his lessons or not, he argues:

Teacher HBR at S2: "Yes and no. Of course, we have a curriculum that we have to deal with every year. Students work towards an exam. The exam also includes healthy food. But nutrition in general, that is central here. Of course, we try to explain to students that if we beat whipped cream, for example, they have to weigh the sugar; that you always get a constant quality... but it is of course also much healthier. We also try to explain to students that, for example, they only use the salt in a meal at the end of the production process, so that there is not too much salt on it. And in that way, we try to explain to students that healthy cooking is important."

With regard to sustainability, there is no policy on sustainable nutrition. The only theme that is discussed during cooking lessons or lessons HBR is awareness of food waste. The importance of separating waste is something pupils are aware of:

Teacher HBR at S2: "I think they [pupils] have more knowledge of healthy food here than sustainability. But at the same time, the students are aware of the fact that we do not separate waste here, for example. And they say that too."

Interviewer: "And what do you think about that?"

Teacher HBR at S2: "That they are right. I would prefer to have several types of containers here; one for the biodegradable waste, and one for the residual waste, and you name it. And one for the glass. But as I said, if we are going to do that, then it is going to be thrown outside into one big container, because the garbage service... they do not want to come by more often, because it costs money."

Interviewer: "So that is a limiting factor?"

Teacher HBR at S2: "Yes, that is really a limiting factor."

### 5.3.3 Education at S3

According to the facility manager (FM) at S3, the school is trying to make school employees more aware of health in different ways:

Facility manager at S3: “For our employees, every week, twice a week, we offer fresh fruit, free of charge. And coincidentally, last Tuesday we had a professionalization meeting (...). Teachers [of the sport courses at another location of S3] explained to us as employees what the sports line entails and we also made a healthy lunch together. And those are things we [S3] do want to make our employees aware of as well, that you can be sporty and also eat healthy. So, we cooked something together and then we took a walk. So, we are consciously working on emphasizing this within the team.”

Most education at S3 is methods or curricula driven. Education on healthy nutrition is included in the curriculum of some courses. One of these courses is ‘Zorg & Welzijn’ (ZW; care and well-being). This course is broad, with different target groups, from elderly care to facility, and with parts about cooking but also personal care. Nutrition is also part of this. Teachers ZW argue the following about the topic of healthy nutrition in their lessons:

Teacher 1 ZW at S3: “If you are talking about healthy food, yes, that they really get to know the ‘Schijf van Vijf’, and what nutrients are in it, what it does for your body, what it gives your body, vitamins, minerals. So, they get that too. And we try to cook... it is not always feasible, but generally healthy meals. Because you also have an assignment that you have to deep fry, something with bitterbal or... We actually skip that for example, as far as possible and feasible.

Teacher 2 ZW at S3: “Yes, as healthy as possible. According to the ‘Schijf van Vijf’.”

Thus, pupils are involved with healthy nutrition, especially with ‘What nutrients are important, and why?’ And depending on the target group that is discussed in class, the content about nutrition varies. For example, in discussing the childcare theme, pupils learn about nutrition and children or babies (like fruit juices). In this way nutrition is something that comes back with all target group themes pupils learn about:

Teacher ZW at S3: “And with some [themes] it is really cooking, and with others it is more indeed theoretical, like with the energy drink of ‘how many sugar cubes are in it’. So, it is not always in practice, but theoretically it [nutrition] is something that appears in every theme.”

With regard to policy, teachers ZW argue that they follow the material in their books. There also are some national guidelines on nutrition as a topic in education, but the teachers think these can be improved with regard to healthy nutrition:

Teacher 1 ZW at S3: “We have the national requirements, and the national requirements are very general though. And then it is particularly about that combo of healthy food with the target group. You are talking about certain chronic diseases that require a specific diet. And the ‘Schijf van Vijf’, the knowledge of the ‘Schijf van Vijf’... And that is where it ends, if you are talking about the national ones.” (...)

For sustainable nutrition, the teachers ZW are not aware of any national guidelines at all. They think more study material on sustainable nutrition should be developed, because currently sustainable nutrition is not part of the curriculum and books. The teachers are not really familiar with sustainable nutrition themselves. They do try sometimes to work with sustainable products or vegan products, but

these are topics that they come up with themselves to add to the lessons. For example, they teach about footprints, but this is just a very small topic and pupils do still not know much about it according to the teachers.

Furthermore, the teachers are not really familiar with the link between healthy and sustainable nutrition. For the teachers ZW there is no automatic link between these concepts. They link sustainability more with fashion or stuff at home than with nutrition, while they do see the link between health and nutrition. However, sustainability is a topic that is recently getting attention among school employees:

Teacher 1 ZW at S3: "We did have a working group the day before yesterday (...), sustainability and farm were linked and the question was: what practice assignment can you come up with that is educational for grade 1 and 2, regarding sustainability and farm." (...)

Interviewer: "That was given to you as an assignment as teachers?"

Teacher 1 ZW at S3: "We got that as an assignment from a working group, yes."

Teacher 2 ZW at S3: "To develop that. So, the theme [sustainability] has actually been put there, like 'we want to do something with this', but there is actually nothing real going on yet. (...) In any case, not that we know about. Maybe it is at HBR [Hospitality industry, Bakery and Recreation], I do not dare say."

Teacher 1 ZW at S3: "But so that was the first time we were confronted with educationally doing something with sustainability."

Regarding attention to healthy nutrition in the course HBR (Hospitality industry, Bakery and Recreation), a teacher HBR thinks it is important that pupils learn to work with fresh ingredients and make a meal with these ingredients for guests in the restaurant at school. With regard to guidelines or policy on what should be included in lessons on healthy nutrition, this is limited. Knowledge of what healthy nutrition is, is not specifically educated. However, in the kitchen specialization module there is a focus on the value knowledge of certain products:

Teacher HBR at S3: "In the kitchen specialization module it does go more into real value knowledge, so the knowledge of the products. Different types of mushrooms, the pasta types, the vegetables... So that does get a lot of attention in the classes."

Interviewer: "Just what nutrition is and what kinds of nutrition are out there?"

Teacher HBR at S3: "Yes. And in practice, of course, we also just try to have a range of fresh produce; different every week. So today broccoli, next week asparagus, then we do something with zucchini..."

Interviewer: "So variation?"

Teacher HBR at S3: "Yes, we always try to include that in the preparations and in the menus."

Interviewer: "And do you follow certain guidelines or requirements, or is there something on paper, in terms of what you offer in the lessons about healthy or sustainable food?"

Teacher HBR at S3: "No, we are completely free to determine that ourselves. And also the choice of the supplier."

Sustainability is only a small part of the theory in one of the HBR books:

Teacher HBR at S3: "In the theory in the book 'kitchen', I think that is a little bit. That is about sustainability. And then you are also talking about planting your own vegetable garden, for



example, or growing and using herbs yourself. (...) It is very limited what the pupils need to know about that [sustainability].”

They did try to use their own vegetable garden with herbs for the lessons HBR, but because of the six weeks of summer holidays this was difficult to maintain. However, next year when S3 will be located elsewhere, the plan is to try to make more use of regional entrepreneurs and suppliers for their purchases in the bakery. This also includes visiting local farmers, for example. Although the teacher HBR argues that such activities come with a price tag, this is not really an issue because they work with a budget. However, the current exam learning outcomes restrict these kinds of practices. There is a fixed program with a theory and practice, which should be followed. This results in very limited space to organize these kinds of new practices. Time is really a limiting factor here.

Next to ZW and HBR, the learning methods of ‘Mens en natuur’ (Human and nature) also cover a bit on healthy and sustainable nutrition, but this is not very specific according to the location manager of S3.

#### 5.3.4 Education at S4

At S4, in the course ‘Verzorging’ (care) teachers work with a very outdated method. According to one of the teachers, they teach mainly at their own discretion. This course includes a variety of themes, like a very small part about economics, how to handle money, a small part about sex education, how to get along with each other, peer pressure, and also a very small part about nutrition. The part about nutrition is one chapter in the first class, at the end of the year. A teacher says the following about education on healthy nutrition:

Teacher of care at S4: “We have only been able to cover that chapter halfway because the time is just too short really. It is mainly about what is in food; vitamins, minerals, fats, how to eat healthy, the ‘Schijf van Vijf’, we have an assignment about that. But it is very general.”

Next to this one chapter on healthy nutrition, they have some practical activities. Overall, the teacher thinks four lessons are dedicated to the topic of nutrition during the year. With regard to policy on education about healthy nutrition, the teacher of care argues this topic is not mandatory:

Teacher of care at S4: “For care we then work with a PT [program of testing], but we set it up ourselves. And of course, care is not an exam subject. So, if we do not consider food to be important, then we could leave it out too. It is not that it is mandatory nationally to take that in care classes. And whether it is compulsory to do it at school at all and then in the project week or whatever, I dare not say that.”

In that PT (program of testing) now only that one chapter on nutrition is included. And pupils get one assignment on the ‘Schijf van Vijf’. These are the parts the teachers choose to include in the PT, but that is not mandatory. Furthermore, the teacher of care never thought about sustainable nutrition and this topic is not included in her lessons anyway. She is not sure whether it is part of another course in higher classes, but she thinks S4 is not much concerned with the topic of sustainable nutrition. The teacher herself is also not familiar with the combination of healthy and sustainable nutrition.

Finally, there are also project/activity weeks at school with workshops. Before the Corona pandemic, S4 organized these activity weeks, for example with a visit of the GGD (Municipal or Community Health

Service). In such weeks, several topics were addressed, and nutrition was one of them. According to the chief concierge the school wants to bring back these activity weeks in the future.

### 5.3.5 Education at S5

At S5 it depends on the direction of study pupils do, whether their program includes education on nutrition. In the curriculum for the study Facility Manager (FM), themes that are discussed are catering, safety, cleaning, logistics, leadership, and management. Some students FM are running the canteen on one of the locations of S5. There is not much about healthy nutrition in the FM curriculum because this is not included in the qualification file that teachers need to follow in their lessons:

Teacher FM at S5: "I find it very interesting myself. There are now also those elective parts. You are looking at 'what is in the qualification file that we have to teach about'. And the qualification file does not say much about nutrition. About catering work in general, but that topic of food is not so... it is not very present. Yes, at some point you have to make a choice of what to teach and what not."

Interviewer: "You mean in terms of time?"

Teacher FM at S5: "Yes, time wise. And I did give nutrition lessons before, and then I went to the Voedingscentrum, and they have a lot of information. (...) I just find that very interesting myself, food and what you eat."

Interviewer: "But you do not have time to teach that during the lessons?" (...)

Teacher FM at S5: "No. Sometimes I do that. And now I will, because we are also working on that catering here [the location with students running the canteen], it is easier to do that now."

Besides the qualification file, which is about the exam requirements, there are no guidelines for FM about healthy and/or sustainable nutrition. In the file there is only a general part that says 'practices caterer activities'. According to the teacher FM, the elective part 'Voeding, bewegend fit' (nutrition, actively fit) is more in depth about nutrition. However, this elective part is created by the teacher because of her own interest, and it is not exam material. In creating elective parts, they look at what is important in the current market, and they ask students what they think is interesting. Right now, there is no elective part given on nutrition, but the teacher thinks that the coming generation more and more think it is important.

In the course 'Loopbaan en burgerschap' (LB), career and citizenship, there is a part on critical consumption and also healthy living is part of that. However, according to the teacher FM, in FM as well as LB there could be more attention for healthy and sustainable nutrition. She does argue that personal interest of teachers plays a role here too:

Teacher FM at S5: "Of course, that has to do with the teacher standing in front of the class."

Interviewer: "Because it is not mandatory? Or...?"

Teacher FM at S5: "Well, of course, if you, as a teacher, find something interesting and know a lot about it yourself, then of course you will teach more about it sooner, or if you are more enthusiastic than when you do not know much about it and you are not actually doing something with it yourself."

In the study direction Consumptive Techniques (CT) pupils have cooking lessons and theory lessons about cooking. Besides, they have some other courses related to dieting, for example. There are elective courses, which can be 'wine knowledge' or 'eating cultures and wishes'. 'Eating culture and

wishes' is about dieting, religion and what wishes guests can have about nutrition. There is a restaurant in the building and what is cooked in class during CT is consumed there. With regard to healthy and sustainable nutrition, a teacher CT states:

Teacher CT at S5: "What we use at school here is actually the 'Schijf van Vijf', which we take as a basis, because it is actually very clear to the students. And what I personally always tell all students, is the principle of moderation. That you can actually eat anything, but moderation is the biggest challenge. So not too much of one thing and not too much of another. We are very much fans of local products. (...) Sustainable and regional products are two separate groups of course; it does not necessarily mean that if you have a regional product in the house that it is also very sustainable. You have to keep an eye on both. And unprocessed products are important to us as a team. So, what you give to guests or what you eat yourself; that you know what you are eating. (...) And for a cook, that is very important anyway, because when you give something to the guests you have to be able to tell exactly what the guest eats. What you make, someone else puts in their mouth. Is quite a responsibility."

With regard to healthy nutrition, in the elective course 'eating cultures and wishes', there is a part on nutrition, about micro and macro nutrients, and what this does with your body. Furthermore, students CT are educated about nutrition every day. A year line and a whole curriculum have been written out. Furthermore, there is a lot of value knowledge and craftsmanship, including information about products. Healthy nutrition is intertwined in these themes.

With regard to sustainable nutrition in the study direction CT, there is a course 'Achterhoek Food' in year 2, in which the focus is on local products and how these can replace products from a supermarket or the wholesaler of S5. For CT, S5 has a contract with a wholesaler. This contract is different from the contract between the wholesaler and the canteen at S5. For lessons CT, S5 has more freedom to buy products elsewhere. A teacher CT does acknowledge that it is for business, financially, convenient to have tenders with the wholesaler, because it just saves money for S5. Also for 'Achterhoek Food', there is a year line. It is the second year this course is available, so they are still adjusting the year line but most of it is already written out. In the course, next to lectures of teachers about Achterhoek Food, local suppliers also come over to talk about their practices. In this way there are guest lectures several times per year about regional producers.

Lastly, the Senior Education Manager (SEM) for the directions 'Hospitality industry', for 'Tourism and recreation', for 'Bread and pastries' and 'Safety' mentions that healthy and sustainable nutrition is part of the education programs:

SEM at S5: "Of course we have a qualification file, and of course that qualification file describes exactly what the students should know and be able to do. And there they really do learn nutrition; what food does to you, what is in food, they have taste lessons, they have labs. (...) In addition to their practical lessons, how should you prepare foods, what should you pay attention to, et cetera. And what do proteins do in food, what happens to the fats. For example in butter, in margarine, there are also pieces of plastic in it to keep it spreadable. All that sort of thing. Look, I do not exactly know the content, but I do know that we pay a lot of attention to it. We call it theory of practice."

Interviewer: "And do you have any guidelines or requirements about certain healthy foods that you should talk about?"

SEM at S5: “Yes, of course we need to be very concerned about healthy food. Of course also about sustainable [food]. But also 'what do you use in that food?'. For example, they always bake with sunflower oil or something, and not with 'Becel bak en braad'. Also because it is much healthier and much better. And there are also suppliers from the region, for example. Then the butcher comes, and he also shows you how to bone half a pig and such, and where that comes from. And that it does not just come from the purple car of the (...) [the wholesaler], but that it really...”

Interviewer: “Comes from the farmers?”

SEM at S5: “Yes, that they also know where it comes from, how it works.” (...) We have wonderful books. From the SDA, which is a book supplier, and they really like how you... With videos and teaching materials, they also explained how to fry a steak and how to make an egg with an (...) omelet. That is really very well explained.”

With regard to sustainable food and education on what sustainable food is, they have the elective parts 'food culture and people' and 'sustainability'. In these parts culture is discussed with regard to nutrition. Another example is the discussion about the fact that you would better make your own salad instead of buying it at a supermarket. The Senior Education Manager (SEM) argues this is much more sustainable.

## 5.4 | Problems and opportunities

Overall, most school employees think that the responsibility to make pupils consume more healthy and sustainable foods at school, is mostly for schools. It is also often argued that parents play a role in this too. Furthermore, a major problem that has been addressed in all schools, is the price of foods in canteens. For this reason, many pupils leave the schoolyard and buy food at supermarkets nearby.

At all schools, problems and opportunities for interventions regarding (more) healthy and sustainable food choices, are addressed in interviews. This section discusses the most noteworthy ones per school.

### 5.4.1 Problems and opportunities at S1

In general, at S1 pupils and employees are quite content with the current practices regarding healthy and sustainable food choices among pupils at school. There is a growing awareness for these themes at school, among pupils as well as employees. This awareness is created through education on healthy and sustainable nutrition, but also with activities like growing your own vegetables and projects like the MECA-week (Make Earth Cool Again). However, there are some points for improvement addressed in the interviews.

A teacher GWO and 'Gezonde wereld' thinks that in education, health and sustainability can be better connected and combined. The student council brought up the idea to raise more awareness among pupils at school. Currently, pupils sometimes get assignments and cook things in class. In these classes they learn about what is in it and why it is healthy and/or sustainable. The booths at the entrance of the school could be used to sell foods that pupils make in class, with a small explanation on paper about health and/or sustainability. In this way other pupils know what they buy and what is healthy

and/or sustainable about it. According to the student council, this will create awareness among pupils at school.

The student council recently conducted a survey among first graders. This survey was on the opinions of pupils about the 'healthy school canteen'. One of the outcomes is that the amount of sandwiches is fine, but that there should be more variation in sandwiches. For example, some pupils would like to have more vegetables and more vegetarian options. However, the survey also pointed at the fact that a lot of pupils wish for more unhealthy options in the canteen. The pupils from the student council argue that these pupils probably want this because there is a supermarket nearby the school, where pupils otherwise would go for unhealthy foods. However, the pupils that were interviewed for the current study, agree on the fact that the removal of the candy vending machines was a good thing. Now there is less unhealthy food at school, resulting in less temptation to buy such foods.

A possible obstacle for choosing sustainable nutrition is that it is time consuming, because it requires the consideration of transport, production processes and origin. Budget plays a role for pupils in choosing certain foods too; sandwiches, for example, are considered to be too expensive. For this reason, pupils leave the schoolyard and buy their foods outside the school, at supermarkets nearby for example. According to the caterer at S1, it is hard to keep the price of the products in the canteen low. She has been trying to postpone raising prices, but because the prices of her supplier also rise, she needs to raise the prices of her products at school too. She thinks pupils will understand, because in the current society everything becomes more expensive. Furthermore, the caterer often sees pupils in the canteen with foods from supermarkets or other shops nearby. Although there is a rule that first and second graders are not allowed to leave the schoolyard, the compliance with this rule is not very good. The caterer thinks it is the responsibility of the school to change this behavior:

Interviewer: "They come with food that they got at the supermarket? Or at a snack bar?"

Caterer S1: "Yes. (...) That is close by. (...) And they are eating French fries or whatever, or they are having a pizza delivered (...). Cannot tell at the moment if that really happens anymore. But yes, it did happen there once. And then I think, yes, you [S1] have to be consistent and say 'guys that does not happen here'."

Interviewer: "The school, you mean?"

Caterer S1: Yes. Because I cannot say that."

Interviewer: "Because you are external actually?"

Caterer S1: "Yes. I am at that school, and I do my catering and I stick to the rules, and apart from that... I make sure it runs. That is all I can do then. But that is up to the school... But I have indicated that a few times too."

Next to the responsibility of school to make rules about pupils leaving the schoolyard to buy foods elsewhere, a team manager also addresses the role of school employees and parents in changing food choice behavior of pupils:

Team manager S1: "They [parents] have a very important role in that. I mean, prohibiting things here [at S1] is very easy, but in the end, I think you can win more. We were all young, and I do not always eat healthy (...). And there is a bit of peer pressure, and with the energy drink... well, you can sell that nicely, you can make a little money with it. That is all completely normal teenage behavior. (...) But if we also notice, from what students sometimes get from home..."

Interviewer: “But how do you try to influence parents in this?”

Team manager S1: “Yes, of course you have the combination around the GGD, and you sometimes have an information session, and of course we have the information evenings in which we discuss these kinds of things. Then you include certain rules. Sometimes you talk about telephone use, but of course you also talk about food and that sort of thing. When you go to camp, what do you bring and what do you not bring? Little things like that. (...) And with some it is easier than with others. And sometimes it is not at all wrong if they only eat potato chips at school for a month. In the end, that can also have a certain purpose in the long run. But it is not like we are standing here with all these gates in front of the door going 'Hey, show me your bag'. (...) Around food, and the concierges know that too, if they see conspicuous things... And that is really not if someone has a bag of chips once, but if someone drinks energy drinks daily, then that really does end up with the people where it belongs. Initially, that is often the mentor (...) to take a look 'Hey, we have noticed that...' (...) I also have that sometimes when a student comes in here with a can, that I think 'Hey, that is the third time that boy has done that'. Well then, of course, I first speak to him myself, but then we also pass on that signal to the mentor. Because at first, he [the mentor] always has the most contact with home, and also with the student of course.”

Lastly, with regard to the canteen, for a long time there is the idea at S1 to grow ingredients themselves and offer their own products at school:

Teacher and mentor at S1: “How nice it is to be able to offer the stuff that we have grown here (...) in the canteen, or as a snack in between.”

Interviewer: “Is that idea here at school?”

Teacher Biology and GWO: “Yes, for a long time, but that just did not get off the ground. And that is it... Of course, we had a fire and Corona, that does not help, but now we are going a bit back to normal. And also, if you want to, someone has to do it. Because (...) you can want something, but then you have to think of it from A to Z. Because when we have vegetable gardens ready here and you have not cleared everything, you will come back after the summer holidays with a huge gang. And it all stinks, because if you do not harvest cauliflower, it becomes a big stinking mess, and it does not look good. So, if you want to do that well, it takes quite a bit of effort. And in terms of man-hours, that is not always easy. But the idea is there. (...) You have the janitor's kitchen, but you also have a kitchen next to it that belongs to the ‘Wereld keuken’ [World kitchen]. And there you could bring in the products from the garden through the back door and process them and distribute them again via the canteen [to pupils].”

#### 5.4.2 Problems and opportunities at S2

At S2 there is far less awareness of healthy and sustainable nutrition in comparison to S1. Pupils at S2 know little about healthy nutrition and even less about sustainable nutrition. A teacher HBR argues that it can always be useful to give more attention to these themes at school, but that the focus is on the pupil itself who needs to be ready to pass the exam. He argues the following:

Teacher HBR at S2: “I do think that sustainability and health, things that are relatively a choice of the consumer, should not be the most important thing in the learning process. The pupil does need to remain central.”

Interviewer: “So, if the CITO requirements say 'more should be given about this', then you would start doing that anyway?”

Teacher HBR at S2: “Right, then I think we should start connecting.”

According to the teacher HBR, the responsibility for making students choose more sustainable or healthier foods, lies with parents as well as teachers. He argues:

Teacher HBR at S2: “Because we can teach pupils something, but if I see what pupils eat here themselves, or smoke or whatever... Yes, if you are talking about health then, we can all be as good as the Pope, but it will not work.”

Regarding the offer in the canteen, the canteen employee is rather content with the assortment right now. She is content with the overall health of the assortment. Regarding sustainable nutrition, she does not know much about that herself other than the eggs which they get from a local farmer. She thinks it could be more healthy and sustainable, but that will not be feasible because pupils will not buy these foods. An example is salads; she tried to sell these, but pupils did not buy them. The teacher HBR argues that the school could have another look at the assortment, but that budget plays a significant role here:

Teacher HBR at S2: “Well I think you can always take another look at the assortment. That is indeed a very good one. I think if you look at the costs, for example, that we have here at the school now... If we want to buy a product from our wholesaler, and we are going to bake it and offer it to the students, and we want to break even on that, then we are still three times more expensive than Lidl [supermarket nearby S2]. And that makes it very difficult. Because students simply do not have a budget, so they just go to Lidl for the cheaper choice.”

The instructor HBR at S2 agrees to this, arguing that healthy food is much more expensive. Interviewed pupils at S2 agree to the fact that they are willing to buy more healthy and sustainable nutrition in case these foods were cheaper. According to the teacher HBR, not the school but the government should do something about this problem on a national scale. The school canteens should be subsidized so they can offer the assortment more economically. The cost they pay at school for a sandwich is not necessarily very expensive, he thinks, but compared to a supermarket it is more expensive.

#### 5.4.3 Problems and opportunities at S3

Currently, the canteen at S3 is run by an external caterer, offering the assortment in the canteen and vending machines according to the principles of ‘De Gezonde School’ (of the Voedingscentrum). This means a certain percentage can be ‘less healthy’, for example salt popcorn and light products. The caterer employee is content with the assortment because it is all approved by the Voedingscentrum. However, the facility manager is not fully content with the assortment right now, because she thinks it still contains too much unhealthy nutrition. The pupils agree to this, stating that the school promotes having a healthy canteen (approved by the Voedingscentrum), but in reality it is not as healthy as claimed. According to the facility manager, the problem here is that S3 is tied to the contracts with the caterer. When S3 moves to a new location next year, the school wants to profile itself more as a ‘healthy school’, maybe without a caterer.

According to the interviewed pupils, another problem is the price of the foods at school, as also addressed on S1 and S2. Pupils at S3 argue that they would buy more healthy and sustainable nutrition if these foods were cheaper. Besides, unhealthy foods should then also be made more expensive.

Although pupils are familiar with healthy nutrition, they are hardly familiar with sustainable nutrition. Among pupils, more awareness with regard to nutrition can be achieved in education. A teacher of HBR argues that value knowledge of the products should be back in the curriculum. Speaking about sustainable nutrition, he argues that a lot more practice is needed so that pupils get in touch with sustainable nutrition. He thinks a vegetable garden with ingredients for classes HBR would be great. They already tried this with herbs, but it turned out to be difficult to maintain due to the six weeks holiday. Another idea is purchasing ingredients from local entrepreneurs and suppliers for the lessons. The teacher argues that sustainable and regional products come with a price tag, but there is budget thus this will not be a problem. Furthermore, it can be an idea to visit such farmers, for example an asparagus grower, to see what is going on there from beginning to end, followed by making a meal with these asparagus the next day in class. Other examples are visiting a cheese farmer who makes cheese himself, or the mustard fabric nearby. These are examples in which pupils see practices and get in touch with sustainable nutrition. However, disadvantages are the current end terms to which teachers and pupils are bound. Now there is a fixed program, with theory and practice, and there is little space to organize these activities. Although they really want to do such activities, time and space within these programs are the limiting factors here.

Furthermore, in the course 'Zorg & Welzijn' (ZW; care and well-being), nutrition is already part of the curriculum. However, there is only a small part about healthy nutrition, and nothing about sustainable nutrition. Teachers ZW think more attention should be paid to healthy and sustainable nutrition in their lessons. There are opportunities to make assignments about nutrition, for example: what suppliers are here in this region? What do they offer? How does the process go, from beginning to end? However, currently there are no detailed guidelines on this topic, which is desired by the teachers on different levels:

Teacher 1 ZW at S3: "We would feel supported and also feel led if that is also in it from above or from the books. It takes a lot of effort, energy, and time to develop something about that yourself. We are in a flow, in an acceleration, where we have to tick things off. And then creating a new topic, and integrating it into the current one, it is just not usable with the time we get." (...)

Interviewer: "Where does the responsibility lie? And why? (...) Nationally? Higher up?"

Teacher 1 ZW at S3: "Yes, and the policy makers, at school with management as well. Because if we want this, if the school wants this, we must also be given space for it, in terms of support but also in time. And nationally from the PTA."

Teacher 2 ZW at S3: "Because now it says 'healthy lifestyle', for example, that is specifically mentioned. The bit of nutrition, really the basics of 'Schijf van Vijf' and diets, but not... [not many details on nutrition]" (...)

Teacher 1 ZW at S3: "We have been doing this education for a long time, but recently lifestyle does also appear in it, and it includes healthy exercise, or movement in general, less sugars, and your stress and your diet, is described as 'that is a healthy lifestyle'. But I must say it is just touched [not much in details]."

The facility manager at S3 thinks the responsibility to make pupils choose (more) healthy and sustainable nutrition lies with school, but also partly with parents:

Facility manager at S3: "We [S3] do have to encourage it of course, we do have to offer it, so facilitate it. So then that responsibility lies with the school. And also partly the parents of



course. But anyway. Sometimes parents say 'my child can take chips to school', while we say 'well, I'd rather not'. That is tricky of course, isn't it, where do you go from there? But in principle we have to offer the healthy option as much as possible."

The location manager also thinks that it would be great if parents take some responsibility in influencing pupils towards making more sustainable and healthy food choices. At school she thinks that the mentor could have a very guiding role too. This is because mentors have the most contact with pupils on the individual level. On school level she thinks group lessons can be useful; mentors can start the day with a certain topic in lower classes. In upper classes they also have one hour per week in which they can discuss such topics. Although some new teachers teach mostly from the methods in the books, she thinks it would be great if teachers also use actualities. For this reason all teachers are already required to provide two practical-realistic assignments every year. This implies lessons that are not in books but linked to society. According to the location manager, this makes the topics more relevant because it comes more to life, also due to the use of more senses. This also makes it stick more with pupils. She thinks healthy and sustainable nutrition should be the central theme in lessons instead of one lesson about it; it should not be new, but it should be a standard way-of-life that is discussed every day, so that pupils become aware of it:

Location manager at S3: "That can be current events in the newspaper, that we hear that the sugar tax has been introduced in England after all. You can talk about it in mathematics, but you can also talk about it in 'maatschappij' [a course called 'society'], and you can also talk about it in an English class because it happened in England. You can tackle one subject in such a way that you can discuss it in three lessons. (...) That sugar tax, you can of course calculate the percentages, but how much is that and how much do you use. And with English you can indeed specify the country where they entered it, why there. And then you can also do a bit of 'maatschappijleer', which includes the law and regulations. (...) And I mean that by practical-realistic, because then you make it just that little bit different. That you think 'oh, yes I can tell it in English so I am working on a language'. Another [pupil] thinks 'I am doing math; instead of a sum I am now calculating a sugar content... and how many sugar cubes are there in a glass of Coke', for example. Then he gets a completely different picture. Because that is what they tell at home in the evening, when someone picks them up from school. Or that they drink another glass of Coke; 'Do you know how much sugar?' And if you do a sum, 'How much percent is that?', you do not talk about that in the evening, is not interesting."

While considering what resources are needed to make this all happen, the location manager argues that time and money are always easy to say, but she thinks creativity is more important. Of course time is needed, but mostly creativity and space to think about is important. Therefore, teachers should sit together and come up with a class assignment, for example regarding the sugar tax she mentioned. She concludes:

Location manager at S3: "So it is not about time, it is not about money, but I think it is also more about the awareness of 'Hey, we all think this is important, we are now sitting around the table and in an hour we all have an idea about it so that we can discuss it in our next lesson'. If you ask for communication, you get posters, you get videos, but that is so static; you have to live it through (...) and then just brainstorm."

#### 5.4.4 Problems and opportunities at S4

The head of facilities and housing (HFH) at S4 thinks healthy and sustainable nutrition has to be integrated in the education table. She mentions that this will take time because policy is not written within an hour. With this integration a lot of themes within the 'Gezonde School' program will be touched. A plan must be developed on how to integrate the themes in education. The phasing should also be taken into account:

HFH at S4: "When children come out of primary school, what do you offer in the first grade? And how, for example, do you want to follow up on this in the years that follow?"

Interviewer: "That it will be a whole package and not a few individual lessons or information?"

HFH at S4: "Yes. I would like that best, but I do notice the tension there with all the themes you want to deal with."

Next to activities at school, an organization nearby S4 offers presentations for parents and pupils, for which you can sign up. Here they work on awareness, for example on the topic of alcohol consumption. According to the HFH of S4, such presentations can be organized in more disciplines. She thinks it is important to offer such activities for pupils, but that it is also important to include parents in this because parents also have responsibility in this.

With regard to education, a teacher of care does give some lessons on healthy nutrition, but not on sustainable nutrition. She herself is not very familiar with both, and she thinks pupils are neither. Currently, the teacher herself only has the basic knowledge on healthy nutrition, only what is in the books. More education could be given in terms of healthy and sustainable nutrition, for example because of the current society with a lot of overweight children. An idea for in class can be to give practical lessons and give examples to pupils of meals they can eat, instead of just learning theory and making a test, as it is now:

Teacher of care at S4: "They have to make a test about the theory of what the vitamins are and what the minerals are and so on, but then I think in practice they do not learn much from that. I do not think that in a year they will still think 'Oh, I'll eat that banana because it contains a lot of vitamins' or something. I do not think that really."

Interviewer: "Would practical lessons in which, for example, they actually (...) could taste it? Is that an idea?"

Teacher of care at S4: "Yes, that they will make a healthy breakfast together. Or, if necessary, go to the supermarket to see what is there. I just name something."

To realize this, she thinks money is needed to purchase materials. Also cooking classrooms need to be available. In addition, she thinks guest lectures, for example in activity weeks, would be best. Otherwise, teachers need to follow extra trainings to get more knowledge themselves:

Interviewer: "Do you think that more attention should be paid to healthy and sustainable food in the lessons? Does that have to be done in class?"

Teacher of care at S4: "Well I do not know, because that also means that the teachers must have a lot of knowledge about that and then you have to go on further training. So maybe it makes more sense (...) in the activity weeks or in external lessons, that a mentor lesson is once replaced by a healthy food topic"

Interviewer: "That experts come to school?"

Teacher of care at S4: "Yes. Or there really has to be a structural change in the training [of teachers], of course, that is possible."

In the past S4 already organized some activity weeks, for example with dieticians. The teacher of care does not know to what extent the pupils learned something from that. She thinks there is still a lot to be done with regard to the theme of nutrition. However, she does not know how this is in upper classes. The chief concierge also thinks education is the key to stimulating pupils to eat more sustainable and healthy foods. The activity weeks are an example. Such activity weeks are organized by some teachers to address some themes, and nutrition was one of those. In the past (before the Corona-pandemic) the GGD (Municipal or Community Health Service) came in this week to give education on nutrition for the 'Gezonde school' (healthy school) concept. Examples of themes are alcohol, addiction and energy drinks. The chief concierge thinks education as well as policies with regard to such themes could influence food choice behavior of pupils:

Chief concierge at S4: "Sometimes I do wonder if they [pupils] are aware of certain things, real awareness. I also sometimes see children well over 3/4 cans [of energy drinks] during the break (...). And of course that starts with education. (...) But we are just not that far yet, that the energy drink is out, that we are just going to ban it. But I would like to do the same with the chips. I just do not think it is normal [what pupils consume right now]."

Looking at the canteen, pupils agree on the fact that products there are rather expensive. They argue that healthy foods are more expensive than unhealthy foods and that price largely determines what they buy. Here is space for improvement at school because pupils claim they would buy healthy and sustainable nutrition sooner if it were cheaper. Caterer employees agree on the price being higher than in a supermarket, and that a lot of pupils leave the schoolyard to buy cheaper and healthier foods there. However, the school has no rules to prohibit pupils to leave the school, so this remains a problem:

Interviewer: "Thus, school wants to have a 'Gezonde Schoolkantine' [healthy school canteen, according to the guidelines of the Voedingscentrum] ..."

Caterer employee 1 at S4: "But not the responsibility." (...)

Caterer employee 2 at S4: "Yes. Because how many times we say here: 'We stay here with our healthy products, and the whole canteen is full of 'frikandel' sandwiches, sausage rolls, chips.'"

Caterer employee 1 at S4: "And energy drink." (...)

Caterer employee 2 at S4: "And at 10 o'clock. And then I say... Then unfortunately the one who decides that [pupils are allowed to bring or buy foods elsewhere] is not here, but then I say to the concierges: 'Look, and then we stand here with our good behavior, because you [S4] want the Golden scale [according to Voedingscentrum]'. Because school can tell the parents 'We have a Golden Scale, we are a Healthy School', but it really makes no sense at all." (...)

Interviewer: "Because there's actually no ban on them being allowed to leave school?"

Caterer employee 1 at S4: "Yes." (...)

Caterer employee 2 at S4: "But you know, that is what we have been fighting for so many times. (...) I think it is so weird that we are standing here for the Golden scale, we do our best, and then you have to see that they are all eating chips, Red Bull drinking. They [S4] have been trying to ban that, but..." (...)

Interviewer: "In school policy you mean?"

Caterer employee 1 at S4: "Yes."

Caterer employee 2 at S4: “Then you just get parents who call, ‘Why can’t my child take a can of drink to school?’”

Caterer employee 1 at S4: “‘He gets it with him from home, you have nothing to say about it’.”

The assortment in the canteen is now based on the guidelines of the Voedingscentrum, but according to a caterer employee it is not completely healthy after all. Here she refers to sugar free drinks (zero or light drinks) that do contain a lot of sweeteners, for example. She thinks these products are unhealthy. The caterer thinks they cannot change this easily because they are attached to the guidelines of Voedingscentrum who allows these products. According to the ‘golden scale’ guidelines, 80% of what is offered has to be ‘healthy’, and 20% can be less healthy. The caterer employee argues that this is according to *their* rules (of the Voedingscentrum), about which she is critical regarding healthy nutrition.

With regard to sustainability, the caterer employees agree that the foods should be much more sustainable at school, but that it is difficult:

Caterer employee 1 at S4: “It should, but it is just very difficult. Because we have already been working on fruit and vegetables, but because we only sell those 40 weeks, and of those 40 also a lot of weeks not, they could not manage to do that with a greengrocer or something similar that sells fresh vegetables here every week. A local greengrocer. But because it is not a regular thing; you do not have to take that much every Monday. And that was the whole issue.”

Caterer employee 2 at S4: “And that very sustainable thing is fine by me, but sustainability often comes with a price tag. And you just cannot do that with those children anymore. It should actually be as cheap as possible.”

Interviewer: “Is that a limiting factor?”

Caterer employee 1 at S4: “Yes, here it is.”

Caterer employee 2 at S4: “Yeah, twelve years, then you do not have... What do you have, 50 cents a day or something?”

Caterer employee 1 at S4: “Maybe just a euro a week. Yes. Or 1.50 euros a week. So, they cannot get much. And let alone pay a lot. They go for the bag of candy in a vending machine. (...) That is how it works anyway. And that is also the financial picture.”

#### 5.4.5 Problems and opportunities at S5

At S5 a teacher Consumptive Techniques (CT) thinks there is a difference in knowing and acting in accordance with regard to healthy and sustainable nutrition among pupils. Even some chefs buy sausage rolls at the supermarket instead of a fresh salad, for example. He thinks pupils are in the age where convenience plays a huge role. He would like to see it differently, but he thinks the average chef student does not meet the guidelines of the Voedingscentrum, referring to the ‘Schijf van Vijf’. According to the teacher, improvements can be made here. Some first steps are already made at school, but there are some difficulties:

Teacher CT at S5: “We have tried to take the first step in this by taking over the canteen with the chef’s study [on the location with the canteen run by pupils].” (...)

Interviewer: “Since October I just heard?”

Teacher CT at S5: “Yes. So, we started very progressively with that, and we just cooked healthy dishes and offered them very cheaply [in the canteen], so everything only for one euro where it was 2.50 euros before, for example. That worked, but we got into trouble ourselves. Because

it is very difficult to supply the canteen and then respect your year line [the curriculum of the chef's study]. So, you have certain assignments. And in that week, for example, meat is the assignment, but you all put sandwiches in the canteen [where also sandwiches without meat are needed]. So, the big challenge was..."

Interviewer: "Because you cook things that are sold in the canteen, here?"

Teacher CT at S5: "Yes, we try to process what we make also in the canteen as much as possible. But you need to have a canteen complete; you have to have a salad and a sandwich, preferably four different sandwiches, and a soup... That is still a challenge to supply that from the chef's study. So, the compromise that we have now, is: suppose we have some, which is salable, then it goes to the canteen. And we are now helping the canteen to put together the assortment. So, we help put together the sandwiches and the soups, and we try to give advice on that, so that we can support it."

Interviewer: "So you can offer a mixed assortment?"

Teacher CT at S5: "Yes."

The teacher Facility Manager (FM) also mentions this so-called 'hybrid' way of running the canteen with students. She argues these students can make a sandwich and they can operate the cash register, but at some point you want the assortment to become better, and healthier, and also more sustainable. She thinks pupils do not have enough knowledge on that. Also, the canteen employee who works with the students in the canteen is not educated with the most recent developments. On the locations of S5 with an external caterer, she thinks there is already more knowledge, because these employees are educated for that. In general, the FM argues that knowledge among canteen employees should be acquired together with a company. She recently had contact with 'Caterconcept', which is a catering company that does professional catering, also for schools. Collaboration of schools with such companies, especially professional catering companies, is key according to the teacher FM; such companies already have a lot of knowledge on price setting and healthy and sustainable nutrition:

Teacher FM at S5: "You see that they [Caterconcept] have a lot of knowledge in the field of healthy food, but also in the field of 'how can you use the right selling price?'. And that knowledge, of those catering companies, I think that, together with education, you should make use of that. So that you have to work together, and therefore also train the students in the right way. Because I know, at Caterconcept too, they have come a long way with sustainability, with less throwing away. So that is a really high level. And education does not know enough about this, the teacher knows too little about it, because of course these are all the latest developments. And those catering companies have of course not been doing nothing, and they are all busy with 'vegan' and all that sort of thing. (...) And that is already quite well developed. And school is actually a bit behind. (...) They [Caterconcept] can really see like 'well these are products, they have so much fiber in them, and there are so many fibers in them'. So, they can really prepare an assortment in a very targeted way. And as a school you actually need that knowledge to put down a good assortment at a good price. And if you do the catering yourself, you generally do not have enough knowledge about it. And with us, within S5, I notice that the ladies of the catering, they are actually not trained as catering employees. So they did have an education, but that may have been 10/15/20/30 years ago, so they are still very much in the way of working as they used to do. (...) And they are not concerned with health in the way we are currently concerned with health. Because nowadays we know a lot more about nutrition. And I think a lot of schools struggle with that too. And I

personally think that you have to approach the catering companies for this, or you have to fill that gap together.”

## 6 | Conclusion and recommendations

The main research question of this study is: “What explains the limited progress in changing food choice behavior of pupils at secondary and vocational schools in the Achterhoek region towards more healthy and sustainable food choices, and what are opportunities to overcome these limitations?”

For answering the main research question, four sub questions are developed. The first section of this chapter gives answers to the sub questions 1-3. The second section answers the fourth and main question, including recommendations for the future.

### 6.1 Conclusions of sub questions 1-3

The first sub question is: “What explains the limited change of the food choice behavior of pupils regarding healthy and sustainable nutrition at secondary and vocational schools in the Achterhoek region?”

The investigated determinants of this food choice behavior are: knowledge, attitudes, social norms, perceived behavioral control, intention and actual food choices. In general, pupils have little *knowledge* on healthy nutrition. They know about the health of vegetables and fruits. The ‘Schijf van Vijf’ is a concept most pupils are familiar with, but they do not have detailed knowledge about it. Furthermore, almost none of the pupils are familiar with sustainable nutrition. Knowledge on the combination of healthy and sustainable nutrition lacks. Secondly, the *attitude* towards healthy and sustainable nutrition differs among pupils. However, most pupils think healthy nutrition is rather important, while sustainable nutrition is something most pupils are not really concerned about. According to pupils, *subjective norms* do not play a part while choosing their foods. Pupils do sometimes feel like having certain foods too, when a friend buys something. Then they would buy these foods themselves too sooner, but they think peer pressure does not play a part in this. However, some school employees think differently, arguing that they think peer pressure probably plays a role in food choice behavior of pupils. With regard to *perceived behavioral control*, most pupils think choosing healthy foods is not difficult, if it is tasty and cheap enough. Choosing sustainable foods is more difficult in their opinion. A reason for this can be the lack of knowledge on what foods are sustainable. Most pupils are rather content with their current eating pattern and do not have the *intention* to change their *food choices*. However, several pupils do agree that they would buy and eat more healthy and sustainable foods in case these foods were cheaper at school.

Concluding, the limiting factors for pupils to choose more healthy and sustainable nutrition, are price and lack of knowledge of healthy and sustainable nutrition. High prices of healthy and sustainable products in school canteens make it difficult for students to buy these, resulting in pupils leaving the school to buy foods elsewhere. Moreover, also in supermarkets pupils see healthy and sustainable foods being more expensive than unhealthy and unsustainable foods. This results in pupils choosing unhealthy or unsustainable foods over healthy and sustainable foods. Although price is the main argument for pupils to make these choices, the lack of knowledge can be addressed as another

problem. The lack of knowledge on healthy and sustainable nutrition among pupils, results in an indifferent attitude towards (choosing) healthy and sustainable nutrition.

The second sub question is: “What policies and practices do secondary and vocational schools in the Achterhoek region have with regard to healthy and sustainable nutrition in canteens?”

Some schools have policies about certain foods that are prohibited, like energy drinks and chips. Some schools also forbid first and second graders from leaving the schoolyard or ordering hot meals to be delivered at school. Other schools do not have such policies, mainly because it is hard to conduct, and pupils seek violating the rules. Next to this, schools also have policies in contracts between the school, extern caterers and/or the Voedingscentrum. The schools that are not attached to the guidelines of the Voedingscentrum (for the concept ‘Gezonde Schoolkantine’), do not have strict rules or policy on what they offer in the school canteens. The schools that are attached to the Voedingscentrum do, because they need to offer 80% ‘better choices’, according to the Voedingscentrum. Guidelines on the placement of the foods also need to be followed here, which means healthier foods are placed in front and in sight, and less healthy products are placed behind. Among pupils as well as canteen and school employees, opinions differ about the practices in canteens, for example the health of the products offered in canteens. Even at schools where the guidelines of the Voedingscentrum are followed in canteens, not everyone agrees on the overall health of the assortment. Opinions about the availability of water taps in canteens are positive on schools that offer them; many pupils use these taps. Regarding sustainability of the nutrition offered in canteens, there is no policy on the investigated schools. While some schools do try to buy a few ingredients locally, such as eggs and dairy, or try to grow their own vegetables, schools and caterers all have contracts with wholesalers and have no sight on the sustainability of the products they buy there. Finally, schools do engage themselves with sustainable packaging and minimizing food waste in canteens, which also is part of sustainability.

The third sub question is: “What policies and practices do secondary and vocational schools in the Achterhoek region have with regard to healthy and sustainable nutrition in education?”

Most schools have some education on nutrition included in the curriculum. Education programs are mainly based on basic national requirements, sometimes extended at schools, depending on the interests and knowledge of teachers. National policy includes the ‘Schijf van Vijf’ of the Voedingscentrum in education on healthy nutrition. It depends on the type of school, but in general education programs include just this part (‘Schijf van Vijf’) on healthy nutrition. Furthermore, currently there is no national policy on sustainable nutrition in education that the schools follow. For this reason, some schools do not educate on sustainable nutrition, nor on the combination of healthy and sustainable nutrition. A few schools do address sustainable nutrition to some extent. An exception here is a school that is attached to Eco-schools and has a so-called ‘Green Profile’. Here sustainability is a central theme in all education programs. Sustainable nutrition is also addressed here, for example through discussing production processes of certain foods and growing their own vegetables. However, the combination of healthy and sustainable nutrition is not yet sufficiently addressed. Lastly, some schools offer practical education, with guest lectures or activity weeks, to not only learn from theory but also gain practical knowledge on nutrition. However, such practices are limited because these are not mandatory within the current exam requirements.

## 6.2 Conclusions main question and recommendations

For answering the main question, and giving recommendations for the future, this section uses data collected for answering the fourth sub question in combination with the answers on sub questions 1-3 and data from literature as described in the beginning of this study.

The fourth sub question is: “According to pupils and school employees, what are opportunities for interventions to change the food choice behavior of pupils towards making healthier and more sustainable food choices at secondary and vocational schools in the Achterhoek region?”

The main research question of this study is: “What explains the limited progress in changing food choice behavior of pupils at secondary and vocational schools in the Achterhoek region towards more healthy and sustainable food choices, and what are opportunities to overcome these limitations?”

There are several opportunities for interventions at schools to make pupils choose more healthy and sustainable foods at school. As became clear in the literature study and examples from schools under investigation, policy is key here. Policy is required on a national scale to have the impact that is needed, due to the urgency of changing food consumption given the negative impacts the current consumption patterns have on health and planet. Policy is needed on what is offered in canteens as well as in education.

National policy for canteens is needed on offering less unhealthy and unsustainable foods, and more healthy and sustainable nutrition. In case schools do not have enough knowledge on healthy and sustainable nutrition themselves, they should hire a professional caterer who has. However, in the long term, schools should obtain knowledge on this theme themselves. In determining their assortment, current guidelines like the ones from the Voedingscentrum (for the concept ‘Gezonde Schoolkantine’) are recommended for schools. Nevertheless, the criticism of some schools on these guidelines must be taken into account, as not all schools and pupils are content with the overall health of the assortment that the Voedingscentrum recommends. Therefore, the Voedingscentrum should communicate more on the content and application of these guidelines, to explain their recommendations to canteen employees, school employees and pupils. Next to this, sustainable nutrition is not taken into account in current school policies on the canteen assortment. This must be added, supported by the national government. Furthermore, to overcome the problem of healthy and sustainable foods being too expensive for pupils, schools should take responsibility to invest in these foods to keep prices low. Moreover, it seems hard to force pupils to stay at school, even when it is forbidden in school policy. In order to keep pupils at school, and not leave the schoolyard to buy (cheaper) food at supermarkets nearby, the assortment in school canteens should be optimized in terms of price and taste. However, schools often have contracts with wholesalers because foods are cheaper there compared to foods from local and smaller suppliers. In case there is no budget at schools to change these current practices and start purchasing more healthy and sustainable nutrition, support is needed on a higher scale, for example in the form of subsidies from the government.

Also policy on education programs is needed on including healthy and sustainable nutrition in curricula. Education on healthy and sustainable nutrition is needed, because only with knowledge of these themes the combination of both can be understood too. To make sure pupils are aware of the importance of this, both aspects need to be integrated in all education programs (PTA) at schools as a central theme, instead of providing just a few individual lessons about the subject. An example is to



introduce practical-realistic assignments in which actualities, like the introduction of a sugar tax, are discussed in several courses at school. In this way a topic will be addressed from several perspectives, which can make pupils remember these topics more. Another idea is organizing activity weeks and guest lectures where experts (like dieticians and farmers) educate about healthy and sustainable nutrition. Even more effective is applying theory in practice with cooking lessons, growing vegetables, and visiting local companies (like a farm). In this way pupils get in touch with healthy and sustainable foods not only in theory, but also in practice. This can all help to raise awareness of the importance of healthy and sustainable nutrition among pupils as well as school employees. A limiting factor in this is time, because if these themes are mandatory in education programs, often teachers do not have time to educate on this. Another limitation is the lack of knowledge of healthy and sustainable nutrition among many teachers. Guest lectures can be useful to fill this knowledge gap, but this is only a temporary solution. Retraining all teachers on these topics is essential in the near future.

Finally, schools must not wait for national policies because it will take time to develop these. Given the urgency of changing food choice behavior, schools must take responsibility themselves and start right now. It is important that parents also take their responsibility towards healthy and sustainable nutrition while raising their children, and support activities of schools with regard to this topic. Schools should prioritize practices that include healthy and sustainable nutrition. For this they should learn from existing projects, like Eco-Schools, and join such projects. Projects like this require collaboration of several actors at school, including school employees as well as pupils. Furthermore, schools should also start looking into their current contracts and tenders with food suppliers, and change their canteen assortment by replacing unhealthy and unsustainable nutrition for healthier and more sustainable nutrition. This might be more expensive, but schools need to invest in the health of pupils and the planet. For schools this also means making the healthy and sustainable foods affordable for pupils. In addition, schools should install water taps in their canteens, in case they do not already have them. At last, an important limiting factor is missing knowledge of (the link between) healthy and sustainable nutrition among pupils as well as school employees. This has to be introduced to them. For now, schools can invite guest speakers who give lessons about healthy and sustainable nutrition. However, schools need to start extending knowledge of teachers and canteen employees, because in the future health and sustainability should and will be a central theme at all schools.

## 7 | Discussion

### 7.1 Limitations

There are some aspects that could have influenced the outcome of this study. First, the research is conducted using interviews. One disadvantage of this method is that respondents may have given socially desirable answers. This could have led to less reliable outcomes. To overcome this as much as possible, all respondents were assured in advance that their answers would remain anonymous in the study. Another limitation can be that pupils were interviewed in groups. This could have led to pupils influencing each other's answers. Individual interviews may have led to more reliable conclusions. However, the advantage of the conducted group interviews was that pupils discussed their experiences, which contributed to useful information for the current study.

Another important remark is that this study uses an interpretivist approach. The answers of respondents are interpreted afterwards. It is important to be aware of the subjectivity during the interpretation of the answers of respondents, as in interpretivist approaches scientists' perspectives and biases can influence data collection and analysis. Next to possible misinterpretation of the answers, it could also be the case that not all respondents understood all questions as intended. Such misinterpretations could have led to incorrect measurement of the concepts in this study, resulting in less reliable conclusions. To overcome misinterpretations as much as possible, answers were summarized during interviews and follow-up questions were used to clarify questions as well as answers.

Furthermore, conducting this study on schools that are different on a lot of aspects (e.g. secondary and vocational, and different education levels), has advantages and disadvantages. An advantage is that every school is unique and has different perspectives, which leads to a varying set of possible interventions. A disadvantage is that this makes it harder to compare schools and discover patterns. The rather small scope of this study is a limitation. Five schools are investigated, and at these schools a small number of employees and pupils are included. This small scope limits the external validity of this study. It could be the case that other school employees and pupils have different experiences, opinions, and knowledge on the topic of healthy and sustainable nutrition at school. To be able to generalize results for the whole Achterhoek region (external validity), more schools could be investigated, where more actors are interviewed.

Another important limitation is that mainly the internal school environment is investigated in this study. The reason for this is that it would take too much time to also investigate the external environment thoroughly. This limits internal validity, because the internal and external environment of schools both can influence the food choice behavior of pupils. As an external environment, supermarkets are discussed to a minor extent in interviews; prices of products in supermarkets turn out to influence pupils' food choices. Another example of external environments are pupils' homes. This has not been investigated at all. It could be, for example, that attitudes of parents towards certain nutrition influence food choices of pupils.

## 7.2 Future research

To improve internal validity, future research should include internal as well as external school environments. Internal school environments can be investigated more thoroughly by also using observations next to interviews. Observations can be done in classes (to see what is educated) and in canteens (to see what foods pupils choose). Regarding external school environments, the current study shows that supermarkets play a significant role in pupils' food choices. The assortment and the pricing of (healthy and sustainable) products in supermarkets could be investigated. Moreover, pupils' home situations could be investigated. Next to interviews, surveys could be used to collect more personal data from pupils, like home situation, culture, and religion. With such surveys, also quantitative data can be collected on the determinants of food choice behavior (like attitudes, social norms, et cetera). In this way the relative influences of the determinants on actual food choices of pupils can be investigated. With these additions pupils' food choice behavior can be investigated more thoroughly.

By adding observations and surveys as research methods to interviews, triangulation is used to enhance validity and reliability of the research.

In the future, more research is needed on all involved actors in the internal and external school food environment. Therefore, collaboration is needed between investigators, pupils, school employees and canteen employees. External parties should also be involved. These parties could be municipalities and the GGD, for example. Furthermore, local entrepreneurs and canteen suppliers can be interviewed to get an overview of (and insight into the motivations of) all involved actors regarding the canteen supply at the schools under investigation. Together they can find interventions and solutions for problems like the irregular supply of fresh local products due to school holidays.

The current study already shows that much can be improved at schools in the Achterhoek region; healthy and sustainable nutrition should be integrated more into policies and practices in canteens as well as education. Future research can build on the findings of the current study by using the recommendations and implementing the advised interventions. Research on the implementation of these interventions requires time. The schools under investigation should be under watch before and after the intervention, to be able to see what impact the interventions have and whether the interventions are successful or not (e.g. pupils making more healthy and sustainable food choices at school or not).

Given the fact that negative impacts of current unhealthy and unsustainable food systems are still increasing on a global scale, the current study contributes to solving a worldwide problem. Ultimately, comparable research can be conducted at other schools outside the Achterhoek, because problems relating to health and sustainability exist beyond the Achterhoek region too. This future research can use theories of the current study, include its suggestions for future research, and broaden the scope to national or even international level.

## 8 | References

- Adams, W. (2015). Conducting semi-structured interviews. In K. Newcomer, H. P. Hatry, & J. S. Wholey (Eds.), *Handbook of Practical Program Evaluation* (4th ed.) (pp. 492-505). <https://doi.org/10.1002/9781119171386.ch19>
- Aertsens, J., Verbeke, W., Mondelaers, K., & van Huylenbroeck, G. (2009). Personal determinants of organic food consumption: a review. *British Food Journal*, 111(10), 1140-1167. <https://doi.org/10.1108/00070700910992961>
- Afshin, A. M. D., Forouzanfar, M. H., Reitsma, M. B., Sur, P., Estep, K., Lee, A., ... Patton, G. C. (2017). Health effects of overweight and obesity in 195 countries over 25 Years. *The New England Journal of Medicine*, 277(1), 13-27. <https://doi.org/10.1056/NEJMoa1614362>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Ajzen, I., & Fishbein, M. (2005). The influence of Attitudes on Behavior. In Albarracín, D., Johnson, B. T., & Zanna, M. P. (Eds.), *The Handbook of Attitudes*, 2015, pp. 173-221. Mahwah, New Jersey, United States: Lawrence Erlbaum Associates Publishers.
- Alkas, D. (2019, November 28). Bourgondische Achterhoeker is al jaren te zwaar. *De Gelderlander*. Retrieved Februar 7, 2022, from <https://www.gelderlander.nl/achterhoek/bourgondische-achterhoeker-is-al-jaren-te-zwaar~a67e1028/>
- Anttila, J., Rytönen, T., Kankaanpää, R., Tolvanen, M., & Lahti, S. (2015). Effect of national recommendation on sweet selling as an intervention for a healthier school environment. *Scandinavian Journal of Public Health*, 43(1), 27-34. <http://www.jstor.org/stable/45150928>
- Asioli, D., Aschemann-Witzel, J., Caputo, V., Vecchio, R., Annunziata, A., Næs, T., & Varela, P. (2017). Making sense of the “clean label” trends: A review of consumer food choice behavior and discussion of industry implications. *Food Research International*, 99, 58-71. <https://doi.org/10.1016/j.foodres.2017.07.022>
- Askew, K. (2022, June 15). ‘The health of people and our planet go hand-in-hand’: How conscientious consumption is driving sustainable nutrition. *Food Navigator*. Retrieved July 11, 2022, from <https://www.foodnavigator.com/Article/2022/06/15/The-health-of-people-and-our-planet-go-hand-in-hand-How-conscientious-consumption-is-driving-sustainable-nutrition>
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice- Hall, Inc.
- Bandura, A. (2001). Social Cognitive Theory of Mass Communication. *Media Psychology*, 3(3), 265-299. [https://doi.org/10.1207/S1532785XMEP0303\\_03](https://doi.org/10.1207/S1532785XMEP0303_03)

- Bandura, A. (2004). Health Promotion by Social Cognitive Means. *Health Education & Behavior*, 31(2), 143-164. <https://doi.org/10.1177%2F1090198104263660>
- Bissonnette, M. M., & Contento, I. R. (2001). Adolescents' Perspectives and Food Choice Behaviors in Terms of the Environmental Impacts of Food Production Practices: Application of a Psychosocial Model. *Journal of Nutrition Education*, 33(2), 72-82. [https://doi.org/10.1016/S1499-4046\(06\)60170-X](https://doi.org/10.1016/S1499-4046(06)60170-X)
- Bosco, F. J., Joassart-Marcelli, P., & O'Neal, B. (2017). Food Journeys: Place, Mobility, and the Everyday Food Practice of Young People. *Annals of the American Association of Geographers*, 107(6), 1479-1498. <https://doi.org/10.1080/24694452.2017.1310019>
- Brink, E., Van Rossum, C., Postma-Smeets, A., Stafleu, A., Wolvers, D., Van Dooren, C., ... Ocké, M. (2019). *Public Health Nutrition*, 22(13), 2419-2435. <https://doi.org/10.1017/S1368980019001435>
- Broers, J. V., de Breuker, C., van den Broucke, S., & Luminet, O. (2017, October). A systematic review and meta-analysis of the effectiveness of nudging to increase fruit and vegetable choice. *European Journal of Public Health*, 27(5), 912–920. <https://doi.org/10.1093/eurpub/ckx085>
- World Commission on Environment and Development. (1987). *Our Common Future (Brundtland Report)*. Oxford, United Kingdom: Oxford University Press.
- CBS. (2019). *Lichaamsgroei 1981-2018: recent vooral gewichtstoename*. Retrieved February 7, 2022, from <https://www.cbs.nl/nl-nl/nieuws/2019/48/lichaamsgroei-1981-2018-recent-vooral-gewichtstoename>
- CBS. (2022). *Lengte en gewicht van personen, ondergewicht en overgewicht; vanaf 1981*. Retrieved March 28, 2022, from <https://www.cbs.nl/nl-nl/cijfers/detail/81565NED?dl=2AA3B>
- Chen, P., & Antonelli, M. (2020). Conceptual models of food choice: influential factors related to foods, individual differences, and society. *Foods*, 9(12), 1898. <https://doi.org/10.3390/foods9121898>
- Crotty, M. J. (1998). The foundations of social research: meaning and perspective in the research process. *The foundations of social research*, 1-256. London, England: Sage Publications.
- De Brabander, E., Daas, M., Dulam, A., Ising, G., Kreuger, D., & Schumacker, C. (2021, October). Towards the realization of a healthy and sustainable school environment with students, school staff, external parties in case high schools in Apeldoorn. Gelderland, The Netherlands: Jong Leren Eten Gelderland.
- De Krom, M., Vonk, M., & Muilwijk, H. (2020). *Voedselconsumptie veranderen: bouwstenen voor beleid om verduurzaming van eetpatronen te stimuleren*. Den Haag, The Netherlands: PBL. <https://www.pbl.nl/publicaties/voedselconsumptie-veranderen>

- Derqui, B., Fernandez, V., & Fayos, T. (2018). Towards more sustainable food systems. Addressing food waste at school canteens. *Appetite*, 129, 1-11.  
<https://doi.org/10.1016/j.appet.2018.06.022>
- DiCicco-Bloom, B., & Crabtree, B. F. (2016). The qualitative research interview. *Medical Education*, 40(4), 314-321. <https://doi.org/10.1111/j.1365-2929.2006.02418.x>
- Dos Santos, E. B., da Costa Maynard, D., Zandonadi, R. P., Raposo, & A. Botelho, R. B. A. (2022). Sustainability Recommendations and Practices in School Feeding: A Systematic Review. *Foods* 2022, 11(2), 176. <https://doi.org/10.3390/foods11020176>
- Eco-Schools. (n.d.-a). *Over Eco-Schools: Hoe het werkt*. Retrieved June 23, 2022, from <https://eco-schools.nl/over-eco-schools/hoe-het-werkt>
- Eco-Schools. (n.d.-b). *Over Eco-Schools: De Groene Vlag*. Retrieved June 23, 2022, from <https://eco-schools.nl/over-eco-schools/de-groene-vlag>
- European Public Health Association. (2017). *Healthy and Sustainable Diets for European Countries*. Retrieved from [https://eupha.org/repository/advocacy/EUPHA\\_report\\_on\\_healthy\\_and\\_sustainable\\_diets\\_20-05-2017.pdf](https://eupha.org/repository/advocacy/EUPHA_report_on_healthy_and_sustainable_diets_20-05-2017.pdf)
- Foley, J. A., Defries, R., Asner, G. P., Barford, C., Bonan, G., Carpenter, S. R., ... Snyder, P. (2005). Global consequences of land use. *Science*, 309(5734), 570-574.  
<https://doi.org/10.1126/science.1111772>
- Food and Agriculture Organization of the United Nations. (n.d.). *Healthy food environment and school food*. Retrieved January 28, 2022, from <http://www.fao.org/school-food/areas-work/food-environment/en/>
- Food and Agriculture Organization & World Health Organization. (2019). *Sustainable healthy diets – Guiding principles*. Rome, Italy: Food and Agriculture Organization of the United Nations World Health Organization. Retrieved from <https://www.fao.org/3/ca6640en/ca6640en.pdf>
- Fordyce-Voorham, S. (2011). Identification of Essential Food Skills for Skill-based Healthful Eating Programs in Secondary Schools. *Journal of Nutrition Education and Behavior*, 43(2), 116-122. <https://doi.org/10.1016/j.jneb.2009.12.002>
- French, S. A., Story, M., & Jeffrey, R. W. (2001). Environmental influences on eating and physical activity. *Annual Review of Public Health*, 22, 2001, 309-335.  
<https://doi.org/10.1146/annurev.publhealth.22.1.309>

- Gezondheidsraad. (2015, November 4). Gezondheidsraad (2015). *Richtlijnen goede voeding 2015*. Retrieved from <https://www.gezondheidsraad.nl/documenten/adviezen/2015/11/04/richtlijnen-goede-voeding-2015>
- Gibbs, A. (2012). Focus groups and group interviews. In J. Arthur, M. Waring, R. Coe, & L. V. Hedges (Eds.), *Research methods and methodologies in education* (pp. 186-192). London, England: Sage Publications.
- GLOS. (2021, April 12). *Dag van de Gezonde Schoolkantine* [figure front page]. Gezonde Leefstijl Op School. Retrieved August 22, 2022, from <https://www.gezondeleefstijlopschool.nl/voeding/dag-van-de-gezonde-schoolkantine/>
- Grunert, K. G. (2011). Sustainability in the food sector: A consumer behaviour perspective. *International Journal on Food System Dynamics*, 2, 207-218. <https://doi.org/10.18461/ijfsd.v2i3.232>
- Hansen, T., Sørensen, M. I., & Eriksen, M. R. (2018). How the interplay between consumer motivations and values influences organic food identity and behavior. *Food Policy*, 74, 39-52. <https://doi.org/10.1016/j.foodpol.2017.11.003>
- Hermans, R. C., Smit, K., van den Broek, N., Evenhuis, I. J., & Veldhuis, L. (2020). Adolescents' food purchasing patterns in the school food environment: Examining the role of perceived relationship support and maternal monitoring. *Nutrients*, 12(3), 733. <https://doi.org/10.3390/nu12030733>
- Hilhorst, A. (2022, June 21). WUR: duurzame voornemens vereisen nieuw voedingspatroon. *Food & Agribusiness*. Retrieved July 11, 2022, from <https://www.foodagribusiness.nl/wur-duurzame-voornemens-vereisen-nieuw-voedingspatroon/>
- Hoek, A., Pearson, D., James, S., Lawrence, M., & Friel, S. (2017). Healthy and environmentally sustainable food choices: Consumer responses to point-of-purchase actions. *Food Quality and Preference*, 58, 94-106. <http://dx.doi.org/10.1016/j.foodqual.2016.12.008>
- Hollands, G. J., Shemilt, I., Marteau, T. M., Jebb, S. A., Kelly, M. P., Nakamura, R., ... Ogilvie, D. (2013). Altering micro-environments to change population health behaviour: towards an evidence base for choice architecture interventions. *BMC Public Health*, 13(1218). <https://doi.org/10.1186/1471-2458-13-1218>
- Jallinoja, P. (2019). The public health relevance of food consumption and food environments. *Scandinavian Journal of Public Health*, 47(5), 475-476. <https://doi.org/10.1177%2F1403494819858867>

- Jung, T., Huang, J., Eagan, L., & Oldenburg, D. (2019). Influence of school-based nutrition education program on healthy eating literacy and healthy food choice among primary school children. *International Journal of Health Promotion and Education*, 57(2), 67-81. <https://doi.org/10.1080/14635240.2018.1552177>
- Kubik, M. Y., Lytle, L., & Fulkerson, J. A. (2005). Fruits, vegetables, and football: Findings from focus groups with alternative high school students regarding eating and physical activity. *Journal of Adolescent Health*, 36(6), 494-500. <https://doi.org/10.1016/j.jadohealth.2004.05.010>
- LaMorte, W. W. (2019). *The Theory of planned behavior*. Boston University School of Public Health. Retrieved July 17, 2022, from <https://sphweb.bumc.bu.edu/otlt/mph-modules/sb/behavioralchange/theories/BehavioralChangeTheories3.html#:~:text=The%20TPB%20is%20comprised%20of,outcomes%20of%20performing%20the%20behavior>
- Lanigan, J. D. (2011). The substance and sources of young children's healthy eating and physical activity knowledge: implications for obesity prevention efforts. *Child: Care, Health and Development*, 37(3), 368-376. <https://doi.org/10.1111/j.1365-2214.2010.01191.x>
- Ma, G. (2015, December). Food, eating behavior, and culture in Chinese society. *Journal of Ethnic Foods*, 2(4), 195-199. <https://doi.org/10.1016/j.jef.2015.11.004>
- Mathie, R. G., & Wals, A.E.J. (2022). *Whole School Approaches to Sustainability: Exemplary Practices from around the world*. Education & Learning Sciences/Wageningen University. <https://doi.org/10.18174/566782>
- Mertens, E., van 't Veer, P., Hiddink, G. J., Steijns, J. M. J. M., & Kuijsten, A. (2016). Operationalising the health aspects of sustainable diets: a review. *Public Health Nutrition*, 20(4), 739-757. <https://doi.org/10.1017/S1368980016002664>
- Moon, K., & Blackman, D. (2014). A guide to understanding social science research for natural scientists. *Conservation Biology*, 28(5), 1167-1177. <https://doi.org/10.1111/cobi.12326>
- Nelson, M. E., Hamm, M. W., Hu, F. B., Abrams, S. A., & Griffin, T. S. (2016). *Advances in Nutrition*, 7(6), 1005-1025. <https://doi.org/10.3945/an.116.012567>
- Neufeld, L. M., Hendriks, S., & Hugas, M. (2021). Healthy diet: A definition for the United Nations *Food Systems Summit 2021*. Retrieved from [https://sc-fss2021.org/wp-content/uploads/2021/03/Healthy\\_Diet\\_Scientific\\_Group\\_March-2021.pdf](https://sc-fss2021.org/wp-content/uploads/2021/03/Healthy_Diet_Scientific_Group_March-2021.pdf)
- Neumark-Sztainer, D., Story, M., Perry, C., & Casey, M. A. (1999). Factors influencing food choice of adolescents: Finding from focus-group discussions with adolescents. *Journal of the American Dietetic Association* 1999, 99(8), 929-937. [https://doi.org/10.1016/S0002-8223\(99\)00222-9](https://doi.org/10.1016/S0002-8223(99)00222-9)



- Nielsen, J. S., Siega-Riz, A. M., & Popkin, B. M. (2002). Trends in food locations and sources among adolescents and young adults. *Preventive Medicine*, 35(2), 107-113.  
<https://doi.org/10.1006/pmed.2002.1037>
- O'Neill, K. J., Clear, A. K., Friday, A., & Hazes, M. (2019). 'Fractures' in food practices: exploring transitions towards sustainable food. *Agriculture and Human Values*, 36, 225-239.  
<https://doi.org/10.1007/s10460-019-09913-6>
- Patton, M. Q. (2002). *Qualitative research & Evaluation methods* (3rd ed.). Thousand Oaks, California, United States: Sage Publications.
- Poti, J. M., & Popkin, B. M. (2011). Trends in energy intake among US children by eating location and food source, 1977-2006. *Journal of the Academy of Nutrition and Dietetics*, 111(8), 1156-1164. <https://doi.org/10.1016/j.jada.2011.05.007>
- Prescott, M. P., Burg, X., Metcalfe, J. J., Lipka, A., Herritt, C., & Cunningham, L. (2019). Healthy Planet, Healthy Youth: A Food Systems Education and Promotion Intervention to Improve Adolescent Diet Quality and Reduce Food Waste. *Nutrients*, 11(8), 1869.  
<https://doi.org/10.3390/nu11081869>
- Raghoobar, S., Mesch, A., Haveman, A., Winkens, L. Gulikers, & Wesselink, R. (2022, March). Gezond en duurzaam eetgedrag volgens experts. *Voeding Nu*, 2, 12-17. Retrieved from <https://www.evmi.nl/files/38c81af8de8d601df150cd9f414d1ff3.pdf>
- RIVM. (2021). *Gezonde voeding*. Retrieved March 29, 2022, from <https://www.rivm.nl/voedsel-en-voeding/gezonde-voeding>
- Roe, L., Hunt, P., Bradshaw, H., Rayner, M. (1997). *Health promotion interventions to promote healthy eating in the general population: a review*. London, England: Health Education Authority.
- Rosman, C. (2019, November 27). Nederlanders steeds langer én steeds zwaarder. *De Gelderlander*. Retrieved February 7, 2022, from <https://www.gelderlander.nl/binnenland/nederlanders-steeds-langer-en-steeds-zwaarder~a3f876511/>
- Rothpletz-Puglia, P., Fredericks, L., Dreker, M. R., Patusco, R., & Ziegler, J. (2022). Position of the Society for Nutrition Education and Behavior: Healthful Food for Children is the Same as Adults. *Journal of Nutrition Education and Behavior*, 54(1), 4-11.  
<https://doi.org/10.1016/j.jneb.2021.09.007>
- Saarijärvi, M., & Bratt, E. L. (2021, April). When face-to-face interviews are not possible: tips and tricks for video, telephone, online chat, and email interviews in qualitative research. *European Journal of Cardiovascular Nursing*, 20(4), 392-396.  
<https://doi.org/10.1093/eurjcn/zvab038>

- Shannon, C., Story, M., Fulkerson, J. A., & French, S. A. (2009). Factors in the School Cafeteria Influencing Food Choices by High School Students. *Journal of School Health*, 72(6), 229-234. <https://doi.org/10.1111/j.1746-1561.2002.tb07335.x>
- Smaakacademie Achterhoek. (2022). *Smaakacademie Achterhoek: Over ons*. Retrieved May 9, 2022, from <https://www.smaakacademieachterhoek.nl/over-ons/>
- Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., ... Sörlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223), 1259855. <https://doi.org/10.1126/science.1259855>
- St-Onge, M., Keller, K. L., & Heymsfield, S. B. (2003). Changes in childhood food consumption patterns: a cause for concern in light of increasing body weights. *The American Journal of Clinical Nutrition*, 78(6), 1068-1073. <https://doi.org/10.1093/ajcn/78.6.1068>
- Story, M., Kaphingst, K., & French, S. (2006). The role of schools in obesity prevention. *Future Child*, 16(1), 109-142. <https://doi.org/10.1353/foc.2006.0007>
- Story, M., Nannery, M. S., & Schwartz, M. B. (2009). Schools and obesity prevention: creating school environments and policies to promote healthy eating and physical activity. *The Milbank Quarterly*, 87(1), 71-100. <https://doi.org/10.1111/j.1468-0009.2009.00548.x>
- Sustainable Development Commission (SDC). (2009). *Setting the Table: Advice to Government on Priority Elements of Sustainable Diets*. London, England: SDC.
- Tilman, D., & Clark, M. (2014). Global diets link environmental sustainability and human health. *Nature*, 515, 518-522. <https://doi.org/10.1038/nature13959>
- Trentinaglia, M. T., Parolini, M., Donzelli, F., & Olper, A. (2021). Climate change and obesity: A global analysis. *Global Food Security*, 29(100539). <https://doi.org/10.1016/j.gfs.2021.100539>
- United Nations. (n.d.). Sustainable Development Goals – Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Retrieved from <https://sdgs.un.org/goals/goal4>
- United Nations. (2015). *Transforming our World: The 2030 Agenda for Sustainable Development*. Retrieved from <https://sdgs.un.org/sites/default/files/publications/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>
- Van der A, D. L., Hiemstra, M., & Deuning, C. (n.d.). *Overgewicht – Regionaal – Overgewicht*. Retrieved February 28, 2022, from <https://www.vzinfo.nl/overgewicht/regionaal/overgewicht>

- Van Thiel, S. (2014). *Research Methods in Public Administration and Public Management – An Introduction*. London, England: Routledge.
- Vermeir, I., & Verbeke, W. (2008). Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. *Ecological Economics*, 64(3), 542-553. <https://doi.org/10.1016/j.ecolecon.2007.03.007>
- Visseren-Hamakers, I. J. (2020, March). The 18th Sustainable Development Goal. *Earth System Governance*, 3, 100047. <https://doi.org/10.1016/j.esg.2020.100047>
- Voedingscentrum. (n.d.-a). *Over het Voedingscentrum*. Retrieved June 23, 2022, from <https://www.voedingscentrum.nl/nl/service/over-ons.aspx>
- Voedingscentrum. (n.d.-b). *Starten met een gezondere kantine*. Retrieved June 14, 2022, from <https://gezondeschoolkantine.voedingscentrum.nl/nl/starten-met-een-gezondere-kantine.aspx>
- Voedingscentrum. (n.d.-c). *Wat staat er in de Schijf van Vijf?* Retrieved June 23, 2022, from <https://www.voedingscentrum.nl/nl/gezond-eten-met-de-schijf-van-vijf/wat-staat-er-in-de-vakken-van-de-schijf-van-vijf.aspx>
- Voedingscentrum. (n.d.-d). *De kracht van de Schijf van Vijf*. Retrieved June 23, 2022, from <https://www.voedingscentrum.nl/nl/service/over-ons/kracht-schijf-van-vijf.aspx>
- Voedingscentrum. (n.d.-e). *Gezond eten*. Retrieved March 29, 2022, from <https://www.voedingscentrum.nl/nl/gezond-eten-met-de-schijf-van-vijf.aspx>
- Voedingscentrum. (n.d.-f). *Duurzaam eten*. Retrieved March 29, 2022, from <https://www.voedingscentrum.nl/encyclopedie/duurzamereten.aspx>
- Voedingscentrum. (2017). *Fact sheet The Wheel of Five – Voedingscentrum*. Retrieved January 26, 2022, from [https://voedingscentrum.nl/Assets/Uploads/voedingscentrum/Documents/Professionals/Per s/Factsheets/English/Fact%20sheet%20The%20Wheel%20of%20Five.pdf](https://voedingscentrum.nl/Assets/Uploads/voedingscentrum/Documents/Professionals/Per%20s/Factsheets/English/Fact%20sheet%20The%20Wheel%20of%20Five.pdf)
- Wageningen University & Research (WUR). (2020, August 25). *Dierenwelzijn als zelfstandige waarde van duurzaamheid*. Retrieved from <https://www.wur.nl/nl/Onderzoek-Resultaten/Onderzoeksinstituten/livestock-research/show-wlr/Dierenwelzijn-als-zelfstandige-waarde-van-duurzaamheid.htm>
- Wals, A. E. J., & Mathie, R. G. (2022). Whole school responses to climate urgency and related sustainability challenges: A perspective from northern Europe. In M. Peters & R. Heraud (Eds.), *Encyclopedia of educational innovation*. Springer. [https://doi.org/10.1007/978-981-13-2262-](https://doi.org/10.1007/978-981-13-2262-13-2262-)

- Willet, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., ... Murray, C. J. L. (2019). Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems. *The Lancet*, 393(10170), 447-492. [https://doi.org/10.1016/S0140-6736\(18\)31788-4](https://doi.org/10.1016/S0140-6736(18)31788-4)
- Wordell, D. Daratha, K., Mandall, B., Bindler, R., & Butkus, S. N. (2012). Changes in a Middle School Food Environment Affect Food Behavior and Food Choices. *Journal of the Academy of Nutrition and Dietetics*, 112(1), 137-141. <https://doi.org/10.1016/j.jada.2011.09.008>

## Appendices



### Appendix 1: Overview participating schools

School	Education types on investigated location	Specialties
<b>School 1 (S1)</b>	Vmbo <ul style="list-style-type: none"> <li>- BB</li> <li>- KB</li> <li>- GL</li> </ul>	<ul style="list-style-type: none"> <li>- Vmbo Groen</li> <li>- Study conducted on one of more locations</li> <li>- Eco-schools member, with 'Green flag'</li> </ul>
<b>School 2 (S2)</b>	High school <ul style="list-style-type: none"> <li>- Vmbo (bl/kl)</li> <li>- Mavo</li> <li>- Havo</li> <li>- Vwo</li> <li>- ISK (international transition class)</li> </ul>	
<b>School 3 (S3)</b>	Vmbo <ul style="list-style-type: none"> <li>- BB</li> <li>- KB</li> </ul>	<ul style="list-style-type: none"> <li>- Study conducted on one of more locations</li> </ul>
<b>School 4 (S4)</b>	High school: <ul style="list-style-type: none"> <li>- Lower classes Grade 1: vmbo-b-/vmbo-k, vmbo-k/mavo, mavo/havo, havo/atheneum, gymnasium+</li> <li>- Upper classes Grade 3 and 4: mavo Grade 4 and 5: havo Grade 4, 5 and 6: atheneum, gymnasium</li> </ul>	<ul style="list-style-type: none"> <li>- Study conducted on one of more locations</li> </ul>
<b>School 5 (S5)</b>	MBO (BOL/BBL) <ul style="list-style-type: none"> <li>- 4 levels (entree, 2, 3, and 4)</li> </ul>	<ul style="list-style-type: none"> <li>- Study conducted on 2 of more locations</li> </ul>

## Appendix 2: Overview interviewees per school

School	Interview number	Expertise of interviewee(s)
School 1 (S1)	1.1	Educational advisor
		Additions: Teacher and mentor
	1.2	Youth social worker
		Additions: Teacher and mentor
	1.3	Team manager (portfolio Gezonde School)
		Additions: Teacher and mentor
	1.4	3 pupils from student council
		Additions: Teacher and mentor
	1.5	Pedagogical employee
		Additions: Teacher and mentor
School 2 (S2)	2.1	4 pupils
		Additions: Teacher and mentor
	2.2	Teacher biology and GWO, and Eco-Schools facilitating teacher
		Additions: Teacher and mentor
	2.3	Teacher GWO and Gezonde Wereld
		Additions: Teacher and mentor
School 3 (S3)	2.4	Owner catering school 1
	2.1	Teacher HBR and mentor
		Additions: Instructor HBR
	2.2	Director facility
		Additions: Teacher HBR and mentor
	2.3	6 pupils
		Canteen employee
School 4 (S4)	2.4	Additions: Instructor HBR
		Additions: Teacher HBR and mentor
	3.1	Teacher HBR
	3.2	2 teachers Zorg & Welzijn
	3.3	Facility manager
	3.4	5 pupils Zorg & Welzijn
	3.5	2 pupils HBR
School 5 (S5)	3.6	Catering employee canteen
	3.7	Location manager
	4.1	2 catering employees canteen
	4.2	Chief concierge
	4.3	6 pupils
School 6 (S6)	4.4	Head of Facilities and housing
	4.5	Teacher Verzorging
	5.1	Senior teacher Facility Manager
	5.2	Canteen employee
	5.3	5 students at MMS
	5.4	Teacher Consumptive Techniques / Cooking teacher
	5.5	Service specialist facility
School 7 (S7)	5.6	3 students JFK
	5.7	Senior Education Manager

## Appendix 3: Codes

Name
<input type="radio"/>  FCB
<input type="radio"/>  Policy education
<input type="radio"/>  Policy canteen
<input type="radio"/>  Education healthy
<input type="radio"/>  Education sustainable
<input type="radio"/>  Canteen healthy
<input type="radio"/>  Canteen sustainable
<input type="radio"/>  Opportunity
<input type="radio"/>  Problem
<input type="radio"/>  Healthy and sustainable
<input type="radio"/>  Responsibility
<input type="radio"/>  (un)healthy nutrition
<input type="radio"/>  (un)sustainable nutrition