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Assessment of the impact of organic school meals to improve the school food environment and children's awareness of healthy eating habits

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Department of Planning

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Aalborg University

Assessment of the impact of organic school meals to improve the school food environment and children's awareness of healthy eating habits

8/6/2012

PhD dissertation

Chen He

**Assessment of the impact of organic school meals to improve the
school food environment and children's awareness of healthy eating
habits**

Chen He

PhD dissertation

August 2012

Research group for Meal Science & Public Health Nutrition (MENU)

Department of Planning

Aalborg University Copenhagen

Title: Assessment of the impact of organic school meals to improve the school food environment and children's awareness of healthy eating habits

Dansk titel: En vurdering af økologiske skolemadsstrategiers effekt på måltidsomgivelser og på børns bevidsthed om sunde kostvaner

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Preface

This PhD thesis investigates the influence of public organic food consumption and procurement strategies on school meal systems and the potential of such strategies to positively impact the eating patterns of school children. The project was conducted in Denmark, Germany, Finland and Italy. Part of this PhD project was financed by the members of CORE Organic Funding Body Network, who have funded the innovative Public Organic food Procurement for Youth (iPOPY) project as one of eight pilot research projects within the CORE Organic ERA net I. The iPOPY project had five working packages and the outcome of the first part of this PhD study will be counted as part of the delivery of working package 5, Nutrition and Health. The rest of the PhD project was funded by Aalborg University and does not relate to any projects. The research work was carried out at the Research group for Meal Science & Public Health Nutrition, Department of Planning (MENU), Aalborg University Copenhagen.

This thesis is based on the following three studies listed below.

Study I: Chen He & Bent Egberg Mikkelsen. “The correlated relationship of organic school food policy and school food environment – results from an observational study in Danish schools”. (*Conditional acceptability of publication in Perspectives in Public Health*)

Study II: Chen He, F.J. Armando Perez Cueto Eulert & Bent Egberg Mikkelsen. “Do attitudes, intentions and actions of School Food Coordinators (SFCs) regarding Public Organic food Procurement (POP) policy improve the eating environment at school? - Results from the iPOPY study”. (*Conditional acceptability of publication in Public Health Nutrition*)

Study III: Chen He, Søren Breiting & F.J. Armando Perez Cueto Eulert. “Effect of organic school meals to promote healthy diet in 11-13 year old children - A mixed methods study in four Danish public schools”. (*Published in Appetite*)

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Copenhagen, Denmark

August 2012

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Chen He

August 2012

Abstract in English

Background

School food is believed to hold the potential to positively influence the eating patterns of school children towards healthier diets, thereby reducing the risk of obesity and overweight and contributing to the achievement of better long-term health. This study investigates the role of the school meal as an effective mechanism for the promotion of healthy diets in school children via policies to increase organic food consumption. The aims of this study were to identify the extent to which public organic food procurement policies might act as a driver for healthy eating among children, to explore potential actions to support the introduction of organic food in public school food serving outlets for school children, and to understand and to increase our understanding of sustainable nutrition among school children. Furthermore, this study aimed to examine whether such innovative public procurement and provision strategies could increase the promotion of healthy school meals for school children and influence those who shape the school food environment to be more aware of serving healthy food.

Methods

Study I & II: These were two cross-sectional studies involving school food coordinators as the research subject and using web based questionnaires distributed in selected public primary and lower secondary schools in Denmark (n = 179), Germany (n = 2050), Finland (n = 998) and Italy (n = 940). Each questionnaire was designed to explore the attitudes, intentions/policies, and actions related to organic and healthy foods served in the schools. A pilot test was conducted in all participating countries, after which questionnaires were then modified and distributed to e-mail addresses of each of the sampled schools.

Study III: An observational study was carried out among 6th grade Danish pupils in two organic schools (n = 85) and two non-organic schools (n = 80) in two different municipalities located in the Copenhagen Capital region. This study was designed to explore the pupils' experiences of school meals, knowledge, attitudes, intentions and food practices related to organic foods and health in schools. In each of the four schools, the pupils were asked to fill in an online adapted food frequency questionnaire. Immediately afterwards the pupils, both boys and girls from two organic schools (n = 24) and two non-organic schools (n = 25), were divided into two groups and invited to participate in semi-structured focus group interviews. The interview pupils were informed that it was not compulsory to participate in answering the questionnaires and interviews, and that study results were to be kept confidential and not leaked out to any other third parties.

Results

Study I: Results indicate that the Danish organic schools were more likely to have indicators associated with healthier school environments, including the adoption of a food and nutrition policy in the school ($P = 0.032$), and to recommend nutritious menus for children in canteens ($P = 0.004$), than the non-organic schools.

Study II: The Finnish schools were most likely to adopt a food and nutrition policy than schools in Germany and Italy ($P < 0.001$). In the three countries, non-organic schools were less likely to adopt a food and nutrition policy than organic schools ($P < 0.001$). Compared with Germany and Italy, the Finnish schools were also most likely to adopt a health promoting school policy according to World Health Organization principles, to have a school playground, and to have physical activity as a priority theme in curriculum activity, not including gym courses ($P < 0.001$). The non-organic schools were less likely to adopt a health promoting school policy than the organic schools in all three countries ($P = 0.002$). In these countries, Finnish schools were most likely to have a canteen ($P = 0.001$) and non-organic schools were less likely to have a canteen than the organic schools ($P = 0.017$). The Italian schools were most likely to involve food and nutrition policy issues in pedagogical activities ($P = 0.004$), to serve nutritional school meals ($P < 0.001$), and to recommend children to eat healthily in comparison to Germany and Finland ($P < 0.001$).

Study I & II: In this dissertation, the questionnaire data from study I and II were merged together. When comparing schools in Denmark, Germany, Finland and Italy, Finnish schools were most likely to adopt a food and nutrition policy ($P < 0.001$), to adopt a health promoting school policy according to World Health Organization principles ($P < 0.001$), and to have physical activity as a priority theme in curriculum activity, not including gym courses ($P < 0.001$). Additionally, the Italian schools were most likely to include food and nutrition policy issues in pedagogical activities ($P < 0.001$), to adopt an own health promoting school policy ($P < 0.001$), and to recommend children to eat healthily ($P < 0.001$), compared to schools in Denmark, Germany and Finland. Moreover, the Danish schools were most likely to have a school playground ($P < 0.001$), to promote physical activity during breaks at school ($P < 0.001$), and to serve nutritionally calculated school meals ($P < 0.001$). In the four countries, the non-organic schools were less likely than organic schools to adopt a food and nutrition policy ($P < 0.001$), to adopt a health promoting school policy according to World Health Organization principles ($P = 0.016$), to promote physical activity during breaks ($P = 0.006$), and to have a canteen ($P = 0.017$). In addition to these results, the SFCs' intentions in the organic schools of all four countries had a positive influence on their actions to encourage pupils to eat healthier foods ($P < 0.05$). In these countries, the attitudes of the SFCs' towards organic food and health in the non-organic schools also had a significant influence on their intentions towards healthy school meals ($P < 0.01$).

Study III: Pupils in the organic schools reported better experiences with school meals, e.g. healthy meals that were tasty ($P < 0.001$), whilst more negative experiences, e.g. the selling of unhealthy foods and/or small portions, were observed in children attending the non-organic schools ($P < 0.001$). In these four sampled schools, the pupils had an overall positive attitude, opinion, and fundamental knowledge towards organic food and health, with positive intentions

with respect to the consumption of healthier foods. Furthermore, the pupils' attitudes towards organic food and health positively predicted their intention to consume organic food ($P < 0.01$). However, the results also indicated that the most of pupils generally do not often consume school meals during school time.

Conclusions

In summary, this project provides suggestive but not conclusive evidence for the effectiveness of an organic consumption policy to increase awareness of health and healthy eating habits in school children. The study suggests that a public organic food procurement policy in schools might be supportive for achieving healthier school food environments. For example, such a policy might result in an increased availability of healthier food items, the serving of nutritionally calculated meals and the establishment a canteen facility. Finally, the results demonstrate that more attention needs to be placed at the school level in order to have a greater impact on children's' consumption of healthy school meals throughout the school day.

Dansk resumé

Baggrund

Skolemad anses for at have potentiale til at have en positiv indflydelse i retning af sundere spisning blandt skolebørn og deres kostvaner. Derigennem bliver skolemad et potentielt tiltag, der kan mindske risikoen for fedme og overvægt samt bidrage til opnå en mere langsigtet folkesundhed. Dette studie undersøger, hvorvidt skolemad kan fungere som en velegnet mediator i forbindelse med forandrings- og innovationsprocesser affødt af politikker for sundere spisning og større økologisk madforbrug og indkøb. Formålet med undersøgelsen var dels at identificere, i hvilket omfang en offentlig økologisk indkøbspolitik kan virke som drivkraft for en sundere spisning blandt børn, og dels at undersøge mulige tiltag til støtte af indførelsen af økologisk mad i folkeskolens skolemads udbud. Endelig var formålet med undersøgelsen at bidrage til en øget forståelse af bæredygtig ernæring blandt skolebørn. Desuden havde studiet til sigte at undersøge, hvorvidt sådanne innovative offentlige indkøbs og forsynings strategier kan medvirke til at fremme sund skolemad til skolebørn, samt påvirke dem, der udformer skolemads miljøer, sådan at de er mere opmærksomme på at servere sund mad.

Metoder

Studie I & II: Disse var to tværsnitstudier med skolemads-koordinatorer som informanter med anvendelse af internet-baserede spørgeskemaer distribueret til udvalgte offentlige folkeskoler og gymnasier i Danmark (n = 179), Tyskland (n = 2050), Finland (n = 998) og Italien (n = 940). Hvert spørgeskema var designet til at udforske de holdninger, intentioner / politikker og tiltag i forbindelse med økologiske og sunde fødevarer, der serveres i skolerne. En pilot-test blev gennemført i alle de deltagende lande, hvorefter spørgeskemaerne blev redigeret og distribueret til e-mail adresser for hver af de udvalgte skoler.

Studie III: Et observationsstudie blev foretaget blandt 6. klasses danske elever i to økologiske skoler (n = 85) og to ikke-økologiske skoler (n = 80) i to forskellige kommuner beliggende i Region Hovedstaden. Dette studie blev designet til at undersøge elevernes erfaringer med skolemad, viden, holdninger, hensigter og madpraksisser vedrørende økologiske fødevarer og sundhed i skolerne. I hver af de fire skoler blev eleverne bedt om at udfylde et internetbaseret fødevarer-frekvens spørgeskema. Umiddelbart efter blev eleverne, både drenge og piger fra de to økologiske skoler (n = 24) og de to ikke-økologiske skoler (n = 25), opdelt i to grupper og opfordret til at deltage i et semi-struktureret fokusgruppeinterview. Eleverne blev informeret om, at det ikke var obligatorisk at deltage i at besvare spørgeskemaer eller deltage i interviews, og at undersøgelsens resultater blev holdt fortroligt og ikke delt med til nogen tredjepart.

Resultater

Studie I: Resultaterne viser, at danske økologiske skoler var mere tilbøjelige til at have indikatorer associeret med sundere skolemiljøer, herunder vedtagne kost- og ernæringspolitikker i skolen ($P = 0,032$), og at anbefale sunde menuer for børn i kantiner ($P = 0,004$), sammenlignet med ikke-økologiske skoler.

Studie II: De finske skoler var mest tilbøjelige til at have vedtagne kost- og ernæringspolitikker end skoler i Tyskland og Italien ($p < 0,001$). I de tre lande var ikke-økologiske skoler mindre tilbøjelige til at have vedtagne kost- og ernæringspolitikker end økologiske skoler ($P < 0,001$). Sammenlignet med Tyskland og Italien var de finske skoler også mest tilbøjelige til at have en vedtagen sundhedsfremmende skolepolitik i overensstemmelse med verdenssundhedsorganisationens principper, til at have en skolegård, og at have fysisk aktivitet som et prioriteret tema i pensum, dog ikke inklusiv gymnastiktimer ($P < 0,001$). De ikke-økologiske skoler var mindre tilbøjelige til at have en vedtagen sundhedsfremmende skolepolitik end de økologiske skoler i alle tre lande ($P = 0,002$). I disse lande er finske skoler mest tilbøjelige til at have en kantine ($P = 0,001$), og ikke-økologiske skoler var mindre tilbøjelige til at have en kantine, end de økologiske skoler ($P = 0,017$). De italienske skoler var mest tilbøjelige til at implementere kost- og ernæringspolitiske emner i pædagogiske aktiviteter ($P = 0,004$), til at servere ernæringsrigtig skolemad ($P < 0,001$), og at anbefale børn at spise sundt sammenlignet med Tyskland og Finland ($P < 0,001$).

Studier I & II: I denne afhandling blev data fra spørgeskemaerne fra studie I og II slået sammen. Når man sammenligner skoler i Danmark, Tyskland, Finland og Italien, var finske skoler mest tilbøjelige til at vedtage en kost- og ernæringspolitik ($P < 0,001$), til at indføre en sundhedsfremmende skolepolitik i overensstemmelse med Verdenssundhedsorganisationens principper ($P < 0,001$), og til at have fysisk aktivitet som et prioriteret tema i pensum, dog ikke inklusiv motionskurser ($P < 0,001$). Desuden var de italienske skoler mest tilbøjelige til at implementere kost- og ernæringspolitiske emner i pædagogiske aktiviteter ($P < 0,001$), til at indføre egen sundhedsfremmende skolepolitik ($P < 0,001$), og at anbefale børn at spise sundt ($P < 0,001$), sammenlignet med skoler i Danmark, Tyskland og Finland. Derudover, var de danske skoler mest tilbøjelige til at have en skolegård ($P < 0,001$), for at fremme fysisk aktivitet i frikvartererne i skolen ($p < 0,001$), og at servere ernæringsberegnet skolemad ($P < 0,001$). I de fire lande var de ikke-økologiske skoler mindre tilbøjelige end de økologiske skoler til at indføre en kost- og ernæringspolitik ($P < 0,001$), til at vedtage en sundhedsfremmende skolepolitik i overensstemmelse med Verdenssundheds-organisationens principper ($P = 0,016$), til at fremme fysisk aktivitet i frikvarterer ($P = 0,006$), og til at have en kantine ($P = 0,017$). Endelig viste resultaterne at skolemadskoordinatorerne i de økologiske skoler fire lande havde intentioner igennem deres handlinger at tilskynde eleverne til at spise sundere fødevarer ($P < 0,05$). I disse lande havde skolemadskoordinatorernes holdninger til økologiske fødevarer og sundhed i de ikke-økologiske skoler en betydelig indflydelse på deres hensigter i forholdt til sund skolemad ($P < 0,01$).

Studie III: Elever i de økologiske skoler har bedre erfaringer med skolemad, fx sunde måltider, der er velsmagende ($P < 0,001$), mens flere negative oplevelser, fx salg af usunde fødevarer og / eller små portioner, blev observeret hos børn i de ikke-økologiske skoler ($P < 0,001$). I disse fire udvalgte skoler havde eleverne en overordnet positiv holdning, mening, og grundlæggende viden om økologiske fødevarer og sundhed med positive intentioner i forhold til indtag af sunde fødevarer. Derudover synes elevernes holdninger til økologiske fødevarer og sundhed at vise positive forudsigelser og intentioner om, at de agter at forbruge økologiske fødevarer ($P < 0,01$). Samtidig viser resultaterne dog også, at de fleste af eleverne generelt sjældent spiser skolemad i løbet af skoledagen.

Konklusioner

Sammenfattende giver dette projekt en indikation på, men ikke afgørende beviser for, at økologiske indkøbspolitikker kan øge bevidstheden om sundhed og sunde spisevaner hos skoleelever. Undersøgelsen tyder på, at en offentlig økologisk indkøbspolitik i skolerne kan være understøttende for at opnå sunde skolemads miljøer. For eksempel kan en sådan politik resultere i en øget tilgængelighed af sunde fødevarer, servering af ernæringsmæssigt beregnede måltider og etablering af kantinefaciliteter. Endelig viser resultater, at der er behov for mere opmærksomhed på skoleniveau om vigtigheden af børns indtag af sund skolemad hele skoledagen.

I Definition of terms

Organic food

Organic food is defined based on the Soil Association Certification definition (<http://www.soilassociation.org/whatisorganic/organicfood>). For foods to be labelled as organic, at least 95% of the ingredients must come from organically produced plants and animals. Any food product sold as 'organic' falls under the EU regulations 834/2007 and 889/2008. This means that the product must have been produced to these regulations and inspected and certified by a registered certification body, such as Soil Association Certification www.sacert.org.

Public Organic food Procurement (POP) policy

POP policy refers to a policy practiced by public organizations offering food, where a particular amount of specified foods are expected to be organic. The policy may be adopted at the municipal and/or local school levels.

Food and Nutrition Policy (FNP)

FNP is a set of written and adopted principles that aim to fulfil nutritional needs of pupils and ensure the availability and accessibility of healthy foods in schools. The policy may be adopted at the municipal and/or local school levels.

School Food Coordinators (SFCs)

SFCs are in charge of arranging, implementing and operating school meal programs and delivering the meals to children at schools. The meals they serve can be lunches (cold and/or hot meals), morning and/or afternoon snacks. Coordinators could work in any number of school positions, such as teachers, school headmasters, school kitchen managers, school board members, etc.

Organic and Non-organic schools

The schools were categorized into “organic schools” if they had a POP policy concerning the use of a certain proportion of organic ingredients in school meals, and “non-organic schools”, where no such policy was in place and the school served only non-organic foods.

Public primary and lower secondary school

In this study the public primary and lower secondary schools were those where attending children are aged between 6 and 15 years old, and the school is operated and financed by the public authorities.

Healthy eating habits

Healthy eating habits were defined based on the eight dietary recommendations by the Ministry of Food, Agriculture and Fisheries / Danish Veterinary and Food Administration (https://www.foedevarestyrelsen.dk/english/Nutrition/The_eight_dietary_recommendations/Pages/default.aspx):

- 1) Eat fruit and vegetables - 6 pieces/portions a day.
- 2) Eat fish and fish products - several times a week.
- 3) Eat potatoes, rice or pasta and wholegrain bread - every day.
- 4) Limit intake of sugar - particularly from soft drinks, sweets and cakes.
- 5) Eat less fat - particularly fats from meat and dairy products.
- 6) Eat a varied diet - and maintain a healthy body weight.
- 7) Drink water to quench your thirst.
- 8) Be physically active - at least 30 minutes a day.

Health

Health was defined based on World Health Organization (WHO) definition (<http://www.who.int/about/definition/en/print.html>). Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

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IV List of abbreviations

SFCs = School Food Coordinators

TPB = Theory of Planned Behaviour

iPOPY = innovative Public Organic food Procurement for Youth

SEM = Structural Equation Modelling

FNP = Food and Nutrition Policy

CI = Confidence Interval

WBQ = Web Based Questionnaire

WBQs = Web Based Questionnaires

POP = Public Organic food Procurement

WHO = World Health Organization

AFFQ = Adapted Food Frequency Questionnaire

FFQ = Food Frequency Questionnaire

OR = Odds Ratio

ORs = Odds Ratios

KMO = Kaiser-Meyer-Olkin

AMOS = Analysis of Moment Structure

CFI = Comparative Fit Index

RMSEA = Root Mean Square Error of Approximation

1 Overview of the PhD thesis

1.1 Context of the doctoral work

Why is this research needed?

It is widely recognised that healthy school meals can positively influence the eating habits and academic performance of school children¹⁻³. The school setting has frequently been on the frontline of efforts to improve the health and wellbeing of children⁴⁻⁶ and the improvement of school meals is an important step towards achieving that goal⁷⁻⁹. With obesity and overweight now reaching epidemic levels among youths in Europe¹⁰⁻¹², many initiatives across Europe are using the school meal as a tool for promoting sustainable and healthy eating habits, for example by integrating an organic food supply¹³⁻¹⁵. This is the context and setting in which the research for this PhD thesis was undertaken.

There are challenges surrounding the school meal system which are complex and not easily defined. Such challenges include 1) the quality of school meals, which might involve a combination of nutritional quality¹⁶⁻¹⁹, sensory aspects²⁰ and safety issues^{21,22}, 2) the quality of the school food service, which relate to the food education program in place²³⁻²⁵, the availability of an eating facility²⁶⁻²⁹, 3) the role of personal representatives^{30,31}, and 4) the welfare state³²⁻³⁴.

What does this research contribute to existing knowledge?

The research aims to explore how and why organic school food might address the complex challenges described above. So far, there is little available scientific knowledge about the effectiveness of an organic school food service as well as opportunities and challenges that it may present. Hence, this PhD study conducts exploratory research on the implementation of an organic school food service in order to fill this knowledge gap. Furthermore, by using a multi-level approach, the thesis might well contribute to the development of new recommendations and implications for further research in the field of school meals.

The aim of this PhD work is to provide an up-to-date, research based reference with peer-reviewed papers that investigate theoretical and practical aspects of the school food service. It is particularly relevant for health professions, practitioners, policy makers, researchers, as well as students of public health nutrition.

How did we conduct the research?

In order to address this wider context, the research has analyzed the implementation of school meals from two different perspectives; the School Food Coordinators (SFCs) and, focusing on the other end of the spectrum, the receivers of school meals (school children). The thesis is composed of three studies. Study I and study II were conducted first and used a multi-national web survey method to collect and analyse information on the views and opinions of SFCs across four countries (Denmark, Germany, Finland and Italy). Study III was carried out last and used a mixed-methods approach to look at the viewpoint of Danish school children. For detailed aims of each study, see section 2.4.

1.2 Structure of the thesis

The PhD thesis is set out in ten chapters.

1. The thesis begins by giving a briefly introduction of the context of the PhD work.
2. The “Introduction” chapter provides a foundation for the following chapters of the thesis and summarises current issues surrounding healthy school meals, organic food and organic school food procurement. This chapter also presents the aims and outline of the study.
3. The following “Theoretical and conceptual framework” chapter focuses on the understanding of Theory of Planned Behaviour (TPB) within health research and attempts to give a foundation for the use of this theoretical framework in the current study.
4. The “Methods” chapter draws parallels to the TPB framework and constructs the methodological approaches used in both the quantitative and qualitative analysis.
5. The fifth chapter, “Results”, presents the data collected in four countries and reports results from the descriptive analysis, regression analysis, factor analysis, path analysis and interview data interpretation.
6. The sixth “Discussion” chapter explores possible reasons, any scientific benefits as well as the practical implications associated with the study results.
7. The seventh chapter, “Methodological issues”, assesses limitations of both the study methods and the data collected.
8. The eighth chapter, “Conclusions and future work”. The recommendations for school food practices and also for health professions are discussed, and study findings and suggestions for future work are highlighted.
9. The last two chapters are “References” and “Appendices”.

2 Introduction

2.1 Healthy school meals

Why are healthy school meals important?

Many studies suggest that school meal menus that include a balance of nutritious and healthy foods and restrict the sale of less healthy items can provide a promising approach to counteracting the increasing prevalence of childhood overweight and obesity³⁵⁻³⁷. Evidence shows that about 43 million of world's school-aged children were overweight or obese in 2010, whilst an additional 92 million school aged children were at risk of becoming overweight³⁸. Moreover, overweight and obesity during childhood can track into adulthood, with negative impacts on growth, development and disease risk throughout life³⁹⁻⁴¹. Nowadays, children have the opportunity to access a variety of food options in the current social environment^{42,43}. However, children's food preferences often include sweet, salty and energy dense foods and low-calorie, nutrient-dense foods such as fruit or vegetables are more often rejected, despite these foods being well-known as healthy and beneficial for reducing overweight and obesity^{44,45}. In schools, children can eat up to three meals, plus snacks, per day and consume up to one third of their daily energy intake during school⁴⁶. Therefore, healthy school meals are important, pertinent and timely, not only for the promotion of healthy eating habits among school children, but also for promoting access to food for hungry children^{3,47}. Studies have proven that eating a healthy lunch helps children to concentrate on their studies and develop better learning abilities³⁵.

What are current assumptions about healthy school meals?

Healthy food: Published literature reviews imply that greater attention should be placed on healthy school meals that increase the availability of healthful foods, such as fresh fruits, vegetables and low-fat milk, and encourage healthier eating habits among children at school^{35,37}. Previous reviews also indicate that the majority of school-based meals programs have been conducted in the USA, and those programs lead to increased consumption of healthful foods^{48,49}. School meals therefore present a natural platform for providing healthy foods and for establishing healthy diets among school children.

Nutrition education: Increasing nutrition education by the provision of a variety of healthy school meals has been shown to be an effective strategy for the promotion of healthier eating behaviours in school children^{50,51}. Nutrition education interventions are based on the assumption that children have the opportunity to develop a preference for healthy foods before poor eating habits are established^{52,53}. Although the nutritional knowledge of children may be low, educating children to obtain a personal taste for healthy food plays an important role in subsequent food selection^{54,55}.

School food policy: In today's school food environment, simply serving healthy meals may not be enough to help children develop healthy eating habits^{56,57}. The innovation of school meals

alone has been shown to have less of an effect on eating behaviour than a combination of school meal modification, nutrition education for healthy eating, exposure to healthy foods and the restriction of selling unhealthy foods^{36,58}. Therefore, school meals may be used as part of a holistic approach to reduce childhood overweight and obesity through the implementation of a school food policy that targets the school food environment throughout the school day⁵⁹⁻⁶¹.

Health awareness: The provision of healthy school meals offer an opportunity for children to learn to enjoy healthy food items that they may have originally disliked^{62,63}. Children might reject a food on their first impression, but their food preferences may then be positively influenced by repeated servings of the food item, by watching what their peers eat, or by encouragement from someone senior to them or from someone that they look up to^{62,63}. This may eventually lead to children gaining the motivation to taste novel and unfamiliar foods^{62,63}.

What are the determinants of food choices in school age children?

Psychological/individual determinants: These include food awareness/preferences, nutrition knowledge and attitudes⁶⁴⁻⁶⁷. Children of school age are undergoing a learning process, which eventually results in the establishment of attitudes, intentions and actions towards eating^{36,68}. Previous studies suggest that school-aged children's food awareness/preferences are often guided by food taste and related factors^{69,70}. These studies also show that the availability of unhealthy foods in vending machines, canteens and snack bars provides a school food environment which encourages the consumption of these less healthy foods at schools and is identified as a barrier to healthy eating in school children^{71,72}. In general, school-aged children have a low level of nutrition knowledge, and few studies have been carried out to assess attitudes towards food and its effect on health^{24,25,66}. The influence of psychological/individual determinants on school children's eating behaviour is emphasized in this thesis.

Social/collective determinants: These include cultural factors, familial and peer factors and factor related to the school food environment⁷³⁻⁷⁶. Culture and family are considered important factors that impact children's eating habits^{74,75}. However, the increasing "globalization" of diets has reduced intercultural differences in food practices within societies. According to previous studies, there is a strong positive association between the availability of fruits and vegetables in the home and consumption^{73,75}. Hence, familial factors also play an important role in children's diets. The acceptance of food and the eating habits of children are certainly influenced by their surroundings^{46,77}. School food environments which stipulate the provision of healthy school meals, restrict the sale of less healthy items such as soft drinks, include nutrition policies, health curricula and teaching and peer influences, have been shown to improve children's diets and to prevent overweight and obesity^{78,79}. Adapting the school food environment could therefore be considered one of the most potentially effective ways to influence children's eating habits^{80,81}. The association between the school food environment and school children's eating behaviours is also investigated in this thesis.

The PhD study used these determinants as a point of departure in its attempt to understand potential consequences of implementing organic school food policies. One of the study's aims was to explore and analyse practices, experiences and perceptions of school stakeholders and children towards an organic school food service. However, the study also aimed to investigate and compare different national school food systems that include organic food practices. Thus, the following sections will firstly introduce organic food issues briefly and then describe the concept for the PhD study, organic school food services, in detail.

2.2 Organic food

Organic food consumption

The demand for the consumption of organically produced food is increasing not only in North America, Europe and other industrial countries but also in many developing countries⁸². The organic food market in the USA has reached 28.6 billion USD in 2010 compared only 3.5 billion USD in 1996⁸³. In Europe, the market for organic food expanded to 19.6 billion Euros in 2010⁸⁴. Since there is a considerable increase in demand for organic food produce from consumers, a number of studies have been carried out to determine people's motivation to purchase organic foods⁸⁵⁻⁸⁸. The main factors that drive organic food consumption seem to include environmental, animal welfare and health issues, as well as improved taste and better quality^{85,86}. However, there is a lack of strong evidence indicating that organic and non-organic foods differ in nutritional values and that consumption of organic foods for that reason should promote health more than non-organic foods^{89,90}. With knowledge of these different findings this current research has focused on the investigation of relationships between organic food and health or, more specifically, the effects of organic food policies/practices on the awareness/motivation to be healthy.

Public organic food procurement

The public food procurement sector can play a key role in having a positive effect on the public^{91,92}. Including organic food in public procurement represents challenges and opportunities when implementing policy into practice. On the one hand, organic food in public procurement could contribute to improved health, education, and might encourage small local business to support sustainable development⁹³⁻⁹⁶. Moreover, this organic procurement may also increase access to organic products for the whole population⁹⁷. On the other hand, high quality healthy organic food is more expensive. As food selection is influenced by price, one important factor is the increased cost of buying organic food compared to non-organic food, which may present a much greater challenge than when only providing non-organic meals^{97,98}. Organic food is currently not widely available in public sectors and many individuals in the public procurement sector are unaware of organic ingredients^{91,92}. In addition, catering staff may often not be able to

prepare an organic dish due to a lack of the knowledge and skills required to make fresh and healthy meals, or they may be working with limited amounts of kitchen equipment and space^{92,99}.

2.3 Organic school food procurement

The gap - will the serving of organic food in school meals lead to healthier eating?

There are currently no similar studies that assess how school food serving outlets that incorporate organic produce could be used to promote the school food environment and children's awareness of healthy eating habits. There are also no standard study requirements available to assess such a subject. This doctoral project investigates how school food policies favouring meals with specified proportions of organic products might influence children's awareness of the importance of healthy eating habits and potentially improve the school food environment.

When aiming to provide healthy meals for school children, the public food catering system might encounter the problem of having to compete with other needs in public budgets^{100,101}. Organic food procurement serving outlets may offer some cost saving approaches; for example they might utilize more local suppliers¹⁰². The local supplier might also often provide the outlet with more seasonal and fresh produce foods¹⁰². Since prices of meat products are often higher, a meal comprised of organic ingredients often contribute to the creation of the concept of a "less meat, more vegetables" innovation^{100,103}. This concept also often relates to health, nutrition and sustainability concerns. However, this might also mean that the local organic food could in some cases be less diverse⁸⁷. This could result in reduced choice on school menus which might discourage children from eating organic meals.

The current challenges for increasing the consumption and sustainability of organic school meals, which may eventually increase youth's interest in their own health, is to attract this new generation of consumers¹⁰⁴. However, providing a sustainable school meals service is a complex procedure consisting of a variety of factors^{105,106}. These include an overall framework, concrete policies on how to conduct the organic food procurement for pupils, and developing facilities and instruments that can implement the service^{105,106}. All these aspects working together may contribute to increased consumption of organic foods in schools, which positively impact children's healthy eating habits^{105,106}.

iPOPY – an international organic school meal innovation project

One third of this PhD research was comprised of the innovative Public Organic food Procurement for Youth (iPOPY) project, one of eight pilot research projects within the CORE Organic ERA net I that is financially supported by the members of the CORE Organic Funding Body Network¹⁰⁷. The main aim of iPOPY was to investigate how an increased consumption of organic food may be achieved by the implementation of strategies and instruments used for

public procurement of organic food in serving outlets for young people¹⁰⁷. Schools in Denmark, Germany, Finland and Italy participated in the iPOPY project. In these four countries, the school meal system began with similar objectives and played mainly a social role by supplying warm meals to needy school children¹⁰⁰. Nonetheless, the development of the school meal systems between these countries appears diverse and different regulatory frameworks in these countries have resulted in different school meal systems¹⁰⁰. There were three types of school meal provision in the four countries: 1) the citizenship model, where school food is a part of the public welfare system, 2) the market-oriented model, and 3) a mix of the citizenship and market-oriented model. For example, Finnish school legislation guarantees a well-balanced free school lunch for every pupil each school day¹⁰⁸. In Italy, in some regions school meal systems are organized so that parents make payments to supplement the whole school meal provision¹⁰⁹. However, in Danish schools, school meals are usually not served free of charge, and the pupils must purchase any school foods that they wish to consume^{110,111}. This market-oriented model is also found in the western part of Germany^{112,113}.

Fills the gap - the PhD project

Organic public food procurement provide a good basis for increasing “out of home” intake of organic food. In this way, children gain the opportunity to receive organic food-related education, information and practice from schools^{13,55,114}. School age children are an especially interesting target group, when raising awareness regarding organic food and sustainability issues as children’s perceptions in school might motivate them to consume more organic foods, as well as increase their self-awareness of long-lasting wellbeing for when they establish their own households^{24,95,103}. Such learning processes may occur via nutrition education^{51,115,116}, or by an experience of organic meals throughout the entire school period. No known empirical research addressing the relationship between the provision of organic food and the school as a healthier eating environment currently exists. This doctoral research has taken the initiative to establish whether the inclusion of organic food in school meals could provide an opportunity to promote children’s health and improve the school food environment. For example, do schools serving organic food have a greater awareness of serving healthy school lunches? Or, is the introduction of an organic school food policy the first step towards the provision of healthier menus for school children and the creation of a healthier school environment?

This doctoral study has focused on four Western European countries (Denmark, Germany, Finland and Italy). There were a number of reasons why these countries were chosen: 1) the school meal model varies between each country but all have the potential for integrating organic school food and this makes it possible to explore the subject in different situations¹⁰⁰, 2) all countries were involved in the iPOPY project, thus taking the advantage of collaborative partnership, and 3) the four countries were also geographically representative of northern, middle and southern Europe. The entire PhD project was conducted in three studies. The first two studies were linked to the iPOPY project. They utilized the same study methods to explore how

processes of change related to the implementation of healthy eating and organic initiatives in schools are associated with learning processes among key stakeholders that might support healthier eating. The third study was based on these two studies but was unrelated to the iPOPY project or any other projects. The study was developed using a mixed-methods approach and explored school children's understanding of organic food, potential health and social impacts of organic food, as well as how school children's attitudes, intentions and actions towards organic food are influenced by the introduction of organic food served in the outlets that they use. Through a combination of "top-down" (studies I & II) or "bottom-up" (study III) approaches¹¹⁷⁻¹²⁰, this PhD project provides new insights into the role of the school meal in children's health.

2.4 Aims, outline of the study and research questions

The overall aim of this project was to explore the links between healthy eating practices and organic food policies using the school as a setting. That is, the whole study aims to test the hypothesis that organic food procurement policies in the school meal system can act directly or indirectly as a driver for healthy school food environment and healthier eating among pupils.

The specific aim of study I

The first study aimed to examine the attitudinal issues, intentions and actions of SFCs towards the promotion of healthy meals in Danish school food services and to uncover the potential impact of organic food procurement policies on creating a healthy school environment. The study aimed to determine whether there is an association between organic school food policies and indicators (proxies) for the promotion of healthy meals and eating for school children, using SFCs' statements on indicators (proxies) for healthy eating as variables.

The specific aim of study II

The second study used a comparative study design to explore the organic school food service in Germany, Finland and Italy. The study aimed to explore the relationship between organic food procurement policies and school food coordinators' attitudinal issues, intentions and actions in relation to the school meals system and whether such policies lead to the promotion of a healthier school food environment.

The specific aim of study III

The third study continued to investigate the above associations but also involved a "bottom" level (pupils') perspective in addition to the "top" level (SFCs). This part of the research investigated the following hypothesis: organic food service policy/praxis is associated with

children's awareness of healthy eating in the Danish school food service. In particular, it looked at whether organic procurement policies and the resulting praxis in schools can help build healthier eating habits among pupils.

Research questions

- 1) Is there a relationship between organic food procurement policies in school food service and building healthy school food environment?
- 2) Are schools with organic meal provision more aware of promoting healthy foods and nutrition for pupils than schools without organic meal provision?
- 3) Do SFCs' attitude towards organic food and health impact on their intentions and actions towards healthy school meals?
- 4) Do pupils in schools with organic school meal provision have a better knowledge, attitude and awareness with regard to health than pupils in schools with non-organic school meal provision?
- 5) Do pupils in schools with organic school meal provision have a higher percentage of consumption of school meals than pupils in schools with non-organic school meal provision?
- 6) Do pupils in schools with organic school meal provision have a higher percentage of consumption of healthy food and drink practices than pupils in schools with non-organic school meal provision?
- 7) Do pupils' attitude towards organic food and health impact on their intentions and actions towards healthy eating habits?

3 Theoretical and conceptual framework

3.1 Brief summary

A number of theories have been developed to predict a wide range of behaviours. These major theories of behaviour change include Ajzen's Theory of Planned Behaviour (TPB) (1991)¹²¹, Bandura's Social Cognitive Theory (1986)¹²², Becker's Health Belief Model (1974)¹²³, and Prochaska's Transtheoretical Theory of Change (1998)¹²⁴. These theories primarily focus on cognitive factors as determinants of behaviour change, are qualitative in nature, providing less insight into the dynamics of behavioural intentions¹²⁵. This PhD research uses the TPB using detailed, robust and empirical methods, rather than a qualitative approach. The empirical techniques employed here aim to use the TPB to give a more complete picture. The reasons for choosing the TPB as the theoretical framework for this research is explained in section 3.2.

Health behaviours are complex and are determined by more than just an individual's own level of knowledge¹²⁶. Behaviours can be based on a number of multi-level factors at the individual, organization, community and/or government level¹²⁷. In this PhD research, the school setting is used to incorporate a multi-level approach. According to the literature to date, multi-level approaches that are in tandem with individual approaches are most effective in promoting healthful behaviours¹²⁵. Furthermore, in many settings multi-level approaches can achieve positive and sustainable changes^{128,129}, such as food policy changes to promote a supportive food infrastructure and have a sustainable impact on health^{130,131}.

Examples of previously identified key environmental determinants of obesity include the availability and accessibility of foods, the availability of opportunities to perform physical activity, the interconnectivity of streets and perceived safety in areas where physical activity can take place^{130,132,133}. Until now, few studies have examined the effect of the school policy environment and little research has integrated the broad range of modifiable determinants found in schools, including the multi-level approaches that improve healthy behaviour^{134,135}. Such components might be the inclusion of organic food, education about healthy eating and the effect of school food policies, as was investigated in this PhD research. Therefore, this doctoral research adds to current knowledge and adds further insight into the processes and factors involved when using multi-level approaches. With a lack of knowledge in the current literature about which strategies work, this study highlights the type of coordination needed and the most effective methods used in the process of implementation.

3.2 Why use the Theory of Planned Behaviour?

The specific reasons for why the TPB was chosen for basis of this doctoral research, as opposed to other theories of behavioural change, are addressed here:

- **Determinant measurement.** The determinants of children's eating related behaviour change are many and varied^{127,131}. The sum of all the relevant factors and their interdependencies that determine eating related behaviours for an individual or group can

include individual psychology and activity, societal influences, food production and consumption, and biology etc^{73,136,137}.

As this study was designed with time and budget restraints, it focused specifically on the individual and collective determinants of children's healthy eating behaviours. The measures described in the TPB appear most commonly in a psychological research context or are applied in a specific setting or environment^{121,138}. We therefore believe that the TPB model provides an appropriate theoretical framework on which to base this project, as it seeks to measure effect of individual psychology of school stakeholders and school children towards organic food and the influence of an organic school food environment on the consumption of healthy school meals.

- **Predictive power.** The TPB is a well validated decision-making model that provides an appropriate theory framework for understanding and predicting people's behaviours. Meta-analyses testing the TPB have shown different but promising results regarding the effectiveness of the theory's variables¹³⁹⁻¹⁴¹. Although there is support for the TPB model, researchers have questioned whether the TPB variables encompass all of the predictors of people's intentions and behaviours^{121,138,142}.
- **Widely employed.** Numerous studies have demonstrated that the TPB has predictive power across a broad range of behaviours¹³⁹⁻¹⁴¹. The theory model has been employed in various fields, such as health, physical activity, leisure, technology, etc¹⁴³⁻¹⁴⁷. A variety of studies have successfully applied the TPB to predict the health related behaviours that induce eating behaviours^{144,146-148}.

For example, a survey to assess eating behaviours in urban Native American youth included questions based on the TPB structures to measure the common understanding, benefits of behaviour and important people that might impact on eating behaviours¹⁴⁴. In this context, the approach expanded the application of the TPB model to also measure barriers and self-efficacy of the eating behaviour of youths¹⁴⁴. Another example of when constructs of the TPB were used to investigate eating behaviours was in the prediction of breakfast consumption among 96 students in an Australian university¹⁴⁷. This involved extending the TPB model with an additional variable, past behaviour, in order to test whether this was predicted breakfast consumption behaviour¹⁴⁷.

Many studies have measured eating behaviour changes based on the TPB or extended TPB constructs, but few studies have examined the direct effect path from attitude to behaviour in the theory, and even fewer studies have linked organic food consumption behaviours with the TPB model. Conversely, this PhD study developed a school-based multinational survey that utilizes the TPB constructs but also examines the direct effect between the attitude variable and the behaviour variable.

- **Technical reasons.** One of the primary reasons that this PhD research employed the TPB was to frame the data analysis and provide a strong theoretical background for the structural modelling¹⁴⁹. Structural Equation Modelling (SEM) can go beyond classic segmentations, such as exploratory factor analysis and cluster analysis, to produce stronger models to determine causality in the relationships^{150,151}. SEM can be used inductively based on an existing theoretical framework¹⁴⁹. Specifying the TPB as a path model has been used in food related health and consumer studies^{144,146-148}, and consequently, the present application contributes to an innovative application of both methods.

3.3 What is the Theory of Planned Behaviour?

Based on Ajzen's (1991) TPB, it is a social cognition model that aims to map out influences on behavioural change¹²¹. Fig. 1 provides the interplay between the socio-demographic factors in the TPB model. According to the model, behaviour is determined by an individual's intentions, which are shaped by their attitude towards behaviour, subjective norms, and perceived behavioural control¹²¹. The overall theory describes how behaviour can be best predicted from intention, which is an indicator of how much people are willing to consider future behaviours¹²¹.

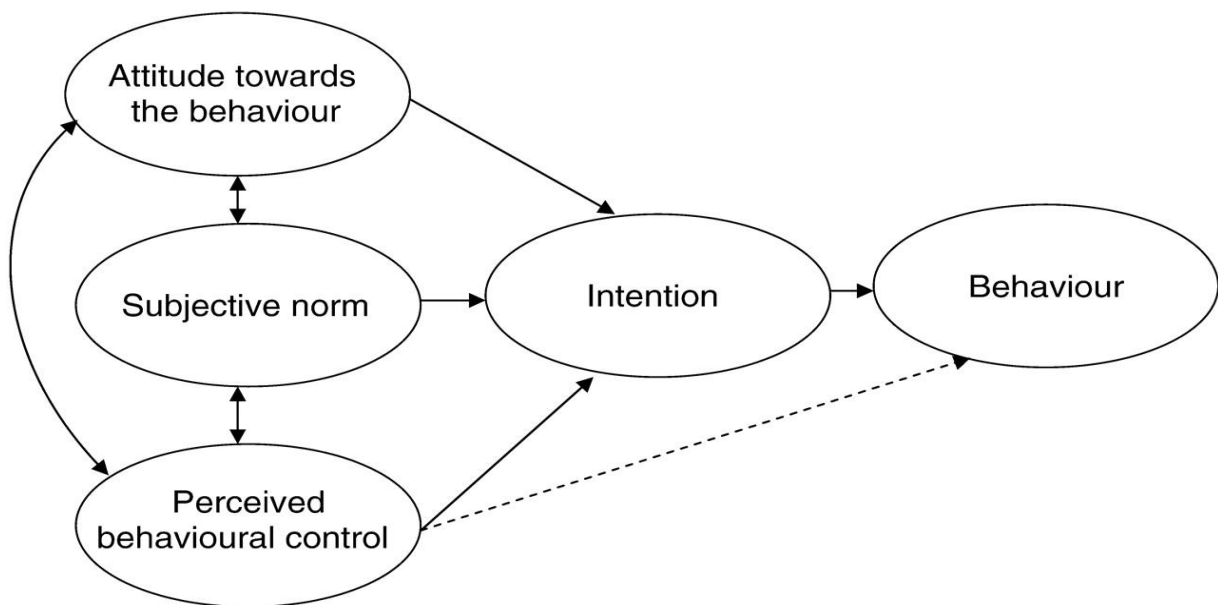


Figure 1. Theory of Planned Behaviour. *Source Ajzen (1991)*

3.4 Advantages and disadvantages of the Theory of Planned Behaviour

The TPB is useful for predicting factors directly related to healthy eating behaviour by including a ‘perceived behavioural control’ variable in the model. This can cover people's non-volitional behaviour, thereby improving the predictability of intention and explaining the association between intention and behaviour^{152,153}. In addition, an important variable ‘social norm’ included in the TPB can explain behaviours that are influenced by significant others, such as family, friends^{125,142,154}. This component can also refer to more broadly social pressure, such as mass media or society.

Along with other major theories of behaviour change, the TPB cannot fully assess whether or not people engage in a given food-related behaviour¹⁵⁵. The TPB is largely dependent on the emotional components or rational processes such as mood, feel and so forth¹⁵⁵. Nevertheless, attitudes and intentions can also be affected by other factors that are not outlined in the theory. This suggests that the TPB needs more conceptualisation, definition and additional explanatory factors¹⁵⁵. Moreover, there is a gap between behavioural intention and actual behaviour, whereby individuals often do not perform the behaviours that they first intend on doing^{156,157}. A meta-analysis of TPB studies indicated that the average amount of variance in intention and behaviour accounted for by the TPB was 39% and 27%, respectively¹⁴³⁻¹⁴⁷. It appears that intention is influenced by more factors and to a greater extent than action. This suggests that support for this theory is limited.

3.5 The Theory of Planned Behaviour for the PhD work

The TPB provides a theoretical framework for the current PhD study. This study takes as a point of departure that food environmental factors have a significant impact on food choice and intake^{154,158-160}. Thus, this project assumes that the physical, organizational and social environment at school directly influences the eating patterns of school children, who are in a period of learning, facilitated by the observation of others and the influence of their exposures^{140,161,162}. Since it is not possible to measure attitude towards behaviour, subjective norms, perceived behavioural control, intention and behaviour at the collective level of a school, this project builds on the assumption that there are two layers of importance within the school environment; the SFCs and the pupils.

3.5.1 Attitude towards the behaviour

Attitude towards behaviour refers to both an individual's prior beliefs about behaviour and an evaluation of the individual's own performance of that behaviour¹²¹. The evaluation is based on beliefs about a behaviour, which links behaviour to certain positively or negatively valued attributes¹²¹. For example, SFCs may hold positive or negative attitudes towards the promotion of healthy eating habits through pedagogical activity and the school food service because they have the responsibility to spend time and effort on such activities.

3.5.2 Subjective norm

Subjective norms refer to the social pressure to perform or to not perform a particular behaviour¹²¹. This includes beliefs about social pressure and motivation to comply¹²¹. In this context, for example, pupils who consume school meals often do so due to encouragement from the school, whereas pupils who often skip school lunch often might not be receiving sufficient encouragement to consume school lunches.

3.5.3 Perceived behavioural control

Perceived behavioural control refers to the individual's perception of the ease or difficulty of performing or not performing the behaviour of interest¹²¹. Perceived behavioural control is made up of both internal and external factors¹²¹. It can be demonstrated with regard to consuming more school meals, which pupils may see as easy on an assessment of price, the availability of preferable food, and the facilities available. For example, available meals may be affordable, contain tasty food and pupils may have time available to consume them. However, they also may perceive a loss of behavioural control because the quality of school meals may be poor, such as if they were poorly packaged or if they were associated with unpleasant smells e.g. from fish dishes.

3.5.4 Intention and behaviour

Intention and behaviour refers to whether or not a person intends, and is able, to carry out a behaviour¹²¹. For example, the SFCs' intention to adopt a school food policy reflects how strong they intend to provide healthy school meals for school children. Another example is whether children would like to eat more fruit and vegetables in the future, and whether schools provide healthy nutritional menus for pupils.

3.6 Constructing questionnaires based on the Theory of Planned Behaviour

3.6.1 Adapted theory of planned behaviour

The iPOPYP project provided the first draft of the questionnaire and recommended that the questionnaire development should be based on social research theory such as the TPB. By these recommendations, the questionnaires should be able to look at not only eating behaviours, but also the environmental factors that influence the eating habits of children. The present project thereby assumes that social factors play an important role in the creation of healthy eating environments, and so this study draws on an adapted theory of planned behaviour. The adapted theory of planned behaviour is derived from the basic beliefs and structure of the TPB model. According to the TPB, behaviour does not stem from a direct path from attitude. The present studies were interested in investigating the direct effect of relationships between attitude and behaviour. In the adapted theory of planned behaviour (see Fig. 2), attitude, subjective norm, perceived behavioural control, intention and action/behaviour are further decomposed into

smaller constructs. This provides a more comprehensive explanation of the adoption of behaviour¹⁶³⁻¹⁶⁶ by using the hypotheses of the project that are listed in Table 1. These involve important determinants of SFCs and pupil's action/behaviour. In the present studies, both quantitative and qualitative methods used the adapted theory of planned behaviour to construct the questionnaires and interview guidelines.

3.6.2 Attitudinal measures

For directly measuring SFCs' and pupils' attitudinal issues, the current study used the common rating methods of agree/disagree scales and verbal rating scales^{167,168}. Previous reviews indicate that verbal rating scales improve the validity and reliability of results and are easily administrated to informants^{167,168}. Verbal rating scales might not be appropriate for use in telephone surveys due to difficulties in remembering each scale by respondents^{167,168}. In the web survey model of current project, however, this was not a barrier.

Example of a verbal scale from the questionnaire in study III

Do you think you are healthy?

1. *I am very healthy*
2. *I am healthy*
3. *I am almost healthy*
4. *I am not so healthy*
5. *I am unhealthy*

Agree/disagree scales are commonly used in research due to the benefits of repeatable, easily understood questions^{168,169}. However, agree/disagree scales are also prone to compliance bias because respondents are more likely to accept agreement than disagreement^{168,169}. In order to avoid this type of bias, as well as to encourage respondents to read each question and think about each option thoroughly rather than simply repeating agree/disagree, the current project structured the positive and negative options with a Likert-type scale such as from "Strongly agree" to "Strongly disagree"^{168,169}.

Example of an agree/disagree scale from the questionnaire in study III

I think our school meals are healthy.

1. *Strongly agree*
2. *Agree*
3. *Somewhat agree*
4. *Somewhat disagree*
5. *Disagree*
6. *Strongly disagree*

Table 1. Hypothesis setting based on the adapted theory of planned behaviour constructs.

Number	Hypothesis statement	Adapted theory of planned behaviour construct
H1	Organic school food procurement policy is positively associated with attitude towards promotion of organic food for pupils.	Attitude
H2	Organic school food procurement policy is positively associated with attitude towards promotion of healthy eating habits for pupils.	Attitude
H3	Organic school food procurement policy is positively associated with pupils' attitude about organic food and health.	Attitude
H4	Organic school food procurement policy is positively associated with pupils' attitude towards school meals.	Attitude
H5	Organic school food procurement policy is positively associated with pupils' received encouragement from school regarding eat healthily and consume school meals.	Subjective norm
H6	Organic school food procurement policy is positively associated with pupils' confidence on school food service.	Perceived behavioural control
H7	Organic school food procurement policy is positively associated with pupils' willingness on school food service.	Perceived behavioural control
H8	Organic school food procurement policy is positively associated with adoption of a school food policy.	Intention
H9	Organic school food procurement policy is positively associated with adoption of a health promoting school policy.	Intention
H10	Organic school food procurement policy is positively associated with pupils' intention of healthier eating habits.	Intention
H11	Organic school food procurement policy is positively associated with provision of healthy school food and drink practices.	Action
H12	Organic school food procurement policy is negatively associated with provision of unhealthy school food and drink practices.	Action
H13	Organic school food procurement policy is positively associated with encouragement of healthy eating for pupils.	Action
H14	Attitude items towards are positively associated with action items.	Attitude

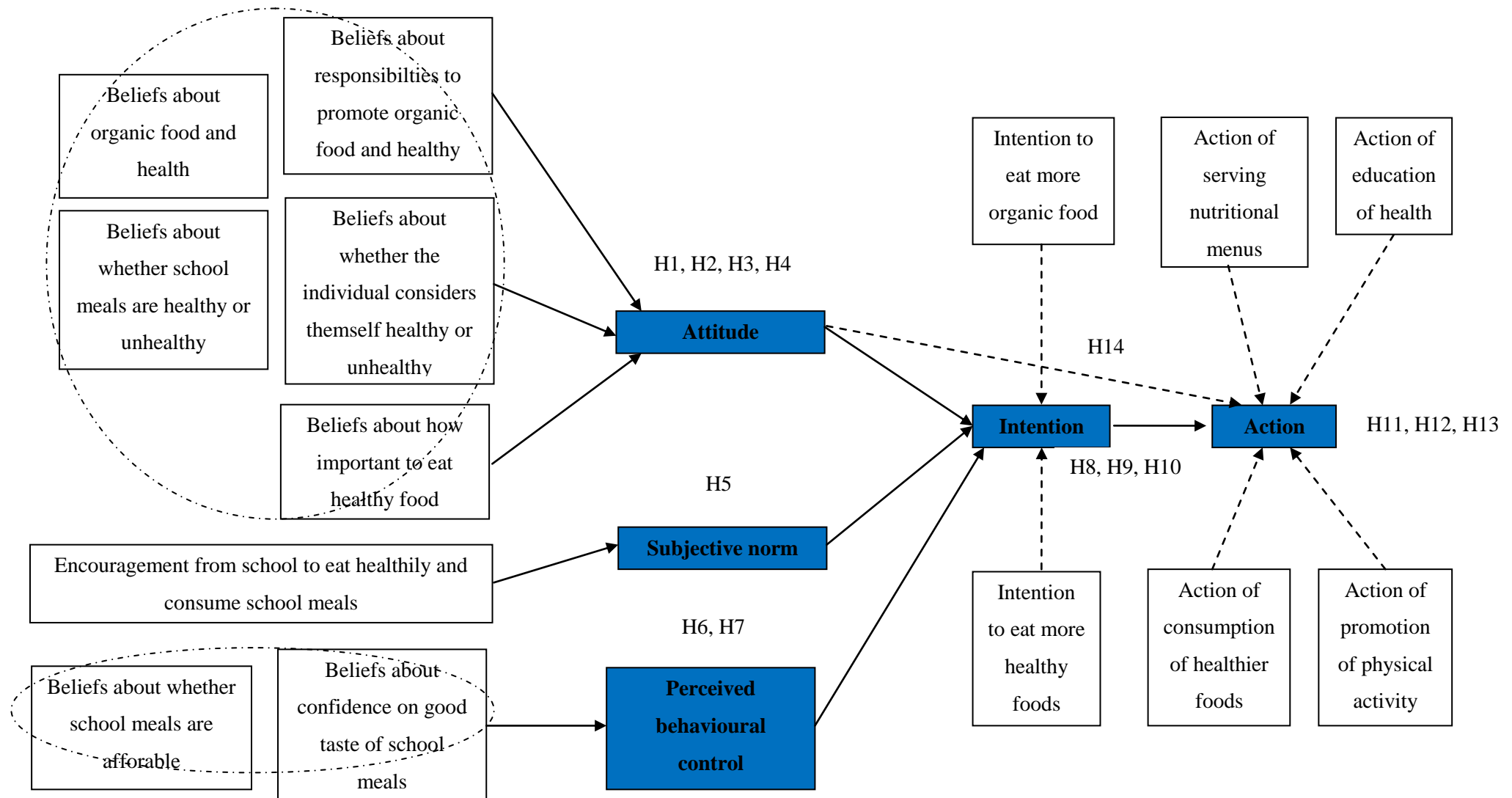


Figure 2. Adapted theory of planned behaviour for studying factors influencing school food environment and pupils' eating habits.

Table 2. Example questions based on the adapted theory of planned behaviour constructs.

Adapted theory of planned behaviour construct		Example questions
Attitudes	Beliefs about a behaviour	I think school has a responsibility to promote healthy eating habits via the school food service.
	Evaluation about performance of behaviour	It is important for me to eat healthy food.
Subjective norms	Social pressure	Does your school encourage you to eat healthy food?
	Motivation to comply	Have you sometimes not eaten this food because it is unhealthy?
Perceived behavioural control	Internal factors	Do you like to eat school meals?
	External factors	Do you have enough time to eat lunch?
Intention		I would like to eat more organic food in the future.
Action		Does your school serve nutritionally calculated meals according to official guideline?

For indirect measurements of attitudinal issues, this study designed the questions to be specific^{170,171}. Asking specific questions can improve the accuracy of collected data and avoid vagueness from respondents¹⁷². However, the disadvantages of question specificity are an increased cost of surveys and questionnaire length, which add to respondent burden and can cause a reduction in response rate^{139,173}. Table 2 lists the example questions of attitudinal measures.

3.6.3 Behavioural measures

This project was interested in measuring actions undertaken by schools with respect to building a healthy school environment, as well as actions related to pupils' school food consumption. The units of measurement for school action were chosen to measure the specific activities carried out by schools to improve school health, particularly with respect to school meals and how these might impact pupils' eating habits. In the process of developing the units of measurement, the project considered the respondents' perspectives carefully¹⁷⁴. Accordingly, we defined different key terms in the questionnaire, such as what a Food and Nutrition Policy (FNP) contains, in a way the school staff would find easy to understand and provided any information thought necessary^{141,175}. The present study did not address questions that required plenty of cognitive effort from respondents, e.g., 'How many grams of salt did you consume yesterday?'¹⁴⁹.

Example question of measuring school action from the questionnaire in studies I & II

Does your school recommend nutritional menus for pupils in canteen?

1. *Yes*
2. *No*
3. *Don't know*

The units of measurement for pupils focused more on the frequency of their action towards defined food categories (e.g. fresh fruit, processed vegetables, fizzy drinks without sugar) so that pupils' general eating habits could be measured more specifically. The questionnaire included banded frequency questions for the consumption of food categories¹⁶⁸. In order to avoid the differences in respondent's opinions as to what composes various time intervals such as "often" or "sometimes", the present study chose to employ specific quantifiers (e.g. never, everyday, 1-2 times per day)¹⁶⁸. For banded frequency questions, the longer the reference period the more suitable it is for accurate data collection¹⁶⁸. On the other hand, it is often difficult for respondents to recall food consumption if the period is for more than a number of days¹⁶⁸. In addition to this, the current study aimed to investigate frequency of action within school time only. Consequently, we determined the reference period for this part of the study as the children's school period from start point to research date.

Example question of measuring frequency action from the questionnaire in study III

How often do you buy school meals?

1. *Never*
2. *Less than one day per week*
3. *One day per week*
4. *2-4 days per week*
5. *1 time per day*
6. *2 times per day*
7. *More than 2 times per day*

3.7 Research paradigm

The indicators for proxies of healthy eating in school children in the present study were the dependent variables (see Fig. 3). Independent variables in study I and II were the type of school and country, and in study III the type of school (organic or non-organic) was the independent variable. The association between independent and dependent variables was used to test the project hypothesis.

The entire project was divided into three studies whereby the intention was to test whether organic school food procurement policy has a potential role in improving children's awareness of healthy eating, impacting their eating habits and the school food environment from two sides of the same coin (see Fig. 4). One side was categorized as "top" level, and refers to the group of individuals in schools that implement, arrange, or operate school meal systems, such as SFCs. The other side was "bottom" level, which refers to the pupils that consume lunches provided by schools during schools days. By looking at both sides we were able to investigate the associations between organic school food procurement policy, school food environment and children's health. Furthermore, we explored the gap in schools' effort to promote a healthy school environment as well as the pupils' reflection of this. As demonstrated in the TPB, attitude, subjective norm, and perceived behaviour control are correlated. Hence, all the three layers are important to map. The first layer is individual attitudinal issue (what the SFCs or pupils think or feel), the second is policy, typically adopted by a professional context and which can be seen as an indication of collective individual motivations (what the SFCs or pupils intend to do), and the third is action (what the SFCs or pupils are actually doing).

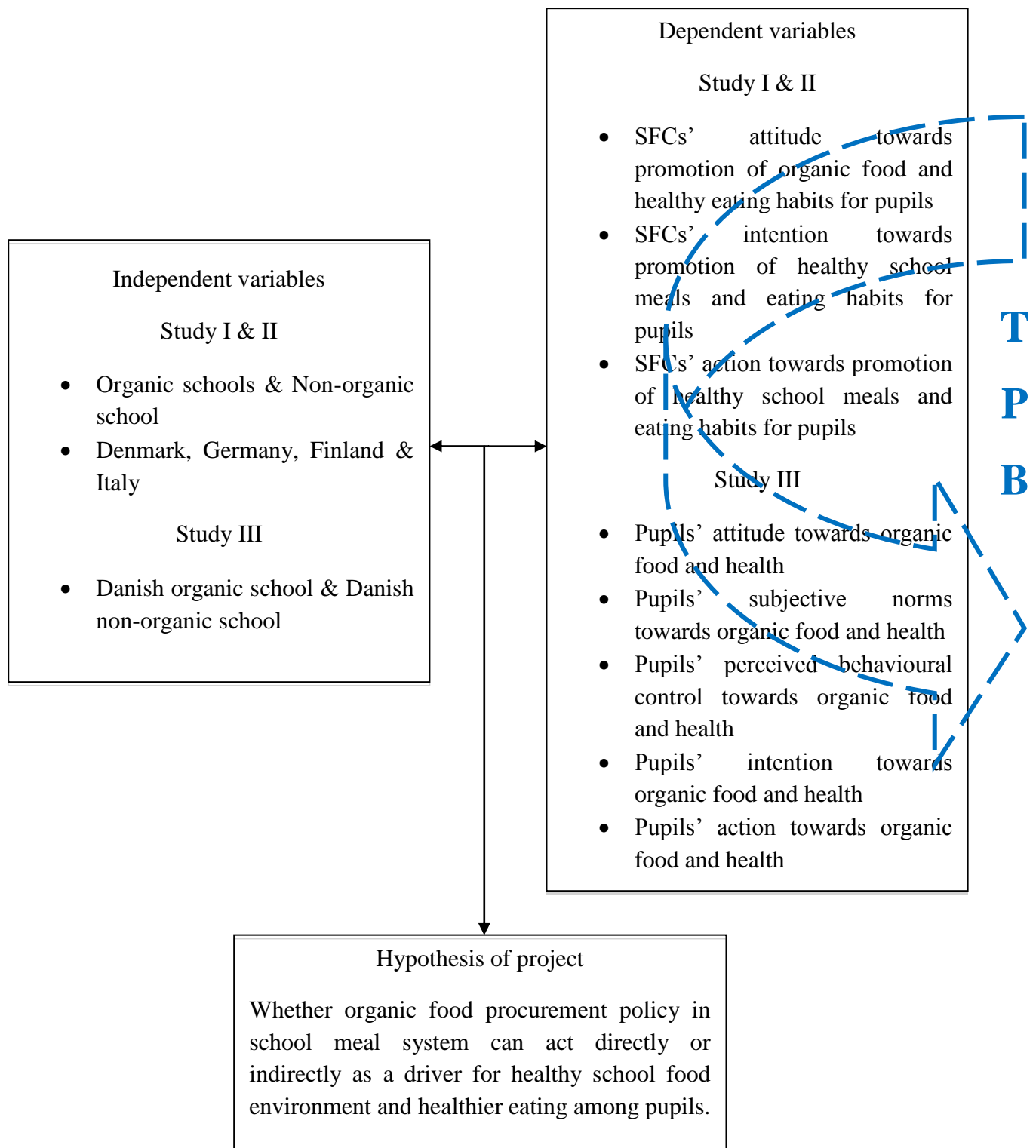


Figure 3. The diagram illustrates the conceptual framework of the study and how organic school food procurement policy can be related with improvement of a healthy school food environment and pupils' awareness of healthy eating habits.

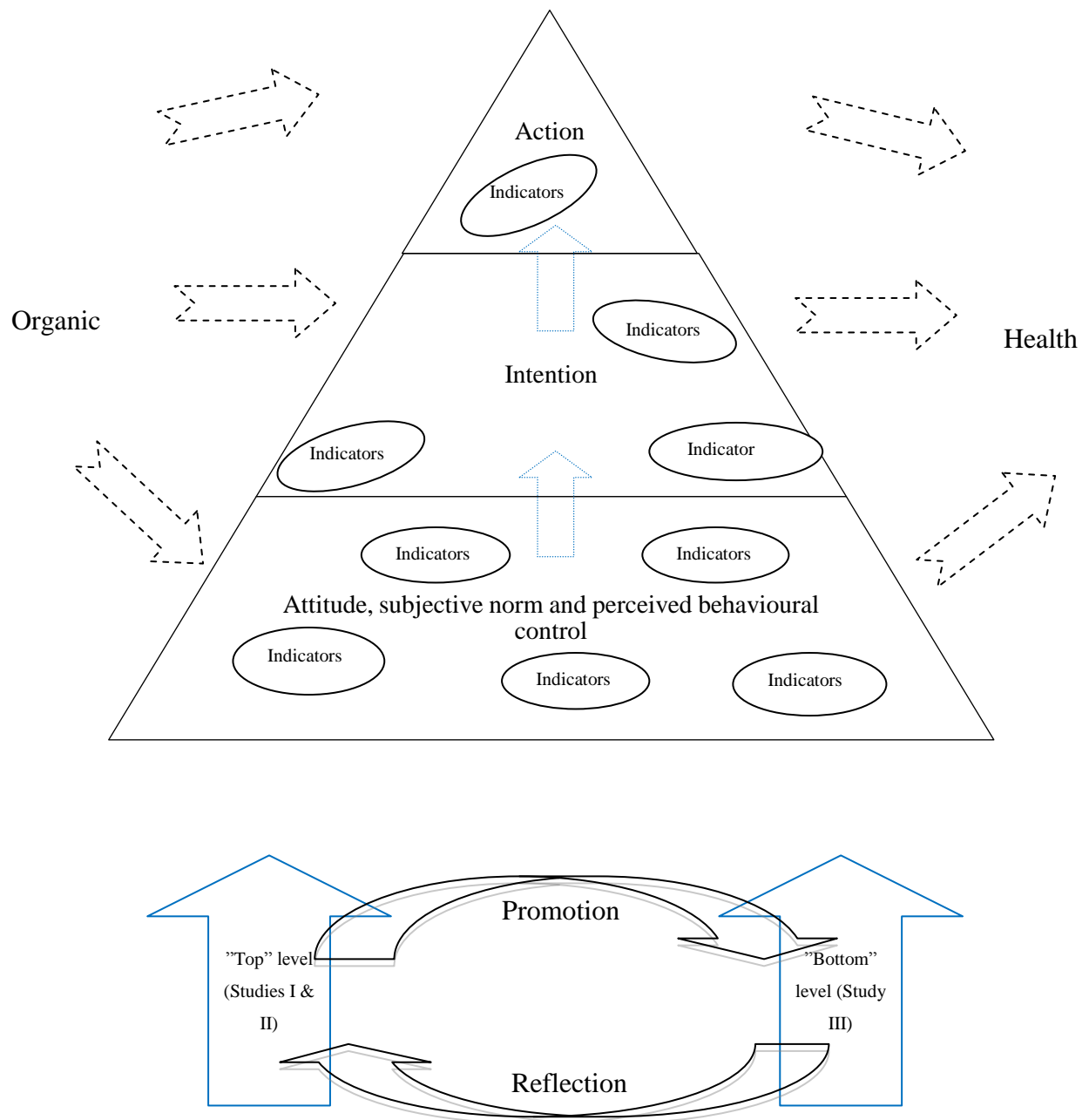


Figure 4. Overall project design.

4 Methods

4.1 Study I & study II

4.1.1 Subjects & Sampling

Study I and II were part of the iPOPY project and included researchers from Denmark, Germany, Finland and Italy. The research subjects of study I and II were the SFCs in the public primary and lower secondary schools (children aged 6-15 years old). With a 95% confidence level and a Confidence Interval (CI) of 5, under the 50% preference, the required sample size was 377¹⁷⁶. To meet the calculated sample size, 2050 German, 998 Finnish and 940 Italian questionnaires were distributed. As a result, the number of Danish schools with publicly organized school food service was limited. The study could afford to select 179 representative schools with prepared food provision in Denmark. However, it was not possible to base the sampling on which identified a school as organic or non-organic school in each country. It should also acknowledge that, due to varying population sizes in the four countries, the numbers of sampled schools were distinctly different from each other.

In Denmark, officials in two municipalities of Zealand provided part of the schools list. The rest school names were obtained from former studies conducted by the National Food Institution. After the collection of all school names, the E-contact information of sampling schools could be researched through the website of the Danish Education Ministry. In Germany, our iPOPY project partners provided the sampling schools' list from the state of Hesse, despite encountering difficulties during the process of attaining school contacts due to strict restrictions by the German authorities when handling out schools' contact information. Similarly, for Finnish sampling schools, our iPOPY partner in the country supplied the school contact information. Contact information for the Italian schools was collected using the website of the Emilia Romagna Central School Office, which was also offered by our Italian iPOPY partners.

4.1.2 Instruments

A quantitative survey using a self-administered Web Based Questionnaire (WBQ) was conducted in all sampling schools, both with, and without organic food provision. The surveys were carried out in the selected public primary lower secondary schools in Denmark, Germany, Italy and Finland. Four web-based surveys were conducted among the “top” levels in each of the countries.

The initial questionnaire was designed in a Word format in English and later translated into Danish, German, Finnish and Italian (see Fig. 5), and the questionnaires used the same questions but were slightly adapted to suit local school food conditions. In each country, a pilot questionnaire was carried out at the one of the schools known to provide meals with a certain amount of organic foods, and at a school known to provide meals based only on non-organic foods. After all responses were collected, the completed questionnaire was revised and converted to a web-based version using the software SurveyXact. Thereafter, the informants received the final WBQ via a web browser link.

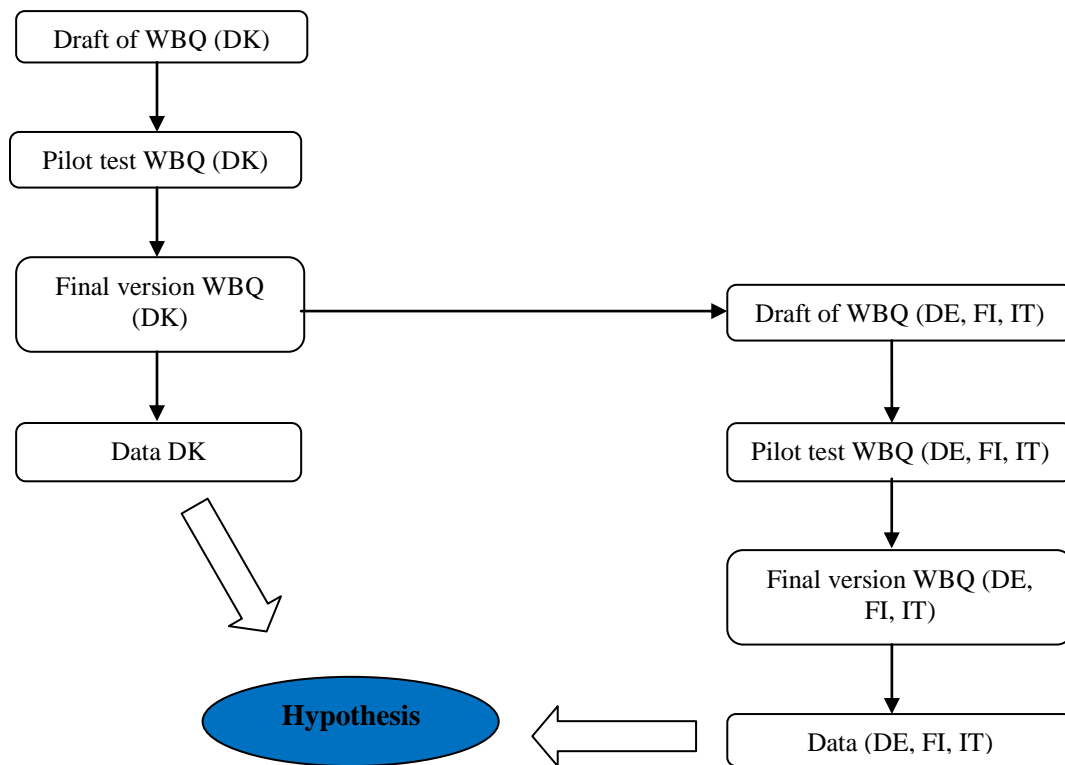


Figure 5. Flow sheet of developing the Web Based Questionnaires (WBQs) for school surveys in order to test study hypothesis in Denmark, Germany, Finland and Italy.

4.1.3 Questionnaire measures

The WBQ was constructed to explore the attitudes of the respondents, and to recognize present school food policies such as a Public Organic food Procurement (POP) policy and FNP, as well as serving practices. The first part of the WBQ (factual information) addressed factual information such as the position of the SFC in the school, and the number of pupils and classes (1-7, 1-8, 1-10 or 8-10).

The second part of the WBQ mapped the attitudes of the informants towards the responsibility of the school to promote organic foods through food serving and through the teaching activities. Similarly, the WBQ asked whether the school should be responsible for promoting healthy eating habits via food serving and via education. These questions were answered by ticking 6 response categories ranging from “Strongly agree” to “Strongly disagree” to the statement that the school should promote organic food and healthy eating habits via education and school meals.

The third part of the WBQ mapped the organic food issues in school. It was designed to explore existing policies related to the provision and consumption of organic foods. Moreover, the question was addressed to the decision maker of such a policy, and also if it was voluntary to

adopt the policy. The questionnaire also determined whether there was any control process for organic food purchasing, as well as how the use of organic foods was evaluated or.

The fourth part of the WBQ firstly defined the term FNP. As above, the first question asked if the school had a FNP and if so, who played the central role in the decision to adopt the FNP at the school. This part also inquired about whether the FNP was involved in curricular time, if the FNP concerned the purchase of organic foods and if the school had a nutritional group/committee/board.

The fifth part of the WBQ mapped whether the school informants identified their school as a health-promoting school, in line with the World Health Organization (WHO) definition (a school that continuously aims to promote a healthy lifestyle for pupils and parents). Questions addressed whether the school encouraged pupils to bike to school, if there were school playgrounds, and whether there was the promotion of physical activity during breaks and in curricular time, not including gymnastics. At the last stage of the questionnaire, it was asked whether the school participated in the Green Flag-program

The sixth part of the WBQ addressed the school food system in practice. The informants were asked to provide information on whether the schools applied a fruit subscription system, a milk subscription scheme, school tuck shop, or a school canteen. For fruit and milk, the questionnaire asked whether these items were offered for free or for sale, as well as how large the organic share was. Within the milk scheme questions, informants were also asked about the distribution of various milk types (fat reduced, cocoa etc). Informants were asked whether dishes offered in the tuck shop were prepared at school or elsewhere, how large the organic share was, what kind of food items were offered, the duration of lunch breaks, if the school had any restrictions on the type of food to be offered, if a competing food seller was available nearby, and if the school restricted the access of this competing arena for the pupils. In relation to the canteen, it was asked whether dishes offered were prepared at school or elsewhere, how large the organic share was, if the menu complied to public standards for nutrition, if the menus were adapted to the pupils' demands, if the menu was fixed or several options were available, if the school guided the pupils about healthy eating, the duration of the lunch break and the availability of competing food sellers.

The final section was a detailed mapping of how food offered in school had changed in last 5 years, whereby the questions were answered by level of scales. Furthermore, informants were questioned about the main reasons for any trends that had developed, e.g. to cut costs or meet nutritional demands, and if any changes were associated with a POP policy in schools. The informants could also give their additional comments if applicable.

4.1.4 Design and procedure

The full-scale study I & II took place from 2008 to 2010 (see Table 3). Since there was little previous research concerning the influence of organic food policies on children's eating habits,

this current project was defined via an exploratory pathway. These two studies were designed as cross-sectional and analytical observational studies to explore possible differences between assumptions among schools where organic food policies existed and those in the schools where no such policies were in place. The workload of the three surveys in Germany, Finland and Italy was shared with our iPOPY partners who translated the questionnaires, distribution letters and reminders and who also obtained the contact information of the schools. The collected data was used not only to test the hypothesis of this study, but was also used to produce a comparative study regarding school food services in the countries involved.

Table 3. The year of conducted studies, opened time for Web Based Questionnaire (WBQ), the number of sent reminders and pilot test schools in Denmark, Germany, Finland and Italy.

	Denmark	Germany	Finland	Italy
Year	2008	2009 - 2010	2009	2009 - 2010
Accessing duration of WBQ	3 weeks	4 months	1 month	2 months
Reminders	2	1	2	3
Number of organic school for pilot test	1	NA*	1	2
Number of non-organic school for pilot test	1	NA*	1	1

*Pilot test was not able to carry out in schools, due to the difficulties in contact with local authority
NA: not applicable

Denmark

The part of the study conducted in Denmark used existing research results to test the hypothesis from the “top” level. This study was performed in 2008 among 179 SFCs in Danish public primary schools, with most of the schools located on Zealand. After all school contact information was collected, the pilot test, the modified version of the questionnaire, and the link to the WBQ together with a short introduction of project were distributed to all sampling schools via email¹⁷⁶. Two reminders were also sent out one and two weeks afterwards in order to increase response rates^{176,177}. The WBQ was open for three weeks.

Germany

Before the survey was performed, a pilot test to evaluate the questionnaire was conducted by a number of school meals experts. Due to the complexity and time consuming nature of approaching the German school contacts, it was determined that the WBQ link would be distributed by a monthly school newsletter created by the Ministry of Education and Cultural

Affairs. In order to increase response to the questionnaire, the link was also uploaded on the School Coordinator Centre homepage. Likewise, the reminder was prepared and sent out^{176,177}. The access to the WBQ was prolonged for up to four months.

Finland

The Finnish school samples were distributed across the country. The WBQ was sent out directly to selected schools via email. The WBQ was open for one month and two reminder letters were sent afterwards^{176,177}. A number of people working at school also conducted the pilot test in Finland. The questionnaire was sent as a word document to individuals who had agreed to test it, who then returned the completed questionnaire along with any feedback.

Italy

Three schools from the Milan region participated in the pilot testing of the questionnaire as well as an official in the municipality of Emilia Romagna. The survey was opened for two months and three reminders were sent out in sequence^{176,177}.

4.2 Study III

After input from the iPOPY study, an additional research question was asked: whether the adoption of an organic school food policy can influence the healthy eating behaviours of school children? Therefore, a study on 6th grade school children was performed in order to investigate the effects of the organic food procurement policy at the school from the children's point of view. Furthermore, this research activity was specifically designed as a mixed-methods study in order to provide both quantitative and qualitative data; the former via a questionnaire and the latter through focus group interviews.

4.2.1 Subjects & Sampling

The research subjects in this part of the study were 6th grade school children, generally 11-13 years of age, in public schools in Denmark. A representative sample of children from two organic and two non-organic schools, which were located in two municipalities on Zealand, was selected. School selection was based on the following eligibility criteria: 1) public primary and lower secondary schools ("Folkeskole" in Danish) located in urban areas, 2) schools were equipped with a canteen service, 3) school meals were administered on site, 4) approval of the study implementation by the school, 5) organic schools were known to serve a certain amount of organic food according to the POP policy by the local municipality, 6) for non-organic schools, schools were known to serve non-organic food.

A total of 85 children from organic schools and 80 from non-organic schools were enrolled in the quantitative part of this study, while 24 children from equivalent organic schools and 25 from non-organic schools were enrolled in the qualitative part of this study. The children who participated in the qualitative study were also previously enrolled in the quantitative study. The number of individuals in the two organic and two non-organic schools was very similar.

4.2.2 Quantitative instruments

A self-administered dietary assessment tool, the Adapted Food Frequency Questionnaire (AFFQ), was adapted from the Food Frequency Questionnaire (FFQ) used in previously validated projects: “Pro Children”^{195,196}, which focused on fruit and vegetable intake among school children, and “Bedre Sundhed for Mor og Barn (Better health for Mother and Child)”^{197,198}. Some of the questions in the AFFQ were previously validated and re-used from two of these previous projects. This AFFQ asked children questions about their usual food and beverage consumption during a typical school day. The food and beverages included in the questionnaire were relevant to the context in which the children received and/or purchased the foods in the school environment. Organic food and health topics were not included in “Pro Children”^{178,179} and “Bedre Sundhed for Mor og Barn”^{180,181}, but were included in our questionnaire. The questionnaire was composed of closed ended questions.

The AFFQ should be kept simple and plain due to the age of the respondents, and the content should be as brief as possible, whilst providing enough information in order to test the study hypothesis^{182,183}. The self-administrated AFFQ was in Danish and finally converted into a web-based AFFQ. This was so that the pupils could easily open and complete the questionnaire through the Internet where this was available. The questionnaire was pilot tested on children before the study began¹⁸⁴. The questionnaire was then modified until most children understood all questions¹⁸⁴. Based on this observation, a short introductory lesson for children explaining how to operate and complete the questionnaire correctly was presented before children carried out the AFFQ^{184,185}. In addition, we provided special assistance to those children who experienced difficulties during the actual study.

4.2.3 Quantitative measures

The AFFQ was used to explore what and how often school foods were consumed by children. The questionnaire firstly asked for children’s personal information such as which school grade they were in, their age, and sex.

The second section focused on how often the children ate at school, including how often children purchased school meals, brought a lunch-box from home, purchased meals outside of school during school time, skip lunches, and how often they eat snack meals between class breaks. The third section investigated how often the school children consumed fruit and vegetables provided by the school. The questionnaire also asked how often the pupils consumed fish, bread.

Furthermore, the children were also asked to report how often they drink water, fruit juice, smoothie and skimmed milk at schools. For these questions, 7 response categories were provided, ranging from “Never” to “More than 2 times per day”.

In the last two sections, the AFFQ was designed to investigate children’s attitudes, intentions and actions concerning organic food and health issues. For example, statements included “I think organic food is healthy food” or “I think our school meals are healthy”. Most questions contained 6 response categories, ranging from “Strongly agree” to “Strongly disagree”.

4.2.4 Qualitative instruments

This study chose to use focus group interviews rather than individual interviews. This was because group interviews allow the children feel more secure and positive when expressing their opinions^{168,186}. Focus group interviews can create a platform where children can discuss, share their views and question each other, rather than simply answering direct questions from the interviewer, thereby leading to a more informative conversation^{168,186}. On the other hand, group interviews may also create a situation in which the children’s statements might be influenced by other, more dominating children in the group^{168,186}. The focus group interviews in this study were conducted among school children in order to determine their knowledge, opinions, intentions and experiences towards organic food and health. The semi-structured interview guideline was based on the former AFFQ.

For comparison reasons, the sequence of questions in the interviews was kept consistent across schools. The interview guideline was modified after the pilot of test of the semi-structured interview, which was constructed in the same school as the pretest for the AFFQ^{168,186}. It was found in the pilot test that it was important to balance hierarchy among children so that each child had the opportunity to express his/her opinion^{168,186,187}. In the final stages the focus group interviews were then transcribed and analyzed.

4.2.5 Qualitative measures

The interview intended to measure five factors: 1) Children’s general experiences and opinions regarding school meals and organic food, 2) Children’s attitude towards organic food and its involvement in school meals, 3) Children’s attitude regarding health and its association with organic food, 4) Questions were expanded to investigate children’s intentions regarding their future eating behaviours, 5) Additional questions such as if children consumed or talked about organic food at home.

4.2.6 Design and procedure

The study in this part of the research was performed in Danish public primary and lower secondary schools from October to December 2010, using ‘bottom level’ research objects. The

study firstly measured frequency of intake of food items for pupils in the sampled organic and non-organic schools via an online survey, followed by interviews exploring the children's knowledge, opinions, intentions and experiences related to organic food and health. The AFFQ and interview guideline were first evaluated by experts in the field of nutritional assessment methods, both in the internal research group and from an external resource, to assess their fit into the current Danish school food context. In the pilot test, the questionnaire and semi-structured interview questions were examined to see if they were clear, easily understood and readable by children^{168,186,187}. The school used for the pilot test was not involved in the final study.

Schools that were known to have adopted a POP policy were selected from one municipality as well as schools in another municipality that did not have an existing POP policy. School names and contact information was acquired from each of the two municipalities' homepage. An invitation email that addressed the research aim, methods and time involved was sent to all schools to ask for their participation in the study. Following this, a contact person was selected from each school in order to further coordinate and carry out the studies e.g. school teacher or a school secretary.

Conducting the AFFQ in the school PC room was only possible in the organic schools and for one class in one of the non-organic schools. Instead, teachers at non-organic schools distributed a link to the AFFQ on the internal school website for pupils as homework. This meant that these children did not complete the questionnaire at schools, instead completing the questionnaire at home or out of curricular time. This meant that it was unknown whether these children received any assistance. In the organic schools, researchers were present in the school PC room to assist any children who had questions regarding the AFFQ. Besides this, the children were not allowed to talk with each other whilst completing the questionnaire. All children were only able to attempt the questionnaire once.

The semi-structured interviews were carried out in all four schools. At each school two focus group interviews were conducted, with 6 to 7 children recruited for each interview. The preliminary condition for participation in the interviews was completion of the online AFFQ. The class teachers selected pupils for interview participation upon the researcher's request. A mixture of boys and girls, both talkative and less talkative, were selected to participate in the interviews^{168,186,187}. The participants were either in the same or in separate classes, depending on the size of the school. The interview was recorded both by dictaphone and by digital camera to help recognize statements by different children in the transcription process. During the interviews, children and the moderator were present, but no school staff was present.

4.3 Statistical analysis

The data from the WBQs and AFFQ were captured in a database and analyzed in an electronic spreadsheet. Statistical analyses were carried out using the Statistical Package for the Social Science software package versions 19.0 (IBM SPSS® inc., Chicago, IL, USA). All P-values

reported were two-tailed. The level of statistical significance was set at $P < 0.05$ for bivariate and multivariable analyses.

4.3.1 Bivariate analyses within Denmark, Germany, Finland and Italy (studies I, II & III)

For this research, both the WBQs and AFFQ were comprised of questions that contained nominal and ordinal values. The Chi square test is one of most useful inferential statistical tests to examine relationships between two variables with nominal data^{149,188}. Chi square tests were thereby used to explore the association between type of school and dependent variables including nominal values^{149,188}. Before the nominal data analysis, variables with 3-point Likert-scale response options such as “1 - Yes”, “2 - No” and “3 - Don’t know” were dichotomized into “1 - Yes” and “2 - No”, that is, the option of “3 - Don’t know” and missing values were excluded in the analysis.

Since ordinal data is information organized in a particular order, with no specific relationship between the distances between each value, it was appropriate to employ the Mann Whitney U test^{149,188}. The Mann Whitney U test was used to verify the difference between type of school and dependent variables related to the questions in which responses consisted of ordinal values^{149,188}. After this, since the expected frequencies were small as 20% of the expected frequencies of the variables were excess of the value 5^{149,188}, the Fisher’s exact test was therefore used to test the association between school category and independent variables. Data with missing values was also excluded for ordinal data analysis.

4.3.2 Multivariable analyses between Denmark, Germany, Finland and Italy (studies I & II)

After bivariate analyses, the survey data from four countries was recoded (“1 - Denmark”, “2 - Germany”, “3 - Finland” and “4 - Italy”) and merged into one database. During the pooling of the data, missing values and those related to the option of “Don’t know” were excluded. This re-categorization was executed in order to quantify the association between the type of school in the countries with SFC’s attitudes, intentions and actions towards organic and healthy school meals. Regression analysis was chosen for this part of data analysis because 1) it is a common statistical method to investigate the relationship between one dichotomous dependent variable and two or more independent variables¹⁸⁹, 2) it is therefore suitable for the collected data where the majority of independent variables as well as the dependent were dichotomized and for which the assumption of normality of data is not required¹⁸⁹, and 3) the study provided rich and valuable data¹⁸⁹. Categorical independent variables in the regression models included country (Denmark, Germany, Finland and Italy) and type of school (organic and non-organic school). Dependent variables were the SFC’s responses to the questionnaires.

Multinomial logistic regression analyses were first carried out to investigate the associations between organic and non-organic SFCs in each country and their reported attitude responses^{189,190}. This was because SFCs were asked in the questionnaire to describe how much

they agreed with the promotion of organic and healthy eating habits through the school setting by choosing one answer from six alternatives^{189,190}. Binary logistic regression analyses were then used to examine the associations between two independent variables (country and type of school) and dichotomized variables, and mutually controlling for confounding^{189,190}.

The Hosmer and Lemeshow Goodness-of-Fit-test was used to identify whether the obtained models fitted the original data at an acceptable level^{189,190}. The Odds Ratio (OR) and their 95% CI indicate the likely effect of an explanatory variable on the dependant variable, keeping the remaining explanatory variables constant^{189,190}. In all cases, Denmark and organic schools were used as the reference category.

4.3.3 Exploratory factor analysis between Denmark, Germany, Finland and Italy (studies I, II & III)

The method followed here was to first examine the SFCs' attitudes, intentions and actions towards healthy school meals, and pupils' attitudes, intentions and actions towards organic food and health, based on the adapted theory of planned behaviour, with a view to select a subset of questions that might influence further responses. By this, the survey responses (both WBQs and AFFQ) were analysed at the scale level. Missing data was excluded in the analysis.

First, the variables were mapped under the adapted theory of planned behaviour theme, as shown in Table 4. Reliability analysis was used to check the internal consistency of the variables, with Cronbach's alpha as the coefficient of reliability¹⁹¹. It should be noted that a reliability coefficient of ≥ 0.50 suggests that the items have acceptable internal consistency, meaning that the questions were adequately grouped¹⁹¹. The factors were identified when the loading of factor items was above 0.30 on only one factor¹⁵¹. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy examines whether the partial correlations among variables are small¹⁵¹. A correlation matrix of ≥ 0.50 indicated that it was acceptable for factor analysis to proceed and Bartlett's test of sphericity examines whether the correlation matrix is an identity matrix¹⁵¹. Thirdly, correlation tests were conducted to check whether identified factors were related¹⁴⁹. The variables including ordinal data used Spearman's Rho and the variables with nominal data used Phi to determine the level of correlation that exists between variables¹⁴⁹.

4.3.4 Path analysis between Denmark, Germany, Finland and Italy (studies I, II & III)

After exploratory factor analysis was performed, path analysis was employed to confirm the exploratory factors and to test whether their relationships remained strong according to the adapted theory of planned behaviour¹⁵¹. Path analysis was carried out using SPSS AMOS (Analysis of Moment Structure) version 19 and missing values were excluded in the analysis. The reasons for choosing path analysis rather than traditional statistical methods that use only one test to determine whether analysis is significant were 1) to determine the adequacy of model fit to the data by several statistical tests^{192,193}, 2) to determine the goodness of fit between the

Table 4. The questions from Web Based Questionnaire (WBQ) and Adapted Food Frequency Questionnaire (AFFQ) for exploratory factor analysis.

Adapted theory of planned behaviour scale	WBQs (SFCs)	AFFQ (Pupils)
Attitude towards organic food and healthy eating habits	<ol style="list-style-type: none"> 1. I think that the school has a responsibility in promoting organic foods through its food service. 2. I think that the school has a responsibility in promoting organic food through its curricular activities. 3. I think that the school has a responsibility in promoting healthy eating habits through its food service. 4. I think that school has a responsibility in promoting healthy eating habits through its curricular activities. 	
Attitude towards organic food and health		<ol style="list-style-type: none"> 1. I think organic food is healthy. 2. I think organic food is less harmful for environment and me. 3. I think organic food is healthier than non-organic food. 4. Do you think you are healthy? 5. It is important for me to eat healthy meals.
Intention/Policy towards healthy school meals	<ol style="list-style-type: none"> 1. Does your school have a food and nutrition policy in relation to pupils' health? 2. Does your school have a health promoting school policy according to World Health 	

	Organization (WHO) principle?	
	3. Does your school have your own health promoting school policy?	
Intention towards organic food		<ol style="list-style-type: none"> 1. I would like to eat organic food than non-organic food. 2. I would like to eat more organic food in the future.
Action towards healthy school meals	<ol style="list-style-type: none"> 1. Do teachers involve this food and nutrition policy in teaching activities? 2. Does your school recommend nutritional menus for pupils in canteen? 3. Does your school have a canteen onsite? 4. Is school food or menus nutritionally calculated according to official nutritional guidelines? 5. Please specify in which direction (more, same, less, don't know) your serving practices have changed in relation to availability of following items over the past 5 years. <ol style="list-style-type: none"> 1) Fresh Vegetables (e.g. Lettuce, Cucumbers, Carrots, Tomatoes Green beans etc) 2) Fresh Fruits (e.g. Apples, Pears, Peaches, Oranges, Grapefruit etc) 3) Meats (e.g. Chicken, Pork chops, Steaks, Fish, Lean hamburger etc) 4) Whole grain products (e.g. Whole grain 	

	<p>bread, Whole grain pasta, Whole grain cereal, Oatmeal etc)</p> <p>5) Beverages (e.g. free cold drinking water, 100% Fruit juice, Tomato juice, Herb tea etc)</p> <p>6) Low fat dairy (e.g. Low fat milk, Low fat yoghurt, Low fat sour cream, Low fat cream cheese etc)</p> <p>7) Deep fried food (Pommes fries, Chicken nuggets, Fish fingers, Hamburgers, etc)</p> <p>8) Sausages</p> <p>9) Chocolate / Chocolate Bars</p> <p>10) Candy</p> <p>11) Chips</p> <p>12) Cake</p> <p>13) Fizzy drinks</p>	
Action towards food practices		<ol style="list-style-type: none"> 1. How often do you eat fresh fruits that you buy or receive from school? 2. How often do you eat salad or grated salad that you buy or receive from school? 3. How often do you eat other raw vegetables that you buy or receive from school? 4. How often do you eat potato that you buy or receive from school? 5. How often do you eat processed vegetables that you buy or receive from school? 6. How often do you eat fish or fish products that

-
- you buy or receive from school?
7. How often do you eat white bread that you buy or receive from school?
 8. How often do you eat whole wheat bread that you buy or receive from school?
 9. How often do you eat rye bread that you buy or receive from school?
 10. How often do you drink water that you buy or receive from school?
 11. How often do you drink fruit juice that you buy or receive from school?
 12. How often do you drink smoothies that you buy or receive from school?
 13. How often do you drink skimmed milk that you buy or receive from school?
 14. How often do you drink low fat milk that you buy or receive from school?
 15. How often do you drink mini fat milk that you buy or receive from school?
 16. How often do you eat sweets that you buy or receive from school?
 17. How often do you eat chocolate that you buy or receive from school?
 18. How often do you eat cake that you buy or receive from school?
 19. How often do you eat chips that you buy or receive from school?
 20. How often do you drink full fat milk that you
-

buy or receive from school?

21. How often do you drink concentrated juice
water that you buy or receive from school?

22. How often do you drink soda water with sugar
that you buy or receive from school?

23. How often do you drink soda water without
sugar that you buy or receive from school?

hypothesized model and the sample data^{192,193}, and 3) to suggest that the addition of a path/relationship can improve overall fit of the model^{192,193}. Based on the adapted theory of planned behaviour (see Fig. 2), the directional relation between attitude and intention scales, intention and action scales, attitude and action scales, of the SFCs/pupils, and the indirect effect of attitude on action through intention variable, of the SFCs/pupils, were tested in the models.

Evaluation of model fit

In order to assess model fit, a number of estimate parameters (fit indices) in the model need to be collected^{156,157}. The present studies utilized fit indices of CMIN (chi-square), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA), to indicate the degree to which the adapted theory of planned behaviour pattern of specified parameters in the model was consistent with the pattern of variances from observed data^{156,157}.

CMIN is chi-square, an index of badness of fit, in which smaller values indicate better fit¹⁵¹. CFI is equal to the discrepancy function adjusted for sample size, an index of goodness of fit¹⁵¹. CFI ranges from 0 to 1 with a higher value indicating better model fit. A CFI value of 0.90 or greater indicates an acceptable model fit¹⁵¹. RMSEA is related to residual in the model, an index of goodness of fit¹⁵¹. RMSEA values range from 0 to 1 with a smaller RMSEA value indicating better model fit¹⁵¹. An RMSEA value of 0.06 or less indicates an acceptable model fit¹⁵¹.

4.4 Qualitative data analysis (study III)

After the interviews were recorded, they were transcribed verbatim. The interviews were analyzed mainly using a qualitative content framework analysis, created by Krueger (1994)¹⁹⁴. Using this method, the analysis was performed according to the following steps: (1) Read through all transcriptions in order to obtain an overall impression; (2) Became familiar with the content by reading the transcriptions three times and numbering line by line for each transcript. During this process, the main themes started to gather; (3) Sorting/coding the data, gathered the common themes via named different colours, e.g. “pupils’ experience with school meals” blue, “pupils’ attitude towards organic food and health” red, “pupils’ intention towards future eating habits” purple, “pupils’ school food practice” green; (4) Reviewed the coded contents, grouped and reanalyzed the contents into each theme according to the school categories; (5) Data reduction and avoidance of repetition, merged overlapping interview contents and removed the irrelevant information in order to develop quotations; (6) Interpretation and management of the quotations in text; (7) Checked the consistency of interpretation with original transcriptions.

4.5 Ethical considerations

For the protection of children's rights, a permission form asking whether parents would allow their children to participate in the survey and interview was provided and signed by the parents. This consent form informed the parents about the researcher status, the study purpose, confidentiality terms, and emphasized that participation in the study was voluntary, with all research results as anonymous^{186,187}. Furthermore, before the interviews, the participants were informed that 1) the conversation was recorded by digital recorder and digital camera, 2) their anonymity would be safeguarded in the subsequent written work, 3) their personal information would not leak out to any third parties.

5 Results

5.1 Overview

This chapter presents main findings from the project. The data collected from the WBQs conducted in studies I & II involved the same research subjects (SFCs) and will therefore be presented together in a sequential order as sections ‘5.2 Descriptive statistics between SFCs in Denmark, Germany, Finland and Italy’, ‘5.3 Regression analysis between SFCs in Denmark, Germany, Finland and Italy’, ‘5.4 Exploratory factor analysis between SFCs in Denmark, Germany, Finland and Italy’, ‘5.5 Path analysis between SFCs in Denmark, Germany, Finland and Italy’, ‘’. Since study III was conducted among the pupils in a Danish school context, the data collected from the quantitative surveys and qualitative interviews from the Danish pupils is given at the end.

Table 5. Number of distributed questionnaires, responses to questionnaires, organic and non-organic schools and response rates from study I, II and the quantitative part of study III in Denmark, Germany, Finland and Italy.

	Denmark		Germany	Finland	Italy
	SFCs (WBQ)	Pupils (AFFQ)	SFCs (WBQ)	SFCs (WBQ)	SFCs (WBQ)
Distributed (n)	179	165	2050	998	940
Responded (n)	87	161	122	250	215
Organic school (n)	20	82	14	24	53
Non-organic school (n)	63	79	44	69	108
Response rate (%)	51	99	6	25	23

Table 5 shows the number of distributed questionnaires, responses to questionnaires, organic and non-organic schools and response rates from study I & II, and the quantitative part of study III in Denmark, Germany, Finland and Italy. Denmark had the highest response rate from SFC’s compared to those in Germany, Finland and Italy. Furthermore, there were 20 Danish, 14 German, 24 Finnish and 53 Italian schools identified as organic schools based on the definition of POP policy in the WBQ. In addition to this, the power of study for the SFCs (0.99) and the Danish pupils (0.99) was checked and was considered sufficient to perform the statistical analyses.

5.2 Descriptive statistics between SFCs in Denmark, Germany, Finland and Italy (studies I & II)

Chi square test results in Table 6 show a statistically significant difference between organic and non-organic schools regarding adoption of a FNP in Denmark ($P = 0.032$), Germany ($P < 0.001$),

and Italy ($P < 0.001$). The organic schools were more likely to adopt the FNP than the non-organic schools in these three countries. The organic schools in Germany ($P = 0.022$) and Italy ($P = 0.013$) were more likely to apply a health promoting school policy according to WHO principles than non-organic schools in these countries. The German organic schools ($P = 0.016$) were more likely to establish their own health promoting policy than the non-organic schools.

Significant differences were found between organic and non-organic schools in Italy in terms of having a school playground, promoting physical activity during recess and after school time, and having a facilitating school canteen. Interestingly, the Finnish organic schools were less likely to promote physical activity compared to the non-organic schools in Finland, and this association was found to be statistically significant ($P = 0.002$). It should be noted that this variable was not included in the Danish study.

Despite these results, there were no observed differences found in any of the four countries between school types regarding whether they set physical activity as a prioritized theme in curriculum activity, not including a gym course. Lastly, the Danish organic schools were found to be significantly different from the non-organic Danish schools in relation to providing a recommend nutritional menu for pupils in the canteen ($P = 0.004$). The organic schools were much more likely to recommend pupils to choose nutritional menus than the non-organic schools in Denmark.

5.3 Regression analysis between SFCs in Denmark, Germany, Finland and Italy (studies I & II)

5.3.1 School food policy

Table 7 presents the association between school type and variables related to a school having a FNP as well as variables related to involving such a policy in pedagogical activities. The Finnish schools were significantly more likely to adopt an FNP (odds = 7.91). The results also show that the non-organic schools were 0.16 times less likely to have a FNP than the organic schools in Denmark, Germany, Finland and Italy ($P < 0.001$). Accordingly, the Finnish organic schools (odds = 7.91×0.16) were more likely to apply the FNP. However, there was no significant difference in having a FNP between Danish and German schools, and between Danish and Italian schools. Italian schools were significantly more likely to involve FNP issues in teaching time (odds = 38.24). Nevertheless, associations between school type and the integration of a FNP in pedagogical activities were found not to be significant. Likewise, there was no significant difference in involving the FNP in teaching between Danish and German schools, and Danish and Finnish schools.

5.3.2 Health promoting school

Regression analysis, shown in Table 8, indicates that Finnish schools were most likely to have a health promoting school policy, according to WHO principles (odds = 45.47), followed by Italy

Table 6. The association between variables and type of schools in each country.

Dependent variables	Independent variables																			
	Denmark					Germany					Finland					Italy				
	OS ^a (%)	NS ^b (%)	X ²	df	P	OS ^a (%)	NS ^b (%)	X ²	df	P	OS ^a (%)	NS ^b (%)	X ²	df	P	OS ^a (%)	NS ^b (%)	X ²	df	P
Does your school have a FNP in relation to pupils' health?	84	57	4.6	1	0.032 ^c	91	36	10.7	1	< 0.001 ^c	96	92	0.3	1	NS	90	57	16.7	1	< 0.001 ^c
Does your school have a health promoting school policy according to WHO principle?	39	53	0.8	1	NS	91	52	5.4	1	0.022 ^d	100	97	0.3	1	NS	93	75	6.2	1	0.013 ^c
Does your school have your own health promoting school policy?	67	55	0.8	1	NS	100	70	5.5	1	0.016 ^d	87	79	0.4	1	NS	85	90	0.8	1	NS
Does your school have a playground?	95	98	0.8	1	NS	71	66	0.2	1	NS	92	96	0.5	1	NS	93	81	3.8	1	< 0.050 ^c
Does your school promote physical activity among pupils during recesses?	95	95	0.004	1	NS	79	82	0.1	1	NS	91	98	2.0	1	NS	74	43	13.7	1	< 0.001 ^c
Does your school promote physical	NA	NA	NA	NA	NA	77	79	0.03	1	NS	50	90	11.5	1	0.002 ^d	77	58	5.0	1	0.026 ^c

activity among
pupils after school
time?

Does your school have physical activity as a prioritized theme in curriculum activity except gym course?	59	57	0.02	1	NS	82	65	0.3	1	NS	77	95	4.2	1	NS	88	78	2.1	1	NS
Does your school have canteen onsite?	71	68	0.04	1	NS	36	34	0.01	1	NS	77	74	0.03	1	NS	65	44	6.4	1	0.011 ^c
Does your school recommend nutritional menu for pupils in canteen?	71	21	8.4	1	0.004 ^c	30	45	0.7	1	NS	68	83	4.0	1	NS	85	81	0.4	1	NS

^a OS: Organic School

^b NS: Non-organic School

^c P-value by Pearson's chi-squared test

^d P-value by Fisher's exact test

NS: not significant

NA: not applicable

Table 7. Results of binary logistic regression analysis and the respective Odds Ratios (ORs) of applying the Food and Nutrition Policy (FNP), and involving it in teaching activities between organic and non-organic schools in each country.

Variables	Does your school have a FNP in relation to pupils' health? ^a				Do teachers involve this FNP during teaching activities? ^b			
	95% Confidence interval				95% Confidence interval			
	Exp (B) OR	Lower	Upper	P – value ^c	Exp (B) OR	Lower	Upper	P – value ^c
Country				< 0.001				0.005
Denmark (reference)	1				1			
Germany	0.50	0.24	1.05	NS	1.27	0.35	4.60	NS
Finland	7.91	3.03	20.66	< 0.001	2.12	0.73	6.17	NS
Italy	1.07	0.59	1.93	NS	38.24	4.87	300.67	< 0.001
Type of schools								
Organic school (reference)	1				1			
Non-organic school	0.16	0.08	0.33	< 0.001	0.67	0.25	1.79	NS

^a The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have a FNP in relation to pupils’ health?”: P=0.903 indicates acceptable goodness of fit.

^b The Hosmer and Lemeshow Goodness-of-Fit-test of “Do teachers involve this FNP during teaching activities? ”: P=0.513 indicates acceptable goodness of fit.

^c Estimated P – value for the association between the independent variables and dependent variables using the odds ratio test.

NS: not significant

Table 8. Regression analysis of health promoting school between types of schools in each country.

Variables			Country	Denmark (reference)	Germany	Finland	Italy	Type of schools	Organic school (reference)	Non- organic school
Does your school have a health promoting school policy according to WHO principle?^a	95% Confidential interval	Exp (B) OR		1	1.70	45.47	4.24		1	0.41
		Lower			0.76	5.78	2.10			0.20
		Upper			3.63	357.68	8.58			0.85
		P – value ^f	< 0.001		NS	< 0.001	< 0.001			0.016
Does your school have your own health promoting school policy?^b	95% Confidential interval	Exp (B) OR		1	2.47	3.09	5.19		1	0.68
		Lower			1.14	1.35	2.67			0.36
		Upper			5.33	7.07	10.07			1.29
		P – value ^f	< 0.001		0.020	0.007	< 0.001			NS
Does your school have a playground?^c	95% Confidential interval	Exp (B) OR		1	0.05	0.44	0.13		1	0.63
		Lower			0.01	0.08	0.03			0.30
		Upper			0.23	2.31	0.57			1.31
		P – value ^f	< 0.001		< 0.001	NS	0.007			NS
Does your school promote physical activity among pupils during recesses?^d	95% Confidential interval	Exp (B) OR		1	0.22	1.20	0.05		1	0.42
		Lower			0.07	0.26	0.02			0.23
		Upper			0.73	5.55	0.15			0.78
		P – value ^f	< 0.001		0.014	NS	< 0.001			0.006

Does your school have physical activity as a prioritized theme in curriculum activity except gym course?^e		Exp (B) OR	1	1.62	6.07	3.07	1	0.77
	95% Confidential interval	Lower		0.77	2.31	1.66		0.43
		Upper		3.40	15.95	5.67		1.40
		P – value ^f	< 0.001	NS	< 0.001	< 0.001		NS

^a The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have a health promoting school policy according to WHO principle?”: P=0. indicates acceptable goodness of fit.

^b The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have your own health promoting school policy?”: P=0.340 indicates acceptable goodness of fit.

^c The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have a playground?”: P=0.716 indicates acceptable goodness of fit.

^d The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school promote physical activity among pupils during recesses?”: P=0.095 indicates acceptable goodness of fit.

^e The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have physical activity as a prioritized theme in curriculum activity except gym course?”: P=0.287 indicates acceptable goodness of fit.

^f Estimated P – value for the association between the independent variables and dependent variables using the odds ratio test.

NS: not significant

(odds = 4.24). Differences between countries were also apparent in relation to schools having their own health promoting school policy ($P < 0.001$), where Italian school had the greatest odds (odds = 5.19), Finnish schools were ranked second (odds = 3.09). The Danish schools were most likely to offer a school playground ($P < 0.001$) and promote physical activity during breaks ($P < 0.001$). Excluding gym courses, the Finnish schools were most likely to see physical activity as a prioritized theme in curriculum activity (odds = 6.07). Italian schools had the second greatest odds (odds = 3.07).

The regression results provided further confirmation of a positive association between the type of school and the existence of a health promoting school policy according to WHO principles ($P = 0.016$), the promotion of physical activity during breaks by the school ($P = 0.006$), with the organic schools as more likely to have health promoting policy according to WHO principles (odds = 0.41) and to promote physical activity during breaks (odds = 0.42).

5.3.3 School food environment

Table 9 shows the OR and 95% CI for the establishment of a canteen, operating nutritional calculated menus, and enforcing nutritional recommendations among organic and non-organic schools in each country. The organic schools ($P = 0.017$) had greater opportunities to facilitate a school canteen than the non-organic schools. A significant difference in the serving of nutritionally calculated school meals was only observed in the German schools, which were slightly less likely to serve nutritionally calculated school meals for pupils than the Danish schools (odds = 0.04). Therefore, it is apparent that the Danish schools were most likely to offer nutritional meals at school. The Italian schools were most likely to recommend school children to choose healthier foods in the canteen (odds = 8.75). Nevertheless, there were no observed associations between serving nutritionally calculated school meals, recommending nutritional menus for pupils in canteen, and the type of school.

5.4 Exploratory factor analysis between SFCs in Denmark, Germany, Finland and Italy (studies I & II)

The results of reliability and exploratory factor analysis between SFCs in four countries are shown in Table 10. Internal consistency for each of the adapted theory of planned behaviour scales was examined using Cronbach's alpha. The alphas were a moderate 0.66 for the Attitude scale (4 items), an accepted 0.50 for the Intention scale (3 items), and a good 0.77 for the Action scale (17 items). The exploratory factor analysis yielded six components/factors (factor loadings $\Rightarrow .30$). Two factors were extracted from the attitude scale, "Attitude towards organic food" and "Attitude towards health", one factor extracted from the intention scale, "Intention/Policy towards healthy school meals", and three factors extracted from the action scale, "Action towards healthy food items", "Action towards unhealthy food items" and "Action towards encouragement for healthy eating". An examination of the KMO measure of sampling adequacy suggested that the sample was acceptable to perform factor analysis factorable > 0.50 and Bartlett's test of sphericity was significant ($P < 0.001$) for all factors. For attitude items, the first

Table 9. Odds Ratios (ORs) and 95% confidence intervals for establishing canteen, operating nutritional calculated menus and enforcing nutritional recommendations among organic and non-organic schools in each country.

Variable	Does your school have a canteen onsite? ^a				Is the school food nutritionally calculated according to official nutritional guidelines? ^b				Does your school recommends own nutritional menus for pupils in canteen? ^c			
	Exp (B) OR	95% Confidence interval		P – value ^d	Exp (B) OR	95% Confidence interval		P – value ^d	Exp (B) OR	95% Confidence interval		P – value ^d
		Lower	Upper			Lower	Upper			Lower	Upper	
Country				0.003				< 0.001				< 0.001
Denmark (reference)	1				1				1			
Germany	0.00	0.00	NA	NS	0.04	0.01	0.35	0.003	1.02	0.40	2.62	NS
Finland	0.00	0.00	NA	NS	0.25	0.03	2.09	NS	7.90	3.13	19.96	< 0.001
Italy	0.00	0.00	NA	NS	3.08	0.26	35.81	NS	8.75	3.62	21.18	< 0.001
Type of schools												
Organic school (reference)	1				1				1			
Non-organic school	0.53	0.32	0.89	0.017	0.78	0.30	2.00	NS	0.71	0.36	1.39	NS

^a The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have a canteen onsite?”: P=0.771 indicates acceptable goodness of fit.

^b The Hosmer and Lemeshow Goodness-of-Fit-test of “Is the school food nutritionally calculated according to official nutritional guidelines?”: P=0.365 indicates acceptable goodness of fit.

^c The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school recommends own nutritional menus for pupils in canteen?”: P=0.414 indicates acceptable goodness of fit.

^d Estimated P – value for the association between the independent variables and dependent variables using the odds ratio test.

NS: not significant

NA: not applicable

factor explained 51.59% of the variance, and the second factor explained 31% of the variance. For intention items, the factor explained 48.28% of the variance. For action items, the three factor solution, which explained 29.74%, 15.81% and 8.69% of the variance respectively. A total of 6 factors had an eigenvalue > 1 , which is one criteria should be assumed to determine factor extraction, indicated the variance in all the variables which was accounted for by that factor. Overall, these analyses indicated that 6 distinct factors were underlying SFCs' responses to the WBQs and that these factors were moderately internally consistent.

Table 11 indicates the correlations amongst the extracted factors based on the adapted theory of planned behaviour constructs. Positive correlations were found between attitude towards organic food and intention/policy towards healthy school meals, as well as with the actions. Negative correlations were observed between two attitude factors, attitude towards organic food and action towards unhealthy food items. Moreover, attitude towards health was also negative correlated with action towards healthy food items and encouragement.

5.5 Path analysis between SFCs in Denmark, Germany, Finland and Italy (studies I & II)

Table 12 presents the result summary for path analysis among the SFCs in four countries. The study examined the effect coefficients for the path models for organic schools, non-organic schools and both school types combined. The model and the resulting path coefficients are illustrated in Fig. 6 for the combined both school types, Fig. 7 for the organic schools and Fig. 8 for the non-organic schools.

Results indicate that the SFCs' attitude towards organic food and health significantly predicted their intentions towards healthy school meals in both school types combined ($b = 0.23$, $SE = 0.06$, $P < 0.01$) and non-organic schools ($b = 0.19$, $SE = 0.05$, $P < 0.01$). Furthermore, the SFCs' intention towards healthy school meals had a significant impact on their action towards encouragement for healthy eating among the pupils in all school models (combined both school types: $b = 0.39$, $SE = 0.07$, $P < 0.01$; organic schools: $b = 0.35$, $SE = 0.12$, $P < 0.05$; non-organic schools: $b = 0.39$, $SE = 0.07$, $P < 0.01$). In addition to this, the SFCs' attitude towards organic food and health had a significantly negative influence on their action towards unhealthy food and drink practices when both school types were combined ($b = -0.16$, $SE = 0.07$, $P < 0.05$).

The final models in Fig. 6, Fig. 7 and Fig. 8 represent standardized path coefficients. The parameters for both the school types combined model suggests a good model fit ($X^2 = 0.99$, $df = 3$, $P = 0.80$, $CFI = 1.00$, $RMSEA = 0.00$), likewise for the organic school model ($X^2 = 1.61$, $df = 3$, $P = 0.66$, $CFI = 1.00$, $RMSEA = 0.00$), and for the non-organic school model ($X^2 = 0.99$, $df = 3$, $P = 0.80$, $CFI = 1.00$, $RMSEA = 0.00$), although not all path coefficients were statistically significant.

Table 10. Number of questions from Wed Based Questionnaire (WBQ), Cronbach's Alpha, and exploratory factor analysis parameters related to the adapted theory of planned behaviour constructs.

Variable	No. of items	Cronbach's Alpha	Components	Eigenvalue	% Extracted Variance	KMO ^a	P - Value ^b	X ²	df
Attitude towards organic food and healthy eating habits	4	0.66	Attitude towards organic food	2.06	51.59	0.55	<0.001	467.65	6
			Attitude towards health	1.24	31.01				
Intention/Policy towards healthy school meals	3	0.50	Intention/Policy towards healthy school meals	1.45	48.28	0.53	<0.001	72.03	3
Action towards healthy school meals	17	0.77	Action towards healthy food items	5.10	29.74	0.84	<0.001	1591.56	136
			Action towards unhealthy food items	2.69	15.81				
			Action towards encouragement for healthy eating	1.48	8.69				

^a Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy with >0.50 indicates suitable for factor analysis.

^b P - value (<0.001) for Bartlett's tests of Sphericity should be significant for factor analysis to be suitable.

Table 11. Correlations among the variables based on the adapted theory of planned behaviour constructs.

Variable	Attitude towards organic food	Attitude towards health	Intention/Policy towards healthy school meals	Action towards healthy food items	Action towards unhealthy food items	Action towards encouragement for healthy eating
Attitude towards organic food	1					
Attitude towards health	-0.40 ^b	1				
Intention/Policy towards healthy school meals	0.23 ^b	0.20	1			
Action towards healthy food items	0.14	-0.05	0.22	1		
Action towards unhealthy food items	-0.16 ^a	0.11	0.22	0.00 ^c	1	
Action towards encouragement for healthy eating	0.10	-0.07	0.22	0.00 ^c	0.00 ^c	1

^a Spearman's Rho correlation coefficient test is significant at the 0.05 level (2-tailed).

^b Spearman's Rho correlation coefficient test is significant at the 0.01 level (2-tailed).

^c Phi's correlation coefficient test is significant at the 0.05 level (2-tailed).

Table 12. Results of path analysis based on the adapted theory of planned behaviour model.

Path	Direct effect			Indirect effect			Total effect			S.E.			C.R.			Significance		
	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school
Attitude ^a →Intention	0.23	0.15	0.19				0.23	0.15	0.19	0.06	0.11	0.05	3.33	1.30	3.92	***	NS	***
Intention→Action1 ^b	0.14	0.19	0.14				0.14	0.19	0.14	0.07	0.14	0.07	1.92	1.70	1.95	NS	NS	NS
Intention→Action2 ^c	-0.03	-0.07	-0.25				-0.03	-0.07	-0.25	0.07	0.15	0.07	-0.34	-0.57	-0.35	NS	NS	NS
Intention→Action3 ^d	0.39	0.35	0.39				0.39	0.35	0.39	0.07	0.12	0.07	5.70	3.17	5.80	***	**	***
Attitude ^a →Action1 ^b	0.03	-0.06	0.03	0.03	0.03	0.03	0.07	-0.08	0.06	0.07	0.14	0.07	0.47	-0.52	0.43	NS	NS	NS
Attitude ^a →Action2 ^c	-0.15	-0.15	-0.14	-0.01	-0.01	-0.01	-0.16	-0.20	-0.15	0.07	0.15	0.07	-2.11	-1.33	-1.95	*	NS	NS
Attitude ^a →Action3 ^d	0.01	-0.14	0.01	0.09	0.50	0.08	0.10	-0.16	0.08	0.06	0.12	0.07	0.13	-1.31	0.11	NS	NS	NS
Model fit statistics	CMIN ^e			DF			P-value			CMIN/DF			CFI ^f			RMSEA ^g		
	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school
	0.99	1.61	0.99	3	3	3	0.80	0.66	0.80	0.33	0.54	0.33	1.00	1.00	1.00	0.00	0.00	0.00

*significant at the 0.05 level.
** significant at the 0.01 level.
NS: not significant
^a Attitude towards organic food and health
^b Action towards healthy food and drink practices
^c Action towards unhealthy food and drink practices
^d Action towards encouragement for healthy eating
^e CMIN: Chi²
^f CFI: Comparative Fit Index
^g RMSEA: Root Mean Square Error of Approximation

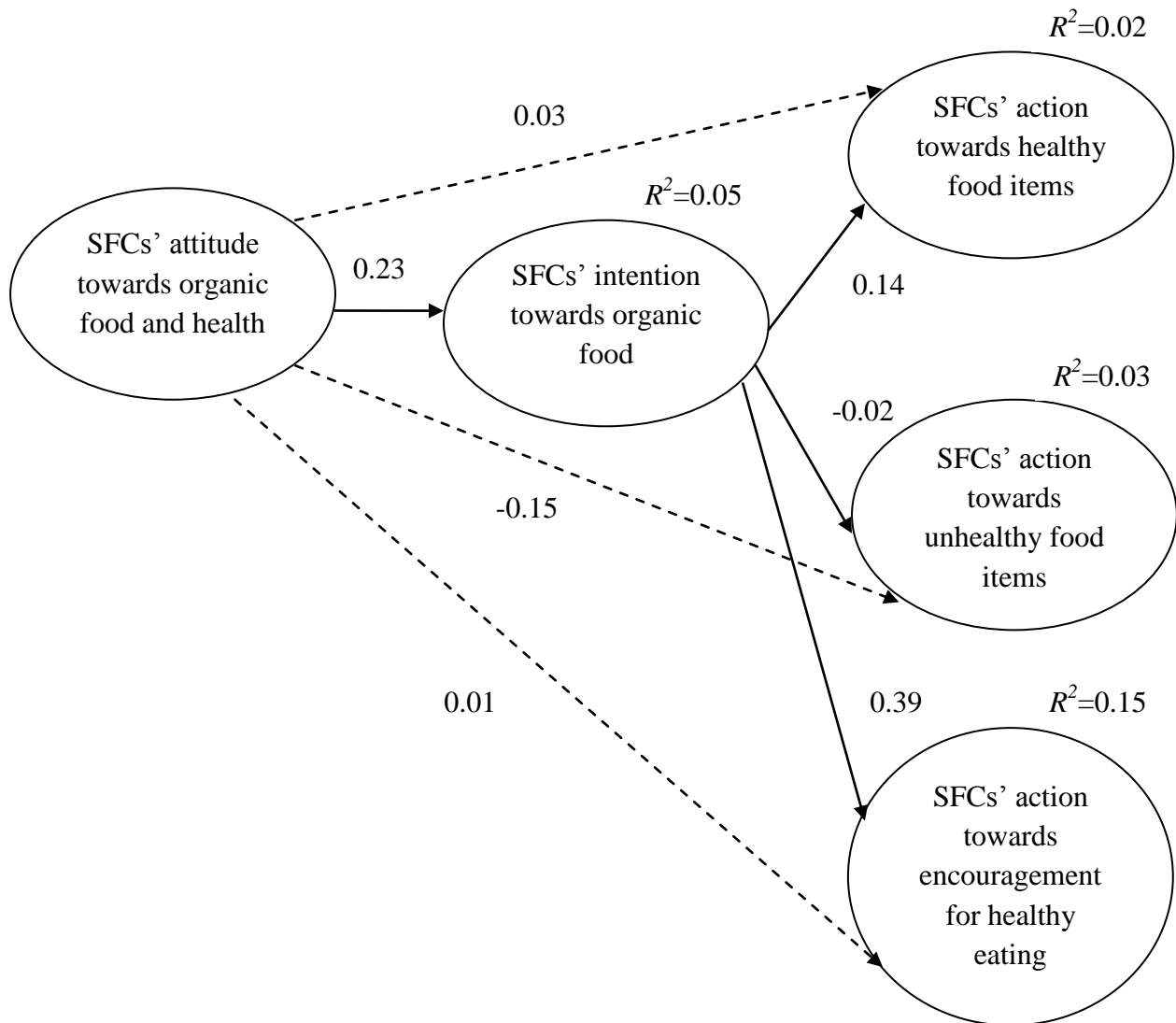


Figure 6. Path analysis of the combined school types based on the adapted theory of planned behaviour model.

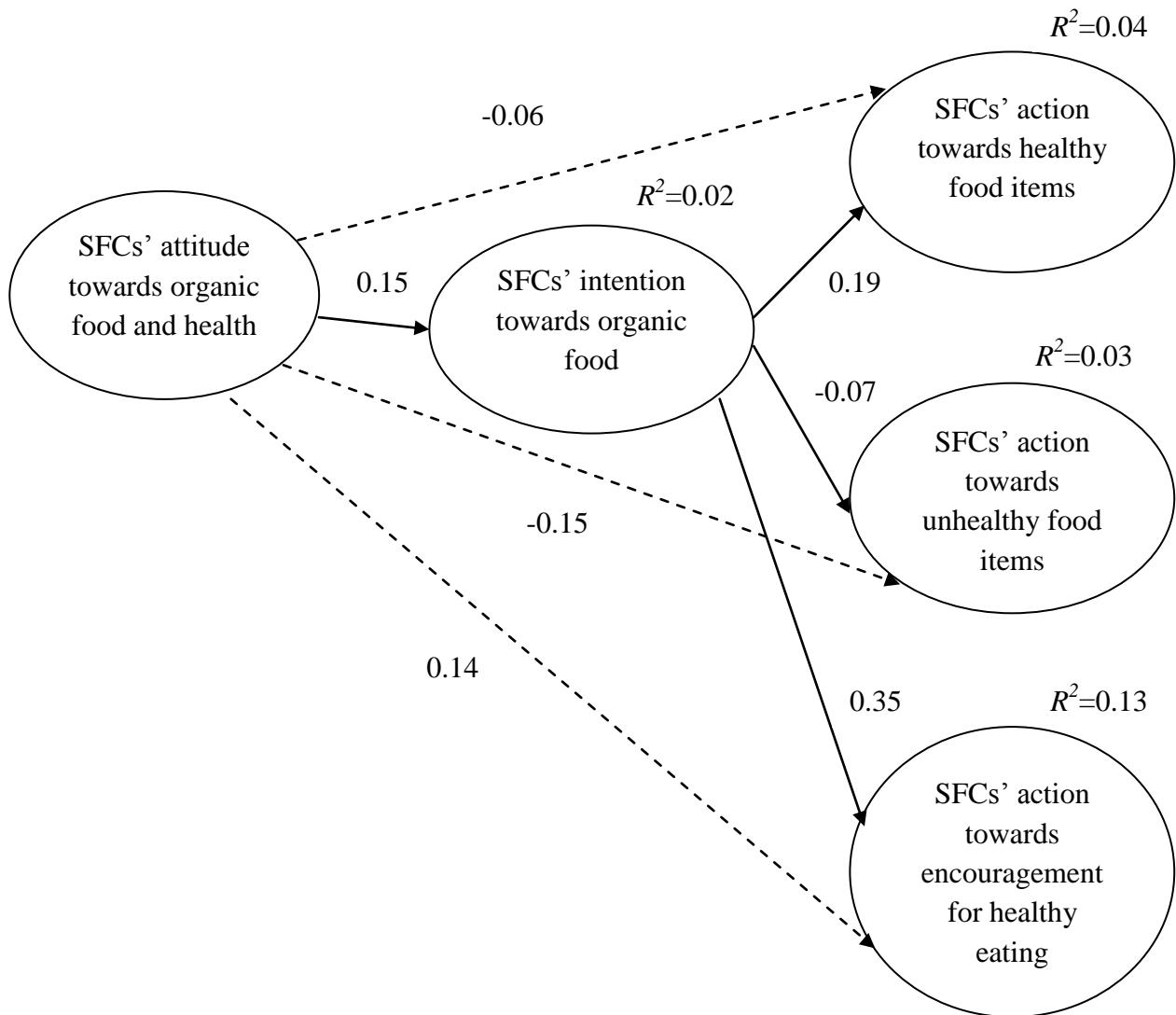


Figure 7. Path analysis in the organic schools based on the adapted theory of planned behaviour model.

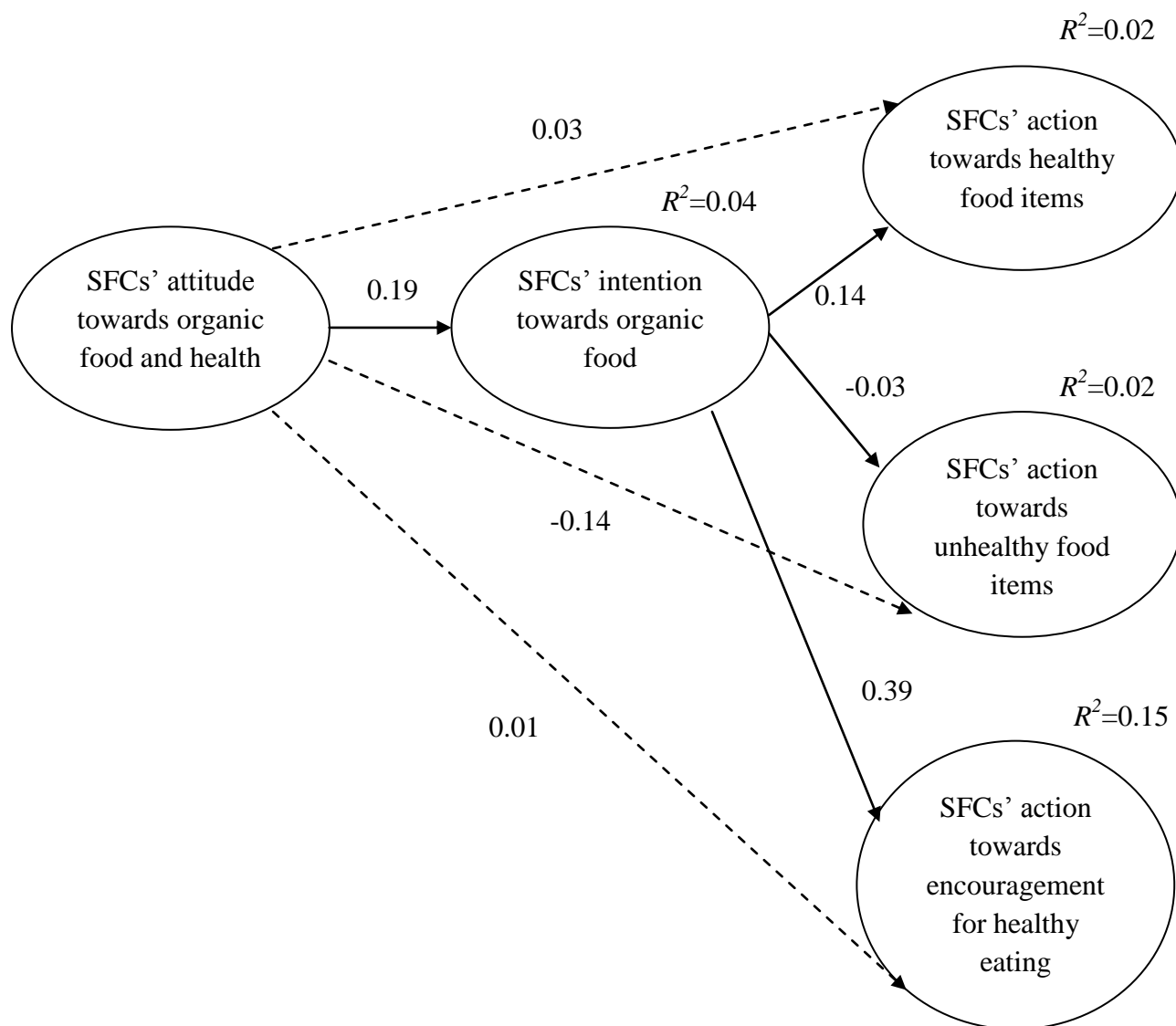


Figure 8. Path analysis in the non-organic schools based on the adapted theory of planned behaviour model.

5.6 Danish school children studies (study III)

5.6.1 Descriptive statistics between pupils in Danish organic and non-organic schools

Overall, as can be seen from Table 13, the pupils had a low consumption of their school meals in both school groups. Approximately 21.2% of pupils in the organic schools indicated that they ate school meals at least 2-4 times per week, while 3.8% pupils in the non-organic schools reported the same frequency of meals. On the other hand, in both school groups, a high percentage of pupils reported that they ate lunch boxes every day at schools. The significant associations between school type and frequency of consumption of school meals, lunch boxes, and the skipping of lunch were observed. It was also seen that the pupils in the two organic schools were significantly more likely to regard the school meals served as healthy foods, in comparison to pupils in the two non-organic schools. Descriptive analysis of less healthy food availability is presented in Table 13. The results indicate that the frequency of purchasing less healthy food by pupils during school time was low. Positive associations between the frequency of purchasing smoothies ($P = 0.013$), and full fat milk ($P = 0.070$), and the type of school were found.

5.6.2 Exploratory factor analysis between pupils in Danish organic and non-organic schools

Reliability results and exploratory factor analysis between pupils in Danish organic and non-organic schools are shown in Table 14. Cronbach's Alpha was at 0.60 for the attitude scale, 0.83 for the intention scale and was at 0.90 for the action scale. Initially, a factor analysis of the 5 attitude items, 2 intention items and 23 action items was conducted. By factor loading matrix, extracted factors for the attitude scale were "Attitude towards organic food" and "Attitude towards health", for the intention scale was "Intention towards consumption of organic food", and for the action scale were "Action towards healthy food items", "Action towards healthy drinks", "Action towards healthy diet" and "Action towards unhealthy food and drink practices". Secondly, the KMO measure of sampling adequacy was 0.61 for the attitude scale, 0.50 for the intention scale and 0.89 for the action scale, and Bartlett's test of sphericity was significant (attitude: $X^2 = 102.25$, $P < 0.001$; intention: $X^2 = 90.77$, $P < 0.001$; action: $X^2 = 1010.70$, $P < 0.001$). The two attitude factors explained 65.64% of the total variance, one intention factor explained 85.40% of the variance, and the four action factors explained 60.52% of the total variance. All in all, the exploratory factor analysis identified 7 factors and these factors were internally consistent. Table 15 shows the correlation coefficients among the extracted factors of attitude, intention and action scales. The positive correlations were only found between attitude and intention factors.

Table 13. Percentage of pupils' school lunch habits, consumption frequency of food items and their attitude towards whether school meals are healthy.

Adapted Food Frequency Questionnaire		% Pupils in organic schools	% Pupils in non-organic schools	P - value ^a	P - value ^b
Variables	Responses				
How often do you buy lunches that are provided by schools?	Never	25.9	23.8	0.012	0.000
	Less than 1 day per week	14.1	6.3		
	1 day per week	22.4	18.8		
	2-4 days per week	21.2	3.8		
	1 time per day	4.7	6.3		
	2 times per day	5.9			
	More than 2 times per day				
How often do you bring lunch box from home to school?	Never	10.6	5.0	0.000	0.000
	Less than 1 day per week	5.9	2.5		
	1 day per week	3.5			
	2-4 days per week	32.9	13.8		
	1 time per day	25.9	50.0		
	2 times per day	10.6	16.3		
	More than 2 times per day	3.5	10.0		
How often do you skip lunch when you are in school?	Never	36.5	63.8	0.000	0.000
	Less than 1 day per week	20.0	20.0		
	1 day per week	18.8	2.5		
	2-4 days per week	11.8	6.3		
	1 time per day	5.9	5.0		
	2 times per day				
	More than 2 times per day				
How often do you eat chips that	Never	49.4	77.5	0.023	NS

you get or buy from school?	Less than 1 day per week	14.1	12.5		
	1 day per week	7.1	5.0		
	2-4 days per week	2.4	1.3		
	1 time per day	1.2			
	2 times per day	2.4			
	More than 2 times per day				
How often do you drink smoothies that you get or buy from school?	Never	40.0	76.3		
	Less than 1 day per week	16.5	8.8		
	1 day per week	11.8	6.3		
	2-4 days per week	4.7	3.8	0.003	0.013
	1 time per day		1.3		
	2 times per day	1.2			
	More than 2 times per day				
How often do you drink soda water with sugar that you get or buy from school (e.g. Coca Cola, Pepsi, Sprite, etc.)?	Never	51.8	81.3		
	Less than 1 day per week	12.9	12.5		
	1 day per week	4.7	2.5		
	2-4 days per week	1.2		0.025	NS
	1 time per day	1.2			
	2 times per day	1.2			
	More than 2 times per day	1.2			
How often do you drink full fat milk that you get or buy from school?	Never	63.5	92.5		
	Less than 1 day per week	3.5	1.3		
	1 day per week	1.2	1.3		
	2-4 days per week	1.2		0.028	0.070
	1 time per day		1.3		
	2 times per day	1.2			
	More than 2 times per day	3.5			
I think that our school meals are	Strongly agree	11.8		0.000	0.000

healthy.	Agree	16.5	6.3
	Partially agree	24.7	26.3
	Partially disagree	9.4	23.8
	Disagree	3.5	23.8
	Strongly disagree	2.4	15.0

^aMann Whitney U Test between organic and non-organic school groups

^bP - value for Fisher's Exact Test between two school groups and questions addressed in the AFFQ

NS: not significant

Table 14. Exploratory factor analysis related to the adapted theory of planned behaviour constructs.

Variable	No. of items	Cronbach's Alpha	Components	Eigenvalue	% Extracted Variance	KMO ^a	P - Value ^b	X ²	df
Attitude towards organic food and healthy meals	5	0.60	Attitude towards organic food	1.98	39.61	0.61	<0.001	102.25	10
			Attitude towards health	1.30	26.03				
Intention towards organic food	2	0.83	Intention towards consumption of organic food	1.71	85.40	0.50	<0.001	90.77	1
Action towards food practices	23	0.90	Action towards healthy food items	3.00	13.06	0.89	<0.001	1010.70	253
			Action towards healthy drinks	1.17	5.09				
			Action towards healthy diet	1.39	6.06				
			Action towards unhealthy food and drink practices	8.35	36.31				

^a Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy with >0.50 indicates suitable for factor analysis.

^b P - value (<0.001) for Bartlett's tests of Sphericity should be significant for factor analysis to be suitable.

Table 15. Correlations among the variables based on the adapted theory of planned behaviour constructs.

Variable	Attitude towards organic food	Attitude towards health	Intention towards consumption of organic food	Action towards healthy food items	Action towards healthy drinks	Action towards healthy diet	Action towards unhealthy food and drink practices
Attitude towards organic food	1						
Attitude towards health	-0.13	1					
Intention towards consumption of organic food	0.48 ^b	0.24 ^b	1				
Action towards healthy food items	-0.07	-0.19 ^a	-0.17 ^a	1			
Action towards healthy drinks	0.17	0.05	0.11	-0.09	1		
Action towards healthy diet	-0.14	-0.20 ^a	-0.04	0.09	-0.19 ^a	1	
Action towards unhealthy food and drink practices	0.04	0.32 ^b	0.24 ^b	-0.05	-0.02	0.04	1

^a Correlation is significant at the 0.05 level (2-tailed).

^b Correlation is significant at the 0.01 level (2-tailed).

5.6.3 Path analysis between pupils in Danish organic and non-organic schools (study III)

Table 16 presents direct/indirect/total effect coefficients and standard deviations for all of the continuous variables used in the TPB models of study III. This study also examined the path coefficients for the models for the combined school types (see Fig. 9), the organic schools (see Fig. 10) and the non-organic schools (see Fig. 11).

There were causal links depicted between pupils' attitude towards organic food/health and intention towards consumption of organic food in the combined school types, organic schools and non-organic schools. Results indicated that, pupils' attitude towards organic food and health significantly affected their intention to consume organic food when both school types were combined ($b = 0.52$, $SE = 0.08$, $P < 0.01$), in organic schools ($b = 0.50$, $SE = 0.12$, $P < 0.01$) and in non-organic schools ($b = 0.54$, $SE = 0.09$, $P < 0.01$). In contrast, the pupils' intention related to the consumption of organic food had a significantly negative influence on their action towards healthy food and drink practices in the organic school model ($b = -0.47$, $SE = 0.11$, $P < 0.01$). Moreover, in non-organic school model, the pupils' intention towards consumption of organic food positively affected their action towards unhealthy food and drink practices ($b = 0.29$, $SE = 0.12$, $P < 0.05$).

Standardized parameters estimate the final models presented in Fig. 9, Fig. 10 and Fig. 11 were good model fit (combined both school types: $X^2 = 0.07$, $df = 1$, $P = 0.79$, $CFI = 1.00$, $RMSEA = 0.00$; organic school: $X^2 = 0.25$, $df = 1$, $P = 0.62$, $CFI = 1.00$, $RMSEA = 0.00$, non-organic school: $X^2 = 0.48$, $df = 1$, $P = 0.49$, $CFI = 1.00$, $RMSEA = 0.00$).

5.6.4 Interview data summary between pupils in Danish organic and non-organic schools

Table 17 summarizes the results from interviews among pupils from four Danish schools concerning school meal services and provides a first impression of the pupils' evaluation of the school meals service. The pupils from both school groups expressed a general interest in consuming school meals if the school was to serve tastier food, reduce meal prices, and develop a better school canteen, etc. A number of pupils from the non-organic schools argued that school meals were cooked and packed poorly, and were not as healthy as the schools had promised in commercial materials. Lastly, the interview results showed that all pupils demonstrated a basic level of knowledge and positive attitude towards organic food and health. Moreover, the pupils expressed a willingness to take future action with regard to achieving a healthier diet in both school groups, e.g. by eating more fruits and vegetables. However, the pupils from both schools reported that they did not regularly receive information from schools concerning the promotion of healthy eating habits, and school meals, except occasionally, such as in home economics lessons.

Table 16. Results of path analysis based on the adapted theory of planned behaviour model.

Path	Direct effect			Indirect effect			Total effect			S.E.			C.R.			Significance		
	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school
Attitude ^a →Intention	0.52	0.50	0.54				0.52	0.50	0.54	0.08	0.12	0.09	6.96	4.39	5.51	***	***	***
Intention→Action1 ^b	-0.16	-0.47	0.08				-0.16	-0.47	0.08	0.10	0.11	0.16	-1.53	-3.44	0.54	NS	***	NS
Intention→Action2 ^c	0.06	-0.16	0.29				0.06	-0.16	0.29	0.09	0.14	0.12	0.57	-1.10	2.14	NS	NS	*
Attitude ^a →Action1 ^b	0.10	0.08	-0.02	-0.08	-0.24	0.04	-0.06	-0.16	0.03	0.10	0.12	0.15	0.25	0.57	-0.11	NS	NS	NS
Attitude ^a →Action2 ^c	0.03	0.27	-0.08	0.03	-0.08	0.16	0.13	0.18	0.08	0.09	0.14	0.12	0.99	1.79	-0.57	NS	NS	NS
Model fit statistics	CMIN ^d			DF			P-value			CMIN/DF			CFI ^e			RMSEA ^f		
	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school	Combined school type	Organic school	Non-organic school
	0.07	0.25	0.48	1	1	1	0.79	0.62	0.49	0.07	0.25	0.48	1.00	1.00	1.00	0.00	0.00	0.00

* significant at the 0.05 level.
** significant at the 0.01 level.
NS: not significant
^a Attitude towards organic food and health
^b Action towards healthy food and drink practices
^c Action towards unhealthy food and drink practices
^d CMIN: Chi²
^e CFI: Comparative Fit Index
^f RMSEA: Root Mean Square Error of Approximation

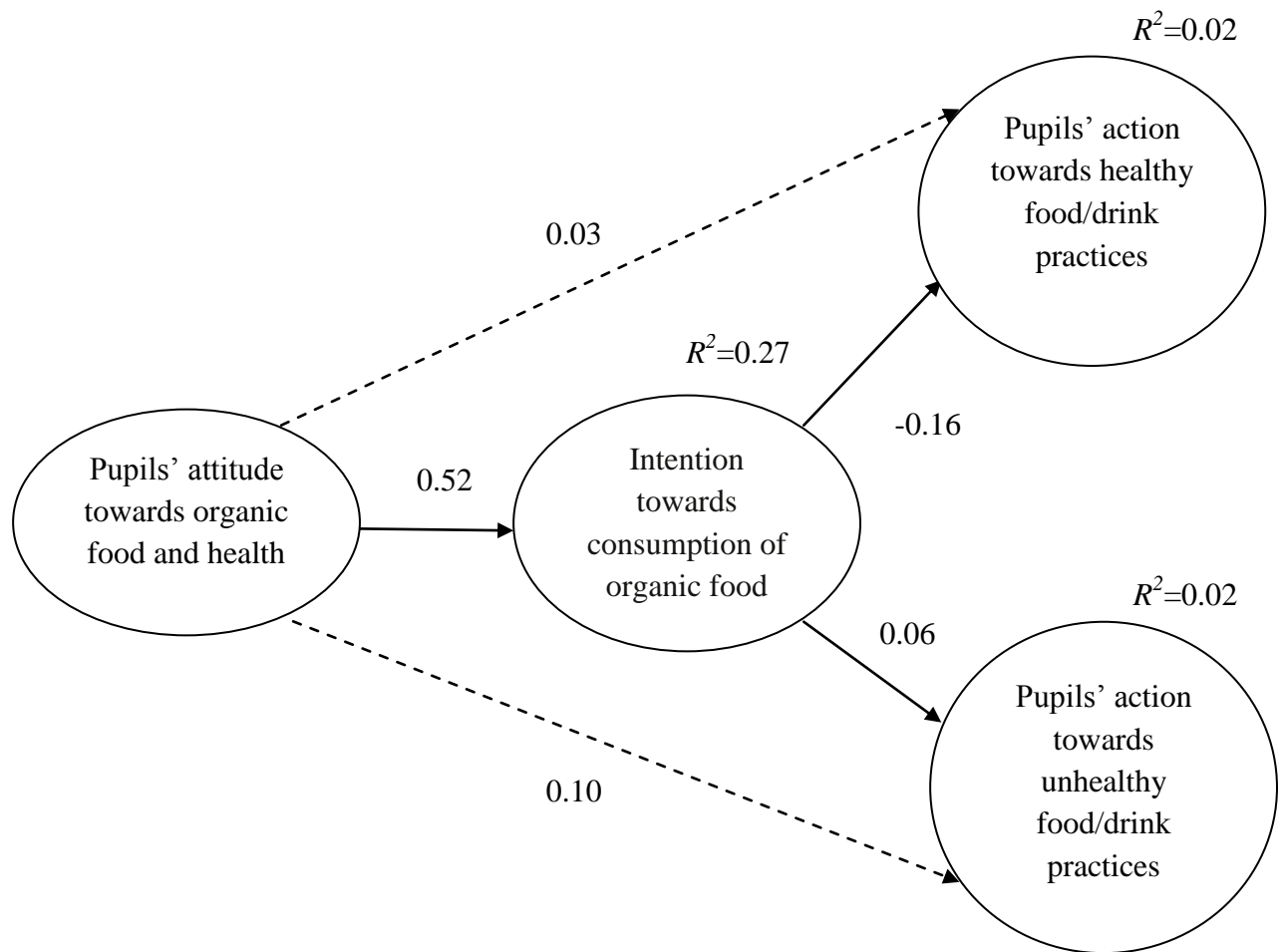


Figure 9. Path analysis of the combined school types based on the adapted theory of planned behaviour model.

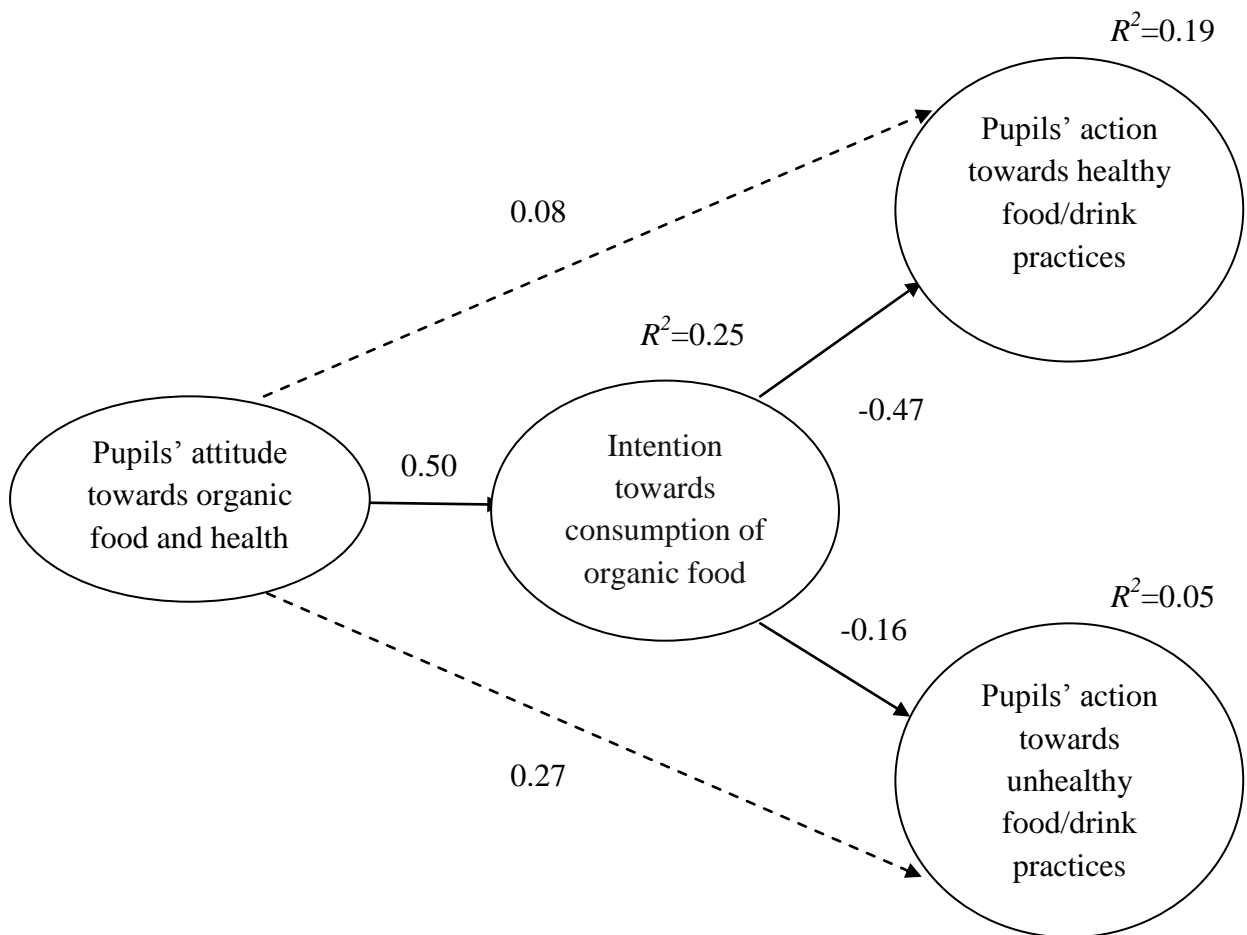


Figure 10. Path analysis in the organic schools based on the adapted theory of planned behaviour model.

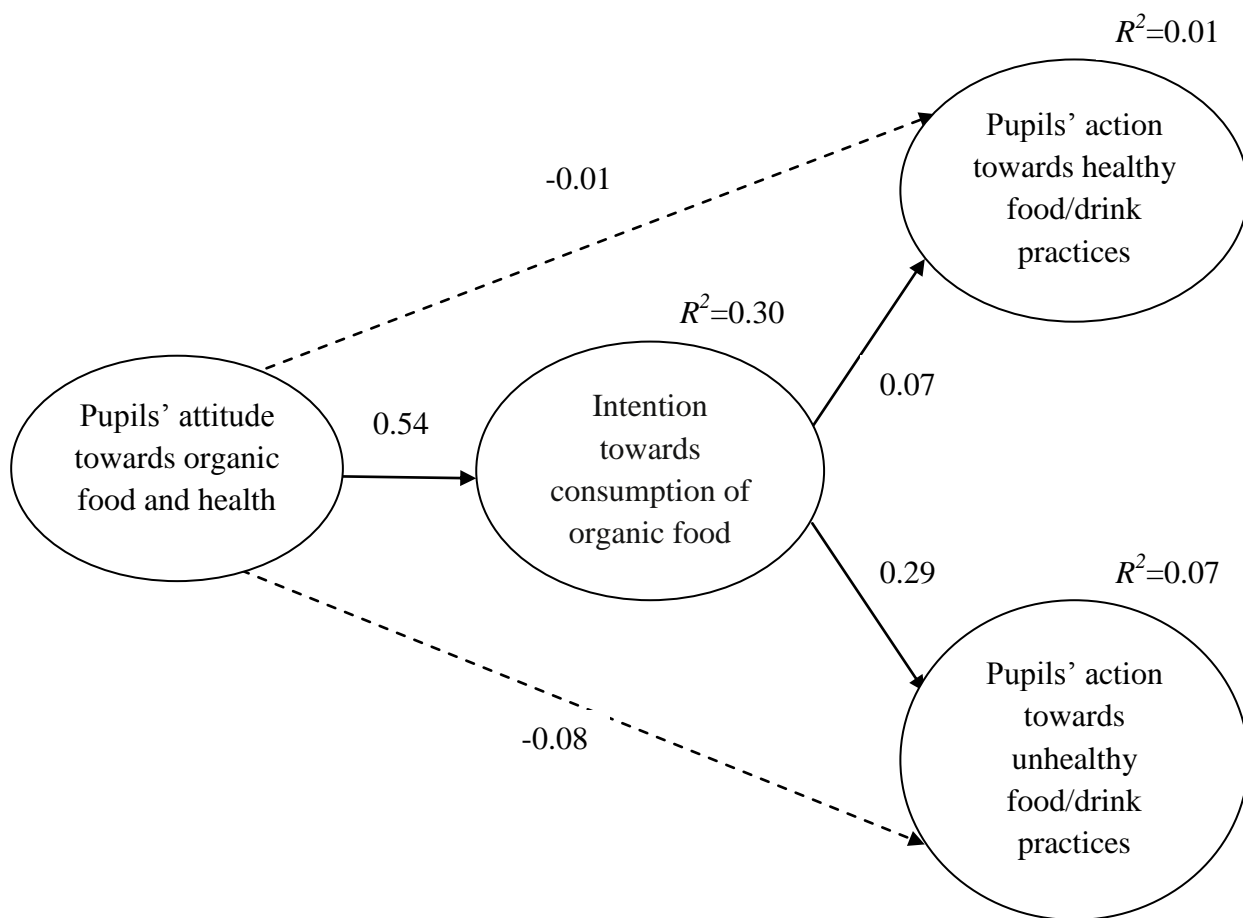


Figure 11. Path analysis in the non-organic schools based on the adapted theory of planned behaviour model.

Table 17. The pupils' knowledge, attitudes, intentions and actions regarding organic food and health, and their experiences whether school meals are healthy.

Interview theme	Example of quotations	
	Pupils in organic schools (n=24)	Pupils in non-organic schools (n=25)
Experiences towards school meals	<p>"I eat school meals when there are some of my friends who are going to buy food in school canteen, and then I will also go there and eat together with my friends." (6th grade girl)</p> <p>"It is because that we know from the menu what food and which day they will serve, then we will have money with us and buy food that we would like to have at that day."</p> <p>"I buy the food I think is the most delicious."</p> <p>"It depends if I have money with me...a bit expensive ..."</p> <p>"...the canteen is just some chairs and tables...it is also noisy"</p>	<p>"It feels very heavy in the stomach after eating school meals..." ... "You can feel full very fast, and then all energy goes away shortly after."</p> <p>"It depends on what I have in the lunch box, if it is just some boring food that I don't want to eat I just leave and throw it out. Maybe buy school meals...I don't know."</p> <p>"I think they choose to sell the food they sell the best in school like muffin and such."</p> <p>"They are constantly setting up the prices, the portions are getting smaller and smaller and it looks less and less appetizing."</p> <p>"One time a sausage roll costed 7DKK^a, now the cost is 12 DKK, then no one buy it anymore."</p>
Knowledge, attitudes, intentions and actions related to organic food and	<p>"It is something that is produced and processed properly, and there are no chemicals added, if it is from animals, then the animals have good condition, for example have much more space and so on."</p>	<p>"I got the impression from our theme weeks that the school is very focused on health."</p> <p>"Yes, I think over what I eat, if I eat a package of</p>

health	<p>“I think we have a healthy school because in school we can never buy a cake or something like that. I think we have a healthy school.”</p> <p>“I think so, but I don’t know how much it does, but I think it helps a bit – maybe I think people get better quality...”</p> <p>“...not all of our school meals are organic, I know milk and butter are organic...I notice the red organic mark.”</p> <p>“From now on I'd like to eat fruit instead of a cake in the evening.”</p> <p>“I would like to eat a lot salad, it is healthy.”</p>	<p>chips, then I feel myself really fat.”</p> <p>“I see it is that when I eat something sweet, I'll be hungry for more so it is difficult to manage, so I try to stop.”</p> <p>“I would like to try to eat more fruits and vegetables.”</p>
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^a DKK is the official currency of Denmark

6 Discussion

6.1 Research originality

Several studies suggest that it might be relatively advantageous to reduce excessive weight during childhood in comparison to adulthood, when food eating habits become established^{39-41,195}. It may therefore be of more benefit to encourage the development of a healthier diet pattern during childhood^{39-41,195}. In recent years, food policy development in the school setting has been one of the most popular approaches to addressing childhood overweight and obesity¹⁹⁶⁻¹⁹⁸. This project has focused on how action undertaken at the multi-level of the whole school environment, such as the implementation of school food policies, could help create a healthy school food environment and promote healthy diets to school children. There has been little previous research on such collective level action. Therefore, this study may provide original evidence to suggest that organic and/or nutrition food policies might contribute to an improved food environment in public schools.

6.2 Main findings

Based on the findings of one published paper (study III) and two papers being in the final stages of revision prior to final acceptance for publication (studies I & II), this work suggests that it is possible to influence pupils' awareness of health and eating habits, through combining modifications of the school lunch with modifications of the whole school food environment. The results imply that both the establishment and implementation of a POP policy as well as the use of organic school meals are potentially important components in increasing a focus on improving general health aspects in schools, thereby helping to promote healthy diets among pupils. It also suggests that the two "competing" agendas of organic sourcing and healthier eating can actually work in synergy, without counteracting each other's effects. The results show that, overall, there was lack of significant evidence on how an organic school food policy might influence children's eating habits and improve the school food environment. As a result, a number of potential effective actions observed in this research could be implemented in order to create a healthier food environment in schools. In order to influence the diets of pupils, these organic school food strategies could be initiated at the public welfare systems level, such as by politicians, or at the level of the individual school, or at a market oriented level, such as by private caterers. Ultimately, this study has shown how challenging it is to achieve such an aim as improving the eating habits of school children.

6.3 The association between organic food and school meals

6.3.1 Healthy food

The contribution made by school meals to the overall nutritional intake of school children has been shown to be positive¹⁹⁹⁻²⁰². In the four participating Danish schools there was usually a set weekly menu. However, if the foods provided on this menu are not the ones that the children like

or are sold at affordable prices, meals are not consumed and some children may therefore eat very little at lunchtime. By this, school children are more likely to explore other possibilities such as eating fast food or skipping lunches¹⁹⁹⁻²⁰². Previous studies have also found poorer dietary behaviour in general in school children who regularly consume snacks (e.g., sweets, chips) during school time, particularly during lunch periods^{77,203}. Hence, the provision of healthy school meals and discouragement of less healthy foods seems to be a promising approach to prevent this, for example through the impact of school food procurement on school children's eating habits^{36,58}.

The findings from the AFFQ in the paper 3, where the organic school pupils had a significantly higher percent score and showed greater agreement that their school meals were healthy, than the pupils in the non-organic schools. Likewise, the data found a significant association between the pupil's perception of whether their school meals were healthy and school type (organic or non-organic). Results from the AFFQ of food intake also showed that the pupils in organic school groups had a significantly higher intake of school meals than the non-organic schools by 2-4 days per week. This indicates that, from the pupil's perspective, there was a higher exposure to organic foods and a higher intake of provided meals in the two schools with organic food procurement when compared to the non-organic schools. The observed findings may be due to 1) organic food is well established in the Danish food market, private catering companies and in a number of municipalities^{111,204,205}. It should be noted that schools are not always the decision maker during the process of adopting food policies^{103,111,206}. In this case, the decision has been made by the municipality for these two organic schools²⁰⁶. 2) The availability of better eating facilities. This municipality built new kitchens in all the schools, including the two organic schools in the region and also hired more trained personnel to help with education²⁰⁶. It is clear that the municipality has made the effort to work on school meal issues. Thus, they are perhaps more likely to focus on serving better school meals than the two non-organic schools, which may have led to the school children in these two Danish organic schools to be more willing to consume healthy school meals.

Not surprisingly, in accordance with the literature that indicates the school meal system is still underdeveloped in Danish schools and that the majority of Danish school children have a packed lunch box^{110,207}, the present studies also reported (via the AFFQ) that in both school types, the pupils mostly consumed traditional lunch boxes. This may indicate that the school meals provided by these four schools are not yet recognized by school children as the most preferable lunch option during the school day, although this picture seems to be gradually changing^{103,111,206}. Positively, our findings described in paper 3 indicate that the children have a desire to consume school meals more often, if the meals and eating environment comply with their expectations. The interviewed school children argued that the school canteen is not a particularly attractive eating environment. These findings draw attention to an urgent need to promote, not only the school meals, but also the common food venue, such as a canteen.

The school canteen is becoming an important venue to promote children's health and wellbeing by carrying out the actions in practice, in relation to the desirability of the consumption

experience^{26,28,208,209}. Other studies highlight that the school canteen has much room for development to improve the school food environment and to encourage school children to consume healthy school meals^{26,28,208,209}. It is because of this that the current research considered the existence of a school canteen, that is, an onsite school kitchen, as an indicator of whether the school contributes to the creation of a healthy school food environment.

The multivariate analysis data in studies I & II also showed significant associations between the facilitation of a school canteen and the type of school. The reasons for observed findings might be the varying school food systems between the countries, from the provision of hot lunches in Finland and Italy^{108, 109}, to home-packed lunchboxes in Denmark and Germany^{110,207, 112,113}. On the one hand, as the more regulated school food system is politically prioritized and economically supported from the public, the system becomes more widely embedded in terms of complete infrastructures^{108, 109}, e.g. school canteen. Nevertheless, this formal school food system may exclude decisions from the 'bottom' level, e.g. from school children or parents^{108, 109}. On the other hand, with less regulation embedded in the school food system, the structure can be relatively fragile so that the school food system may not survive or develop due to lack of economic support, or canteen facilities, etc¹⁰⁰. However, because of this, the less regulated school food system may better involve actors such as parents and teachers themselves.^{100, 103,111,206}

Implications for school meal practices: Since children were found to possess fundamental knowledge, positive attitudes and intentions towards organic food and healthy school meals, schools could take this opportunity to further improve children's knowledge and eating habits through school food provision. For example, this might be achieved by making attractive and healthy menus available and serving them in an environment attractive to children, by lowering the price of school lunches, and by creating a context in which children are exposed to organic and healthier foods whilst limiting their access to unhealthy foods. Introducing organic food into school meals not only requires a simple food substitution, but it is also important to address legal issues, price issues, structural issues, sourcing issues, social issues, environmental and sustainability issues^{92,106}. The findings also suggest that school meals do not often meet children's preferences. In order to minimize this, relevant school actors should more often consider the desires of school children to reform school meals in order to better meet the needs of all pupils. In other words, the school food service should be where school children and practitioners gain a perspective of everyday life. In addition, the school canteen could be developed and utilized as both an eating facility and as an inspirational setting for health. This might ultimately lead to the increased satisfaction of school children in relation to school meals^{26,28,208,209}.

In short, these findings may be useful for SFCs, practitioners, private or public catering companies working with individual schools or districts by assisting these agencies in making decisions about where to focus their supply and facilities. These findings may also be useful for identifying and targeting specific areas for improvement, e.g. freshness and package for foods, in order to give a quality school food practices.

6.3.2 *School food policy*

A number of studies have demonstrated that engaging food policies in schools helps school staff and pupils understand the relationship between health and diet^{37,203}. In this project, it is assumed that integrating an organic and healthy food availability policy in school meals enables the use of a whole school approach which might positively influence the eating patterns and the long-term food and nutritional status of the individual.

The findings (studies I & II) show that the organic schools were more likely to operate a FNP ensuring the availability and accessibility of healthier food items in comparison to the non-organic schools. Besides this, compared to the non-organic schools, the organic schools were more likely to take more action towards building a health promoting school according to WHO principles, to promote physical activity during breaks. If we discuss specific countries, the multivariate analysis showed that of all the countries, the Finnish organic schools were most active in applying a FNP, a WHO-based school policy, and in teaching physical activity themes for children. These positive results might be due to the fact that the Finnish school food service has already been well-developed and recognized as one part of the social welfare systems¹⁰⁸. The adoption of such school policies is a natural and rational development within this system. For example, according to The Basic Education Act (628/1998), The General Upper Secondary Schools Act (629/1998), and The Vocational Education and Training Act (630/1998) in Finland¹⁰⁸, there is already an efficient school system that delivers healthy warm school meals for free and promotes physical activity during school time established¹⁰⁸. The government has created nutrition standards for school meals, catering companies, and the school kitchens in charge of preparation and implementation of meals¹⁰⁸.

Based on the definition of POP policy presented in this research, there were a low number of organic schools in these four countries, in relation to the total number of sampled schools. This demonstrates that the provision of organic food in schools is currently not prevalent in these countries. On the one hand, the present findings are in agreement with the existing research that highlights a lack of schools serving organic food across Denmark, Germany and Finland¹⁰⁰. Such findings might be due to a variety of reasons: 1) Current entrenched school meal systems are challenging to change. The existing school food culture is rooted in the societal conventions, and in this way the involvement of organic food in school meals is not a priority¹⁰⁸. For example, in Finland this top-down initiated school food programs has been deeply embedded in the school culture, yet the users of the food service systems do not see links between the food served by the school canteen and what they have learned about sustainable nutrition in the class time^{108,210,211}. There is lack of sufficient ownership of such initiatives among the users, thereby resulting in a low level of utilisation¹¹⁷⁻¹²⁰. Nevertheless, this also represents a high potential for organic food in school meal system by the POP policy can be more efficient when it is associated with a broader concept of public sustainable nutrition. 2) Less support for organic food from political and economic environments such as the government, regional authorities. A good example can be found in Denmark and Germany, where the school meal systems are still at an incipient stage and there is lack of concern on the political level for organic food procurement in public school food outlets, although organic issues are rather popular in both countries^{110,207,112,113}. In addition

to this, the price premium of organic food is relatively more expensive than non-organic food, and consequently schools do not consider it as a priority in the school food budget^{110,111}. Also, the organic dishes are more systematically linked with higher expenses and consequently school children or parents prefer to pack the lunchbox at home or eat outside of school than to consume school meals²⁰⁶. 3) The support for organic can be limited due to organic food production often depending on seasonal and local aspects and competition with regional foods^{97,101}. These aspects often require an extra effort and a minimum level of professionalism which the school food sector is still often lacking^{97,101}.

On the other hand, the observation of a low percentage of Italian organic schools in this study is contradictory to the well-developed organic school food system in Italy. This may be explained by difficulties that the SFCs may have had in understanding the definition of a POP policy during the completion of the questionnaire, or a lack of knowledge regarding the inclusion of organic ingredients in school meals. Additionally, it may also be due to public financing that the Italian municipalities are responsible for the school food service, from the decision of meal prices, provision of the infrastructure, food procurement to set the standards for school food systems¹⁰⁹. By this, the SFCs that responded the questionnaire may have different opinions regarding the POP policy being placed at the higher level authority instead at school level.

Implications for policy makers: The results of this part of study provide useful information to policy makers both at national, regional and school levels. Policy makers may use these findings when constructing a school food policy. They should observe the power of a top-down policy implementation approach and consider positioning organic food in school FNP at local and regional level. Policy makers and school personnel must work together to formulate and enforce comprehensive school food policies in order to improve the diet quality of school children, through reinforcing behaviour-focused school food policies into the whole school approach²¹²⁻²¹⁴. This can be done for instance by increasing the availability of healthy food options in the school cafeteria during the school day, by implementing policies to improve the nutritional quality of foods at school, and by enforcing restrictions that limit access to unhealthy foods both at school and outside of school^{215,216}.

School food policies that target organic school meals' influence on children's awareness of healthy eating habits should adapt the current school food environment by improving school based nutrition programmes and services²¹⁷⁻²¹⁹. For example, although children may learn the value of healthy food choices in the classroom, schools may still offer unhealthy food options in kiosks, snack tuck shops etc, contradicting the message of good nutrition as being significantly related to their health and wellness^{37,203}. However, policy makers, particularly at the national level, should develop and establish nutritional recommendations, standards and guidelines for the implementation of organic school food. Stakeholders from different parts of the organic school meal arena should participate in the process.

To summarise, the establishment of organic school food policies that benchmark indicators of success toward promoting healthy school meals and the school food environment can serve as a

facilitator to positively influence the eating habits of school children. Decision makers can use the findings of this study to evaluate whether their school food policy meets minimum recommendations and may also use this information to inform upper level decision makers on areas where school meals fall short of expected levels.

6.3.3 Nutrition education

This multivariate analysis (studies I & II) revealed that Italian schools were most likely to teach the FNP in comparison to the other countries. This finding is may due to the Italian municipalities' actions, particularly in the Northern regions where Italian schools in the current study were sampled, and regarding the development of an education program, over a decade ago, in which the teachers are responsible for developing children's nutritional knowledge during curricular activities^{102,109}. In Italy, one of the objectives of the school meal system is to educate school children about the properties of organic food and its environmental benefits and aim to improve children's awareness of food and health¹⁰⁹. However, such an objective has been well used through teaching activities but is not directly connected to the organic school food service, where it could have been involved¹⁰⁹. In fact, school children and their parents are not informed on the organic ingredients in the school meals¹⁰⁹. It has been suggested that the food service personnel are rarely responsible for or even knowledgeable about curricula which belong to the pedagogical sphere and the service and teaching sectors are mainly very disconnected.

Further findings from the focus group interview in four Danish schools gave the overall impression that pupils rarely received information and encouragement from schools in terms of nutritional food, health and the promotion of school meals. However, the Danish SFCs (study I) have clearly reported that their schools recommended the pupils to eat healthy school meals. A number of Danish private catering companies as well as some municipalities provide teaching materials and try to use the school meals as a way to integrate the school children in operating the school food service during lunch time^{100,111,206,207}. In this way, the school meal systems are considered as an educational tool by teaching the school children about the effects of food consumption using a holistic perspective, in order to improve their eating behaviours^{100,111,206,207,220}. The gap occurs here might because of these four Danish schools did not participate in the previous survey. It can be also seen that these actions have been poorly received by the school children.

Nevertheless, our findings also suggest that school children in both school groups were interested in learning more about organic food and health issues through the classroom. The interviews also found that, in some respects, the individual teachers might bring up these topics as a result of their own motivation. The findings from the "top" and "bottom" level of the schools highlight the desire of both school staff and children to teach and acquire nutrition and health knowledge, to address the importance of increasing nutritional awareness, to improve dietary behaviours. As indicated in previous studies, perhaps these recommendations to target school children need to be applied to a more educational approach that is specified in the

curriculum and with a better understanding of how to spread the information amongst school children^{215,221}.

Implications for school health education: School children currently learn about different food varieties, how to make healthy choices, nutrition and health topics through nutrition education or hands-on experiences. By this, organic school meals are suitable in schools and have great potential to contribute to the teaching of sustainable nutrition and sustainable development, for instance, by creating the opportunity for school children to have practical experiences such as cooking, farm visits and school gardening^{102,109}. Due to the findings obtained which highlighted a gap between curricula activities, organic school meals and healthy eating habits, school teachers and practitioners could benefit from integrating the well established education for nutrition with organic school meals for healthy eating. It is also recommended to integrate education materials about food, nutrition and health with sustainable issues, including onsite practices such as home economics in canteen facilities. Furthermore, in order to maintain this as a continuous process, it is very important to have a school teacher or school administrator with time to champion school health education^{215,221}. This person could lead a school health education team to work on sustainable nutrition education and healthy school meals related to improving eating habits and awareness of health between among children.

In brief, the findings suggest that there was a desire from school staff and school children to spread and receive more knowledge about nutrition and health. It is recommended to 1) bring the organic food concept to school lunches, and 2) combine with nutrition education that 3) applies to the school canteen as a whole. This may be a more effective approach, rather than limiting such nutrition education to the curricular time^{222,223}. By doing so, the chances for creating sustainable learning and behavioural change are greatest both in terms of healthier eating and in terms of organic consumption patterns.

6.3.4 Health awareness

Analysis of the AFFQ data in paper 3 revealed that school children in the four Danish schools had a low consumption of unhealthy foods according to their reports. The majority of children who answered the AFFQ reported that they did not consume unhealthy food items that were purchased and/or received by schools during school time. However, the secretaries in these four Danish schools informed us that there were no specific restrictions at the municipal or school level limiting the availability of unhealthy food onsite in all four schools. As part of the Danish school culture, it is customary for children to bring cakes to all classmates on his/her birthday^{111,206,207,224}. Activities such as this might be a fundamental reason why it could be difficult to set up restrictions towards the forbiddance of unhealthy food in Danish schools. Such policies, however, can be decided by individual teachers and/or the school board^{111,206,207,224}. Thus, this might explain why the teachers and/or parents take the initiative to ban unhealthy food items for pupils at these four schools.

Nevertheless, the interpretation of observations from the school teachers and parents may be affected by problems of individualistic fallacy. In other words, the values and intentions of the individual school teachers and parents may not accurately reflect the whole school approach, which is likely to be heavily influenced by factors such as historical trajectories, institutions, physical environments and larger international structures^{132,135,225,226}. The power of individuals to shape their contexts is highly contingent on their position within the school^{132,135,225,226}. This is a particular problem when an organic food and its nutrition benefits fails to stand on a scientific basis^{89,90}, the schools are mostly publicly administered, the SFCs operate in very different positions, and when health agendas may exist independently of organic introductions.

The qualitative findings of paper 3 revealed that in the four Danish schools the health awareness of school children was good, organic food knowledge was generally sound, and that children have a clear positive intention towards future dietary habits. Also, these school children considered healthy foods to be fruits, vegetables, and fish, etc. Foods sold in fast-food restaurants were seen as unhealthy. Most of the pupils in all schools reported that they did not want to eat many unhealthy foods, and instead would prefer healthier foods such as fish, fruits, and vegetables. A number of studies have previously found that children are aware of the importance of healthy food and the provision of nutrients and energy for growth, while less healthy food causes overweight or obesity and the associated illness^{43,227}. Despite this knowledge, health-related features of food are not the main influence on school children's food choice, whereas factors such as the taste, texture and appearance of the food have been shown to be a much greater concern^{158,161,174}. Such as finding was also observed in the current study, whereby several pupils in the non-organic schools explained that they lost interest in school meals due to the meals' unpleasant appearance and unsatisfactory portion sizes. It might therefore be beneficial for schools to consider school children's awareness-related preferences for food, in addition to the serving of school meals.

Implications for whole school approach: Our findings demonstrate that school children's awareness and behaviour towards consuming less unhealthy food is related to a school-based approach for reducing unhealthy food intakes, which may be effective in developing a healthier eating pattern. Although school children are aware of organic and health issues, they tend not to have developed a concrete perspective on them, and school children will therefore not usually be strong drivers for organic school food. This study recommends that development of a whole school approach, including the curriculum, school policies, an educational approach and school meals, should be considered for coherence of children's health awareness/perspectives and practices²¹²⁻²¹⁴.

If schools want to use the organic concept as a vehicle for increasing awareness of healthy eating and as means to promote sustainability, then more efforts would be welcome to include school food policies that embrace organic food procurement. Organic school meals imply a practice-based and experiential, sustainable nutrition education^{102,109}. In this case, involving the relevant user groups, such as parents and teachers, at pertinent stages of developing a healthy school meal system will influence involvement in organic/sustainable issues. This is because of, for example,

parent groups establishing a very important local ownership²²⁸, and the teacher groups being motivated for using a carefully organized food education program through networking with other teachers^{221,229}.

Briefly, school children's health awareness, the whole school approach and the organic concept have the tendency to all pull in the same direction. School principals can place more emphasis on creating dedicated school health time as well as facilitating discussions at staff meetings and the creation of new pupil's wellness organizations. School board members can discuss the use of resources to serve healthy school meals and perhaps involve school children in the discussion. All school personnel need to see the improvement of the school-based whole approach as a way to reduce unhealthy foods whilst at the same time improving healthy eating habits of school children²¹²⁻²¹⁴.

6.4 Revisit the TPB model

The TPB was used in this research as a conceptual frame for performing the path analysis, which is a special case of SEM^{150,151}. This is because, with an initial theory, SEM can be used inductively by specifying a corresponding model, in this case the TPB, and using data to estimate the values of free parameters^{150,151}. Although, often the initial hypothesis requires adjustment in light of model evidence, in this case the hypothesized TPB model did not require further adjustments^{150,151}.

One of the main disadvantages of the TPB is that it assumes direct causality between attitudes, social norms and intentions towards a specific behaviour¹⁵⁵. The evidence is overwhelming in the sense that a gap exists, and thus such models explain only partially the variance in the observed behaviour¹⁵⁵. The TPB shares this particular limitation with other behaviour change models, and there is still room for improved models and theories that would account for the confounding.

6.4.1 SFCs

Exploratory factor analysis results showed the relationship between the SFCs' attitudes, intentions and actions towards organic school meals, and factors predicting the SFCs' action based on the adapted theory of planned behaviour.

The factors of attitude towards organic food and intention/policy towards healthy school meals were correlated, a result which complied with the TPB model between attitude and intention. Moreover, actions towards healthy/unhealthy food items and encouragement for healthy eating for pupils were also correlated. In addition to this, attitude towards organic food and action towards unhealthy food items were negatively correlated, although the relationship between attitude and action is not direct in the TPB. In contrast, negative correlations were found between two attitude factors; attitude towards organic food and towards health. This finding, in contrast to

the present research stream and in line with the previous studies, argues that evidence for the relationship between organic food and health is still underdeveloped⁹⁰.

However, this part of analysis contributes to the understanding of the influence of the SFCs' attitudes and intentions on their actions towards healthy school meals. When all factors were examined simultaneously according to the adapted theory of planned behaviour, only in the non-organic schools of four countries did the SFCs' attitude towards organic food and health significantly influence their intention towards healthy school meals. Similar to previous research, these results may suggest that the SFCs' attitude towards organic food and health were more important motives than other attitude factors for intention or adoption of a health policy by schools^{86,87,89,90}. Nevertheless, the lack of significant results in the organic schools might be due to the SFCs' attitude being affected by limited finances, and the already strong and established institutional cultural structure increasing resistance to change.

The results from earlier studies indicate that school staff such as teachers can affect children's eating habits through encouragement, classroom activities, education, etc^{52,53}. The direct effect between the SFCs' intentions towards healthy school meals and their action towards encouragement for healthy eating among the pupils was discovered in both the organic and non-organic schools, suggesting that the SFCs' intentions towards healthy school meals had an impact on their action towards encouragement for healthy eating among school children. This result supports the argument for the role of the school teachers' influence in encouraging children's healthy behaviours.

6.4.2 School children

In the paper 3, the factor analysis revealed that, in the four schools, the pupils' attitude towards organic and health showed significantly positive correlations with their intention to consume organic foods. Furthermore, the path analysis indicated that the pupils' attitude towards organic food and health could predict their intentions towards the consumption of organic food. These results were in accordance with the TPB model, in which individual attitudes drive intentions and reflect the degree of positive or negative evaluation towards an individual's behaviour. In other words, the pupils with a positive attitude towards organic food and health were more likely to intend to consume more organic food. The results may reflect the findings from previous literature which found health to be an important factor when predicting attitudes and intentions related to the consumption of organic food^{86,87,89,90}. However, there was no consistency in the attitudes, intentions and actions observed among the pupils in four schools, a factor also known as the "attitude-behaviour gap", which has also been reported in previous studies²³⁰⁻²³².

The message seems clear; although the pupils were aware of healthy eating, they actually did not do anything to really make it happen, or more importantly, they did not actually consume healthier foods. In the case of children, this might be due to²³⁰⁻²³² 1) the lack of decision power of the children i.e. parents are responsible for preparing and making the lunch boxes, 2) an "age-effect" or "peer-pressure" to eat what is "cool", 3) eating disorders and the accompanying eating

patterns, or 4) already ingrained habits. Moreover, they might have a lack of support or frame that could be translated, such as the absence of nutrition education in the school.

6.5 Scientific contributions and news values

These empirical findings are expected to benefit both the scientific community and general media. The findings of the study contribute to the scientific literature regarding strategies for policy implementations that may increase the awareness of health and consumption of healthier foods in public food serving outlets for youth. The research also contributes to providing original evidence on 1) the implementation and experiences of organic food policies that adopted either the top-down approach or the bottom-up approach in four European countries, and, 2) the practices and perspectives of the organic food practice from school children in Denmark. Given that the European school food revolution is becoming stronger, these research findings could be of interest to many European scholars within the field of public health nutrition.

Moreover, the research provides a clearer understanding of the school landscape and how school children perceive themselves and their learning within an organic school meal context which will help researchers reconsider the ways in which they prepare research methods and materials within the relevant subjects. The scientific community will also benefit from the fact that this research shares information on how organic food policy/practice might act as a driver for healthy eating among school children and increase the construction of knowledge about sustainable nutrition.

More importantly, this research presents a new insight about the ‘organic brand concept’. That is, a healthier lifestyle or more awareness of healthy eating in general. It seems that organic food is often branded as a way of helping people lead a healthier lifestyle and organic claims often include factors such as sustainability, being environmental friendly and local production⁸⁵⁻⁸⁸. Consequently, the promotion of organic food might also result in the promotion of healthy lifestyles.

The results of the research can be also addressed by dissemination activities. For instance, findings may be presented in scientific conferences, workshops, seminars and lectures. The population (e.g. school personnel, policy maker, parents) that do not usually attend such scientific events will benefit from the findings through the general media, such as newspapers, magazines, and websites. In addition, school staff can address the findings during their school health events.

7 Methodological issues

7.1 Novel methods - strengths and weaknesses

Strengths – develop a multinational approach in relation to the subject

This PhD research was partly dependent on its trans-nationality. Analysing and comparing organic school meals for children in four countries with highly different food cultures and school food service systems has been the novel aspect of this research's methods, and hence provides an opportunity to study and to develop a cross-national comparative survey.

A multicenter study firstly shows a picture of organic school meals in terms of the geographic gradient from North, Middle to South Europe. Secondly, it demonstrates different approaches to school meals, namely, the welfare model, market oriented model and a mixture of the two models. Thirdly, it addresses, within the school setting, both the top level (SFCs) viewpoints in relation to the implementation of organic school food policies and also the bottom level (school children) with respect to the consumption of school meals. Lastly, all aspects in the research used a common methodology that allowed for comparisons between the studies. This, however, also has weaknesses and these are discussed below.

Weakness - Comparability and equivalence of hypotheses posed

The design of survey questions for the four countries might be biased with culturally-tailored languages, phases and tapping of culture-specific concepts¹⁶⁸. One of the drawbacks of such a comparative study is that shared questions had to be developed for multiple samples and so questions may become less specific than if these questions were designed for a mono-cultural study¹⁶⁸. Moreover, substantive understanding of the subject and translation of the surveys by different translators may also bias the data¹⁶⁸.

However, it is neither possible nor desirable to implement the same survey everywhere. Therefore, one strategy adopted by this study was to ask the same questions, or for questions to be as similar as possible in all four countries. The data collection methods have remained the same procedures for each study, and another strategy was to pre-test the surveys in each country. In each country, the iPOPY project partners were not only experts on health research, but also had a mutual understanding of the project subject which assisted with translation of the questionnaires. As a result it was likely to produce a successful survey translation product, especially because the survey questions were simple and easy.

Another limitation of the research might be the potential effects of several confounding factors that may have had an impact on the project hypothesis¹⁴⁹, but which were not assessed in this study, e.g. parents' influence. This should be a concern for future studies.

7.2 Limitations of a mix of quantitative and qualitative approach

The mixture of questionnaires and interviews, as used in the study III, is a method commonly used to assess implementation. However, there are limitations to this type of study. Firstly, a cross-sectional study takes the measurement at one point in time^{233,234}. This could limit the conclusions of this study concerning why schools experienced success or failure in involving organic school meals. Nevertheless, the current project provides a snapshot of the current school situation.

Secondly, 56 out of the 80 children in the non-organic schools completed the questionnaire at home instead of completing the questionnaire in the school PC room. The investigators were supposed to be present during the completion of the FFQs in order to provide help for any children who did not understand the questions or who experienced technical problems, whilst also ensuring that the pupils answer the questionnaires individually. Bias might have therefore occurred in responses from the pupils who completed the AFFQ as homework, as they may have obtained help from family or peers. However, the experiences of researchers during the process of questionnaire completion in the school PC rooms from pre-test schools and the organic schools was that children did not generally ask questions regarding their understanding of the AFFQ, and did not appear to have trouble conducting the AFFQ individually. Therefore, the present study believes that the fact that pupils from non-organic schools completed the AFFQ outside of school time should not result in the data being significantly biased.

Thirdly, only four schools in two municipalities were used for quantitative data collection and so cannot be representative of the whole Denmark¹⁸⁸. However, the power of the study was calculated and it was considered sufficient to perform these analyses.

Fourth, although extensive interviewing of the pupils immediately after the questionnaires might have increased the validity of the results and also was beneficial in providing more in-depth information^{168,187}, social desirability bias may have been a potential barrier to obtaining valid data if children responded to questions in a way that they believed would please investigators, rather than reporting their actual opinions and dietary behaviours¹⁶⁸. In order to remove such bias as far as possible, a qualified interviewer within the relevant research field was selected to reduce possible effects of the researchers personal preferences, communicated through verbal and non-verbal manners, on the children's responses¹⁶⁸.

Lastly, a comparative issue was that so-called background variables e.g., ethnicity or socioeconomic status, may have had an impact on children's awareness of health and eating habits^{235,236}, but were not assessed in this study. This should be considered in future studies.

7.3 Response rates (studies I & II)

The low response rate in the four WBQs in this study might reduce the validity of the statistical conclusions. However, the power calculation of sample size indicates that the data is at an

acceptable level. The response rate might have been improved by making prior arrangements with the participants and by addressing the respondents specifically in the invitation e-mail¹⁷⁶. Unfortunately this was not possible due to large sample sizes and geographical constraints. Only one meeting with a group of school teachers in the region of Copenhagen before the survey was made possible, which may have been a possible reason for the higher response rate among Danish cases compared to the other three countries. The process of approaching the German schools was particularly difficult due to restrictions on the provision of school information by the local authorities. As a result, the duration of the open access to the German WBQ was extended to four months in order to gain more responses.

The aspects of web survey design also affect non-response. In the case of a web survey, the communication between survey organization and respondents is mostly addressed in the form of an individual email and, therefore, the interaction is fairly limited^{168,169}. Moreover, web surveys require the target sample to have and to use an email account. It is challenging to verify that the collected email addresses actually reach the people selected for the target sample^{168,169}. In this research, as school e-mail addresses were mostly official rather than school staff's specific e-mail addresses, it was not known which participants actually received the WBQs, whether he or she was the correct recipient for the questionnaire, or whether the link was further distributed to another person^{168,169}. For the purpose of minimizing such bias, the study emphasized the invitation e-mail, and asked any members of school staff who received the e-mail incorrectly to pass the email on to the correct recipient^{168,169}.

The low response rate in this study implies a risk of a selected investigation group as SFCs are often busy, and it is possible that this study may have included a proportion of SFCs who might not sit in front of a computer regularly. The SFCs' computer and technical skills and their level of literacy may have also biased the data^{168,169}. In order to deal with such bias, the questionnaire was designed with the intention of avoiding the use of difficult words and terms. This was helped by the fact that the theme of the WBQ focused more on general aspects of the school food system, rather than specific issues^{168,169}. Other reasons for the high dropout rate of schools in this study could also be a lack of time and/or limited personnel power^{168,169}.

7.4 Validation of questionnaire

The development of the WBQs and sections related to organic food in the AFFQ were not based on earlier studies as, to our knowledge, the present study is one of the pioneer studies in the field. Thus, the measures used were based on pre-tests and expert consultations; hence the content validity was considered to be high. The SFCs and the pupils could have provided answers that either underestimated or overestimated their assessment of the policy implementation and food practices by the school food service. According to former studies, different methods lead to different results, and usually information collected from self-reports is likely to reflect more social desirability bias or to be more optimistic than in reality as objectively assessed by observations in classrooms and post-interview^{176,184,237,238}. This suggests that an overestimation

of school food implementation might have occurred in this study. However, such type of bias has been dealt with by applying multivariate statistical methods to control for confounding.

7.5 Sample size

Although it has been previously described in the above section that the observed power was enough to conduct the analyses, it is acknowledged that compared to the number of total responded SFCs in Germany, Finland and Italy, the number of Danish SFCs was not large (see Table 5). Therefore, the data collected from the SFCs in Denmark, Germany, Finland and Italy was merged in order to reduce the imperfections in sample size and in order to increase the validity of statistical results^{149,188}.

Factor analysis: Based on the current statistical theory, there is no estimation for sample size for conducting factor analysis¹⁵¹. Only a very limited number of studies have investigated the role of sample size in factor analysis and suggest that size be no smaller than 50^{151,193}. A few earlier studies, however, suggest that sample sizes of 30 or 25 could be adequate^{239,240}. These findings indicate that the recommendations for minimum sample size vary greatly between sources. Accordingly, the sample size in the present studies of SFCs and pupils should be sufficiently large for exploratory factor analysis and path analysis.

7.6 Statistic methods

One goal of the statistical analysis in this PhD research was to see whether variations in the measurement/independent variables (e.g. type of school) cause variations in the probability of the nominal/dependent variables (e.g. has a school food policy); the other goal was to predict the variation in the probability of the nominal/dependent variable, given the measurement/independent variable. With consideration of these goals, there were three main statistical methods that have been applied for the data analysis, multiple logistic regression, exploratory factor analysis and path analysis.

Firstly, multiple logistic regression as a very flexible statistical method was chosen by the study over regression analysis, e.g. multiple linear regression, due to the fact that the dependent variables were dichotomous and that multiple logistic regression does not require a linear relationship between the dependent and independent variables, namely linearity, normality, homoscedasticity (homogeneity of variance) and measurement level, and thereby can handle all sorts of relationships²⁴¹. In addition, the independent variables neither need to be metric (interval or ratio scaled) or need to be multivariate normal, so can also handle nominal and ordinal variables²⁴¹. If there is a drawback of multiple logistic regression, it would be the difficulty and lack of familiarity of the method when compared to the t-test. However, researchers would be able to express the results in a way that was easy to understand and it was therefore more preferable²⁴¹.

Secondly, the exploratory factor analysis was chosen to identify the number of underlying factors or, in other words, to perform data reduction¹⁵¹. In this research, with the help of exploratory factor analysis, we can determine what the factor structure looks like according to how SFCs and to the school children's responses. However, there are also some limitations of exploratory factor analysis. A larger dataset is desirable in order to have a stronger correlation between the factors¹⁵¹. Fortunately, we had rich data, although some SFCs and school children did not answer every question. In addition, the exploratory factor analysis shows correlations/relationships between factors but not causality¹⁵¹. The factors identified can be used as the basic for the SEM/path analysis, where causal inferences can be made.

Therefore, the path analysis was used as a special case of SEM in this research to infer causality that was based on the TPB model, and to allow interpretation of statistical associations^{239,242,243}. More importantly, graphical interfaces of the path analysis have the added advantage of visualization the hypothesized models^{239,242,243}. Nevertheless, the weakness of path analysis is associated with the uncertainties of hypothesized model, which normally entirely depends on the researchers because the statistical techniques cannot choose a model^{239,242,243}. With consideration of this uncertainty, we employed the TPB structures as the basis for deciding the sequences of variables in the model and to ensure the correct paths were analyzed.

8 Conclusions and future work

8.1 Conclusions

This PhD work

- Identifies a research gap in that the serving of organic food in school meals may have the potential to induce healthier eating among children.
- Provides new insights on filling the above gap by investigating both the school stakeholders and the school children.
- Confirms there was lack of significant evidence on how an organic school food policy might influence children's eating habits and improve the school food environment.
- Shows it is difficult to achieve such an aim as improving the eating habits of school children.
- Applied and tested a multinational comparative survey method.
- Contributes an innovative application in the area of the TPB model.
- Produces peer-review papers in the subject area.

Key conclusions from the evidence

- Schools with an organic food policy are more likely to adopt a FNP, to build a health promoting school, to promote physical activity and to supply a school canteen.
- SFCs' intentions had an influence on their actions in relation to encourage children to choose healthier food independently of whether the school had or not an organic food policy.
- Children in schools with an organic food policy had better expectations of school meals.
- School children had good knowledge and attitudes towards organic food and health, independently of whether the school had or not an organic food policy.
- School children's attitudes had an impact on their intention to consume organic food, independently of whether the school had or not an organic food policy.
- The organic concept could act as a landmark/characteristic for those engaged in healthier lifestyles.

Recommendations

- Policy makers, school stakeholders, practitioners and catering sectors should consider integrating school meals with organic foods, as means to promote school children's health awareness.
- Policy makers, school stakeholders, practitioners should work on developing a local school food policy integrating agendas on both healthy eating and organic food.

- Schools may benefit from the materials already produced by the organic activities in order to educate children in sustainable nutrition and healthy eating, as well as in providing good foodscape at school.
- Policy makers, school stakeholders, practitioners should consider issues (e.g. price, resources) in terms of school menus redesign when including organic food.

8.2 Fulfilment of research questions

- 1) Within the four countries, the Danish organic schools were more likely to adopt a FNP than the non-organic schools. The Italian organic schools were also more likely to adopt a FNP, as well as facilitate a canteen than the non-organic schools. All of these variables were significantly related to the type of school (organic vs. non-organic).

Out of all the four countries, the Finnish schools were most likely to adopt the FNP, build a WHO health promoting school, and have physical activity as a priority theme in curriculum activity. The Italian schools were most likely to have their own health promoting policy. The Danish schools were most likely to promote physical activity in breaks, to offer a school playground. The variables that having a FNP in schools, having a health promoting school policy according to WHO principles, promoting physical activity during breaks and having a school canteen were significantly related to the type of school.

- 2) Within the four countries, the Danish organic schools were more likely to recommend nutritionally balanced menus for children in the canteen than the non-organic schools. The variable was significantly related to the type of school.

Out of all the four countries, the Italian schools were most likely to integrate FNP issues into pedagogical activities and to recommend pupils to choose healthier foods. The Danish schools were most likely to provide nutritionally balanced meals. All of these variables were not significantly related to the type of school.

- 3) Among the four countries, the SFCs' intention towards healthy school meals positively influenced their actions towards encouraging pupils to eat healthier food. Moreover, for the SFCs in the non-organic schools, attitudes towards organic food and health had an effect on their intention towards healthy school meals.
- 4) In the four interview schools, most of the pupils had a fundamental knowledge and positive attitude and experience towards organic food and health.
- 5) The pupils in the two organic schools in Denmark were more likely to have better experiences and expectations with regards to their school meals than those in the non-organic schools. In both of these school categories, the pupils did not frequently purchase

school meals, and lunch boxes were still the main choice for children's lunch consumption.

- 6) The pupils in both school groups reported that they mostly did not consume unhealthy food items during school time. Interestingly, our interview findings indicate that in these four schools, the children's preferences were in some ways consistent with the dietary recommendations made by the Danish Veterinary and Food Administration. Therefore, the school food environment should reflect the majority of the pupils' desire to be provided with healthier school foods.
- 7) In the four Danish schools, the pupils' attitudes towards organic food and health positively influenced their intentions towards the consumption of organic food, but not their actions towards healthy food and drink practices.

8.3 Suggestions for future work

Further research is needed to identify and examine effective approaches to encourage healthy eating habits in children using schools as a setting. The findings of this study suggest a variety of research directions that need to be pursued to make such approaches feasible.

One such direction would be to investigate the children's food choices when organic food is provided over a period of time, whether the inclusion of organic foods in schools is likely to increase the amount of local and fresh food served compared to non-organic food provision, and how best to modify menus to contain healthier foods, whilst still retaining their popularity. In such research, this study of evidence could be utilized as a point of departure.

Although this research touched upon the possible influence of organic food on the school food environment and children's awareness of healthy eating habits, a more comprehensive and detailed study that focused solely on the potential of organic food for improving children's health awareness by school setting would be much more insightful. A study that systematically analyzed the progress of awareness to practice would help policymakers, school stakeholders and practitioners better understand and anticipate the specific implications of such strategies. For example, what teaching methods in relation to food, health and sustainable development, could be effective in improving school children's health and well-being.

The methods used in this study could be used for food service researchers to work with this resource to conduct similar studies. On the one hand, more qualitative data for school personnel should be collected, when more research is conducted in this subject, in order to make the assessment of the values more in-depth. The respondents of our surveys in four countries were mainly school teachers and were often busy with usual teaching tasks. Other school stakeholders should be considered for sampling, for instance the school secretary.

Further hypotheses, such as whether there is an association between sustainable nutrition education, sustainable development, food education and organic school meals, should be included in the research objective within the field of study. The reasons for users' (e.g. school children, parents, school teacher) acceptance or rejection of organic school food should be extended by including both ethical and socio-economical aspects of the target population and also external factors such as price, or competitive food brands.

9 References

1. Bevans KB, Sanchez B, Teneralli R, Forrest CB. Children's eating behavior: The importance of nutrition standards for foods in schools. *J Sch Health*. 2011;81(7):424-429.
2. Bucher Della Torre S, Akre C, Suris JC. Obesity prevention opinions of school stakeholders: A qualitative study. *J Sch Health*. 2010;80(5):233-239.
3. Fahlman MM, Dake JA, McCaughtry N, Martin J. A pilot study to examine the effects of a nutrition intervention on nutrition knowledge, behaviors, and efficacy expectations in middle school children. *J Sch Health*. 2008;78(4):216-222.
4. Katz DL, O'Connell M, Njike VY, Yeh MC, Nawaz H. Strategies for the prevention and control of obesity in the school setting: Systematic review and meta-analysis. *Int J Obes (Lond)*. 2008;32(12):1780-1789.
5. Katz DL. School-based interventions for health promotion and weight control: Not just waiting on the world to change. *Annu Rev Public Health*. 2009;30:253-272.
6. Shaya FT, Flores D, Gbarayor CM, Wang J. School-based obesity interventions: A literature review. *J Sch Health*. 2008;78(4):189-196.
7. Lazor K, Chapman N, Levine E. Soy goes to school: Acceptance of healthful, vegetarian options in maryland middle school lunches. *J Sch Health*. 2010;80(4):200-206.
8. Vecchiarelli S, Takayanagi S, Neumann C. Students' perceptions of the impact of nutrition policies on dietary behaviors. *J Sch Health*. 2006;76(10):525-31; quiz 540-2.
9. Wharton CM, Long M, Schwartz MB. Changing nutrition standards in schools: The emerging impact on school revenue. *J Sch Health*. 2008;78(5):245-251.
10. Herzig M, Dossegger A, Mader U, et al. Differences in weight status and energy-balance related behaviors among schoolchildren in german-speaking switzerland compared to seven countries in europe. *Int J Behav Nutr Phys Act*. 2012;9(1):139.
11. Suggs LS, McIntyre C. European union public opinion on policy measures to address childhood overweight and obesity. *J Public Health Policy*. 2011;32(1):91-103; discussion 104-6.
12. Wijnhoven TM, van Raaij JM, Spinelli A, et al. WHO european childhood obesity surveillance initiative 2008: Weight, height and body mass index in 6-9-year-old children. *Pediatr Obes*. 2012.
13. da Cunha E, de Sousa AA, Machado NM. Organic food and educational actions in schools: Diagnosis for health and nutrition education. *Cien Saude Colet*. 2010;15(1):39-49.
14. Jones M, Dailami N, Weitkamp E, et al. Food sustainability education as a route to healthier eating: Evaluation of a multi-component school programme in english primary schools. *Health Educ Res*. 2012;27(3):448-458.
15. Nölting B. Providing organic school food for youths in europe – policy strategies, certification and supply chain management in denmark, finland, italy and norway. *CORE Organic Project Series Report*. 2009:18-23.

16. Bevans KB, Sanchez B, Teneralli R, Forrest CB. Children's eating behavior: The importance of nutrition standards for foods in schools. *J Sch Health*. 2011;81(7):424-429.
17. Clark MA, Fox MK. Nutritional quality of the diets of US public school children and the role of the school meal programs. *J Am Diet Assoc*. 2009;109(2 Suppl):S44-56.
18. Lear JG. Health at school: A hidden health care system emerges from the shadows. *Health Aff (Millwood)*. 2007;26(2):409-419.
19. Weinreb L, Wehler C, Perloff J, et al. Hunger: Its impact on children's health and mental health. *Pediatrics*. 2002;110(4):e41.
20. Silberberg M, Cantor JC. Making the case for school-based health: Where do we stand? *J Health Polit Policy Law*. 2008;33(1):3-37.
21. Gance-Cleveland B, Costin DK, Degenstein JA. School-based health centers. statewide quality improvement program. *J Nurs Care Qual*. 2003;18(4):288-294.
22. Khan S, Pinckney RG, Keeney D, Frankowski B, Carney JK. Prevalence of food insecurity and utilization of food assistance program: An exploratory survey of a vermont middle school. *J Sch Health*. 2011;81(1):15-20.
23. Cullen KW, Hartstein J, Reynolds KD, et al. Improving the school food environment: Results from a pilot study in middle schools. *J Am Diet Assoc*. 2007;107(3):484-489.
24. Anderson AS, Porteous LE, Foster E, et al. The impact of a school-based nutrition education intervention on dietary intake and cognitive and attitudinal variables relating to fruits and vegetables. *Public Health Nutr*. 2005;8(6):650-656.
25. Prelip M, Slusser W, Thai CL, Kinsler J, Erausquin JT. Effects of a school-based nutrition program diffused throughout a large urban community on attitudes, beliefs, and behaviors related to fruit and vegetable consumption. *J Sch Health*. 2011;81(9):520-529.
26. De Keyzer W, Van Caneghem S, Heath AL, et al. Nutritional quality and acceptability of a weekly vegetarian lunch in primary-school canteens in ghent, belgium: 'Thursday veggie day'. *Public Health Nutr*. 2012:1-5.
27. Drummond C, Sheppard L. Examining primary and secondary school canteens and their place within the school system: A south australian study. *Health Educ Res*. 2011;26(4):739-749.
28. Mensink F, Schwinghammer SA, Smeets A. The healthy school canteen programme: A promising intervention to make the school food environment healthier. *J Environ Public Health*. 2012;2012:415746.
29. Zulueta B, Xarles Irastorza I, Oliver P, Garcia Z, Vitoria JC. Nutritional profile of foods offered and dietary intake in school canteens in biscay. *Nutr Hosp*. 2011;26(5):1183-1187.
30. Andrepont E, Cullen KW, Taylor WC. The use of point-of-sale machines in school cafeterias as a method of parental influence over child lunch food choices. *J Sch Health*. 2011;81(5):239-243.

31. Cullen KW, Hartstein J, Reynolds KD, et al. Improving the school food environment: Results from a pilot study in middle schools. *J Am Diet Assoc.* 2007;107(3):484-489.
32. Cullen KW, Watson K, Zakeri I. Improvements in middle school student dietary intake after implementation of the texas public school nutrition policy. *Am J Public Health.* 2008;98(1):111-117.
33. Cullen KW, Watson KB, Fithian AR. The impact of school socioeconomic status on student lunch consumption after implementation of the texas public school nutrition policy. *J Sch Health.* 2009;79(11):525-31; quiz 561-3.
34. Story M. The third school nutrition dietary assessment study: Findings and policy implications for improving the health of US children. *J Am Diet Assoc.* 2009;109(2 Suppl):S7-13.
35. Story M, Kaphingst KM, French S. The role of schools in obesity prevention. *Future Child.* 2006;16(1):109-142.
36. Cooke L. The importance of exposure for healthy eating in childhood: A review. *J Hum Nutr Diet.* 2007;20(4):294-301.
37. Neumark-Sztainer D, French SA, Hannan PJ, Story M, Fulkerson JA. School lunch and snacking patterns among high school students: Associations with school food environment and policies. *Int J Behav Nutr Phys Act.* 2005;2(1):14.
38. de Onis M, Blossner M, Borghi E. Global prevalence and trends of overweight and obesity among preschool children. *Am J Clin Nutr.* 2010;92(5):1257-1264.
39. Global childhood obesity update. *Child Obes.* 2012;8(6):591-594.
40. Matson KL, Fallon RM. Treatment of obesity in children and adolescents. *J Pediatr Pharmacol Ther.* 2012;17(1):45-57.
41. Jennings A, Cassidy A, van Sluijs EM, Griffin SJ, Welch AA. Associations between eating frequency, adiposity, diet, and activity in 9-10 year old healthy-weight and centrally obese children. *Obesity (Silver Spring).* 2012;20(7):1462-1468.
42. Hendy HM, Williams KE, Camise TS. "Kids choice" school lunch program increases children's fruit and vegetable acceptance. *Appetite.* 2005;45(3):250-263.
43. Klepp KI, Perez-Rodrigo C, De Bourdeaudhuij I, et al. Promoting fruit and vegetable consumption among european schoolchildren: Rationale, conceptualization and design of the pro children project. *Ann Nutr Metab.* 2005;49(4):212-220.
44. Black MM, Creed-Kanashiro HM. How to feed children? healthy eating behaviors starting at childhood. *Rev Peru Med Exp Salud Publica.* 2012;29(3):373-378.
45. Cribb V, Emmett P, Northstone K. Dietary patterns throughout childhood and associations with nutrient intakes. *Public Health Nutr.* 2012:1-9.
46. Demas A, Kindermann D, Pimentel D. School meals: A nutritional and environmental perspective. *Perspect Biol Med.* 2010;53(2):249-256.

47. Gougeon LA, Henry CJ, Ramdath D, Whiting SJ. Dietary analysis of randomly selected meals from the child hunger and education program school nutrition program in saskatchewan, canada, suggests that nutrient target levels are being provided. *Nutr Res.* 2011;31(3):215-222.
48. Pitt Barnes S, Robin L, O'Toole TP, Dawkins N, Kettel Khan L, Leviton LC. Results of evaluability assessments of local wellness policies in 6 US school districts. *J Sch Health.* 2011;81(8):502-511.
49. Cullen KW, Watson KB. The impact of the texas public school nutrition policy on student food selection and sales in texas. *Am J Public Health.* 2009;99(4):706-712.
50. Powers AR, Struempfer BJ, Guarino A, Parmer SM. Effects of a nutrition education program on the dietary behavior and nutrition knowledge of second-grade and third-grade students. *J Sch Health.* 2005;75(4):129-133.
51. Wall DE, Least C, Gromis J, Lohse B. Nutrition education intervention improves vegetable-related attitude, self-efficacy, preference, and knowledge of fourth-grade students. *J Sch Health.* 2012;82(1):37-43.
52. Manios Y, Kafatos A, Preventive Medicine and Nutrition Clinic University of Crete Research Team. Health and nutrition education in primary schools in crete: 10 years follow-up of serum lipids, physical activity and macronutrient intake. *Br J Nutr.* 2006;95(3):568-575.
53. Martens MK, Van Assema P, Paulussen TG, Van Breukelen G, Brug J. Krachtvoer: Effect evaluation of a dutch healthful diet promotion curriculum for lower vocational schools. *Public Health Nutr.* 2008;11(3):271-278.
54. Jordan KC, Erickson ED, Cox R, et al. Evaluation of the gold medal schools program. *J Am Diet Assoc.* 2008;108(11):1916-1920.
55. Kafatos A, Manios Y, Moschandreas J, Preventive Medicine & Nutrition Clinic University of Crete Research Team. Health and nutrition education in primary schools of crete: Follow-up changes in body mass index and overweight status. *Eur J Clin Nutr.* 2005;59(9):1090-1092.
56. James J, Thomas P, Kerr D. Preventing childhood obesity: Two year follow-up results from the christchurch obesity prevention programme in schools (CHOPPS). *BMJ.* 2007;335(7623):762.
57. Gorely T, Nevill ME, Morris JG, Stensel DJ, Nevill A. Effect of a school-based intervention to promote healthy lifestyles in 7-11 year old children. *Int J Behav Nutr Phys Act.* 2009;6:5.
58. Muth ND, Chatterjee A, Williams D, Cross A, Flower K. Making an IMPACT: Effect of a school-based pilot intervention. *N C Med J.* 2008;69(6):432-440.
59. Mirtcheva DM, Powell LM. Participation in the national school lunch program: Importance of school-level and neighborhood contextual factors. *J Sch Health.* 2009;79(10):485-494.
60. Perlman SE, Nonas C, Lindstrom LL, Choe-Castillo J, McKie H, Alberti PM. A menu for health: Changes to new york city school food, 2001 to 2011. *J Sch Health.* 2012;82(10):484-491.

61. Wojcicki JM, Heyman MB. Healthier choices and increased participation in a middle school lunch program: Effects of nutrition policy changes in san francisco. *Am J Public Health*. 2006;96(9):1542-1547.
62. Tremblay MS, LeBlanc AG, Kho ME, et al. Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *Int J Behav Nutr Phys Act*. 2011;8:98.
63. Lytle LA, Kubik MY, Perry C, Story M, Birnbaum AS, Murray DM. Influencing healthful food choices in school and home environments: Results from the TEENS study. *Prev Med*. 2006;43(1):8-13.
64. Caglar E, Bilgili N, Karaca A, Ayaz S, Asci FH. The psychological characteristics and health related behavior of adolescents: The possible of social physique anxiety and gender. *Span J Psychol*. 2010;13(2):741-750.
65. Mack DE, Strong HA, Kowalski KC, Crocker PR. Self-presentational motives in eating disordered behavior: A known groups difference approach. *Eat Behav*. 2007;8(1):98-105.
66. Martin KA, Leary MR, O'Brien J. Role of self-presentation in the health practices of a sample of irish adolescents. *J Adolesc Health*. 2001;28(4):259-262.
67. Richardson JG, Trafimow D, Madson L. Future health-related behavioral intention formation: The role of affect and cognition. *J Soc Psychol*. 2012;152(6):775-779.
68. Danielzik S, Pust S, Muller MJ. School-based interventions to prevent overweight and obesity in prepubertal children: Process and 4-years outcome evaluation of the kiel obesity prevention study (KOPS). *Acta Paediatr Suppl*. 2007;96(454):19-25.
69. Oellingrath IM, Hersleth M, Svendsen MV. Association between parental motives for food choice and eating patterns of 12- to 13-year-old norwegian children. *Public Health Nutr*. 2012;1-9.
70. Wu XY, Ohinmaa A, Veugelers PJ. Diet quality, physical activity, body weight and health-related quality of life among grade 5 students in canada. *Public Health Nutr*. 2011;1-7.
71. Kakarala M, Keast DR, Hoerr S. Schoolchildren's consumption of competitive foods and beverages, excluding a la carte. *J Sch Health*. 2010;80(9):429-35; quiz 461-3.
72. Wouters EJ, Larsen JK, Kremers SP, Dagnelie PC, Geenen R. Peer influence on snacking behavior in adolescence. *Appetite*. 2010;55(1):11-17.
73. Fisman AS, Samdal O, Torsheim T. Family affluence and cultural capital as indicators of social inequalities in adolescent's eating behaviours: A population-based survey. *BMC Public Health*. 2012;12(1):1036.
74. Hamilton HA, Marshall L, Rummens JA, Fenta H, Simich L. Immigrant parents' perceptions of school environment and children's mental health and behavior. *J Sch Health*. 2011;81(6):313-319.
75. Murray R. Response to "parents' perceptions of curricular issues affecting children's weight in elementary schools". *J Sch Health*. 2007;77(5):223; author reply 223.

76. Power TG, Bindler RC, Goetz S, Daratha KB. Obesity prevention in early adolescence: Student, parent, and teacher views. *J Sch Health*. 2010;80(1):13-19.
77. O'Toole TP, Anderson S, Miller C, Guthrie J. Nutrition services and foods and beverages available at school: Results from the school health policies and programs study 2006. *J Sch Health*. 2007;77(8):500-521.
78. Danyliw AD, Vatanparast H, Nikpartow N, Whiting SJ. Beverage patterns among canadian children and relationship to overweight and obesity. *Appl Physiol Nutr Metab*. 2012.
79. Pabayo R, Spence JC, Cutumisu N, Casey L, Storey K. Sociodemographic, behavioural and environmental correlates of sweetened beverage consumption among pre-school children. *Public Health Nutr*. 2012:1-9.
80. Foster GD, Sherman S, Borradaile KE, et al. A policy-based school intervention to prevent overweight and obesity. *Pediatrics*. 2008;121(4):e794-802.
81. Devi A, Surender R, Rayner M. Improving the food environment in UK schools: Policy opportunities and challenges. *J Public Health Policy*. 2010;31(2):212-226.
82. ReportLinker. World organic food industry brief. ReportLinker Web site. <http://www.reportlinker.com/d012711620/World-Organic-Food-Industry-Brief.html>. Published December 20112012.
83. Forman J, Silverstein J, COMMITTEE ON NUTRITION, COUNCIL ON ENVIRONMENTAL HEALTH. Organic foods: Health and environmental advantages and disadvantages. *Pediatrics*. 2012;130(5):e1406-15.
84. FiBL. Organic agriculture worldwide: Market growing, agricultural land remains steady. <http://www.fibl.org/en/media/media-archive/media-release/article/organic-agriculture-worldwide-market-growing-agricultural-land-remains-steady.html>. Updated 2012. Accessed November 27, 2012.
85. Arvola A, Vassallo M, Dean M, et al. Predicting intentions to purchase organic food: The role of affective and moral attitudes in the theory of planned behaviour. *Appetite*. 2008;50(2-3):443-454.
86. Zagata L. Consumers' beliefs and behavioural intentions towards organic food. evidence from the czech republic. *Appetite*. 2012;59(1):81-89.
87. van de Vijver LP, van Vliet ME. Health effects of an organic diet-consumer experiences in the netherlands. *J Sci Food Agric*. 2012.
88. Tobler C, Visschers VH, Siegrist M. Eating green. consumers' willingness to adopt ecological food consumption behaviors. *Appetite*. 2011;57(3):674-682.
89. Dangour AD, Dodhia SK, Hayter A, Allen E, Lock K, Uauy R. Nutritional quality of organic foods: A systematic review. *Am J Clin Nutr*. 2009;90(3):680-685.
90. Huber M, Bakker MH, Dijk W, Prins HA, Wiegant FA. The challenge of evaluating health effects of organic food; operationalisation of a dynamic concept of health. *J Sci Food Agric*. 2012.

91. Morgan K, Sonnino R. Empowering consumers: The creative procurement of school meals in Italy and the UK. *International Journal of Consumer Studies*. 2007;31:19-25.
92. Morgan K, Sonnino R. Procurement matters: Reclaiming the public plate. In: *The school food revolution: Public food and the challenge of sustainable development*. London: Earthscan; 2008:21-42.
93. Hjelmar U. Consumers' purchase of organic food products. A matter of convenience and reflexive practices. *Appetite*. 2011;56(2):336-344.
94. Kearney J. Food consumption trends and drivers. *Philos Trans R Soc Lond B Biol Sci*. 2010;365(1554):2793-2807.
95. Jones M, Dailami N, Weitkamp E, et al. Food sustainability education as a route to healthier eating: Evaluation of a multi-component school programme in English primary schools. *Health Educ Res*. 2012;27(3):448-458.
96. Mikkola M. Role of public catering and use of organic food in educational contexts: Creating centres for sustainable food systems. *Bioforsk Report*. 2010;104:5-22.
97. Friedman WJ. The framework for global organic food trade circa 2005: Accomplishments and challenges. *Food Drug Law J*. 2005;60(3):361-373.
98. Oates L, Cohen M, Braun L. Characteristics and consumption patterns of Australian organic consumers. *J Sci Food Agric*. 2012.
99. Morgan K, Sonnino R. A sustainable world city? School food reform in London. In: *The school food revolution: Public food and the challenge of sustainable development*. London: Earthscan; 2008:89-112.
100. Nielsen T, Nölting B, Kristensen NH, Løes AK. A comparative study of the implementation of organic food in school meal systems in four European countries. *Bioforsk Report*. 2009;145(4).
101. Spigarolo R, Sarti MV, Bocchi S, Giorgi G. Main constraints in developing public organic procurement. *CORE Organic Project Series Report*. 2010:4-11.
102. Morgan K, Sonnino R. School food as social justice: The quality revolution in Rome. In: *The school food revolution: Public food and the challenge of sustainable development*. London: Earthscan; 2008:65-88.
103. Løes AK, Nölting B. Organic school meal systems – towards a more sustainable nutrition. *Agronomy Research*. 2009;7(2):647-653.
104. Bårdsen MG, Løes AK. Organic food in schools and kindergartens in Trondheim. A case study report. *Bioforsk Report*. 2010;18:21-28.
105. Spigarolo R, Donegani G, Giorgi G, Sarti MV. Differences between real and perceived quality among users of school catering – survey on 40 Italian schools. *CORE Organic Project Series Report*. 2010:4-9.

106. Nölting B, Løes AK, Strassner C. Constellations of public organic food procurement for youth-an interdisciplinary analytical tool. *Bioforsk Report*. 2009;7:9-12.
107. CORE Organic iPOPY. iPOPY: More organic food for young people. CORE organic Web site. https://djfextranet.agrsci.dk/sites/coreorganic_ipopy/public/Pages/front.aspx. Accessed 07/01, 2012.
108. Mikkola M. Organic and conventional public food procurement for youth in finland. *Bioforsk Report*. 2008;41:13-17.
109. Spigarolo R, Sarti MV, Giorgi G. Organic and conventional public food procurement for youth in italy. *Bioforsk Report*. 2010;109:6-18.
110. Benn J. Mad på skolens spiseseddel. *Dansk Pædagogisk Tidsskrift*. 2002;1:44-51.
111. Hansen SR, Schmidt HW, Nielsen T, Kristensen NH. Organic and conventional public food procurement for youth in denmark. *Bioforsk Report*. 2008;40:12-22.
112. Strassner C, Løse A, Nölting B, Kristensen NH. Organic food for youth in public settings: Potentials and challenges. preliminary recommendations from a european study. *CORE Organic Project Series Report*. 2010:9-10.
113. Strassner C, Noelting B, Reimann S. School food provision in germany. A first analysis of the role of organic produce. *CORE Organic Project Series Report*. 2009:66-68.
114. Golley R, Pearce J, Nelson M. Children's lunchtime food choices following the introduction of food-based standards for school meals: Observations from six primary schools in sheffield. *Public Health Nutr*. 2011;14(2):271-278.
115. Sarlio Lähteenkorva S, Manninen M. School meals and nutrition education in finlandnb. *Nutrition Bulletin*. 2010;35:172-174.
116. Taylor RW, McAuley KA, Barbezat W, Strong A, Williams SM, Mann JI. APPLE project: 2-y findings of a community-based obesity prevention program in primary school age children. *Am J Clin Nutr*. 2007;86(3):735-742.
117. Buse K, Mays N, Walt G. The health policy framework: Context, process and actors. In: *Making health policy*. Open University Press; 2005:4-18.
118. Buse K, Mays N, Walt G. Research, evaluation and policy. In: *Making health policy*. Open University Press; 2005:157-174.
119. Buse K, Mays N, Walt G. Government and the policy process. In: *Making health policy*. Open University Press; 2005:80-98.
120. Buse K, Mays N, Walt G. Policy implementation. In: *Naking health policy*. Open University Press; 2005:120-136.
121. Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 1991;50:179-211.
122. Bandura A. *Social foundations of thought and action; A social cognitive
theory*. Prentice Hall: Englewood Clifffa, N.J.; 1986.

123. Becker M. Health education monographs 2. In: ; 1974:324-508.
124. Prochaska J, Johnson S, Lee P, eds. *The transtheoretical model of behavior change*. in S. schumaker, E. schron, J. ockene & W. McBee (eds.), *the handbook of health behavior change*. 2nd ed. New York: Springer; 1998.
125. Baumeister R, Vohs K. *Handbook of self-regulation: Research, theory, and applications*. New York: NY: Guilford Press; 2004.
126. Silva MN, Markland D, Minderico CS, et al. A randomized controlled trial to evaluate self-determination theory for exercise adherence and weight control: Rationale and intervention description. *BMC Public Health*. 2008;8:234.
127. Brug J, van Lenthe FJ, Kremers SP. Revisiting kurt lewin: How to gain insight into environmental correlates of obesogenic behaviors. *Am J Prev Med*. 2006;31(6):525-529.
128. Giskes K, Kamphuis CB, van Lenthe FJ, Kremers S, Droomers M, Brug J. A systematic review of associations between environmental factors, energy and fat intakes among adults: Is there evidence for environments that encourage obesogenic dietary intakes? *Public Health Nutr*. 2007;10(10):1005-1017.
129. Glass TA, McAtee MJ. Behavioral science at the crossroads in public health: Extending horizons, envisioning the future. *Soc Sci Med*. 2006;62(7):1650-1671.
130. Kamphuis CB, Giskes K, de Bruijn GJ, Wendel-Vos W, Brug J, van Lenthe FJ. Environmental determinants of fruit and vegetable consumption among adults: A systematic review. *Br J Nutr*. 2006;96(4):620-635.
131. Flynn MA, McNeil DA, Maloff B, et al. Reducing obesity and related chronic disease risk in children and youth: A synthesis of evidence with 'best practice' recommendations. *Obes Rev*. 2006;7 Suppl 1:7-66.
132. Kirk SF, Penney TL, McHugh TL. Characterizing the obesogenic environment: The state of the evidence with directions for future research. *Obes Rev*. 2010;11(2):109-117.
133. Giskes K, Avendano M, Brug J, Kunst AE. A systematic review of studies on socioeconomic inequalities in dietary intakes associated with weight gain and overweight/obesity conducted among european adults. *Obes Rev*. 2010;11(6):413-429.
134. Brownson RC, Hoehner CM, Day K, Forsyth A, Sallis JF. Measuring the built environment for physical activity: State of the science. *Am J Prev Med*. 2009;36(4 Suppl):S99-123.e12.
135. Chow CK, Lock K, Teo K, Subramanian SV, McKee M, Yusuf S. Environmental and societal influences acting on cardiovascular risk factors and disease at a population level: A review. *Int J Epidemiol*. 2009;38(6):1580-1594.
136. Taylor JP, Evers S, McKenna M. Determinants of healthy eating in children and youth. *Can J Public Health*. 2005;96 Suppl 3:S20-6, S22-9.
137. Jodkowska M, Oblacinska A, Tabak I, Radiukiewicz K. Differences in dietary patterns between overweight and normal-weight adolescents. *Med Wieku Rozwoj*. 2011;15(3):266-273.

138. Ajzen I, Fishbein M. *Understanding attitudes and predicting social behaviour*. Englewood-Cliffs, NJ: Prentice Hall; 1980.
139. Freberg K. Using the theory of planned behavior to predict intention to comply with a food recall message. *Health Commun*. 2012.
140. Galef BG. A case study in behavioral analysis, synthesis and attention to detail: Social learning of food preferences. *Behav Brain Res*. 2012;231(2):266-271.
141. Jiang F, Lu S, Hou Y, Yue X. Dialectical thinking and health behaviors: The effects of theory of planned behavior. *Int J Psychol*. 2012.
142. Croker H, Whitaker KL, Cooke L, Wardle J. Do social norms affect intended food choice? *Prev Med*. 2009;49(2-3):190-193.
143. Ehrenberg A, Juckes S, White KM, Walsh SP. Personality and self-esteem as predictors of young people's technology use. *Cyberpsychol Behav*. 2008;11(6):739-741.
144. Fila SA, Smith C. Applying the theory of planned behavior to healthy eating behaviors in urban native american youth. *Int J Behav Nutr Phys Act*. 2006;3:11.
145. Grunert KG. Future trends and consumer lifestyles with regard to meat consumption. *Meat Sci*. 2006;74(1):149-160.
146. Pelling EL, White KM. The theory of planned behavior applied to young people's use of social networking web sites. *Cyberpsychol Behav*. 2009;12(6):755-759.
147. Wong CL, Mullan BA. Predicting breakfast consumption: An application of the theory of planned behaviour and the investigation of past behaviour and executive function. *Br J Health Psychol*. 2009;14(Pt 3):489-504.
148. Nie C, Zepeda L. Lifestyle segmentation of US food shoppers to examine organic and local food consumption. *Appetite*. 2011;57(1):28-37.
149. Willett W. *Nutritional epidemiology*. New York, NY: Oxford University Press,; 1998.
150. Reise SP, Waller NG, Comrey AL. Factor analysis and scale revision. *Psychol Assess*. 2000;12(3):287-297.
151. Thompson B. *Exploratory and confirmatory factor analysis: Understanding concepts and applications*. Washington, DC, US: American Psychological Association.; 2004.
152. Dunn KI, Mohr P, Wilson CJ, Wittert GA. Determinants of fast-food consumption. an application of the theory of planned behaviour. *Appetite*. 2011;57(2):349-357.
153. Tsorbatzoudis H. Evaluation of a planned behavior theory-based intervention programme to promote healthy eating. *Percept Mot Skills*. 2005;101(2):587-604.
154. Moxley RL, Jicha KA, Thompson GH. Testing the importance of family solidarity, community structure, information access, and social capital in predicting nutrition health knowledge and food choices in the philippines. *Ecol Food Nutr*. 2011;50(3):215-239.

155. Munro S, Lewin S, Swart T, Volmink J. A review of health behaviour theories: How useful are these for developing interventions to promote long-term medication adherence for TB and HIV/AIDS? *BMC Public Health*. 2007;7:104.
156. Pieniak Z, Perez-Cueto F, Verbeke W. Association of overweight and obesity with interest in healthy eating, subjective health and perceived risk of chronic diseases in three european countries. *Appetite*. 2009;53(3):399-406.
157. Pieniak Z, Verbeke W, Perez-Cueto F, Brunso K, De Henauw S. Fish consumption and its motives in households with versus without self-reported medical history of CVD: A consumer survey from five european countries. *BMC Public Health*. 2008;8:306.
158. Holsten JE, Deatrick JA, Kumanyika S, Pinto-Martin J, Compher CW. Children's food choice process in the home environment. A qualitative descriptive study. *Appetite*. 2012;58(1):64-73.
159. McAlister A, Perry C, Parcel G. How individuals, environments, and health behaviors interact: Social cognitive theory. In: *Health behavior and health education: Theory, research, and practice*. 4th ed. San Francisco, CA: John Wiley & Sons, Inc; 2008:169-188.
160. Moore S, Murphy S, Tapper K, Moore L. From policy to plate: Barriers to implementing healthy eating policies in primary schools in wales. *Health Policy*. 2010;94(3):239-245.
161. Franchi M. Food choice: Beyond the chemical content. *Int J Food Sci Nutr*. 2012;63 Suppl 1:17-28.
162. Granner ML, Evans AE. Measurement properties of psychosocial and environmental measures associated with fruit and vegetable intake among middle school adolescents. *J Nutr Educ Behav*. 2012;44(1):2-11.
163. Whittingham JR, Ruiter RA, Castermans D, Huiberts A, Kok G. Designing effective health education materials: Experimental pre-testing of a theory-based brochure to increase knowledge. *Health Educ Res*. 2008;23(3):414-426.
164. Tirado Gonzalez S, Neipp Lopez MC, Quiles Marcos Y, Rodriguez-Marin J. Development and validation of the theory of planned behavior questionnaire in physical activity. *Span J Psychol*. 2012;15(2):801-816.
165. Thompson FE, Midthune D, Subar AF, Kipnis V, Kahle LL, Schatzkin A. Development and evaluation of a short instrument to estimate usual dietary intake of percentage energy from fat. *J Am Diet Assoc*. 2007;107(5):760-767.
166. Swanson M, Schoenberg NE, Davis R, Wright S, Dollarhide K. Perceptions of healthful eating and influences on the food choices of appalachian youth. *J Nutr Educ Behav*. 2012.
167. Hammer D. Professional attitudes and behaviors: The “A’s and b’s” of professionalism. *AM J Pharm Educ*. 2009;64:455-464.
168. de Leeuw ED, Hox JJ, Dillman DA. *International handbook of survey methodology*. New York, USA: Psychology Press; 2008.

169. Bradburn N, Sudman S, Wansink B. *Asking questions*. Second ed. San francisco, CA 94103-1741: Jossey-Bass; 2004.
170. Matthys C, Pynaert I, De Keyzer W, De Henauw S. Validity and reproducibility of an adolescent web-based food frequency questionnaire. *J Am Diet Assoc*. 2007;107(4):605-610.
171. Murtagh S, Rowe DA, Elliott MA, McMinn D, Nelson NM. Predicting active school travel: The role of planned behavior and habit strength. *Int J Behav Nutr Phys Act*. 2012;9(1):65.
172. Norman RM, Sorrentino RM, Windell D, Ye Y, Szeto AC, Manchanda R. Predicting behavioural intentions to those with mental illness: The role of attitude specificity and norms. *Int J Soc Psychiatry*. 2010;56(3):239-254.
173. Cullen KW, Watson K, Zakeri I. Relative reliability and validity of the block kids questionnaire among youth aged 10 to 17 years. *J Am Diet Assoc*. 2008;108(5):862-866.
174. Sobal J, Bisogni CA. Constructing food choice decisions. *Ann Behav Med*. 2009;38 Suppl 1:S37-46.
175. Rivis A, Sheeran P, Armitage CJ. Intention versus identification as determinants of adolescents' health behaviours: Evidence and correlates. *Psychol Health*. 2011;26(9):1128-1142.
176. Fowler F,J. *Survey research methods*. CA: Sage Publications: Thousand Oaks; 20002.
177. Johnson TP, Wislar JS. Response rates and nonresponse errors in surveys. *JAMA*. 2012;307(17):1805-1806.
178. Perez-Rodrigo C, Wind M, Hildonen C, et al. The pro children intervention: Applying the intervention mapping protocol to develop a school-based fruit and vegetable promotion programme. *Ann Nutr Metab*. 2005;49(4):267-277.
179. Panunzio MF, Antoniciello A, Ugolini G, Dalton S. Bring fruit at school: Promotion of healthy food habit in primary school-children. *Ann Ig*. 2009;21(4):403-407.
180. Olsen J. Better health for mother and child. A nation-wide study of pregnant women and newborn infants. *Ugeskr Laeger*. 1997;159(22):3419.
181. Olsen J. The national birth cohort--better health for mother and child. *Ugeskr Laeger*. 2003;165(46):4401-4404.
182. Ambrosini GL, de Klerk NH, O'Sullivan TA, Beilin LJ, Oddy WH. The reliability of a food frequency questionnaire for use among adolescents. *Eur J Clin Nutr*. 2009;63(10):1251-1259.
183. Araujo MC, Ferreira DM, Pereira RA. Reliability of a semi-quantitative food frequency questionnaire designed for adolescents from the rio de janeiro metropolitan area, brazil. *Cad Saude Publica*. 2008;24(12):2775-2786.
184. Vereecken C, De Henauw S, Maes L, et al. Reliability and validity of a healthy diet determinants questionnaire for adolescents. *Public Health Nutr*. 2009;12(10):1830-1838.
185. Henn RL, Fuchs SC, Moreira LB, Fuchs FD. Development and validation of a food frequency questionnaire (FFQ-porto alegre) for adolescent, adult and elderly populations from southern brazil. *Cad Saude Publica*. 2010;26(11):2068-2079.

186. Nachmais CF, Nachmais D. *Research methods in the social Sciences*. 7th ed. New York: NY: Worth Publishers; 2008.
187. Wilkins KL, Woodgate RL. A review of qualitative research on the childhood cancer experience from the perspective of siblings: A need to give them a voice. *J Pediatr Oncol Nurs*. 2005;22(6):305-319.
188. Gibney M,J, Margetts B,M, Kearney J,M, Arab L, eds. *Public health nutrition*. Ames, IA: Blackwell Science; 2004The nutrition society textbook series.
189. Hair, J.F. Jr. , Anderson, R.E., Tatham, R.L., Black, W.C. *Multivariate data analysis*. 5th ed. NJ: Prentice Hall: Upper Saddle River; 1998.
190. Hosmer DW, Lemeshow S. *Applied logistic regression*. New York: John Wiley & Sons, Inc; 1989.
191. Spiliotopoulou G. Reliability reconsidered: Cronbach's alpha and paediatric assessment in occupational therapy. *Aust Occup Ther J*. 2009;56(3):150-155.
192. Cuesta-Vargas AI, Solera-Martinez M, Ortega FB, Martinez-Vizcaino V. A confirmatory factor analysis of the fitness of adults with intellectual disabilities. *Disabil Rehabil*. 2012.
193. Sparks MA, Radnitz CL. Confirmatory factor analysis of the children's eating behaviour questionnaire in a low-income sample. *Eat Behav*. 2012;13(3):267-270.
194. Krueger R,A. *Focus groups: A practical guide for applied research*. Second ed. Thousand Oaks, CA: Sage; 1994.
195. Dehghan M, Akhtar-Danesh N, Merchant AT. Childhood obesity, prevalence and prevention. *Nutr J*. 2005;4:24.
196. Davis EM, Cullen KW, Watson KB, Konarik M, Radcliffe J. A fresh fruit and vegetable program improves high school students' consumption of fresh produce. *J Am Diet Assoc*. 2009;109(7):1227-1231.
197. Ashfield-Watt PA, Stewart EA, Scheffer JA. A pilot study of the effect of providing daily free fruit to primary-school children in auckland, new zealand. *Public Health Nutr*. 2009;12(5):693-701.
198. Bere E, Klepp KI. Changes in accessibility and preferences predict children's future fruit and vegetable intake. *Int J Behav Nutr Phys Act*. 2005;2:15.
199. Harrison F, Jennings A, Jones A, et al. Food and drink consumption at school lunchtime: The impact of lunch type and contribution to overall intake in british 9-10-year-old children. *Public Health Nutr*. 2011:1-8.
200. Hirschman J, Chiqui JF. School food and nutrition policy, monitoring and evaluation in the USA. *Public Health Nutr*. 2012:1-7.
201. Hoppu U, Lehtisalo J, Tapanainen H, Pietinen P. Dietary habits and nutrient intake of finnish adolescents. *Public Health Nutr*. 2010;13(6A):965-972.

202. Prynne CJ, Handford C, Dunn V, Bamber D, Goodyer IM, Stephen AM. The quality of midday meals eaten at school by adolescents; school lunches compared with packed lunches and their contribution to total energy and nutrient intakes. *Public Health Nutr.* 2011;1-8.
203. Davee AM, Blum JE, Devore RL, et al. The vending and a la carte policy intervention in maine public high schools. *Prev Chronic Dis.* 2005;2 Spec no:A14.
204. Ministry of Food, Agriculture and Fisheries. Denmark as a green growth country. <http://www.fvm.dk/Default.aspx?ID=18488&PID=169747&NewsID=5558>. Published May 2009. Accessed 07/01, 2012.
205. Mikkelsen B, Bruselius-Jensen M, Andersen J, Lassen A. Are green caterers more likely to serve healthy meals than non-green caterers? results from a quantitative study in danish worksite catering. *Public Health Nutr.* 2006;9(7):846-850.
206. Chen H, Bent Egberg. Organic school meals in three danish municipalities. *Bioforsk Report.* 2009;66(4).
207. Projekt EVIUS – sammenfattende rapport. http://www.evius.aau.dk/digitalAssets/8/8838_sammenfattenderapportevius2.pdf. Accessed November, 2012.
208. Zulueta B, Xarles Irastorza I, Oliver P, Garcia Z, Vitoria JC. Nutritional profile of foods offered and dietary intake in school canteens in biscay. *Nutr Hosp.* 2011;26(5):1183-1187.
209. Drummond C, Sheppard L. Examining primary and secondary school canteens and their place within the school system: A south australian study. *Health Educ Res.* 2011;26(4):739-749.
210. Tilles-Tirkkonen T, Pentikainen S, Lappi J, Karhunen L, Poutanen K, Mykkanen H. The quality of school lunch consumed reflects overall eating patterns in 11-16-year-old schoolchildren in finland. *Public Health Nutr.* 2011;14(12):2092-2098.
211. Raulio S, Roos E, Prattala R. School and workplace meals promote healthy food habits. *Public Health Nutr.* 2010;13(6A):987-992.
212. Bundy DA, Drake LJ, Burbano C. School food, politics and child health. *Public Health Nutr.* 2012:1-8.
213. Cullen KW, Watson K, Zakeri I, Ralston K. Exploring changes in middle-school student lunch consumption after local school food service policy modifications. *Public Health Nutr.* 2006;9(6):814-820.
214. Lytle LA, Fulkerson JA. Assessing the dietary environment: Examples from school-based nutrition interventions. *Public Health Nutr.* 2002;5(6A):893-899.
215. Moore SN, Tapper K, Murphy S. Feeding strategies used by primary school meal staff and their impact on children's eating. *J Hum Nutr Diet.* 2010;23(1):78-84.
216. Eaton DK, Marx E, Bowie SE. Faculty and staff health promotion: Results from the school health policies and programs study 2006. *J Sch Health.* 2007;77(8):557-566.

217. Ask AS, Hernes S, Aarek I, Johannessen G, Haugen M. Changes in dietary pattern in 15 year old adolescents following a 4 month dietary intervention with school breakfast--a pilot study. *Nutr J*. 2006;5:33.
218. Bere E, Veierod MB, Bjelland M, Klepp KI. Free school fruit--sustained effect 1 year later. *Health Educ Res*. 2006;21(2):268-275.
219. Bere E, Veierod MB, Bjelland M, Klepp KI. Outcome and process evaluation of a norwegian school-randomized fruit and vegetable intervention: Fruits and vegetables make the marks (FVMM). *Health Educ Res*. 2006;21(2):258-267.
220. Johansen A, Rasmussen S, Madsen M. Health behaviour among adolescents in denmark: Influence of school class and individual risk factors. *Scand J Public Health*. 2006;34(1):32-40.
221. O'Brien LM, Polacsek M, Macdonald PB, Ellis J, Berry S, Martin M. Impact of a school health coordinator intervention on health-related school policies and student behavior. *J Sch Health*. 2010;80(4):176-185.
222. Hazzard EL, Moreno E, Beall DL, Zidenberg-Cherr S. An evaluation of the california instructional school garden program. *Public Health Nutr*. 2012;15(2):285-290.
223. Ransley JK, Taylor EF, Radwan Y, Kitchen MS, Greenwood DC, Cade JE. Does nutrition education in primary schools make a difference to children's fruit and vegetable consumption? *Public Health Nutr*. 2010;13(11):1898-1904.
224. Beck AM, Balknas UN, Furst P, et al. Food and nutritional care in hospitals: How to prevent undernutrition--report and guidelines from the council of europe. *Clin Nutr*. 2001;20(5):455-460.
225. Savage JS, Fisher JO, Birch LL. Parental influence on eating behavior: Conception to adolescence. *J Law Med Ethics*. 2007;35(1):22-34.
226. Kristjansdottir AG, De Bourdeaudhuij I, Klepp KI, Thorsdottir I. Children's and parents' perceptions of the determinants of children's fruit and vegetable intake in a low-intake population. *Public Health Nutr*. 2009;12(8):1224-1233.
227. Krolner R, Rasmussen M, Brug J, Klepp KI, Wind M, Due P. Determinants of fruit and vegetable consumption among children and adolescents: A review of the literature. part II: Qualitative studies. *Int J Behav Nutr Phys Act*. 2011;8:112.
228. Giammarioli S, Boniglia C, Carratu B, et al. Use of food supplements and determinants of usage in a sample italian adult population. *Public Health Nutr*. 2012:1-14.
229. Chen YH, Yeh CY, Lai YM, Shyu ML, Huang KC, Chiou HY. Significant effects of implementation of health-promoting schools on schoolteachers' nutrition knowledge and dietary intake in taiwan. *Public Health Nutr*. 2010;13(4):579-588.
230. Schmidt CO, Fahland RA, Franze M, et al. Health-related behaviour, knowledge, attitudes, communication and social status in school children in eastern germany. *Health Educ Res*. 2010;25(4):542-551.

231. Lin W, Yang HC, Hang CM, Pan WH. Nutrition knowledge, attitude, and behavior of taiwanese elementary school children. *Asia Pac J Clin Nutr*. 2007;16 Suppl 2:534-546.
232. Shah P, Misra A, Gupta N, et al. Improvement in nutrition-related knowledge and behaviour of urban asian indian school children: Findings from the 'medical education for children/adolescents for realistic prevention of obesity and diabetes and for healthy aGeing' (MARG) intervention study. *Br J Nutr*. 2010;104(3):427-436.
233. Bau AM, Krull S, Ernert A, Babitsch B. Eating behaviour and its association with social living conditions and weight status among adolescent girls: Results of the cross-sectional berlin school children's cohort study. *Public Health Nutr*. 2011;14(10):1759-1767.
234. Kumar BN, Holmboe-Ottesen G, Lien N, Wandel M. Ethnic differences in body mass index and associated factors of adolescents from minorities in oslo, norway: A cross-sectional study. *Public Health Nutr*. 2004;7(8):999-1008.
235. Plachta-Danielzik S, Landsberg B, Johannsen M, Lange D, Muller MJ. Determinants of the prevalence and incidence of overweight in children and adolescents. *Public Health Nutr*. 2010;13(11):1870-1881.
236. Tabak I, Oblacinska A, Jodkowska M, Mikiel-Kostyra K. Changes in structure and socioeconomic position of the family as determinants of overweight in adolescents. *Pediatr Endocrinol Diabetes Metab*. 2012;18(2):70-75.
237. Zhu F, Mariappan A, Boushey CJ, et al. Technology-assisted dietary assessment. *Proc SPIE*. 2008;6814:681411.
238. Economos CD, Sacheck JM, Kwan Ho Chui K, et al. School-based behavioral assessment tools are reliable and valid for measurement of fruit and vegetable intake, physical activity, and television viewing in young children. *J Am Diet Assoc*. 2008;108(4):695-701.
239. Garson G,D. *Factor analysis*. Vol 5. Asheboro: NC: Statistical Associates Publishers; 2012:159-168.
240. Mundfrom D,J, Shaw D,G, Tian L,K. Minimum sample size recommendations for conducting factor analysis. *International Journal of Testing*. 2005;5(2):159-168.
241. Menard S. *Logistic regression: From introductory to advanced concepts and applications*. Thousand Oaks: CA. Sage Publications; 2010.
242. Nachtigall C, Kroeche U, Funke F, Steyer R. Why should we use SEM? pros and cons of structural equation modeling
8(2), 1-22. *Methods of Psychological Research Online*. 2003;8(2):1-22.
243. Kline R,B. *Principles and practice of structural equation modeling*. New York: NY: The Guilford Press.; 1998.

10 Appendices

Appendix I: The WBQ for Danish schools

Spørgeskema om fødevarer i skolen

Formålet med denne undersøgelse er, at frembringe viden omkring sammenhænge mellem sunde kostvaner hos unge og adgangen til økologiske fødevarer samt politikker om disse i folkeskolen/grundskolen. For at frembringe så dyb viden som mulig, er målgruppen for undersøgelsen også omfattet af skoler som ikke har økologiske fødevarer.

Din besvarelse har stor værdi for os!

DTU Fødevarer instituttet er ansvarlige for denne undersøgelse.

Personlige oplysninger

Blandt svarene trækker vi lod om en præmie. Derfor beder vi om nogle personlige oplysninger. Disse oplysninger vil blive behandlet strengt fortroligt og vil ikke blive vidregivet til andre.

Personlige oplysninger

Fornavn _____

Efternavn _____

E-mail adresse _____

Telefon nummer _____

Hvilket land kommer du fra?

(1) ☐ Danmark

(2) ☐ Norge

Hvad er din nuværende stilling på skolen?

(1) ☐ Skole leder el. lign.

(2) ☐ Skolemadskoordinator (Administrativt ansvar)

(3) ☐ Skolekantine leder (driftansvarlig)

(4) ☐ Ekstern skolemadsleverandør

(5) ☐ Skolekøkken personale

(6) ☐ Andet _____

Oplysninger om skolen

Dette afsnit omfatter grundoplysninger om skolen.

Skolens adresse

Navn _____

Adresse _____

Postnummer _____

By _____

Kommune nummer _____

Antal elever på skolen

(1) ☐ <100

(2) ☐ 100-200

(3) ☐ >200

Klassetrin på skolen

(1) ☐ 7

(2) ☐ 9

(3) ☐ 10

(4) ☐ 8-10

Holdningsspørgsmål

De følgende spørgsmål fokuserer på holdinger omkring skolemad. Begrebet 'mad servering' referer til mad som er serveret/solgt på skolen.

Jeg mener skolen har et ansvar for at fremme økologiske fødevarer gennem skolens mad servering

- (1) ☐ Meget enig
- (2) ☐ Delvis uenig
- (3) ☐ Uenig
- (4) ☐ Ved ikke

Jeg mener skolen har et ansvar for at fremme økologiske fødevarer gennem undervisningen

- (1) ☐ Meget enig
- (2) ☐ Delvis uenig
- (3) ☐ Uenig
- (4) ☐ Ved ikke

Jeg mener skolen har et ansvar for at fremme sunde kostvaner gennem skolens mad servering

- (1) ☐ Meget enig
- (2) ☐ Delvis uenig
- (3) ☐ Uenig
- (4) ☐ Ved ikke

Jeg mener skolen har et ansvar for at fremme sunde kostvaner gennem undervisningen

- (1) ☐ Meget enig
- (2) ☐ Delvis uenig
- (3) ☐ Uenig
- (4) ☐ Ved ikke

Skolens praksis vedrørende økologiske fødevarer

De følgende spørgsmål omhandler den nuværende praksis i skolen relateret til økologiske fødevarer. Følgende begreb er relevant i denne sammenhæng:

Public Organic Food Procurement Policy (POP), refererer til en politik der skal fremme brugen af økologiske fødevarer og som praktiseres hos offentlige organisationer hvor der serveres mad.

Bemærk: Ordet 'politik' dækker også over retningslinier eller regler.

Er der en politik vedrørende indkøb af økologiske fødevarer på din skole?

- (1) ☐ Ja
- (2) ☐ Nej
- (3) ☐ Ved ikke

Hvor mange år har skolen haft denne politik?

- (1) ☐ under 1 år
- (2) ☐ 2 år
- (3) ☐ 3 år
- (4) ☐ 4 år
- (5) ☐ Mere end 5 år

Hvilken myndighed mener du har været afgørende for indførelsen af denne politik på skolen?

- (1) ☐ Staten
- (2) ☐ Kommune eller amt (region)
- (3) ☐ Skoleadministrationen
- (4) ☐ Andet _____

Er det valgfrit at følge denne politik?

- (1) ☐ Ja
- (2) ☐ Nej

Har skolen nogen kontrolmetoder eller evalueringsparametre for politiken, så anvendelsen af økologiske fødevarer kan følges?

- (1) ☐ Ja
- (2) ☐ Nej
- (3) ☐ Ved ikke

Hvordan følges der op på anvendelsen af økologiske fødevarer?

- (1) ☐ Baseret på evaluering fra ekstern myndighed
- (2) ☐ Baseret på inspektion fra skoleadministrationen
- (3) ☐ Baseret på køkkenet egenkontrol
- (4) ☐ Andet _____

Skolens politik vedrørende mad, sundhed og ernæring

Følgende spørgsmål omhandler skolens retningslinier i forbindelse med sundhed og ernæring.

Følgende begreb er relevant i denne sammenhæng:

Food & Nutrition Policy (FNP) refererer til et sæt skriftlige og indarbejdede regler, som forsøger at opfylde elevernes ernæringsmæssige behov og sikrer adgang til sunde fødevarer.

Bemærk: Ordet 'politik' dækker også over retningslinier.

Er der en fødevarer og ernæringspolitik for eleverne på skolen?

- (1) ☐ Ja
- (2) ☐ Nej
- (3) ☐ Ved ikke

Hvor mange år har skolen haft denne politik?

- (1) ☐ under 1 år
- (2) ☐ 2 år
- (3) ☐ 3 år
- (4) ☐ 4 år
- (5) ☐ Mere end 5 år

Hvilken myndighed mener du har været afgørende for indførelsen af denne politik på skolen?

- (1) ☐ Staten
- (2) ☐ Kommune eller amt (region)
- (3) ☐ Skoleadministrationen
- (4) ☐ Andet _____

Omfatter denne politik de pædagogiske aktiviteter?

- (1) ☐ Ja
- (2) ☐ Nej
- (3) ☐ Ved ikke

Omfatter denne politik økologi?

- (1) ☐ Ja
- (2) ☐ Nej
- (3) ☐ Ved ikke

Er der en ernæringsgruppe, kantine udvalg eller lignende på skolen?

- (1) ☐ Ja
- (2) ☐ Nej

(3) ☐ Ved ikke

Hvis skolen har skolemad, er skolemaden da regelmæssigt ernæringsberegnet?

(1) ☐ Ja

(2) ☐ Nej

(3) ☐ Ved ikke

(4) ☐ Skolen har ikke skolemad

Skolens politik vedrørende generelle sundhedsanliggender

Følgende begreb er relevant i denne sammenhæng:

En sundhedsfremmende skole i WHO forstand, refererer til en skole der løbende forsøger at fremme en sund levevis for både elever og lærer.

Er skolen en sundhedsfremmende skole i WHO forstand?

(1) ☐ Ja

(2) ☐ Nej

(3) ☐ Ved ikke Har skolen sin egen sundhedsfremmende politik?

(1) ☐ Ja

(2) ☐ Nej

(3) ☐ Ved ikke

Hvor mange år har skolen haft denne politik?

(1) ☐ under 1 år

(2) ☐ 2 år

(3) ☐ 3 år

(4) ☐ 4 år

(5) ☐ Mere end 5 år

Støtter skolen eleverne i cykling eller til skolen?

(1) ☐ Ja

(2) ☐ Nej

(3) ☐ Ved ikke

Har skolen en legeplads?

(1) ☐ Ja

(2) ☐ Nej

(3) ☐ Ved ikke

Opmuntrer skolen til fysisk aktivitet i frikvarterene?

(1) ☐ Ja

(2) ☐ Nej

(3) ☐ Ved ikke

Er fysisk aktivitet en fast del af undervisningen ud over gymnastikundervisning/idrætstimerne?

(1) ☐ Ja

(2) ☐ Nej

(3) ☐ Ved ikke

Grøn flag skole

Følgende spørgsmål omhandler begrebet 'Grøn Flag Skole'.

En grøn flag skole er skoler overalt i landet og udlandet som benytter Det Grønne Flag skoleprogram til at skabe et sundt arbejds- og undervisningsmiljø.

For mere information se www.greenflagschool.org

Deltager skolen i Det Grønne Flag skoleprogrammet?

- (1) ☐ Ja
- (2) ☐ Nej
- (3) ☐ Ved ikke

Hvor mange år har skolen deltaget?

- (1) ☐ under 1 år
- (2) ☐ 2 år
- (3) ☐ 3 år
- (4) ☐ 4 år
- (5) ☐ Mere end 5 år

Skolen forsynings af fødevarer

De næste spørgsmål er delt ind i 4 afsnit. Baseret på svaret nedestående spørgsmål, vil der blive vist et separat afsnit af spørgsmål for hvert svarmulighed der vælges.

Hvert afsnit er tilpasset den valgte forsyningskilde.

Hvilket af følgende koncepter benytter skolen?

- (1) ☐ Frugtbood/skolefrugt
- (2) ☐ Skolemælk
- (3) ☐ Skolebood (uden faciliteter til at sidde ned).
- (4) ☐ Kantine (med faciliteter til at sidde ned og med eget køkken)

Frugtbood Dette afsnit omhandler spørgsmål vedrørende jeres frugtbood.

Tilbyder skolen frugt?

- (1) ☐ Ja, gratis
- (2) ☐ Kun mod betaling
- (3) ☐ Nej

Hvor mange procent udgør andelen af økologisk frugt?

- (0) ☐ 0 %
- (1) ☐ under 25 %
- (2) ☐ 25 - 50 %
- (3) ☐ 50 - 75 %
- (4) ☐ over 75 %

Skolemælk

Det næste afsnit omhandler spørgsmål vedrørende skolemælk.

Tilbyder skolen mælk hver dag?

- (1) ☐ Ja, gratis
- (2) ☐ Kun mod betaling
- (3) ☐ Nej

Anslå hvor stor en procentandel udgør økologisk mælk af den samlede mængde mælk

- (0) ☐ 0 %
- (1) ☐ under 25 %
- (2) ☐ 25 - 50 %
- (3) ☐ 50 - 75 %
- (4) ☐ over 75 %

Anslå skønsmæssigt den procentuelle fordeling af mælktyper.

0 - 20 % 20 - 40 % 40 - 60 % 60 - 80 % 80 - 100 % Har ikke

	0 - 20 %	20 - 40 %	40 - 60 %	60 - 80 %	80 - 100 %	Har ikke
Andelen af sødmælk (ca. 3,5% fedt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Andelen af letmælk (ca. 1,5% fedt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Andelen af minimælk (ca. 0,5% fedt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Andelen af skummetmælk (ca. 0,1% fedt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Andelen af kakaomælk (ca. 3,5% fedt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Andelen af kakaoskummetmælk (ca. 0,1% fedt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>

Skolebod Det næste afsnit omhandler spørgsmål vedrørende skoleboden.

Bemærk: For at være en skolebod og ikke en egentlig kantine, må der ikke være faciliteter til at sidde ned eller køkken

Hvor er maden tilberedt?

(1) ☐ På skolen

(2) ☐ Uden for skolen

Hvor stor en skønsmæssig procentandel udgør økologiske fødevarer?

(0) ☐ 0 %

(1) ☐ under 25 %

(2) ☐ 25 - 50 %

(3) ☐ 50 - 75 %

(4) ☐ over 75 %

Hvilke typer mad tilbydes der?

(1) ☐ Sandwich

(2) ☐ Kolde tallerken anretninger (f.eks. sushi, burger, pasta, salat)

(3) ☐ Genopvarmede retter (f.eks. ris, kødsauce)

(4) ☐ Kage

Hvor lang tid varer spisepausen på skolen?

(1) ☐ 15 minutter

(2) ☐ 20 minutter

(3) ☐ 25 minutter

(4) ☐ over 30 minutter

Har skolen restriktioner på typen af måltider/produkter der sælges fra skoleboden?

(1) ☐ Ja

(2) ☐ Nej

Hvilke øvrige fødevarer tilbydes der i skoleboden?

(1) ☐ Sodavand

(2) ☐ Chokolade

(3) ☐ Slik

(4) ☐ Chips

Findes der en konkurrerende butik med salg af fødevarer i nærheden af skolen, f.eks. en kiosk, en tank e.l. (under 250 meter)?

(1) ☐ Ja

(2) ☐ Nej

Begrænser skolen, for de elever der må forlade skolens område, elevernes adgang til konkurrerende fødevarerbutikker uden for skolen?

(1) ☐ Ja

(2) ☐ Nej

Kantine/cafeteria

Det næste afsnit omhandler spørgsmål vedrørende skolen kantine eller cafeteria.

Bemærk: For at være en egentlig kantine eller cafeteria, skal der være faciliteter til at side ned.

Hvor er maden tilberedt?

(1) ☐ På skolen

(2) ☐ I et køkken uden for skolen

Hvor stor en skønsmæssig procentandel udgør økologiske fødevarer?

(0) ☐ 0 %

(1) ☐ under 25 %

(2) ☐ 25 - 50 %

(3) ☐ 50 - 75 %

(4) ☐ over 75 %

Overholder udbudet de officielle ernæringsanbefalinger?

(1) ☐ Ja

(2) ☐ Nej

(3) ☐ Ved ikke

Er menuerne sammensat ud fra elevernes efterspørgsel?

(1) ☐ Ja

(2) ☐ Nej

(3) ☐ Ved ikke

Hvilken serveringstype udbydes der på skolen?

(1) ☐ Eleverne vælger ud fra et menu kort

(2) ☐ Eleverne tilbydes en fast menu

Giver skolen en ernæringsmæssig anbefaling til eleverne om hvad de bør vælge?

(1) ☐ Ja

(2) ☐ Nej

Hvor lang tid varer spisepausen på skolen?

(1) ☐ 15 minutter

(2) ☐ 20 minutter

(3) ☐ 25 minutter

(4) ☐ over 30 minutter

Findes der en konkurrerende butik med salg af fødevarer i nærheden af skolen, f.eks. en kiosk, en tank e.l. (under 250 meter)?

(1) ☐ Ja

(2) ☐ Nej

Begrænser skolen, for de elever der må forlade skolens område, elevernes adgang til konkurrerende fødevarerbutikker uden for skolen?

(1) ☐ Ja

(2) ☐ Nej

Angiv i hvilken retning skolens udbud af fødevarer har ændret sig i forhold til tilgængelighed igennem de sidste 5 år

	Mere	Samme	Mindre	Ved ikke
Friske grønsager (F.eks. salat, agurk, gulerødder)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Frisk frugt (f.eks. æbler, pærer, appelsinder)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Kød (f.eks. kylling, koteletter, fisk)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Fuldkornsprodukter (f.eks. fuldkornsbrød eller fuldkornspasta)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Drikkevarer (f.eks. koldt dirkkevand, frugtjuice, ikke sodavand)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Fedtfattige mælkeprodukter (f.eks. fedtfattig mælk, fedtfattig yoghurt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Friturestegt mad (f.eks. pommes friter, chicken nuggets)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Pølser	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Chokolade	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Slik	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Chips	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Kage	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Sodavand	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>

Hvad er efter din mening den primære årsag til at disse ændringer?

- (1) ☐ For at mindske omkostningerne
(2) ☐ For at imødekomme ernæringsanbefalinger
(3) ☐ For at imødekomme efterspørgelse
(4) ☐ Andet _____

Skyldes ændringerne efter din mening politiken vedrørende offentlig indkøb af økologiske varer (POP)?

- (1) ☐ Ja
(2) ☐ Nej
(3) ☐ Ved ikke

Kommentar og feedback

Til sidst vil vi gerne have evt. kommentar eller andet feedback.

Alle kommentar er velkomne!

Kommentar og feedback

Spørgeskemaet er færdig

Tak for din besvarelse!

Tryk på krydset nederst til højre for at fuldføre besvarelsen og vinduet vil lukke.

Appendix II: The WBQ for German school

Befragung zur Schulverpflegungssituation in Deutschland

Im Rahmen des europäischen Forschungsprojektes "iPOPY" – innovative Public Organic food Procurement for Youth soll ein Überblick über die Situation der Schulverpflegung und dem Status der Bio-Verpflegung in den europäischen Mitgliedstaaten gegeben werden. Vor allem die Ermittlung des Status Quo bei der Verpflegung mit Bio-Lebensmitteln in Hessen stellt einen Schwerpunkt dar, darüber hinaus werden Fragen zur Infrastruktur in ihrer Schule, zu gesundheitsfördernden Maßnahmen und zu entsprechenden Leitlinien der Programme gestellt. Für uns ist Ihre Teilnahme sehr wichtig!

Sie sollen möglichst alle Fragen wahrheitsgetreu und nach besten Ermessen beantworten. Das Computerprogramm wird Sie durch den Fragebogen geleiten und Ihnen Hinweise geben was zu beachten ist.

Hauptverantwortlich für die Befragung ist die Aalborg Universität in Aalborg, Dänemark!

Zum Einstieg in das Thema

Zum Einstieg haben wir einige Aussagen für Sie aufgelistet. Dieser Abschnitt soll einen Überblick zur grundsätzlichen Einstellung gegenüber der Schulverpflegung geben.

	Stimme ich vollkomme n zu	Stimme ich zu	Stimme ich teilweise zu	Stimme ich teilweise nicht zu	Stimme ich nicht zu	Stimme ich überhaupt nicht zu
Ich denke, dass die Schule zu der Vermittlung eines gesunden Essverhaltens, durch das Angebot von gesunden Speisen, beitragen sollte.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Ich denke, dass die Schule Aspekte eines gesunden Essverhaltens im Unterricht thematisieren sollte.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Ich denke, dass die Schule eine Verantwortung dafür trägt, in ihrem Verpflegungsangebot Bio-Lebensmittel zu fördern und diese anzubieten.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Ich denke, dass die Schule dafür verantwortlich ist, mögliche Vor- und Nachteile von Biolebensmitteln im Rahmen des Unterrichts zu thematisieren.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>

Schul-Leitlinien zu Verpflegung, Ernährung und Gesundheit

Dieser Abschnitt behandelt die Leitlinien und Regularien in Bezug auf die Gesundheit der SchülerInnen und deren Ernährung in der Schule.

Kurze Erläuterung: Eine gesundheitsorientierte Ernährungs-Strategie stellt sicher, welche Aspekte eine optimale Ernährung für Kinder und Jugendliche enthalten muss sowie dass die Verfügbarkeit und der Zugang zu gesunden Lebensmitteln gegeben ist.

Der Begriff einer Schulleitlinie bezieht sich auf alle existierenden Leitlinien, Regeln, Vereinbarungen (auch zwischen Schule und Caterer), auf nationaler, auch auf regionaler oder kommunaler Ebene und individueller Schul- Ebene.

Hat ihre Schule eine solche, oben beschriebene, Strategie, Leitlinie, Regel oder ein Übereinkommen bezüglich der Schülersgesundheit?

- (1) ☐ Ja
- (2) ☐ Nein
- (3) ☐ Ich weiss es nicht

Wer hat diese Strategie, Leitlinie, Regel oder das Übereinkommen in diesem Fall eingeführt?

- (1) ☐ Bundesregierung
- (2) ☐ Das Bundesland/ Die Kommune
- (3) ☐ Die Schule selbst
- (4) ☐ Die Lehrer
- (5) ☐ Die Eltern
- (6) ☐ Die Schüler
- (7) ☐ Der Caterer
- (8) ☐ Andere

Findet im Unterricht ein Austausch über diese Strategie zu Bio-Lebensmitteln zwischen Lehrern und Schülern statt?

- (1) ☐ Ja
- (2) ☐ Nein
- (3) ☐ Ich weiss es nicht

Nimmt diese Regelung zur Schüler-Gesundheit in irgendeiner Form einen Bezug auf Bio-Lebensmittel?

- (1) ☐ Ja
- (2) ☐ Nein
- (3) ☐ Ich weiss es nicht

Gibt es eine spezielle Arbeitsgruppe oder Informationskästen zum Thema Ernährung?

- (1) ☐ Ja
- (2) ☐ Nein
- (3) ☐ Ich weiss es nicht

Schul-Leitlinien für die Bewegung und Aktivität der SchülerInnen

Dieser Abschnitt beschäftigt sich mit den Leitlinien und Regularien bezüglich der physischen Aktivität der Schülerinnen und Schüler. Solche Schulen tragen auch den Namen: „Gesundheitsfördernde Schulen“.

Kurze Erläuterung: Eine gesundheits-fördernde Schule ist eine Schule, die einen konstanten Beitrag zur Förderung der Gesundheit ihrer SchülerInnen leistet, in den Bereichen Leben, Lernen und Arbeiten (nach dem Konzept der WHO (World Health Organisation). In Deutschland auch unter dem Namen des Projektes „Gesunde Schule“ bekannt.

Hat Ihre Schule eine solche Strategie, die sich an diesen Empfehlungen der WHO orientiert?

- (1) ☐ Ja

(2) ☐ Nein

(3) ☐ Ich weiss es nicht

Hat Ihre Schule eine eigene gesundheitsfördernde Strategie?

(1) ☐ Ja

(2) ☐ Nein

(3) ☐ Ich weiss es nicht

Unterstützt Ihre Schule den aktiven Schulweg mit dem Fahrrad, mit dem Tretrroller/Scooter oder zu Fuss, z.B. Kampagne FahrRad! `` Pro Klima Tour ``?

(1) ☐ Ja

(2) ☐ Nein

(3) ☐ Ich weiss es nicht

Hat Ihre Schule einen Spielplatz?

(1) ☐ Ja

(2) ☐ Nein

(3) ☐ Ich weiss es nicht

Fördert Ihre Schule körperliche Aktivitäten der SchülerInnen in den Pausen?

(1) ☐ Ja

(2) ☐ Nein

(3) ☐ Ich weiss es nicht

Fördert Ihre Schule sportliche SchülerInnen-Aktivitäten am Nachmittag/ nach Ende des Schultages?

(1) ☐ Ja

(2) ☐ Nein

(3) ☐ Ich weiss es nicht

Legt Ihre Schule besonderen Wert auf die Verankerung weiterer Sportangebote im Lehrplan, welche über die vorgeschriebenen Sportstunden hinausgehen?

(1) ☐ Ja

(2) ☐ Nein

(3) ☐ Ich weiss es nicht

Schulleitlinien für Bio-Lebensmittel

Dieser Abschnitt beschäftigt sich mit der Organisationen und der Beschaffung von Bio-Lebensmitteln in ihrer Schule.

Kurze Erläuterung: Der Grundsatz zur Beschaffung von Lebensmitteln in ihrer Schule gibt zum Beispiel einen Anteil von Lebensmitteln in Bio-Qualität von ca. 10% an, exemplarisch bezogen auf die Richtlinien der DGE zur Schulverpflegung und deren Beschaffung (aus 2008).

Der Begriff einer Schulleitlinie bezieht sich auf alle existierenden Leitlinien, Regeln, Vereinbarungen (auch zwischen Schule und Caterer), auf nationaler, auch auf regionaler oder kommunaler Ebene und individueller Schul- Ebene.

Ist an ihrer Schule eine Strategie, Leitlinien, Regeln oder Übereinkommen zur Beschaffung von Bio-Lebensmittel vorhanden?

(1) ☐ Ja

(2) ☐ Nein

(3) ☐ Ich weiss es nicht

Wer hat diese Strategie, Leitlinie, Regel oder das Übereinkommen in ihrer Schule eingeführt?

(1) ☐ Das Bundesland/ Die Kommune

(2) ☐ Die Schule selbst

(3) ☐ Die Lehrer

- (4) ☐ Die Eltern
- (5) ☐ Die Schüler
- (6) ☐ Der Caterer
- (7) ☐ Andere

Findet im Unterricht ein Austausch über diese Strategie zu Bio-Lebensmitteln zwischen Lehrern und Schülern statt?

- (1) ☐ Ja
- (2) ☐ Nein
- (3) ☐ Ich weiss es nicht

Gibt es für die Beschaffung und den Verkauf von Bio-Lebensmitteln entsprechende Schritte zur Überprüfung?

- (1) ☐ Ja
- (2) ☐ Nein
- (3) ☐ Ich weiss es nicht

Wie wird der Einsatz von Bio-Lebensmitteln kontrolliert/ gewährleistet?

- (1) ☐ Durchgeführt wird die Kontrolle von einer offiziellen Kontrollstelle
- (2) ☐ Durchgeführt wird die Kontrolle durch eine Schulinspektion/ die Schulverwaltung
- (3) ☐ Durchgeführt wird die Kontrolle von der Küche selbst/ Selbstkontrolle
- (4) ☐ Andere

Typ der Schulverpflegung

Der nächste Abschnitt ist nochmals unterteilt in 4 Sektionen. Basierend auf Ihren nun folgenden Angaben wird das Programm die weiteren passenden Fragen vorgeben.

- (1) ☐ Schul-Obst
- (2) ☐ Verpflegung mit Schulmilch/ Kakao
- (3) ☐ Schulkiosk (mit einem Angebot von kalten Speisen, ohne Sitzmöglichkeiten, ohne Küche/Möglichkeit der Mittagsbetreuung ist nicht gegeben)
- (4) ☐ Schulkantine oder Speiseraum (mit Sitzmöglichkeiten)

Schul-Obst

Dieser Abschnitt geht auf die Strategie der Schulverpflegung mit Obst ein.

Eine Verpflegung mit Schul-Obst bedeutet, dass den Schülern Obst regelmäßig zur Verfügung gestellt wird.

Gibt Ihre Schule Obst in den Klassen aus?

- (1) ☐ Ja, kostenlos
- (2) ☐ Ja, kostenpflichtig
- (3) ☐ Nein

Gibt Ihre Schule jeden Tag Obst in den Klassen aus?

- (1) ☐ Ja
- (2) ☐ Nein

Bitte geben sie den geschätzten Anteil an Bio-Obst (bezogen auf den Wareneinsatz in Euro) an:

- (1) ☐ 0 %
- (2) ☐ unter 25 %
- (3) ☐ 25 - 50 %
- (4) ☐ 50 - 75 %
- (5) ☐ über 75 %

Schul- Milch

Dieser Abschnitt geht auf die Schulverpflegung mit Schul-Milch ein.

Diese Art von Verpflegung zielt darauf ab, den Schülern frische Milch am Schultag anzubieten.

Gibt Ihre Schule Milch für die SchülerInnen aus?

- (1) ☐ Ja, kostenlos
(2) ☐ Ja, kostenpflichtig
(3) ☐ Nein

Gibt ihre Schule jeden Tag Milch aus?

- (1) ☐ Ja
(2) ☐ Nein

Bitte geben sie den geschätzten Anteil an Bio-Milch (bezogen auf den Wareneinsatz in Euro) an:

- (1) ☐ 0 %
(2) ☐ unter 25 %
(3) ☐ 25 - 50 %
(4) ☐ 50 - 75 %
(5) ☐ über 75 %

Bitte schätzen Sie den Absatz/ Verkauf der prozentualen Anteile der 6 aufgeführten Milchtypen ab:

	1 - 20 %	20 - 40 %	40 - 60 %	60 - 80 %	80 - 100 %	Nicht vorhande n
Vollmilch (3,5% Fett)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Fettarme Milch (1,5% Fett)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Magermilch (0,5% Fett)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Fettfreie Milch (0,1% Fett)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Vollmilch-Kakao (3,5% Fett)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Kakao aus Magermilch (0,1% Fett)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>

Schul-Kiosk

In diesem Abschnitt geht es um den Schul-Kiosk.

Mit der Bezeichnung „Schul-Kiosk“ ist ein kleiner Bereich in der Pausenhalle etc. gemeint. Dort werden Snacks und kleine Menüs angeboten, aber in der Regel keine warmen Speisen.

Normalerweise ist dort keine Möglichkeit zum Sitzen gegeben.

Wo werden die Speisen für den Schul-Kiosk zubereitet?

- (1) ☐ Im Kiosk selbst/ innerhalb des Schulgeländes
(2) ☐ In einer Einrichtung außerhalb des Schulgeländes (Belieferung)

Bitte schätzen Sie den Anteil an Bio-Lebensmitteln bei den angebotenen Produkten (bezogen auf den Wareneinsatz) ab.

- (1) ☐ 0 %
(2) ☐ unter 25 %
(3) ☐ 25 - 50 %
(4) ☐ 50 - 75 %
(5) ☐ über 75 %

Wie lange dauert die Mittagspause?

- (1) ☐ 15 min
- (2) ☐ 20 min
- (3) ☐ 25 min
- (4) ☐ über 30 min

Welche Arten von kleinen Speisen sind im Schulkiosk zu kaufen?

- (1) ☐ Belegte Brötchen
- (2) ☐ Kalte Speisen (wie Salate etc.)
- (3) ☐ Nicht belegte Brötchen, Laugenstangen etc.
- (4) ☐ Kuchen/ süße Teigwaren

Sind die Speisen im Kiosk mit Nährwertberechnungen kalkuliert (z.B. nach den Vorgaben des OptimiX-Konzeptes) ?

- (1) ☐ Ja
- (2) ☐ Nein
- (3) ☐ Ich weiss es nicht

Werden in dem Kiosk Süßigkeiten und Chips etc. angeboten?

- (1) ☐ Ja
- (2) ☐ Nein

Gibt es Einschränkungen bezüglich der Art der Snacks (geringeres Angebot von ungesunden Snacks/ Hervorhebung von gesunden Snacks)?

- (1) ☐ Ja
- (2) ☐ Nein

Gibt es ein "Konkurrenz-Angebot" zum Speisenerwerb in der Nähe (weniger als 250m), wie einen anderen Kiosk, einen Imbiss oder eine Tankstelle?

- (1) ☐ Ja
- (2) ☐ Nein

Gibt es Verbote/Regelungen zum Verlassen des Schulgeländes bzw. zum Erwerb von Speisen in den Geschäften außerhalb des Schulgeländes?

- (1) ☐ Ja
- (2) ☐ Nein

Schulkantinen oder Speisensäle

In diesem Abschnitt werden Fragen zu der vorhandenen Schulkantine bzw. Dem Speisensaal in ihrer Schule gestellt.

Die Schulen, die eigene Schulkantinen haben, haben eine eigene Küche, in der die Speisen zubereitet werden. Darüberhinaus können sich die SchülerInnen hinsetzen und gemeinsam essen. Die Schulen mit Speisensälen geben den SchülerInnen die Möglichkeit, sich zum Essen hinzusetzen. Die Speisen werden entweder in einer zentralen Schulküche zubereitet und geliefert oder von einem Catering Unternehmen geliefert.

Hat Ihre Schule eine Kantine oder einen Speisensaal?

- (1) ☐ Schulkantine
- (2) ☐ Speisensaal

Wo werden die Speisen zubereitet?

- (1) ☐ In einer schuleigenen Küche
- (2) ☐ In einer Zentralküche/ von einem Catering-Unternehmen

Bitte geben Sie den geschätzten Anteil von Bio-Lebensmittel bei der Verpflegung (pro Wareneinsatz) an.

- (1) ☐ 0 %

- (2) ☐ unter 25 %
 (3) ☐ 25 - 50 %
 (4) ☐ 50 - 75 %
 (5) ☐ über 75 %

Wie lange dauert die Mittagspause?

- (1) ☐ 15 min
 (2) ☐ 20 min
 (3) ☐ 25 min
 (4) ☐ über 30 min

Ist die Schulverpflegung mit Nährwertberechnungen optimal kalkuliert (z.B. nach den Vorgaben des OptimiX-Konzeptes)?

- (1) ☐ Ja
 (2) ☐ Nein
 (3) ☐ Ich weiss es nicht

Werden in ihrer Schule ausgewogene, gesunde Menüs extra empfohlen?

- (1) ☐ Ja
 (2) ☐ Nein

Gibt es ein "Konkurrenz-Angebot" zum Speisenerwerb in der Nähe (weniger als 250m), wie einen anderen Kiosk, einen Imbiss oder eine Tankstelle?

- (1) ☐ Ja
 (2) ☐ Nein

Gibt es Verbote/Regelungen zum Verlassen des Schulgeländes zum Erwerb von Speisen in den anderen Geschäften?

- (1) ☐ Ja
 (2) ☐ Nein

Bitte führen Sie aus, wie sich das Angebotsspektrum der folgenden Lebensmittelgruppen in den letzten 5 Jahren an ihrer Schule entwickelt hat.

	Zunahme	Gleich geblieben	Abnahme	Ich weiss es nicht
Frisches Gemüse (z.B. Karotten, Tomaten, Gurken, Salat etc)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Frisches Obst (z.B. Äpfel, Birnen, Bananen etc)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Fleisch (z.B. Geflügel, Schwein, Fisch etc)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Vollkornprodukte (z.B. Vollkornbrot, Vollkornnudeln, Vollkorn-Cerealien etc)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Getränke (z.B. Wasser, 100% Säfte, Tee etc)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Fettarme Milchprodukte (z.B. fettarme Joghurts, fettarme Milch, fettarmer Käse etc)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>

	Zunahme	Gleich geblieben	Abnahme	Ich weiss es nicht
Frittiertes/ Fast Food (Pommes frites, Chicken nuggets, Finger food, Hamburger etc)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Würtschen	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Schokolade/ Riegel	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Süßigkeiten	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Chips	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Kuchen/ süße Teigwaren	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Limonaden	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>

Wenn Ihr Angebotsspektrum an der Schule sich geändert hat, bitte geben Sie den Grund dafür an.

- (1) ☐ Um Kosten einzusparen
 (2) ☐ Um die Ernährungsempfehlungen zu erfüllen
 (3) ☐ Um den Schülerwünschen mehr zu entsprechen
 (4) ☐ Andere

Waren diese Änderungen möglicherweise hinsichtlich gesünderen Nahrungsmitteln, ihrer Meinung nach, auch verbunden mit dem Angebot Bio-Lebensmitteln verknüpft?

- (1) ☐ Ja
 (2) ☐ Nein
 (3) ☐ Ich weiss es nicht

Der Fragebogen ist nun erfolgreich abgeschlossen!

Einen sehr herzlichen Dank für Ihre Mühe und für Ihre Antworten!

Bitte klicken Sie auf den Link unten rechts um den Fragebogen abzuschließen. Das Fenster schließt sich automatisch.

Appendix III: The WBQ for Finnish schools

Kouluruokakysely

Tämän kyselyn tarkoituksena on selvittää, onko luomuruoan tarjoaminen yhteydessä oppilaiden terveellisiin ruokailutottumuksiin. Kysely on osa iPOPY- tutkimushanketta, jota rahoittaa Euroopan unionin toimikunta European Research Area. Saadaksemme arvokasta aineistoa, kysely on suunnattu sekä kouluille, jotka tarjoavat luomutuotteita, että kouluille, jotka eivät tarjoa luomutuotteita.

Osallistumisenne on tärkeää!

Kyselystä vastaa tanskalainen Aalborgin yliopisto.

Asenne

Tässä osiossa tiedustellaan suhtautumistanne koulunne ruokailua kohtaan.

	Täysin samaa mieltä	Samaa mieltä	Osittain samaa mieltä	Osittain eri mieltä	Eri mieltä	Täysin eri mieltä
Kouluilla on vastuu luomutuotteiden käytön edistämisestä kouluruokailun yhteydessä.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Kouluilla on vastuu luomutuotteiden käytön edistämisestä osana opetussuunnitelmaa.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Kouluilla on vastuu terveellisten ruokailutottumusten edistämisestä kouluruokailun yhteydessä.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Kouluilla on vastuu terveellisten ruokailutottumusten edistämisestä osana opetussuunnitelmaa.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>

Koulunne linjaus koskien ruokaa, terveyttä ja ravitsemusta

Tämä osio käsittelee käytäntöjä ja linjauksia oppilaiden terveyteen ja ravitsemukseen liittyen.

Onko koulullanne oppilaiden terveyttä koskevaa ruoka- ja ravitsemussuositusta?

- (1) ☐ Kyllä
(2) ☐ Ei
(3) ☐ En osaa sanoa

Kuka tai mikä taho on vastuussa tästä suosituksesta?

- (1) ☐ Hallitus
(2) ☐ Kunta
(3) ☐ Koulun hallinto/ keittiö
(4) ☐ Opettajat
(5) ☐ Oppilaiden vanhemmat
(6) ☐ Oppilaat
(7) ☐ Ateriapalvelut
(8) ☐ Muu

Toteuttavatko opettajat tätä suositusta opetustyönsä ohessa?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Liittyykö luomuruoan käyttö tähän suositukseen?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Onko koulullanne erillinen ruokailutoimikunta tai vastaava?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Koulunne linjaus oppilaiden fyysistä aktiivisuutta koskien

Tämä osio käsittelee koulun linjauksia, säädöksiä ja käytäntöjä liittyen oppilaiden fyysiseen aktiivisuuteen.

Seuraava määritelmä on olennainen seuraavien kysymyksien kannalta: Maailman terveysjärjestön World Health Organisationin (WHO) mukaan terveyttä edistäviksi kouluiksi voidaan luokitella sellaiset koulut, jotka jatkuvasti vahvistavat kykyään tarjota terveellinen elin-, oppimis- ja työympäristö.

Vastaako koulunne WHO:n terveyttä edistävän koulun määritelmää?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Onko koulullanne oma terveyttä edistävä linjaus?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Pyrkiikö koulunne edistämään polkupyöräilyä, kävelyä tai jotakin muuta fyysistä koulumatkantekomuotoa?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Onko koulunne pihalla leikkikenttä?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Tukeeko koulunne oppilaiden liikuntaa välituntien aikana?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Tukeeko koulunne oppilaiden vapaa-ajan liikuntaa?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Onko fyysinen aktiivisuus liikuntatuntien lisäksi tärkeässä roolissa koulunne opetussuunnitelmassa?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Koulunne luomuruokakäytäntö

Tämä osio selvittää koulunne tämänhetkistä luomuruokatarjontaa.

Käytetäänkö koulunne ruoanvalmistuksessa mitään luomutuotteita?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Käytetäänkö kouluruokailunne yhteydessä mitään luomutuotteita (esimerkiksi maito, piimä, leipä jne.)?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Mitä seuraavista luomutuotteista käytetään kouluruokailussanne?

(1) ☐ Maitotuotteet

(2) ☐ Viljatuotteet

(3) ☐ Juurekset

(4) ☐ Kasvikset

(5) ☐ Marjat

(6) ☐ Lihatuotteet

Onko koulussanne erillistä linjausta luomuruoan käytöstä kouluruokailussa?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Kuka tai mikä taho on vastuussa tästä linjauksesta?

(1) ☐ Hallitus

(2) ☐ Kunta

(3) ☐ Koulun hallinto/ keittiö

(4) ☐ Opettajat

(5) ☐ Oppilaiden vanhemmat

(6) ☐ Oppilaat

(7) ☐ Ateriapalvelut

(8) ☐ Muu

Toteuttavatko opettajat tätä linjausta opetustyönsä ohessa?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Onko koulullanne joitakin tarkkailukäytänteitä tämän linjauksen suhteen?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Kuinka näitä käytänteitä valvotaan?

(1) ☐ Ulkopuolisten viranomaisten toimesta

(2) ☐ Koulun hallinnon toimesta

(3) ☐ Koulun keittiön toimesta

(4) ☐ Muu

Kouluruokailu

Missä kouluruokanne valmistetaan?

- (1) ☐ Koulun keittiössä
 (2) ☐ Keskuskeittiössä tai muussa keittiössä koulurakennuksen ulkopuolella

Arvioi luomutuotteiden osuus koululounaassanne/-ruoassanne.

- (1) ☐ 0 %
 (2) ☐ alle 25 %
 (3) ☐ 25 - 50 %
 (4) ☐ 50 - 75 %
 (5) ☐ yli 75 %

Arvioi luomun osuus kouluruokailunne hedelmätarjonnasta.

- (1) ☐ 0 %
 (2) ☐ alle 25 %
 (3) ☐ 25 - 50 %
 (4) ☐ 50 - 75 %
 (5) ☐ yli 75 %

Arvioi luomumaidon osuus kouluruokailunne maitotarjonnasta.

- (1) ☐ 0 %
 (2) ☐ alle 25 %
 (3) ☐ 25 - 50 %
 (4) ☐ 50 - 75 %
 (5) ☐ yli 75 %

Arvioi seuraavien maitolaatujen osuus kouluruokailunne maitotarjonnasta.

	1 - 20 %	20 - 40 %	40 - 60 %	60 - 80 %	80 - 100 %	ei tarjonnassa
Täysmaito (n. 3.5% rasvaa)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Kevytmaito (n. 1.5% rasvaa)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Ykkösmaito (n. 1% rasvaa)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Rasvaton maito (n. 0.1% rasvaa)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Täysirasvainen kaakaomaitojuoma (n. 3.5% rasvaa)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Rasvaton kaakaomaitojuoma (n. 0.1% rasvaa)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>

Kuinka kauan koulunne ruokatunti kestää?

- (1) ☐ 15 min.
 (2) ☐ 20 min.
 (3) ☐ 25 min.
 (4) ☐ yli 30 min.

Ovatko kouluruokanne ravintoarvot laskettu virallisten suositusten mukaisesti?

- (1) ☐ Kyllä
 (2) ☐ Ei
 (3) ☐ En osaa sanoa

Ohjaako koulunne oppilaita koostamaan lounaansa ravintosuositusten mukaisesti (esim. lautasmalli)?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Onko koulunne läheisyydessä (alle 250 metrin etäisyydessä) kilpailevaa ruokaa tarjoavaa tahoa?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Onko oppilaillanne lupa syödä lounasta koulun ulkopuolella?

(1) ☐ Kyllä

(2) ☐ Ei

(3) ☐ En osaa sanoa

Kuvaile muutoksia seuraavien tuotteiden tarjontamäärissä kouluruokailussanne viimeisen viiden vuoden aikana

	Enemmän	Sama	Vähemmän	En osaa sanoa
Tuoreet vihannekset (kuten kurkku, tomaatti)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Tuoreet hedelmät (kuten omena, päärynä)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Liha (kuten kana, sika, nauta)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Täysjyvätuotteet (kuten leipä, pasta, murot)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Juomat (kuten täysmehu, yrttitee)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Vähärasvaiset maitotuotteet	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Uppopaistettu ruoka (kuten ranskanperunat, kananuggetit)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Makkarat	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Suklaa	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Makeiset	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Perunalastut	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Leivonnaiset	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Limonadi	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>

Mikäli ruokatarjontanne sisältö on muuttunut viime aikoina, nimetkää syy tähän muutokseen.

(1) ☐ Kuluissa säästäminen

(2) ☐ Ravintosuositusten noudattaminen

(3) ☐ Oppilaiden toivomus

(4) ☐ Muu

Ovatko nämä muutokset mielestänne yhteydessä luomutuotteiden käyttöön kouluruokailussanne?

(1) ☐ Kyllä

- (2) ☐ Ei
(3) ☐ En osaa sanoa

Välipalakioski

Onko koulullanne välipalakioskia?

- (1) ☐ Kyllä
(2) ☐ Ei

Missä välipalakioskinne ruoka valmistetaan?

- (1) ☐ Koulunne tiloissa
(2) ☐ Koulunne ulkopuolella

Arvioi luomutuotteiden osuus välipalakioskinne ruokatarjonnasta.

- (1) ☐ 0 %
(2) ☐ alle 25 %
(3) ☐ 25 - 50 %
(4) ☐ 50 - 75 %
(5) ☐ yli 75 %

Kuinka kauan kioskivälitunti kestää?

- (1) ☐ 15 min.
(2) ☐ 20 min.
(3) ☐ 25 min.
(4) ☐ yli 30 min.

Millaisia tuotteita välipalakioskinne tarjoaa?

- (1) ☐ Voileipiä
(2) ☐ Kylmiä aterioita (kuten salaatti, piirakat, pasteijat)
(3) ☐ Sämpylöitä
(4) ☐ Leivonnaisia

Ovatko välipalakioskiruokien ravintoarvot laskettu virallisten ravintosuositusten mukaisesti?

- (1) ☐ Kyllä
(2) ☐ Ei
(3) ☐ En osaa sanoa

Myykö välipalakioskinne pikkupurtavaa (kuten makeisia, perunalastuja, suklaata ym)?

- (1) ☐ Kyllä
(2) ☐ Ei
(3) ☐ En osaa sanoa

Onko välipalakioskinne tarjoamia pikkupurtavien tyyppejä rajoitettu?

- (1) ☐ Kyllä
(2) ☐ Ei
(3) ☐ En osaa sanoa

Yhteystiedot & Koulutiedot

yselyyn vastanneiden kesken arvotaan opintomatka italialaiseen luomuruokaan erikoistuneeseen kouluun. Jotta voimme ottaa yhteyttä voittajaan, tarvitsemme yhteystietonne. Tietoja käsitellään luottamuksellisesti eikä luovuteta eteenpäin.

Etunimi _____

Sukunimi _____

Missä asemassa toimitte koulussanne?

- (1) ☐ Rehtori
(2) ☐ Kouluruokakoordinaattori

- (3) ☐ Opettaja
- (4) ☐ Koulukeittiöpäällikkö
- (5) ☐ Koulukeittiötyöntekijä
- (6) ☐ Ulkopuolinen ruokapalvelujen tarjoaja
- (7) ☐ Muu

Koulunne nimi _____

Kouluaste

- (1) ☐ Ala-aste (luokat 1-6)
- (2) ☐ Yläaste (luokat 7-9)
- (3) ☐ Yhdistetty koulu (esim. ylä- ja ala-aste yhdessä)

Kysely on päättynyt! Kiitos vastauksestanne

Appendix IV: The WBQ for Italian school

Questionario riferito al sistema italiano di ristorazione scolastica

Lo scopo del questionario è quello di individuare le possibili associazioni tra le sane abitudini alimentari tra gli alunni e l'implementazione degli alimenti biologici nelle scuole. Il progetto rientra nell'ambito del progetto di ricerca iPOPY finanziato dalla Ricerca Europea Core Organic. Al fine di ottenere un quadro d'insieme esaustivo, l'oggetto della ricerca non riguarda solo le scuole che offrono alimenti biologici, ma anche le scuole che non offrono alimenti biologici.

Le tue risposte ci danno un contributo significativo!

Aalborg University Denmark è responsabile della ricerca in collaborazione con l'Università degli Studi di Milano.

Opinione

Questa sezione entra nel merito del Vostro giudizio/opinione sul servizio di ristorazione scolastica. Per servizio di ristorazione scolastica intendiamo la fornitura di alimenti agli alunni nell'ambito dei giorni e delle ore della scuola.

	Decisamente d'accordo	D'accordo	Abbastanza d'accordo	Tendenza lmente non d'accordo	Non d'accordo	Decisamente in disaccordo
Penso che la scuola debba avere un ruolo di responsabilità nella promozione degli alimenti biologici attraverso il servizio di ristorazione.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Penso che la scuola debba avere un ruolo di responsabilità nella promozione dei prodotti biologici attraverso le sue attività didattiche.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Penso che la scuola debba promuovere comportamenti virtuosi in ambito di buone abitudini alimentari attraverso i servizi di ristorazione scolastica.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Penso che la scuola debba promuovere comportamenti virtuosi in ambito di buone abitudini alimentari attraverso le attività didattiche.	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>

Politiche scolastiche in ambito di alimenti, salute e nutrizione

Questa sezione fa riferimento alle politiche, ai regolamenti ed alle linee guida in materia di nutrizione e salute dei bambini.

Il seguente concetto è fondamentale: Politiche alimentari e nutrizionali (PAN) sono un insieme di principi e di regole adottate che nel loro insieme mirano a soddisfare le esigenze nutrizionali degli alunni nelle scuole ed a garantire la disponibilità dei cibi sani.

Precisazione: La parola "politica" comprende anche gli orientamenti, le regole, gli accordi e i contratti. In altre parole, non è l'unica politica adottata dal livello superiore (ad esempio, di governo), ma anche, e soprattutto, da chi ha un potere operativo e decisionale come ad esempio comuni, scuole stesse, commissioni mensa, etc.).

In riferimento alla vostra scuola è stata adottata una politica orientata verso principi salutistici in ambito alimentare con linee guida, leggi, regole, contratti e accordi?

- (1) ☐ Sì
- (2) ☐ No
- (3) ☐ Non so

In riferimento alla Vostra scuola chi ha adottato queste leggi, regole, contratti, accordi e linee guida?

- (1) ☐ Il Governo
- (2) ☐ l'ASL
- (3) ☐ Amministrazione interna della scuola
- (4) ☐ Comune
- (5) ☐ Commissioni mensa
- (6) ☐ Bambini
- (7) ☐ L'azienda di ristorazione
- (8) ☐ Altro

Gli insegnanti integrano nella loro didattica queste leggi, regole, contratti, accordi e linee guida?

- (1) ☐ Sì
- (2) ☐ No
- (3) ☐ Non so

Queste leggi, regole, contratti, accordi e linee guida hanno implicazioni riguardo i prodotti biologici?

- (1) ☐ Sì
- (2) ☐ No
- (3) ☐ Non so

Politiche scolastiche riferite ad attività fisiche per i bambini

Questa sezione tratta le politiche, le regole e i regolamenti in ambito di attività fisiche per i bambini, questi tipi di scuole possono essere denominate scuole di promozione della salute.

Il seguente concetto è rilevante: LA scuola di promozione della salute è quella che rafforza continuamente la propria capacità di un ambiente sano per vivere, studiare e lavorare.

Organizzazione mondiale della sanità (OMS).

Ritieni che la tua scuola soddisfi i requisiti promossi dalla Organizzazione Mondiale della Sanità (OMS)?

- (1) ☐ Sì
- (2) ☐ No
- (3) ☐ Non so

La tua scuola ha una propria politica di promozione della salute?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

La tua scuola promuove attività di trasporto di natura salutistica per i bambini maggiori di 9 anni: ad esempio a piedi o in bicicletta?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

La tua scuola ha un area giochi all'aperto?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

La tua scuola promuove attività fisiche negli intervalli?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

La tua scuola promuove attività fisiche nel doposcuola?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

La tua scuola propone attività fisiche, prioritarie nella didattica, che vadano oltre il corso di ginnastica (educazione fisica)?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

Politiche scolastiche riferite ai prodotti biologici

Questa sezione si riferisce all'attuale servizio di ristorazione scolastica in ambito di approvvigionamento di prodotti biologici.

Il seguente concetto è rilevante: La politica di approvvigionamento dei prodotti biologici (POP), fa riferimento a scuole che hanno un approvvigionamento costante e contrattualizzato di prodotti biologici.

Precisazione: La parola "politica" comprende anche gli orientamenti, le regole, gli accordi e i contratti. In altre parole, non è l'unica politica adottata dal livello superiore (ad esempio, di governo), ma anche, e soprattutto, da chi ha un potere operativo e decisionale come ad esempio comuni, scuole stesse, commissioni mensa, etc.).

Nella tua scuola c'è un approvvigionamento di prodotti biologici sancito dalle leggi/politiche/linee guida/accordi/contratti?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

Chi ha adottato queste leggi/politiche/linee guida/accordi/contratti?

- (1) ☐ Il Governo
 (2) ☐ Comune
 (3) ☐ Amministrazione interna della scuola
 (4) ☐ Insegnanti
 (5) ☐ Commissioni mensa
 (6) ☐ Bambini

(7) ☐ L'azienda di ristorazione

(8) ☐ Altro

Gli insegnanti trattano queste leggi/politiche/linee guida/accordi/contratti nel corso delle loro attività didattiche?

(1) ☐ Sì

(2) ☐ No

(3) ☐ Non so

Il Comune effettua un'attività di monitoraggio per valutare gli esiti delle politiche di approvvigionamento dei prodotti biologici?

(1) ☐ Sì

(2) ☐ No

(3) ☐ Non so

Tipologia di approvvigionamento degli alimenti nelle scuola

La prossima domanda ha 3 opzioni di risposta. In base alla tua risposta vai nella sezione indicata.

Che tipo di alimenti vengono serviti dalla tua scuola?

(1) ☐ Spuntini a base di frutta

(2) ☐ Latte fresco fuori dalle ore del pasto

(3) ☐ Una mensa con pasto complete e servizio ai tavoli

Frutta

Questa sezione riguarda le scuole che servono spuntini di frutta fresca secondo un programma prestabilito.

La tua scuola somministra frutta in classe?

(1) ☐ Sì, gratuitamente

(2) ☐ Sì, a pagamento

(3) ☐ No

(4) ☐ Non so

La tua scuola somministra frutta in classe tutti i giorni?

(1) ☐ Sì

(2) ☐ No

(3) ☐ Non so

Può gentilmente quantificare la percentuale di frutta biologica distribuita presso la sua Scuola.

(1) ☐ 0 %

(2) ☐ Sotto 25 %

(3) ☐ 25 - 50 %

(4) ☐ 50 - 75 %

(5) ☐ Sopra 75 %

Latte

Questa sezione riguarda le scuole che servono latte fresco fuori dalle ore del pasto secondo un programma prestabilito.

La tua scuola somministra latte in classe?

(1) ☐ Sì, gratuitamente

(2) ☐ Sì, a pagamento

(3) ☐ No

(4) ☐ Non so

La tua scuola somministra latte in classe tutti i giorni di scuola?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

Può gentilmente quantificare la percentuale di latte distribuito presso la sua scuola.

- (1) ☐ 0 %
 (2) ☐ Sotto 25 %
 (3) ☐ 25 - 50 %
 (4) ☐ 50 - 75 %
 (5) ☐ Sopra 75 %

Quantifichi la percentuale con cui vengono distribuiti i seguenti 4 tipi di latte.

	1 - 20 %	20 - 40 %	40 - 60 %	60 - 80 %	80 - 100 %	Non ho latte
Latte intero (approx 3.5%)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Latte parzialmente scremato (approx 1.5%)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Latte a basso contenuto di grassi (approx 0.5%)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Latte scremato (approx 0.1%)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>

Mense scolastiche

Questa sezione riguarda scuole che hanno servizi di mensa scolastica con pasti caldi e tavoli in cui i bambini si siedono.

La tua scuola ha una mensa o una sala in cui i bambini mangiano i pasti portati da casa?

- (1) ☐ Mensa
 (2) ☐ Sala da pranzo

Dove vengono preparati i pasti?

- (1) ☐ Presso una cucina interna alla scuola
 (2) ☐ In un centro di preparazione pasti esterno alla scuola

Può quantificare una percentuale di alimenti biologici distribuiti presso la sua scuola?

- (1) ☐ 0 %
 (2) ☐ Sotto 25 %
 (3) ☐ 25 - 50 %
 (4) ☐ 50 - 75 %
 (5) ☐ Sopra 75 %

Quanto tempo ci mettono i bambini per la pausa pranzo?

- (1) ☐ 15 min
 (2) ☐ 20 min
 (3) ☐ 25 min
 (4) ☐ Più di 30 min

Che lei sappia, i menu sono pianificati sulla base di ufficiali linee guida nutrizionali?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

La tua scuola ha raccomandazioni in merito agli aspetti nutrizionali ai bambini per quanto riguarda la pianificazione dei menu?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

La tua scuola ha nelle vicinanze (entro 250 metri) esercizi commerciali che vendono alimenti (bar, fast food, piadinerie, etc.)?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

La preghiamo di specificare le linee di tendenza (incremento o decremento) relativamente alle seguenti categorie di alimenti e nell'arco degli ultimi 5 anni.

	Incremento	Stesso	Decremento	Non so
Verdura fresca	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Frutta fresca	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Carne	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Prodotti derivati dal grano (crackers, pane, pasta, etc)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Bevande (succhi di frutta, etc)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Latticini a basso contenuto di grassi (yogurt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Alimenti fritti (bastoncini di pesce, cotolette, etc)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Salsicce	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Cioccolata / Barre di cioccolata	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Caramelle	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Patatine	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Torte	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Bevande gassate	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>

Se vi sono state alterazioni, la preghiamo di dirci le sue opinioni in merito.

- (1) ☐ Riduzione dei costi
 (2) ☐ Adempiere a linee guida nutrizionali
 (3) ☐ Per soddisfare le esigenze degli utenti
 (4) ☐ Altro

Secondo la tua opinione, questi cambiamenti riguardano anche gli alimenti biologici?

- (1) ☐ Sì
 (2) ☐ No
 (3) ☐ Non so

Informazioni personali & sulla scuola

In maniera tale da contattarla se ha vinto il premio, necessitiamo di chiederle alcuni dati personali. Queste informazioni sono riservate e non vengono in alcun modo fornite a soggetti terzi.

Nome _____

Cognome _____

Quale è la sua attuale occupazione nella scuola?

- | | | |
|-----|--------------------------|---|
| (1) | <input type="checkbox"/> | Preside o vice preside |
| (2) | <input type="checkbox"/> | Coordinatore dei servizi di mensa |
| (3) | <input type="checkbox"/> | Insegnante |
| (4) | <input type="checkbox"/> | Operatore interno dei servizi di ristorazione |
| (5) | <input type="checkbox"/> | Operatore esterno dei servizi di ristorazione |
| (6) | <input type="checkbox"/> | Operatore esterno dei servizi di ristorazione |
| (7) | <input type="checkbox"/> | Altro |

Nome della scuola _____

Tipo di scuola

- | | | |
|-----|--------------------------|------------------------|
| (1) | <input type="checkbox"/> | Asilo (1-5 anni) |
| (2) | <input type="checkbox"/> | Elementare (5-10 anni) |
| (3) | <input type="checkbox"/> | Altro tipo di scuola |

Il questionario è terminato.

Grazie per le tue risposte!

Fare clic sul pulsante in basso a destra in modo che le risposte ci vengano inviate e le finestre di compilazione si chiudano.

Appendix V: The FFQ for Danish schools

Formålet med spørgeskemaet er at finde ud af hvor ofte du spiser og drikker forskellig mad og drikkevarer som du får eller køber på skolen. Du skal kun vælge én af svar mulighederne til hvert spørgsmål.

Det er valgfrit at deltage og alle svarene er anonyme.

Tak for din hjælp!

Personlige oplysninger

1. Hvilken klasse går du i?
 - 5th
 - 6th
2. Hvor gammel er du?
 - 10
 - 11
 - 12
 - 13
3. Er du en dreng eller en pige?
 - Dreng
 - Pige

Spørgsmål om hvad du plejer at spise

1. Hvor ofte plejer du at købe mad på skolen?
 - Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen
2. Hvor ofte plejer du at spise mad i skolen, som du har haft med hjemmefra?
 - Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen
3. Har du tilladelse til at forlade skolens område i skoletiden?
 - Ja
 - Nej
4. Hvor ofte plejer du at købe mad uden for skolens område i skoletiden?
 - Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen
5. Hvor ofte plejer du at spise små retter at du købt uden for skolens område i skoletiden (f.eks. Burger, hotdogs, pølsebrød, pizza, pomfritter osv.)?
 - Aldrig

- Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen
6. Hvor ofte plejer du at springe frokosten over når du er i skole?
- Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag
7. Hvor ofte plejer du at spise et mellemmåltid når du er i skole (Et mellemmåltid spises mellem morgenmad og frokost og mellem frokost og aftensmad - f.eks. et stykke frugt, en kiks, en håndmad el.)?
- Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen

Spørgsmål om hvor ofte du plejer at spise frugt og grønsager

8. Hvor ofte plejer du at spise frisk frugt som du har fået eller købt på skolen?
- Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen
9. Hvor ofte plejer du at spise salat eller revne grønsager/råkost som du har fået eller købt på skolen?
- Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen
10. Hvor ofte plejer du at spise andre rå grønsager som du har fået eller købt på skolen? (Rå grønsager kan f.eks. være peberfrugt eller agurk.)
- Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen

- 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen
11. Hvor ofte plejer du at spise kartofler som du har fået eller købt på skolen?
- Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen
12. Hvor ofte plejer du at spise tilberedte grønsager som du har fået eller købt på skolen?
(Kartofler skal ikke tælles med. Tilberedte grønsager inkluderer kogte, dampede, stegte, grillede og bagte grønsager.)
- Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen

Spørgsmål om hvor ofte du plejer at spise fisk

13. Hvor ofte plejer du at spise fisk eller fiskepålæg som du har fået eller købt på skolen?
- Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen

Spørgsmål om hvor ofte du plejer at spise brød

14. Hvor ofte plejer du at spise lyst brød som du har fået eller købt på skolen? (f.eks. Franskbrød, toastbrød, krydderbolle, ciabattaboller).
- Aldrig
 - Mindre end 1 dag om ugen
 - 1 dag om ugen
 - 2-4 dage om ugen
 - Hver dag, en gang om dagen
 - Hver dag, to gange om dagen
 - Hver dag, mere end to gange om dagen
15. Hvor ofte plejer du at spise grovbrød eller grovboller som du har fået eller købt på skolen?
- Aldrig

- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

16. Hvor ofte plejer du at spise rugbrød som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

Spørgsmål om hvor ofte du plejer at spise snacks

17. Hvor ofte plejer du at spise slik som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

18. Hvor ofte plejer du at spise chokolade som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

19. Hvor ofte plejer du at spise kage som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

20. Hvor ofte plejer du at spise chips og popcorn som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen

- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

Spørgsmål om hvor ofte plejer du at drikke

21. Hvor ofte plejer du at drikke vand som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

22. Hvor ofte plejer du at drikke frugtjuice som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

23. Hvor ofte plejer du at drikke smoothies som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

24. Hvor ofte plejer du at drikke skummetmælk som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

25. Hvor ofte plejer du at drikke minimælk som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

26. Hvor ofte plejer du at drikke letmælk som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

27. Hvor ofte plejer du at drikke sødmælk som du har fået eller købt på skolen?

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

28. Hvor ofte plejer du at drikke saftvand som du har fået eller købt på skolen? *bedre sundhed for mor og barn*

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

29. Hvor ofte plejer du at drikke sodavand med sukker som du har fået eller købt på skolen? (f.eks. Coca Cola, Pepsi, Sprite mv)

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

30. Hvor ofte plejer du at drikke sodavand uden sukker som du har fået eller købt på skolen? (f.eks. Cola light, Cola Zero, Pepsi Max)

- Aldrig
- Mindre end 1 dag om ugen
- 1 dag om ugen
- 2-4 dage om ugen
- Hver dag, en gang om dagen
- Hver dag, to gange om dagen
- Hver dag, mere end to gange om dagen

Spørgsmål om økologisk mad

31. Ved du hvad økologisk mad er?

- Ja, det ved jeg godt
 - Ja, det ved jeg lidt om
 - Nej, det ved jeg ikke
32. Hvor har du hørt om økologiske fødevarer? (multiple choices)
- Fra skole
 - Fra mine forældre
 - Fra mine venner
 - Fra TV, internet eller måske aviser
 - Andre
33. Jeg tror økologisk mad er sundt.
- Meget enig
 - Enig
 - Lidt enig
 - Lidt uenig
 - Uenig
 - Meget uenig
34. Jeg synes økologisk mad er mindre skadeligt for omgivelse og mig selv.
- Meget enig
 - Enig
 - Lidt enig
 - Lidt uenig
 - Uenig
 - Meget uenig
35. Jeg vil hellere spise økologisk mad end ikke økologisk mad.
- Meget enig
 - Enig
 - Lidt enig
 - Lidt uenig
 - Uenig
 - Meget uenig
36. Jeg vil gerne spise mere økologisk mad i fremtiden.
- Meget enig
 - Enig
 - Lidt enig
 - Lidt uenig
 - Uenig
 - Meget uenig
37. Jeg vil gerne beholde de spisevaner jeg har nu.
- Meget enig
 - Enig
 - Lidt enig
 - Lidt uenig
 - Uenig
 - Meget uenig
38. Spiser du økologisk mad?
- Ja, jeg spiser meget økologisk mad

- Ja, jeg spiser en gang imellem økologisk mad
- Jeg spiser sjældent økologisk mad
- Nej, Jeg spiser ikke økologisk mad

Spørgsmål om sundhed

39. Hvad vil det sige at være sund? (multiple choices)

- Spise sundt
- At være fysisk aktiv
- Være glad
- Være med venner
- Andre

40. Synes du at du er sund?

- Jeg er meget sund
- Jeg er sund
- Jeg er næsten sund
- Jeg er ikke så sund
- Jeg er usund

41. Det er vigtigt for mig at spise sund mad.

- Meget enig
- Enig
- Lidt enig
- Lidt uenig
- Uenig
- Meget uenig

42. Jeg tror vores skolesmad er sund.

- Meget enig
- Enig
- Lidt enig
- Lidt uenig
- Uenig
- Meget uenig

43. Jeg tror økologisk mad er sundere end ikke økologiske mad.

- Meget enig
- Enig
- Lidt enig
- Lidt uenig
- Uenig
- Meget uenig

Appendix VI: The interview guideline for Danish school children

Semi-structural interview guideline

Intro spørgsmål

1. Har du kun gået på denne skole, siden du startede i skole?
2. Har du mad med i skole hjemmefra?
3. Kan du godt lide at spise på skolen?
4. Hvad synes du om at spise på skolen? – i klassen eller i kantine? Tid nok – støj eller stille – historie i mens – nogle regler – holdninger til regler osv.
5. Der er noget mad (fødevarer) der kaldes økologisk - har du hørt om det?
6. Hvad synes du om økologisk mad?
7. Har du hørt om økologisk mad derhjemme, i skolen eller andre steder?

Holding til økologisk mad

1. Hvilken slags mad kan man få på din skole?
 - Mest økologiske madvarer eller mest ikke-økologisk varer?
 - Tror du, det er vigtigt for skolen hvilken slags mad man kan få her?
 - Tror du det er noget skolen arbejder for?
 - Hvor har du hørt om skolens holdning til den mad man kan få her?
2. Opmuntrer skolen dig til at spise skolemad?
 - Hvordan opmuntrer skolen dig til at spise skolemaden?
 - Underviser lærerne om økologisk mad?
 - Hvor tit underviser de om det?
 - Har du set nogen plakater om økologiske fødevarer i skolen?
3. Tror du det betyder noget for sundheden hvor meget økologiske mad og hvor meget ikke økologisk mad man spiser?
 - Hvorfor tror du det?

Holdning til sundhed

4. Hvad syntes du sund kost er?
 - Kan du komme i tanke om nogen madvarer der er sunde?
 - Tror du det er sundere at spise mere frugt og grøntsager?
 - Syntes du at du spiser sundt?
 - Tror du maden på skolen er sund?
5. Hvad tror du er mest sundt: At spise ikke-økologisk mad eller at spise økologisk mad?

Intention

6. Har du nogen gange tænkt over hvad du spiser eller har lyst til at spise – men lader være fordi du enten ikke kan lide det eller tænker at det er usundt?
7. Kunne du godt tænke dig at spise anderledes i fremtiden (andre ting og måske mere forskellig slags mad), eller vil du hellere bare spise som du gør nu?
 - Hvordan skulle det være anderledes?
 - Hvis du gerne vil spise sundere mad, hvad for noget mad skulle det være?
 - Hvis du gerne vil drikke nogen sundere ting, hvad skulle det være?

Yderligere spørgsmål

8. Hvilken slags mad spiser du derhjemme? - Er noget af det økologisk?
9. Har i nogen sinde snakket om økologisk mad derhjemme?

WBQ spørgsmål

1. Er der nogen steder du ikke forstod hvad du skulle?
2. Er der noget ord, som du ikke kan forstå eller tvivler om?
3. er det svært for dig at svar WBQ?
4. Hvor lang tid tager det at udfylde skemaet?
5. Er det kedeligt spørgeskema?

Appendix VII: Manuscript one

“The correlated relationship of organic school food policy and school food environment – results from an observational study in Danish schools”

The correlated relationship of organic school food policy and school food environment – results from an observational study in Danish schools

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ABSTRACT

Aims: School food in many countries has recently become subject to change and innovation, not only in relation to policies for healthier eating but also in relation to policies for more sustainable food consumption and procurement. The purpose of this study was to examine the possible influence of organic food sourcing policies in Danish school meal systems on the development of healthier school food environments.

Methods: The study was a cross-sectional analysis undertaken among school food coordinators in a sample of Danish public primary schools. Through a web-based questionnaire, “organic” schools were compared to “non-organic” schools. The questionnaire explored current attitudes/intentions, policies and actions in relation to organic and healthy food served in the schools.

Results: Data indicates that the classification of a school as “organic” was associated with indicators of a healthier school environment, including the adoption of a food and nutrition policy in the school ($p = .032$), and recommending children to eat healthy ($p = .004$).

Conclusions: The study suggests that organic food policies in schools may have the potential to support a healthier school food environment.

Keywords: school food policy, healthy eating, organic food, public procurement

INTRODUCTION

There is increasing concern about significant increases in the number of overweight children and adolescents in industrialised countries. In Denmark, there has also been an increasing prevalence of overweight and obesity among school-aged children since the 1970s.^{1, 2} In 2003, 20% of Danish girls and 15% of boys aged 6-8 years were overweight.³ Childhood overweight and obesity is likely to continue into adulthood.⁴ As a result, there is increasing support for the idea that schools should play a more active role in increasing the availability of nutritious foods and in promoting healthy eating environments.⁵⁻⁸ Since young people attend school for approximately 30 hours a week consuming about one-third of their energy intake during this period,⁹ the school is an appropriate setting for policies and actions aimed at improving children's dietary habits. Such initiatives increasingly acknowledge the importance of the food environment. Evidence suggests that the availability of healthy food items in school meals is associated with children's consumption of healthy foods and that facilitating a healthy school environment may promote healthier eating behaviours in children.

In addition to providing opportunities for learning, schools are increasingly being seen as potential arenas for health promotion.¹¹⁻¹³ As a result, attitudes, intentions and actions in relation to opportunities for healthy eating are being included in school agendas and discussions.^{14,15} Consequently, policies and actions are emerging in relation to school food.¹⁶⁻¹⁸ Such discussions and activities include not only health but also involve questions relating to the sustainability of school food provision.¹⁹ School food has gradually become a window of opportunity and an issue that schools are expected to address. Such a development has been referred to as the School Food Revolution.²⁰ Experience from a number of countries, including Denmark, suggests that the call for the rethinking of school food seems to be fuelled by two slightly different perspectives: the call for organic sourcing and the call for healthy eating.²⁰⁻²²

Introducing organic food in school food systems involves making a large number of changes to existing routines. Hence, such innovation processes offer opportunities to shape the meal system to meet more ambitious demands such as improved quality and nutrition of school meals. For instance, when a catering system converts to using only organic products, this may require a redesign of the menu e.g. less meat and more vegetables due to relatively high premium prices on organic meat. Thus, it is reasonable to assume that such radical changes to a supply system may affect the meals served in a way that may also have nutritional implications.

This paper takes a closer look at the school food revolution from a Danish perspective and looks at the possible effect school food might have in relation to these changing attitudes, intentions and actions. The study employed the Theory of Planned Behaviour model^{23, 24} to investigate schools' individual attitudes and policies that may represent a collected viewpoint of individual attitudes, intentions and actions towards organic food. In line with the Theory of Planned Behaviour, action is determined by intention. In turn, attitude has a strong correlation relationship with intention and action in multiple contexts.²³⁻²⁵ Since schools at a collective level are difficult to measure, School Food Coordinators (SFCs) were chosen as the representative objects, as they can be identified at an individual level. This study analyses the interplay between the different levels of attitudes, intentions and actions among stakeholders at school and the interplay between the two school food trajectories: organic sourcing and healthy eating.^{24, 25}

No previous studies have investigated in depth how the healthy diet agenda and the organic food agenda in public schools might be interwoven. Some literature, however, indicates that school food policy has previously attempted to influence children's eating habits and the healthiness of school environments.^{12, 17, 18} Furthermore, previous research has shown that the supportiveness of organic food in Danish workplace canteens²⁶ seems to go hand in hand with an increased availability of healthy food options.

This article includes two important notions: 1) A Public Organic food Procurement (POP) policy refers to a policy where a particular amount of specified foods are expected to be organic, practiced in public organizations offering food. 2) A Food and Nutrition Policy (FNP) is a set of written and adopted principles that aims to fulfil the nutritional needs of pupils and ensure the availability and accessibility of healthy foods in schools. As a result of democratic involvement, despite no national regulation regarding the provision of organic school food, Danish schools may still provide organic food without the adoption of POP policy and/or FNP. It also should be noted that schools may provide organic food based on either of these policies. In the current study, the organic schools were defined as schools with a POP policy and the non-organic schools were defined as those schools without a POP policy. The purpose of this current research was to investigate the influence of POP policy in Danish schools on how a school uses the school food environment to encourage healthy eating behaviours.

METHODS

Samples

The current study was part of the innovative Public Organic food Procurement for Youth (iPOPY) project, which was one of eight pilot research projects within the CORE Organic ERA net. The main focus in the iPOPY project was on organic food served in schools and other public arenas for young people. A basic goal was to contribute to an increased consumption of organic food in Europe. As publicly organized food services are rare in the country, the number of schools sampled was limited. It was therefore not possible to survey all public schools. The selection of schools (public schools with pupils aged 6-15 years) was made in two steps. Firstly, 93 schools were selected with assistance from school meal officials in the municipalities where there were established school food service systems. Secondly, 86 schools were sampled based on

a former study by the National Food Institute. Our desired informants were school staff in charge of the school food service, the SFCs. In practice, this person could be anyone from the school headmaster to a school food caterer.

Instruments

The original questionnaire was assigned by the iPOPY project. To our knowledge, prior to this study no previous quantitative study on organic school food services had been conducted. The Web-Based Questionnaire (WBQ) was thereby further developed based on the Theory of Planned Behaviour²³. This was in order to explore the attitudes of the SFCs towards the integration of organic food in school meals and towards healthy eating in school, and to identify existing school food policies (intentions) and serving practices (actions). In order to identify each school as organic or non-organic, the informants were asked if they had a POP policy in the questionnaire. All questions in the WBQ were closed questions, with alternatives to be ticked for factual information and one option to answer with the informant's opinions (Table 1).

Table 1. Survey questions on SFCs' attitudes, policies/intentions and actions towards organic school food

Questions
Factual information
1. Your position in the school.
2. Number of pupils.
3. Classes (1-7, 1-8, 1-10 or 8-10).
Attitude
1. I think the school has a responsibility in promoting organic foods through its food service.
2. I think the school has a responsibility in promoting organic food through its curricular activities.
3. I think the school has a responsibility in promoting healthy eating habits through its food service.
4. I think that the school has a responsibility in promoting healthy eating habits through its curricular

POP policy

1. Does your school have the POP policy?
2. Which institution has adopted the POP policy?
3. Is this POP policy a compulsory or voluntary program?
4. Does the school have any monitoring steps or evaluation parameters for this POP policy?

FNP

1. Does your school have the FNP?
2. Which institution has adopted the FNP?
3. Does this FNP include pedagogical activities?
4. Does the FNP have any content concern about organic food?
5. Does your school have a nutrition committee or similar?
6. Are school food nutritionally calculated on a regular basis, if your school has school food?

Other policies

1. Is your school a health promoting school according to World Health Organization (WHO) principle?
2. Does your school have your own health promoting policy?
3. Does your school promote biking or walking to school?
4. Does your school have a playground?
5. Does your school promote physical activity in breaks?
6. Does your school have physical activity as a prioritized theme in curricular except gym courses?
7. Is your school in the green flag school program?

School fruit scheme

1. Please estimate the percentage of organic fruit share.
2. Does your school give fruit out in class every school day?

School milk scheme

1. Please estimate the percentage of organic milk share.
2. Please estimate the amount of full fat (3.5%), semi fat (1.5%), mini fat (0.5%), low fat (0.1%), full fat cocoa (3.5%), and low fat cocoa milk (0.1%).
3. Does your school give milk out in class every school day?

School tuck shop

1. Where is your school meal prepared?
 2. Please estimate the percentage of organic foods share.
 3. What type of meals do you offer?
 4. How long is the lunch break at school?
 5. Does your school have restrictions on the type of snack foods available in the tuck shop?
 6. What supplementary food items are offered in the tuck shop?
 7. Does your school have a competitive food outlet outside but nearby the school (shorter than 250 meters), e.g. a kiosk, gasoline station etc.?
 8. Does your school have restrictions, for pupils who are allowed to leave the school, on their access to competitive food outlets outside the school?
-

School canteen

1. Where is your school meal prepared?
2. Please estimate the percentage of organic foods share.
3. Does your school meal service have to comply with official nutritional guidelines?
4. Are menus designed based on the demand of pupils in the school?
5. What kind of meal offering does your school have?
6. Does the school give the nutritional recommendations to pupils about what they should choose?
7. How long is the lunch break at school?
8. Does your school have a competitive food outlet outside but nearby the school (shorter than 250 meters), e.g. a kiosk, gasoline station etc.?
9. Does your school have restrictions, for pupils who are allowed to leave the school, on their access to competitive food outlets outside the school?

Food items

1. Please specify in which direction your serving practices have changed in relation to the availability of the following items over the past 5 years. Fresh Vegetables, Fresh Fruits, Meats, Whole grain products, Beverages, Low fat dairy, Deep fried food, Sausages, Chocolate, Candy, Chips, Cake, Fizzy drinks.
 2. If your serving practices have changed, please give the reason.
 3. Are these changes your option associated with your POP policy?
-

Procedure

179 schools were sampled and approached by e-mail in May 2008. The e-mail contained information about the survey and the iPOPYPY project background. The SFCs were invited to participate in the survey using a self-administered WBQ. In April 2008, several public schools attended a meeting where the survey was presented and they were invited to participate. A pilot test of the questionnaire was conducted with a few schools in the city of Roskilde. After some modifications, the completed questionnaire was converted to a web-based version and the final WBQ was made available for respondents through a web browser link. The questionnaire was sent out individually and directly to 179 schools and was available for completion for three weeks. Reminder letters were sent by e-mail one to two weeks after sending the first invitation. The schools were divided into “organic schools”, and “non-organic schools” based on information from the questionnaires.

Data Analysis

The quantitative data was analyzed using the Statistic Package for the Social Science software package version 19.0 (IBM SPSS® inc., Chicago, IL, USA). Descriptive statistics were used to characterize the study sample of schools. All p - values reported were two-tailed. The level of statistical significance was set at $p < .05$. The Chi-squared test was used to test the association between nominal variables and school type (organic or non-organic). The Mann-Whitney U Test was used to test differences between school type and ordinal variables, followed by Fisher's exact test to examine the relationship between the variables and school type. As, for the majority of the data, statistically significant differences were not observed between the types of schools, the analysis presented in the following results section only reports on items in the survey listed in Table 1.

RESULTS

A total of 92 schools responded the WBQ and the response rate was 51%. Of these, 20 schools reported to have a POP policy and were labeled as an organic school, while the 63 schools that reported to not have any policy to serve organic food were labeled as a non-organic school.

With regard to the importance of promoting healthy eating habits through school meals services and teaching, not many differences were found between organic and non-organic schools, with respondents from both groups generally agreeing that this was important. The differences between the organic and non-organic schools concerning these two questions were not statistically significant (Table 2). However, a difference was found between the two school types in attitudes towards promoting healthy eating habits through education ($p = .013$). In the organic schools, 80 % reported to have an adopted FNP, whereas only 57% of non-organic schools

Table 2. **Percentage that agrees that schools have a responsibility for promoting healthy eating via school meals and education, applying the food and nutrition policy and recommending nutritional menus for pupils in canteen.**

Theory of Planned Behaviour	Questionnaire statement		Organic school (n=20)	Non-organic school (n=63)	X²	df	p
Attitude	I think that the school has a responsibility in promoting healthy eating habits through its food service.	Strongly agree N (%)	100	86	9.3	NA	NS
	I think that school has a responsibility in promoting healthy eating habits through its curricular activities.	Strongly agree N (%)	100	87	15.3	NA	.013 ^a
Intention	Does your school have the FNP? N (%)		80	57	4.6	1	.032
Action	Does the school give the nutritional recommendations to pupils about what they should choose? N (%)		50	6.3	8.4	1	.004

^a*p*-value for Fisher's exact test between school groups and attitude variable

NS: not significant

NA: not applicable

reported such a policy. The difference between the organic and non-organic schools concerning adoption of FNP was statistically significant, with a positive association between having a FNP and the type of schools ($p = .032$). A range of food items and dishes may be offered in school canteens, and food items chosen by the pupils may be very different. Recommendations for nutritional menus for pupils may be helpful. Approximately 50% of the organic schools recommended their pupils to eat healthier, whereas only 6.3% of the non-organic schools recommended their children to eat healthier. The difference was statistically significant, with a strong relationship found between making recommendations for nutritional menus and the type of school ($p = .004$).

DISCUSSION

In the WBQ, a short section questioned the respondent's attitudes towards the extent to which schools should be made responsible for the promotion of organic food and healthier eating habits via teaching and the provision of school meals. Since SFCs have shown strong correlations with improving children's diets and making school meals programs healthier,^{27, 28} it was important to first explore the attitudes of SFCs as they are expected to take the initial steps towards improving school children's poor diets. The responsibility of the SFCs might greatly influence the implementation of school policies through curricular programs and/or school meals. However, the attitudes of the SFCs may also act as barriers to promoting healthy diets among children if SFCs have a poor knowledge of health or if they encourage unhealthy food practices.

In the present study, nearly all SFCs strongly agreed that it is the school's responsibility to promote healthy eating habits via teaching and food serving. This may not be surprising – who would say that a school should promote unhealthy eating? – but at a time when school staff are commonly overloaded with tasks, it is very positive to see that nearly all respondents agree that

healthy eating is something the school should be responsible for and prioritize. Although there were no statistically significant differences between types of schools, it is still encouraging to see that the school sector in general seems to be positive towards the promotion of healthy eating.

A greater amount of organic schools than non-organic schools had developed a dedicated FNP. Developing and adopting a school food policy has shown to be a good way to provide a healthy food environment at school.¹⁰⁻¹² School food restrictions can alter food availability in the school environment, and may therefore reduce the availability of unhealthy items.¹⁸ Other researchers have indicated that school food policy has an influence on children's eating habits.^{12, 17, 18} Hence, a FNP can be assessed as a good indicator of healthy eating patterns in school. Such policies might involve routines and knowledge on how to purchase, prepare, and make healthy school foods available as well as provide ideas on how to get pupils involved in these activities.

It should be noted that, during the process of adopting the school food policies, schools are not always the decision makers. Decision may also be made by the municipalities, or be influenced by government decisions or parent opinions. When the municipalities make the main decision, the schools might feel less responsible for the implementation, arrangement and operation of a school food service. When decisions come from higher levels, it may be challenging for the schools to be motivated to promote the school meals. Low motivation to develop school meal systems with a high share of organic products has been a problem, for example in Copenhagen, where only 7% of the pupils report buying their school lunch from the EAT food service system.²⁹ This number is very low compared to the amount of funding, work, and other resources invested in this project. The school is not only responsible for providing the school food, but is also a crucial actor in encouraging children to consume the food and establish proper dietary patterns.

The finding that more organic schools made nutritional recommendations to pupils about the healthier food options to choose proves that such schools not only have policies in place, but also take action to encourage the pupils to consume healthier foods. Since pupils are largely influenced by cues to eat unhealthily, an active role of the school in enforcing healthy eating recommendations is necessary.^{13, 16} In addition, this provides an opportunity for schools to promote health and wellbeing. The combined effect of a school food policy together with support from the school is likely to positively influence the eating behaviour of children, their confidence in choosing healthy foods, and their perceived support for consuming healthier foods.⁷

Government policy makers may consider this evidence as a reference when they adopt school food policies that may involve organic foods, or that provide more organic healthy products on the menu instead of unhealthy items. The school may integrate the organic food policy into their health curriculum to enhance the awareness of a healthy diet and to help children recognize their responsibility to support sustainable food, such as choosing this kind of food for their school lunch as well as outside of school.

A limitation of this study is the small sample size. The main reason for this study was to investigate how schools with a dedicated POP policy might also perform better in other areas related to nutrition and health, as compared to a sample of average non-organic schools. Despite the small sample size, the information contained in the WBQs received provided very interesting material, as shown by the results presented.

The other limitation of this study was a potential for misinterpretation of the questions in the WBQ. Although the WBQ employed plain language, the SFCs may have experienced difficulty in understanding the concepts if they lacked experience in completing similar tasks. Therefore, there is some risk that the SFCs could have ticked an incorrect response, particularly in the crucial questions which identify the school as organic or non-organic. We identified SFCs, but

did not have their email addresses. Hence, we relied on the person opening the e-mail on behalf of the school to forward it to the correct person, which did not always happen. Further to this, SFCs may not be familiar with using a computer or it is that they might rush the questionnaire if they are busy. This could have also produced incorrect responses.

CONCLUSIONS

This study shows that, in comparison to non-organic schools, organic schools provide food environments that are more favourable to healthy eating, as assessed using a number of proxy measures. These measures were actions to promote healthy eating habits by adopting and maintaining a FNP and applying nutritional recommendations for pupils. Despite the fact that the decisions surrounding organic school food supply in many cases seem to be made by civil servants and politicians, it seems that stakeholders at the school – in the foreground – have attitudes, intentions/policies and actions that comply to a certain extent with the background strategies. Therefore, more effort should be devoted to building a coordinated and systematic platform concerning school food policy among politicians, government officials and school stakeholders. However, there was little evidence and lack of statistical power in previous studies and there is a need for more research on the influence of POP policy on creating a healthy school food environment.

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REFERENCES

1. Lissau, I. & Poulsen, J. 2005, "Nutrition policy, food and drinks at school and after school care", *International journal of obesity (2005)*, vol. 29 Suppl 2, pp. S58-61.
2. Matthiessen, J., Velsing Groth, M., Fagt, S., Biloft-Jensen, A., Stockmarr, A., Andersen, J.S. & Trolle, E. 2008, "Prevalence and trends in overweight and obesity among children and adolescents in Denmark", *Scandinavian Journal of Public Health*, vol. 36, no. 2, pp. 153-160.
3. Pearson, S., Olsen, L.W., Hansen, B. & Sorensen, T.I. 2005, "Increase in overweight and obesity amongst Copenhagen school children, 1947-2003", *Ugeskrift for laeger*, vol. 167, no. 2, pp. 158-162.
4. Pearson, S., Hansen, B., Sorensen, T.I. & Baker, J.L. 2010, "Overweight and obesity trends in Copenhagen school children from 2002 to 2007", *Acta Paediatrica (Oslo, Norway : 1992)*, vol. 99, no. 11, pp. 1675-1678.

5. Moore, L. & Tapper, K. 2008, "The impact of school fruit tuck shops and school food policies on children's fruit consumption: a cluster randomised trial of schools in deprived areas", *Journal of epidemiology and community health*, vol. 62, no. 10, pp. 926-931.
6. Kain, J., Uauy, R., Albala, Vio, F., Cerda, R. & Leyton, B. 2004, "School-based obesity prevention in Chilean primary school children: methodology and evaluation of a controlled study", *International journal of obesity and related metabolic disorders : journal of the International Association for the Study of Obesity*, vol. 28, no. 4, pp. 483-493.
7. Story, M., Kaphingst, K.M. & French, S. 2006, "The role of schools in obesity prevention", *The Future of children / Center for the Future of Children, the David and Lucile Packard Foundation*, vol. 16, no. 1, pp. 109-142.
8. Rees, G.A., Richards, C.J. & Gregory, J. 2008, "Food and nutrient intakes of primary school children: a comparison of school meals and packed lunches", *Journal of human nutrition and dietetics : the official journal of the British Dietetic Association*, vol. 21, no. 5, pp. 420-427.
9. Sanigorski, A.M., Bell, A.C., Kremer, P.J. & Swinburn, B.A. 2005, "Lunchbox contents of Australian school children: room for improvement", *European journal of clinical nutrition*, vol. 59, no. 11, pp. 1310-1316.
10. Bevans, K.B., Sanchez, B., Teneralli, R. & Forrest, C.B. 2011, "Children's eating behavior: the importance of nutrition standards for foods in schools", *The Journal of school health*, vol. 81, no. 7, pp. 424-429.
11. Gosliner, W., Madsen, K.A., Woodward-Lopez, G. & Crawford, P.B. 2011, "Would students prefer to eat healthier foods at school?", *The Journal of school health*, vol. 81, no. 3, pp. 146-151.

12. Eriksen, K., Haraldsdottir, J., Pederson, R. & Flyger, H.V. 2003, "Effect of a fruit and vegetable subscription in Danish schools", *Public health nutrition*, vol. 6, no. 1, pp. 57-63.
13. Chen YH, Yeh CY, Lai YM, Shyu ML, Huang KC, Chiou HY. 2010, "Significant effects of implementation of health-promoting schools on schoolteachers' nutrition knowledge and dietary intake in Taiwan", *Public health nutrition*. vol. 13, no. 6, pp. 579-588.
14. Biloft-Jensen, A., Groth, M.V., Matthiessen, J., Wachmann, H., Christensen, T. & Fagt, S. 2009, "Diet quality: associations with health messages included in the Danish Dietary Guidelines 2005, personal attitudes and social factors", *Public health nutrition*, vol. 12, no. 8, pp. 1165-1173.
15. Prelip, M., Slusser, W., Thai, C.L., Kinsler, J. & Erausquin, J.T. 2011, "Effects of a school-based nutrition program diffused throughout a large urban community on attitudes, beliefs, and behaviors related to fruit and vegetable consumption", *The Journal of school health*, vol. 81, no. 9, pp. 520-529.
16. Cullen, K.W., Watson, K., Zakeri, I. & Ralston, K. 2006, "Exploring changes in middle-school student lunch consumption after local school food service policy modifications", *Public health nutrition*, vol. 9, no. 6, pp. 814-820.
17. Jaime, P.C. & Lock, K. 2009, "Do school based food and nutrition policies improve diet and reduce obesity?", *Preventive medicine*, vol. 48, no. 1, pp. 45-53.
18. Vereecken, C., Bobelijn, K. & Maes, L. 2004, "School food policy at primary and secondary schools in Belgium-Flanders: does it influence young people's food habits?", *European journal of clinical nutrition*, vol. 59, no. 2, pp. 271-277.

19. Morgan, K. & Sonnino, R. 2008, "Procurement Matters: Reclaiming the Public Plate" in *The School Food Revolution: Public Food and the Challenge of Sustainable Development* Earthscan, London, pp. 21-42.
20. Morgan, K. & Sonnino, R. 2008, "School food as social justice: The quality revolution in Rome" in *The school food revolution: Public food and the challenge of sustainable development* Earthscan, London, pp. 65-88.
21. Morgan, K. & Sonnino, R. 2008, "A sustainable world city? School food reform in London" in *The School Food Revolution: Public Food and the Challenge of Sustainable Development* Earthscan, London, pp. 89-112.
22. Willer, H. & Kilcher, L. 2011, *The World of Organic Agriculture. Statistics and Emerging Trends 2010*.
23. Ajzen, I. 1991, "The theory of planned behaviour", *Organ Behav Hum Dec*, vol. 50, pp. 179-211.
24. Ajzen, I. & Fishbein, M. 1980, *Understanding Attitudes and Predicting Social Behaviour*, Prentice Hall, Englewood-Cliffs, NJ.
25. Hammer, D. 2009, "Professional Attitudes and Behaviors: The “A’s and B’s” of Professionalism", *AM J Pharm Educ*, vol. 64, pp. 455-464.
26. Mikkelsen, B., Bruselius-Jensen, M., Andersen, J. & Lassen, A. 2006, "Are green caterers more likely to serve healthy meals than non-green caterers? Results from a quantitative study in Danish worksite catering", *Public health nutrition*, vol. 9, no. 7, pp. 846-850.
27. O'Brien, L.M., Polacsek, M., Macdonald, P.B., Ellis, J., Berry, S. & Martin, M. 2010, "Impact of a school health coordinator intervention on health-related school policies and student behavior", *The Journal of school health*, vol. 80, no. 4, pp. 176-185.

28. Rossiter, M., Glanville, T., Taylor, J. & Blum, I. 2007, "School food practices of prospective teachers", *The Journal of school health*, vol. 77, no. 10, pp. 694-700.
29. Vorum, M.G. , *Sund skolemad skal slå fastfood i frikvarteret*. Available:
<http://www.okologi.dk/baeredygtigt-forbrug/aktuelt-om-oekologi/oeko-nyheder/2010/mar/sund-skolemad-skal-slaa-fastfood-i-frikvarteret.aspx> [2011, 11/02].

Appendix VIII: Manuscript two

“Do attitudes, intentions and actions of School Food Coordinators (SFCs) regarding Public Organic food Procurement (POP) policy improve the eating environment at school? - Results from the iPOPY study”

Do attitudes, intentions and actions of School Food Coordinators (SFCs) regarding Public Organic food Procurement (POP) policy improve the eating environment at school? - Results from the iPOPYP study

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Running title: Organic food policy in the school

Abbreviations in the manuscript:

- innovative Public Organic food Procurement for Youth (iPOPYP)
- Theory of Planned Behaviour (TPB)
- Web-Based Questionnaire (WBQ)
- School Food Coordinators (SFCs)
- Public Organic food Procurement (POP)
- WHO (World Health Organization)
- Kaiser-Meyer-Olkin (KMO)
- Odds Ratio (OR)
- Confidence Interval (CI)
- Food and Nutrition Policy (FNP)

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Abstract

Objective: This study investigates whether Public Organic food Procurement (POP) policies have the potential to induce changes in the school food service environment.

Design: A comparative cross-national survey was conducted in public primary and/or secondary schools in Finland, Germany and Italy. The School Food Coordinators (SFCs) completed a Web-Based Questionnaire (WBQ) on their attitudes, intentions and actions towards organic school food provision.

Setting: In Germany, 122 out of 2050 schools in the state of Hesse responded. In Finland, 250 out of 998 schools across the country responded. In Italy, 215 out of 940 schools from eight provinces responded.

Subjects: SFCs in the sample of schools from each of the three countries.

Results: In our study, the German and Finnish SFCs separately most agreed with the promotion of healthy eating habits ($P<0.001$), and organic food ($P<0.001$), by school. The Finnish schools were most likely to adopt the FNP ($P<0.001$), a health promoting school policy according to WHO principle ($P<0.001$), to have a playground ($P<0.001$), to involve physical activity themes in teaching ($P=0.012$), and to have canteen ($P<0.001$). The Italian schools were most likely to involve the FNP issues in pedagogical activities ($P=0.004$), to serve nutritional school meals ($P<0.001$) and to recommend children to eat healthily ($P<0.001$). In three countries, the non-organic schools were less likely to adopt a FNP ($P<0.001$), a WHO health promoting policy ($P<0.001$) and have a canteen ($P=0.017$) than the organic schools.

Conclusion: This study suggests that there is gap on the effects of the POP policy on building a healthier school food environment.

Keywords: organic food, procurement, school food policy, healthy eating

Introduction

The public sector food procurement can play a key role in providing healthy, sustainable food to the public^(1,2). Including organic food that often is seen to represent sustainability in public procurement represents opportunities and challenges when implementing policy into practice⁽³⁻⁵⁾. On the one hand, organic food in public procurement could contribute to improved health awareness, environment friendly issues and might encourage small local business to support sustainable development^(6,7). On the other hand, one important factor is the increased cost of buying organic food compared to non-organic food, which may present a much greater challenge than when only providing non-organic meals⁽⁸⁾.

Recent years have seen many countries utilising new, healthier diet strategies and policies that aim to create a healthy food environment at public sectors such as school⁽⁹⁻¹²⁾. Many studies indicate that promoting healthy eating habits among children in schools could be a promising approach to counteracting the increasing prevalence of childhood overweight and obesity⁽¹³⁻¹⁶⁾. Previous studies also show that increasing the availability of healthier foods as part of school meals results in their increased consumption by children^(10,17,18). It is therefore relevant to study whether there is mutual influence and positive relationship between the introduction of organic supply policies and healthier eating environments at school.

This study was part of the CORE Research Pilot Project, innovative Public Organic food Procurement for Youth (iPOPY). The project was carried out in countries where school food is a part of the public welfare provision (the citizenship model)⁽¹⁹⁾ as well as in countries where it is offered on the basis of a market-oriented model⁽²⁰⁾. An example of the citizenship model is found in Finland, where a prepared free school lunch is served as part of the welfare system^(19,21). The concept of Finnish school lunch is to offer nutritional and varied meals to pupils. At the same time, the school meal is also used as a pedagogical tool to teach nutrition topics and to advocate for healthier diets⁽²²⁻²⁴⁾. In Germany, where school meals have a market-oriented model, the only kind of school food provision is a complementary in-between meals snack rather than full meals. Furthermore, there is no Federal compulsory regulation to implement a school meal program and consequently only a small proportion of schools offer school meals⁽²⁵⁻²⁷⁾. In Italy, the school meals represent a mix of citizenship and market-oriented models. This means that in some regions school meals are organized with a differential price, where parents with higher incomes pay more than those with lower incomes^(4,28). The Italian school food service is not recognized

simply for the provision of meals for children or good nutrition education, but is also seen as a method of sustainable food procurement⁽²⁸⁾. Moreover, Finland, Germany and Italy are also geographic representatives of northern, middle and southern Europe.

The present study is based on the Theory of Planned Behaviour (TPB)⁽²⁹⁾ and employed a modified TPB as theoretical frame to investigate schools' individual attitudes and policies towards organic foods. The modified TPB was interested in investigating the effect that actions (behaviours) are preceded by attitudes and intentions⁽³⁰⁾. In turn, attitude has a strong association with intention and action in multiple contexts⁽³⁰⁾. Since it is not possible to measure a school's attitude, intention and action, this study builds on the assumption that there is one important stakeholder within the school environment, the School Food Coordinators (SFCs). It analyses the interplay between the different levels of attitudes, intentions (policies) and actions among SFCs and the interplay between the two school food trajectories: organic sourcing and healthy eating. The aim of the study was to investigate the relationship between Public Organic food Procurement (POP) policy and SFCs' attitudinal issues, intentions and actions in relation to the school meals system and whether such policies lead to the promotion of a healthier school food environment.

Experimental methods

Study design and subjects

A comparative cross-national survey was conducted between November 2009 and April 2010. A self-administrated Web Based Questionnaire (WBQ) was completed by the SFCs in selected public primary and/or lower secondary schools (children aged 6-15) in Finland, Germany and Italy. Since schools at a collective level are difficult to measure, it was decided to use SFCs as the research subjects as they can be identified as individual, but can also provide a holistic view of the school food situation at a collective level. The SFCs in this study refer to school staff in charge of the school food service. In practice, this person could be anyone from the school headmaster to a school food caterer. Schools were divided into two categories: organic schools that had an organic sourcing policy aimed at having a certain amount of organic ingredients in school meals; and non-organic schools that had no policy on such an issue, using only non-organic ingredients. The classification was done based on the survey responses since it was not

possible to decide a priori whether the schools in the sample were organic or non-organic schools. A convenience sampling approach was used to select participation schools. The selected schools were sampled and contacted through iPOPYP researchers' network.

The study firstly explored the attitudes of the SFCs towards the promotion of organic food and healthy eating at schools. Secondly, it investigated how the schools intend to create an environment, which encourages and enables children to eat healthier. Thirdly, the study looked at any actions undertaken by the schools to support such attitudes and intentions. Based on an in-depth analysis of the survey findings, a number of indicators were picked up for further data analysis in order to discover potential associations between the introduction of organic food and the provision of conditions that might be supportive of children's' healthier eating at school.

Instruments

The initial questionnaire was designed in a Word format in English and later translated into German, Finnish and Italian respectively by the iPOPYP partners in each country. As the aim was to compare the differences in school meals between organic and non-organic schools from three countries, the phrasing of the questions in the WBQs was adapted slightly in order to capture structural differences in the school food culture between Germany, Finland and Italy, although the subjects remained the same. In each country, the WBQ was pre-tested by experts. In Germany, the pilot test was not able to carry out in schools, due to the difficulties in contact with local authority. In Finland and Italy, the pilot tests were conducted in organic and non-organic schools. After all responses were collected, the iPOPYP partners subsequently revised the questionnaire and produced the final version in the three languages. The completed questionnaires were converted to the web-based versions using the software SurveyXact. The WBQs were made available for respondents through a web browser link.

SFCs' attitude towards promotion of organic food and towards promotion of healthy eating habits

In this section, the questions were aimed at mapping the attitudes and opinions of SFCs concerning school responsibility towards the promotion of organic food and healthy diets

through food serving and education. The statements addressing attitude were “I think that the school has a responsibility in promoting healthy eating habits through its food service”, and “I think that school has a responsibility in promoting healthy eating habits through its curricular activities”. There were 6 response categories ranging from “Strongly agree” to “Strongly disagree”. By not providing a neutral scale (e.g. “Neither agree or disagree”), this forces respondents to think about each scale and answer the response categories provided, rather than respondents repeatedly choosing the same answer to each questions.

Schools’ intentions in serving healthy school meals and creating health promoting school

To explore the schools’ intentions concerning the promotion of healthy eating habits among children through offering organic and healthy school meals, proxy measures in relation to mapping school health policies were taken. For example, “Does your school have a Food and Nutrition Policy (FNP) in relation to pupils’ health?”, “Do teachers involve this FNP during teaching activities?” and “Does your school have a health promoting school policy according to WHO principle?”. It was also asked whether the school had a policy to purchase organic products, and this indicator was used to categorize the sampling schools into two groups; organic and non-organic schools. These questions were dichotomized as having answered “Yes” versus “No”.

Actions that schools had undertaken towards healthy school meals

SFCs were asked questions that addressed the school food system in practice, including whether the schools offered a school canteen with a dining hall, suggestions for children to choose healthier meals, and the provision of nutritious school meals. The questions used were: “Does your school have a canteen?”, “Does your school recommend its own nutritional menus for pupils in canteen?”, and “Is the school food nutritionally calculated according to official nutritional guidelines?”. These questions were dichotomized as having answered “Yes” versus “No”.

Procedures

Germany: a market-oriented model

In Germany, limited resources and ethical considerations regarding the handling of the schools' contact information meant that the study was limited to the state of Hesse. The selected schools were invited to participate in the WBQ via a link inserted into the monthly school newsletter made by the Ministry of Education and Cultural Affairs in Hesse. The newsletters were attached with the link to the WBQ and in November 2009 a short text about project were distributed to all schools (n=2050) in Hesse. The WBQ was open for completion from November 2009 to April 2010. To increase the response rate, the link was also put on the website of the School Coordinator Centre in Hesse, although no reminder was sent.

Finland: a public welfare system model

Two nutrition researchers helped with the collection of Finnish school contacts; one from South Savo Vocational College, who provided 143 schools e-mail addresses, as well as a nutrition researcher from Laurea Polytechnic, who offered 855 school contacts. The WBQ was subsequently distributed to 988 schools along with a brief introduction of the project. Two reminders were sent out one and two weeks after initial distribution. The questionnaire was open for around one month from November to December 2009.

Italy: a mix model of citizenship and market-oriented model

In Italy, the lists of school contacts were obtained from iPOP research partners in Milan. The selected 940 schools were distributed in eight provinces: Bergamo (n=146), Bologna (n=130), Brescia (n=170), Cremona (n=16), Lecco (n=21), Milano (n=268), Pavia (n=72) and Varese (n=117). The WBQ, distribution letter and three reminders were translated into Italian. The WBQ was open two months from December 2009 to February 2010. To increase the response rates three reminders were sent after sending the WBQ. The link to the WBQ was provided in the e-mail each time.

Statistical analysis

All statistical analyses were carried out using the Statistic Package for the Social Science software package versions 19.0 (IBM SPSS® inc., Chicago, IL, USA). Only completed questionnaires were retained for analysis. Descriptive statistics were first used to measure the frequency of the variables studied. All P-values reported were two-tailed. The level of significance used was $P < 0.05$. The independent variables were country (Germany, Finland and Italy) and school category (organic and non-organic).

The factorability of the attitude questions was examined by principal component analysis, because the primary purpose was to identify and compute composite scores for the factors underlying the attitudes of the SFCs. Firstly, all 4 items (a. Attitude of promotion of organic food via school food service. b. Attitude of promotion of organic food via teaching activities. c. Attitude of promotion of healthy eating habits via school food service. d. Attitude of promotion of healthy eating habits via teaching activities.) were correlated with two components, suggesting reasonable factorability. Secondly, at 0.51, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy tests whether the partial correlations among variables are small indicated it was acceptable factor analysis to proceed⁽³¹⁾, and Bartlett's test of Sphericity tests whether the correlation matrix is an identity matrix was significant in our study ($X^2(6) = 440.53, P < 0.001$). Finally, the communalities were all above 0.5 (see Table 2), further confirming that each item shared some common variance with other items⁽³¹⁾. Thereafter, the Kruskal-Wallis Test was used to test comparisons of independent variables. This was due to the fact that attitude questions included ordinal values, and there were also two independent variables. In addition to this, the Kruskal-Wallis Test is a nonparametric test that does not assume normality in the data, and so was therefore appropriate for the present study⁽³¹⁾.

For the questions regarding intentions and action, the dependent variables were nominal. Logistic and Multinomial Regression were used to examine the association between dependent and independent variables. To obtain the odds ratio (OR), a confidence interval of 95% was used. The Hosmer and Lemeshow Goodness-of-Fit-test from Logistic and Multinomial Regression was used to examine whether the estimated model fit the data at an acceptable level⁽³¹⁾. In the form of an OR, the comparison between each independent variable was estimated, with Germany and non-organic schools used constantly in Logistic and Multinomial Regression as the reference categories.

Results

Table 1 shows the number of distributed, organic and non-organic schools and respondent rate from Germany, Finland and Italy. Among the respondents, only 12% German, 10% Finnish and 25% Italian schools were classified as organic schools according to the definition in the WBQ.

Table 1 Number of questionnaires distributed to organic and non-organic schools, and response rates in Germany, Finland and Italy

	Germany	Finland	Italy
Distributed (n)	2050	998	940
Responded (n)	122	250	215
Organic schools (n)	14	24	53
Non-organic schools (n)	44	69	108
Don't know (n)	5	8	26
Missing values	59	149	28
Respondent rate (%)	6	25	23

Attitudes

We firstly investigated the SFCs' attitudes towards the promotion of organic food and healthy eating habits, through school food services and teaching activities in the organic and non-organic schools in each country. Overall, the factor analyses in Table 2 indicate that there were two distinct underlying factors to the SFCs responses to the questions on attitudes. Factor 1 was labelled 'sustainable reasons to determine SCFs' attitude' due to the high loadings by the following item: to promote organic food via school food service and teaching activity. This first factor explained 49.45% of the variance. The second factor derived was labelled 'health reasons to determine SCFs' attitude' due to the high loadings by the following factors: to promote healthy eating habits via the school food service and teaching activities. The variance explained by this factor was 35.80%.

The communalities of the variables included were over 50% so that they rated high overall. This suggests that the variables chosen for this analysis were related to each other. Furthermore, the KMO Test and Bartlett's Test of Sphericity indicated that the set of variables were adequately related for factor analysis. Subsequently, this means that we have identified two clear patterns of response among SFCs; – the promotion of organic food through school food services and

teaching activities for sustainable reasons (or not), and the promotion of healthy eating habits through school food services and teaching activities for health reasons (or not).

The Kruskal-Wallis test presented in Table 2 also revealed significant between-countries effects for all of the four attitudes included in the analysis. In addition to this, results shown in Table 2 suggest that a positive attitude towards the promotion of organic food at school was most apparent in the Finnish schools, and Italian schools ranked at the second place. The promotion of healthy eating habits at school was most common in German schools, and Italian schools ranked at the second place again. In all cases, the organic and non-organic schools ranked almost evenly on the positive side of the scale, suggesting that they both perceive the role of the school as key in the promotion of organic food and healthy eating. Due to the coherence of this distribution, the relationship between the type of school (organic or non-organic) and the SFCs' attitude was not statistically significant.

Intentions

Table 3 shows the odds ratio for the both types of school in three countries applied the FNP and involved such a policy in the school's pedagogic activities. The Hosmer and Lemeshow Goodness-of-Fit-tests showed no difference between the estimate and the raw data, which means that the model represented the data at an acceptable level. In the logistic regression, the Finnish schools were most likely to adopt the FNP at schools of all the three countries ($P < 0.001$). The results also show that the non-organic schools were 0.14 times less likely to have the FNP than the organic schools in all countries ($P < 0.001$). In this section, the schools respondents were also asked whether the schools involved the FNP issues in their pedagogic activities. Table 3 shows

Table 2 Rotated factor loadings, communalities based on a principal component analysis, and the Chi-square value (Kruskal-Wallis H), the degrees of freedom, the significance level and mean values for SFCs' attitude towards school's responsibilities towards the promotion of organic food and healthy eating habits to pupils

Variables	Factor 1	Factor 2	Communality	H	df	Mean	Mean rank	P-value
	Sustainable reasons	Health reasons						
Attitude of promotion of organic food via school food service.	0.93	0.04	0.87	96.82	2	2.18		
Germany							79.68	< 0.001
Finland							219.37	
Italy							147.86	
Attitude of promotion of organic food via teaching activities.	0.92	0.11	0.87	75.14	2	2.30		
Germany							81.81	< 0.001
Finland							207.52	
Italy							153.93	
Attitude of promotion of healthy eating habits via school food service.	0.12	0.90	0.83	23.68	2	1.58		
Germany							198.17	< 0.001
Finland							133.30	
Italy							154.89	
Attitude of promotion of healthy eating habits via teaching activities.	0.03	0.92	0.84	34.01	2	1.64		
Germany							212.05	< 0.001
Finland							138.69	
Italy							146.77	
Initial eigenvalue	1.98	1.43						
% of Total Variance	49.45	35.80						
Total Variance	85.25%							

Table 3 Results of logistic regression analysis and the respective odds ratios of applying the Food and Nutrition Policy (FNP), and involving it in teaching activities, among organic and non-organic schools in Germany, Finland and Italy

Variable	Does your school have a FNP in relation to pupils' health? ^a		Do teachers involve this FNP during teaching activities? ^b	
	OR (95.0% CI)	<i>P</i> -value ^c	OR (95.0% CI)	<i>P</i> -value ^c
Country		< 0.001		0.011
Germany (reference)	1		1	
Finland	16.05 (5.79-44.52)	< 0.001	1.40 (0.33-5.98)	NS
Italy	2.14 (1.09-4.22)	0.028	29.00 (3.00-280.78)	0.004
Type of schools				
Organic school (reference)	1		1	
Non-Organic school	0.14 (0.06-0.32)	< 0.001	1.64 (0.43-6.30)	NS

^a The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have a FNP in relation to pupils' health?”: *P*=0.648 indicates acceptable goodness of fit.

^b The Hosmer and Lemeshow Goodness-of-Fit-test of “Do teachers involve this FNP during teaching activities? ”: *P*=0.813 indicates acceptable goodness of fit.

^c Estimated *P*-value for the association between the independent variables and dependent variables using the odds ratio test.

NS: not significant

Table 4 Binary logistic regression analyses for health promoting school variables among organic and non-organic schools in Germany, Finland and Italy

Variable	Does your school have a health promoting school policy according to WHO principle? ^a		Does your school have a playground? ^b		Does your school have physical activity as a prioritized theme in curriculum activity except gym course? ^c	
	OR (95.0% CI)	<i>P</i> -value ^d	OR (95.0% CI)	<i>P</i> -value ^d	OR (95.0% CI)	<i>P</i> -value ^d
Country		< 0.001		< 0.001		0.034
Germany (reference)	1		1		1	
Finland	29.09 (3.67-230.53)	< 0.001	8.51 (2.95-24.50)	< 0.001	3.72 (1.36-10.38)	0.012
Italy	2.49 (1.20-5.16)	0.014	2.55 (1.27-5.14)	0.009	1.88 (0.93-3.80)	NS
Type of schools						
Organic school (reference)	1		1		1	
Non-Organic school	0.18 (0.06-0.53)	0.002	0.57 (0.27-1.22)	NS	0.71 (0.35-1.46)	NS

^a The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have a health promoting school policy according to WHO principle?”: *P*=0.957 indicates acceptable goodness of fit.

^b The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have a playground?”: *P*=0.562 indicates acceptable goodness of fit.

^c The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have physical activity as a prioritized theme in curriculum activity except gym course?”: *P*=0.114 indicates acceptable goodness of fit.

^d Estimated *P*-value for the association between the independent variables and dependent variables using the odds ratio test.

NS: not significant

Table 5 Odds ratios and 95% confident intervals for having a canteen, operating nutritionally calculated menus, and enforcing nutritional recommendations, in organic and non-organic schools in Germany, Finland and Italy using logistic regression analysis

Variable	Does your school have a canteen onsite? ^a		Is the school food nutritionally calculated according to official nutritional guidelines? ^b		Does your school recommends own nutritional menus for pupils in canteen? ^c	
	OR (95.0% CI)	<i>P</i> -value ^d	OR (95.0% CI)	<i>P</i> -value ^d	OR (95.0% CI)	<i>P</i> -value ^d
Country		0.001		< 0.001		< 0.001
Germany (reference)	1		1		1	
Finland	3.67 (1.83-7.36)	< 0.001	6.12 (2.55-14.70)	< 0.001	7.60 (3.22-17.93)	< 0.001
Italy	1.89 (1.01-3.55)	0.048	75.63 (15.87-360.44)	< 0.001	9.18 (3.97-21.26)	< 0.001
Type of schools						
Organic school (reference)	1		1		1	
Non-Organic school	0.53 (0.32-0.89)	0.017	0.87 (0.33-2.28)	NS	1.16 (0.55-2.43)	NS

^a The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school have a canteen onsite?”: *P*=0.764 indicates acceptable goodness of fit.

^b The Hosmer and Lemeshow Goodness-of-Fit-test of “Is the school food nutritionally calculated according to official nutritional guidelines?”: *P*=0.351 indicates acceptable goodness of fit.

^c The Hosmer and Lemeshow Goodness-of-Fit-test of “Does your school recommends own nutritional menus for pupils in canteen?”: *P*=0.828 indicates acceptable goodness of fit.

^d Estimated *P*-value for the association between the independent variables and dependent variables using the odds ratio test.

NS: not significant

that the Italian schools were most likely to involve the FNP in their teaching activities than the German schools ($P=0.004$). No significant results were obtained for FNP in education.

Table 4 shows the binary logistic regression analysis for each country regarding the adoption of WHO health promoting school policy, possession of a playground, and involvement of physical activity as a prioritized theme in curriculum activity. The Finnish schools were most likely to adopt a health promoting school policy according to WHO principle ($P<0.001$). The non-organic schools were 0.18 times less likely to adopt this policy compared with the organic schools ($P=0.002$). The Finnish schools were ranked first in terms of the possession of a school playground and the involvement of physical activity as a prioritized theme in curriculum activity, not including a gym course. However, no association between having a playground, the involvement of physical activity as a theme in teaching activity, and the type of school were detected.

Actions

Table 5 shows the logistic regression analysis concerning the existence of a school canteen, the operation of nutritionally calculated menus, and the enforcement of nutritional recommendations for children, among organic and non-organic schools in Germany, Finland and Italy. The results indicated that the Finnish schools were most likely to have a canteen ($P=0.001$). The existence of a school canteen facility was also associated with the type of school ($P=0.017$). The Italian schools were most likely to serve nutritionally calculated meals ($P<0.001$) and to recommend the pupils to choose healthier foods ($P<0.001$) amongst all the countries. No associations between school type and the operating of nutritionally calculated menus, or the enforcement of nutritional recommendations for children, were found.

Discussion

To the author's best knowledge, this is one of the first studies examining the impact of organic food sourcing strategies on the shaping of healthier school food environments. The study was carried out as part of the iPOPYPY project, which conducted a pioneering investigation into the

relationship between school food policy and consumption of organic meals in three EU countries⁽⁴⁾.

The present study showed that SFCs in all cases have shown a supportive attitude towards promoting organic food and health for children through the school setting, independently of whether their school was classified as organic or non-organic. Specifically, SFCs in the Finnish schools were more likely to agree than SFCs in other countries, about the responsibility of the school to promote organic food consumption. On the other hand, SFCs in the German schools were more likely to agree with the promotion of healthy eating habits, both through school food services and through curricular activities. Nevertheless, SFCs' attitudes regarding promotion of organic foods and healthy eating habits at school may independently of organic introductions. Their attitudes could be influenced by physical environments, national or traditional school food practices, etc. Although SFCs have great enthusiasm for promotion of healthy school food service, the school systems in these three countries are publicly administered by higher level such as local municipality, the power of SFCs to achieve their ambitions is challenging because of their subservient positions at school.

In Finland, organic schools were more engaged in adopting or maintaining the FNP and a health promoting school policy according to WHO principles (http://www.who.int/school_youth_health/gshi/hps/en/index.html), than the non-organic schools. Furthermore, of all three countries, it was the Finnish schools that had the most concern about the provision of playgrounds and the involvement of physical activity as a prioritized theme in teaching for children. Firstly, these findings could be attributed to the fact that the organic schools in Finland have more motivation and concern for the implementation of school health policies. Secondly, this could also be due to the long tradition of public involvement in Finnish school routines^(3,22,23,32). In Finland, the municipality decides policies determining the types of food products contained in school meals, whilst the composition and nutritional values of the school food is controlled by both by the municipality and the catering companies^(3,22,23,32). In addition to this, the health authorities also need to approve the menus that will be offered to pupils⁽³²⁾. Thirdly, Finland participated in the European Network of Health Promoting Schools (ENHPS) project in the 1990s, which aims to promote the health of pupils and school staff by developing school social and physical environments⁽³³⁾. This project may have positively influenced the Finnish schools, and such impacts may have been maintained to the present day.

Previous studies by Morgan and Sonnino show that, from 2008, the Italian municipalities, especially in Northern provinces, put more effort into the development of healthy and nutritious school meals, complemented with educational programs⁽²⁸⁾. The school teachers therefore became responsible for integrating these nutrition issues into teaching activities^(28,34). The present study confirms the observation that the Italian SFCs had most concerns regarding integrating FNP issues into teaching activities. Previous studies also found that the school food environment is an important venue for children to practice healthy eating. This may be through the types of food made available in school and through educational messages delivered by the school to facilitate making healthy food choices, as specified in school food policies⁽³⁵⁻³⁷⁾.

Our third result suggests that the Finnish organic schools were most likely to provide a school canteen than the non-organic schools. However, according to The Basic Education Act (628/1998) in Finland, all schools have obligation to provide a canteen⁽³²⁾. Catering at Finnish school canteen is provided on a self-service basis with personally supervised⁽³²⁾. Perhaps more importantly, the canteen also provides an opportunity for schools to promote health and wellbeing^(38,39). The previous studies suggest that improving the nutritional value of school meals for children may positively influence their dietary intake⁽⁴⁰⁻⁴³⁾. Regarding the calculation of the nutritional content of school meals, the Italian schools reported maintaining routines for these calculations, as well as recommending healthier food choices to children. Our results are in agreement with reports from another parallel study in the iPOPY project^(3,34), which has also shown that healthy school food is much more a priority in Italy, with Italian authorities currently more focused on the quality of school meals than ever^(3,34).

The limitations of this study are its cross-sectional nature that does not allow us to infer causality. However, the study provides a snapshot of the present situation in the studied countries, and allows for comparisons within and between countries. There were some logistic differences in the execution of the survey in the different countries, particularly the reminders sent and the duration of the web-based surveys⁽⁴³⁾. Although this might be a source of bias, we believe that the sample size overcomes the presence of differences that would be due to chance. In addition to this, the effect size of study sample has been checked and it detected the small effect. For example, For example, the effect size of 14 organic schools and 44 non-organic schools in Germany get an absolute Cohen's *d* of 0.28 so we can assume a small effect. Secondly, administering the survey online was limited in that not all school staff has access to the internet,

and variations in familiarity with computer technology and literacy may also have produced bias. Therefore, we avoided asking questions which contained complex terms and words, or asking for the respondent's overall opinion of the school food system, instead asking more specific questions^(44,45). However, for online surveys it is not possible to completely avoid sample selections bias where we had no control over who actually responded^(44,45). We therefore designed the questionnaire consisting open-ended questions and encouraging respondents to provide their feedback, in order to minimise response bias, i.e. participants answering the way they think they should answer^(44,45).

Conclusions

This study identified some positive associations between type of school (organic or non-organic) and the provision of a healthful school food environment. Having a Food and Nutrition Policy can be one of many sustainable actions to promote a healthy school food environment for children. The SFCs from organic and non-organic school had positive attitudes concerning the promotion of organic food and health within the school context, but they need to work with other actors to achieve the aim. Schools classified as “organic” in the studied countries were more likely to adopt the FNP and, in Finland, to apply a WHO principle school health promoting policy and facilitate a school canteen than non-organic schools. Moreover, Finnish schools expressed the most positive attitudes towards schools having a playground and the teaching of physical activity as a prioritized theme for children. However, these positive indications may dependent on well-developed national legislations behind Finnish school system. Italian schools were most positive towards involving the FNP issues in educational activities, serving nutritious school meals, and recommending school children to choose healthier foods. This might also due to the long traditional Italian school food system. All in all, the present study has found that there is still large evidence gap on the effects of organic food procurement policy on eating behaviours.

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Conflicts of interest

No conflicts of interest exist between the authors.

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References

- (1) Morgan K, Sonnino R. A sustainable world city? School food reform in London. *The School Food Revolution: Public Food and the Challenge of Sustainable Development* London: Earthscan; 2008. p. 89-112.
- (2) Morgan K, Sonnino R. Empowering consumers: the creative procurement of school meals in Italy and the UK. *International Journal of Consumer Studies* 2007;31:19-25.
- (3) Nielsen T, Nölting B, Kristensen NH, Løes AK. A comparative study of the implementation of organic food in school meal systems in four European countries. *Bioforsk Report* 2009;145(4).
- (4) Løes AK, Nölting B. Organic school meal systems – towards a more sustainable nutrition. *Agronomy Research* 2009;7(2):647-653.
- (5) Nölting B, Løes AK, Strassner C. Constellations of public organic food procurement for youth-An interdisciplinary analytical tool. *Bioforsk Report* 2009;7:9-12.

- (6) Jones M, Dailami N, Weitkamp E, Salmon D, Kimberlee R, Morley A, et al. Food sustainability education as a route to healthier eating: evaluation of a multi-component school programme in English primary schools. *Health Educ Res* 2012 Jun;27(3):448-458.
- (7) Mikkola M. Role of public catering and use of organic food in educational contexts: Creating centres for sustainable food systems. *Bioforsk Report* 2010;104:5-22.
- (8) Friedman WJ. The framework for global organic food trade circa 2005: accomplishments and challenges. *Food Drug Law J* 2005;60(3):361-373.
- (9) Jaime PC, Lock K. Do school based food and nutrition policies improve diet and reduce obesity? *Prev Med* 2009 Jan;48(1):45-53.
- (10) Gharib N, Rasheed P. Energy and macronutrient intake and dietary pattern among school children in Bahrain: a cross-sectional study. *Nutr J* 2011 Jun 5;10:62.
- (11) Krolner R, Rasmussen M, Brug J, Klepp KI, Wind M, Due P. Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part II: qualitative studies. *Int J Behav Nutr Phys Act* 2011 Oct 14;8:112.
- (12) Nathan N, Wolfenden L, Butler M, Bell AC, Wyse R, Campbell E, et al. Vegetable and fruit breaks in Australian primary schools: prevalence, attitudes, barriers and implementation strategies. *Health Educ Res* 2011 Aug;26(4):722-731.
- (13) Story M, Kaphingst KM, French S. The role of schools in obesity prevention. *Future Child* 2006 Spring;16(1):109-142.
- (14) Cooke L. The importance of exposure for healthy eating in childhood: a review. *J Hum Nutr Diet* 2007 Aug;20(4):294-301.
- (15) Neumark-Sztainer D, French SA, Hannan PJ, Story M, Fulkerson JA. School lunch and snacking patterns among high school students: associations with school food environment and policies. *Int J Behav Nutr Phys Act* 2005 Oct 6;2(1):14.
- (16) Friel S, Kelleher C, Campbell P, Nolan G. Evaluation of the Nutrition Education at Primary School (NEAPS) programme. *Public Health Nutr* 1999 Dec;2(4):549-555.
- (17) Vereecken CA, Bobelijn K, Maes L. School food policy at primary and secondary schools in Belgium-Flanders: does it influence young people's food habits? *Eur J Clin Nutr* 2005 Feb;59(2):271-277.

- (18) Kain J, Uauy R, Albala, Vio F, Cerda R, Leyton B. School-based obesity prevention in Chilean primary school children: methodology and evaluation of a controlled study. *Int J Obes Relat Metab Disord* 2004 Apr;28(4):483-493.
- (19) Hoppu U, Lehtisalo J, Tapanainen H, Pietinen P. Dietary habits and nutrient intake of Finnish adolescents. *Public Health Nutr* 2010 Jun;13(6A):965-972.
- (20) Samuelson G. Dietary habits and nutritional status in adolescents over Europe. An overview of current studies in the Nordic countries. *Eur J Clin Nutr* 2000 Mar;54 Suppl 1:S21-8.
- (21) Tilles-Tirkkonen T, Pentikainen S, Lappi J, Karhunen L, Poutanen K, Mykkanen H. The quality of school lunch consumed reflects overall eating patterns in 11-16-year-old schoolchildren in Finland. *Public Health Nutr* 2011 Jul 14:1-7.
- (22) Tilles-Tirkkonen T, Pentikainen S, Lappi J, Karhunen L, Poutanen K, Mykkanen H. The quality of school lunch consumed reflects overall eating patterns in 11-16-year-old schoolchildren in Finland. *Public Health Nutr* 2011 Jul 14:1-7.
- (23) Haapalahti M, Mykkanen H, Tikkanen S, Kokkonen J. Meal patterns and food use in 10- to 11-year-old Finnish children. *Public Health Nutr* 2003 Jun;6(4):365-370.
- (24) Katja R, Paivi AK, Marja-Terttu T, Pekka L. Relationships among adolescent subjective well-being, health behavior, and school satisfaction. *J Sch Health* 2002 Aug;72(6):243-249.
- (25) Loss J, Leitzmann M. Environmental approaches in the prevention of obesity in children and adolescents. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2011 Mar;54(3):281-289.
- (26) Huybrechts I, De Bourdeaudhuij I, Buck C, De Henauw S. Environmental factors. Opportunities and barriers for physical activity and healthy eating among children and adolescents. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2010 Jul;53(7):716-724.
- (27) Therre P, Knoll M, Riemer-Hommel P. School Meals at Secondary Schools: An Analysis in the District of St. Wendel in the Province Saarland, Germany. *Gesundheitswesen* 2011 Jul 27.
- (28) Morgan K, Sonnino R. School food as social justice: The quality revolution in Rome. *The school food revolution: Public food and the challenge of sustainable development* London: Earthscan; 2008. p. 65-88.

- (29) Godin G, Kok G. The theory of planned behavior: a review of its applications to health-related behaviors. *Am J Health Promot* 1996 Nov-Dec;11(2):87-98.
- (30) Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 1991;50:179-211.
- (31) Hosmer DW, Lemeshow S. *Applied Logistic Regression*. New York: John Wiley & Sons, Inc; 1989.
- (32) Mikkola M. Organic and conventional public food procurement for youth in Finland. *Bioforsk Report* 2008;41:13-17.
- (33) Turunen H, Tossavainen K, Jakonen S, Salomaki U, Vertio H. Initial results from the European Network of Health Promoting Schools program on development of health education in Finland. *J Sch Health* 1999 Dec;69(10):387-391.
- (34) Spigarolo R, Sarti MV, Giorgi G. Organic and conventional public food procurement for youth in Italy. *Bioforsk Report* 2010;109:6-18.
- (35) Fung C, Kuhle S, Lu C, Purcell M, Schwartz M, Storey K, et al. From "best practice" to "next practice": the effectiveness of school-based health promotion in improving healthy eating and physical activity and preventing childhood obesity. *Int J Behav Nutr Phys Act* 2012 Mar 13;9(1):27.
- (36) Harrison F, Jennings A, Jones A, Welch A, van Sluijs E, Griffin S, et al. Food and drink consumption at school lunchtime: the impact of lunch type and contribution to overall intake in British 9-10-year-old children. *Public Health Nutr* 2011 Sep 22:1-8.
- (37) Kim K, Hong SA, Yun SH, Ryou HJ, Lee SS, Kim MK. The effect of a healthy school tuck shop program on the access of students to healthy foods. *Nutr Res Pract* 2012 Apr;6(2):138-145.
- (38) Wouters EJ, Larsen JK, Kremers SP, Dagnelie PC, Geenen R. Peer influence on snacking behavior in adolescence. *Appetite* 2010 Aug;55(1):11-17.
- (39) Lachat CK, Verstraeten R, De Meulenaer B, Menten J, Huybregts LF, Van Camp J, et al. Availability of free fruits and vegetables at canteen lunch improves lunch and daily nutritional profiles: a randomised controlled trial. *Br J Nutr* 2009 Oct;102(7):1030-1037.
- (40) Bevans KB, Sanchez B, Teneralli R, Forrest CB. Children's eating behavior: the importance of nutrition standards for foods in schools. *J Sch Health* 2011 Jul;81(7):424-429.

- (41) Briefel RR, Wilson A, Gleason PM. Consumption of low-nutrient, energy-dense foods and beverages at school, home, and other locations among school lunch participants and nonparticipants. *J Am Diet Assoc* 2009 Feb;109(2 Suppl):S79-90.
- (42) Story M, Nannery MS, Schwartz MB. Schools and obesity prevention: creating school environments and policies to promote healthy eating and physical activity. *Milbank Q* 2009 Mar;87(1):71-100.
- (43) Braithwaite D, Emery J, De Lusignan S, Sutton S. Using the Internet to conduct surveys of health professionals: a valid alternative? *Fam Pract* 2003 Oct;20(5):545-551.
- (44) Johnson TP, Wislar JS. Response rates and nonresponse errors in surveys. *JAMA* 2012 May 2;307(17):1805-1806.
- (45) Plante C, Jacques L, Chevalier S, Fournier M. Comparability of Internet and telephone data in a survey on the respiratory health of children. *Can Respir J* 2012 Jan-Feb;19(1):13-18.

Appendix IX: Paper three

“Effect of organic school meals to promote healthy diet in 11-13 year old children - A mixed methods study in four Danish public schools”



Research report

Effect of organic school meals to promote healthy diet in 11–13 year old children. A mixed methods study in four Danish public schools [☆]

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ABSTRACT

The aim of this study was to investigate whether organic school meals can be an effective strategy to provide healthy food to children and promote their healthy eating habits. Furthermore, the study aimed to examine pupils' attitudes predicting intention and behaviours in relation to organic food and health. An observational cross-sectional study was designed, and the participants were 6th grade Danish pupils from two schools with organic food provision and two schools with non-organic food provision. The pupils were asked to complete an online adapted food frequency questionnaire, after which selected pupils were invited to focus group interviews. More positive school lunch habits were observed in pupils in the organic schools than in the non-organic schools. Generally all the pupils had positive attitudes towards organic food and health and this had a significant impact on their intention to consume organic food but not on their behaviour. In addition, all participants were willing to adopt healthier eating habits in the future both at school and in the home. These findings suggest that children attending schools where meals include organic ingredients might be more aware of healthy foods, organic foods and healthy eating habits.

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Introduction

Overweight and obesity in childhood and adolescence are international problems. A series of studies conducted with the aim to find ways of preventing obesity and overweight in children and adolescents have been conducted globally (Bauer, Larson, Nelson, Story, & Neumark-Sztainer, 2009; Fernandes, Bernardo Cde, Campos, & Vasconcelos, 2009; Sorensen, 1988) many of which have been carried out in the “captive setting” of schools (Aranceta Bartrina et al., 2008; Bevans, Sanchez, Teneralli, & Forrest, 2011). Lifestyles established during childhood and adolescence are likely to remain into adulthood (Lee et al., 2011). Healthy school meal strategies have been suggested as potentially effective approaches for improving the eating behaviours and dietary intake of youths (Fahlman, Dake, McCaughy, & Martin, 2008; Lamberti et al., 2010; Panunzio, Antoniciello, Ugolini, & Dalton, 2009). Healthy school meals may therefore play a crucial role in the implementation of policies aimed at promoting healthy eating and healthy dietary

behaviour in schoolchildren (Townsend, Murphy, & Moore, 2011).

In Denmark, where the prevalence of overweight in children and adolescents grew from 11% in 1995 to 14% by the early 2000s (Baker & Sorensen, 2011; Bua, Olsen, & Sorensen, 2007; Matthiessen et al., 2008), there is currently no prevailing mode of school food program in Denmark and school meals are only offered as a supplement to children's home-brought packed lunch (Osler & Hansen, 1993; Skovgaard et al., 2005). A number of studies suggest that lunchboxes frequently contain unhealthy food items and are often of low nutritional quality (Finch, Sutherland, Harrison, & Collins, 2006). Moreover, there is no compulsory regulation at a national level concerning provision of public school meals in Denmark (Osler & Hansen, 1993; Skovgaard et al., 2005). Nevertheless, several municipalities in Denmark have established their own policies in order to offer paid school lunches, and the inclusion of organic food is commonly stated in these policies (Hansen, Schmidt, Nielsen, & Kristensen, 2008; Nielsen, Nölting, Kristensen, & Løes, 2009). In these municipalities, schools have increasingly become the object of strategies that seek to create more sustainable public food provision (Hansen et al., 2008; Nielsen et al., 2009). These schools aim to promote healthy eating habits in children through the school food environment by including organic food, due to the fact that organic products are often associated with environmental issues, health awareness, animal welfare, etc (Hansen et al., 2008; Hoefkens, Verbeke, Aertsens, Mondelaers, &

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Van Camp, 2009; Nielsen et al., 2009). In addition to this, the school acts as an arena for food practice, where children are involved in all the production chain, the supply, preparation and serving of foods. But schools are a learning arena, where teaching about organic foods can be included in the curricula, and influence pupil's actual knowledge, awareness and hopefully their practice of healthy eating (Hansen et al., 2008; Nielsen et al., 2009).

In general, organic products are more expensive than non-organic products. On the one hand, this price premium for organic food items forces food service managers to charge more for dishes with organic ingredients. On the other hand, food service managers may also innovate and amend their menus in order to make them profitable even when using organic ingredients. Such innovations may further have a positive impact on health and nutritional status. For example, food service managers may decide to have a reduction in meat and meat products (Perez Cueto, 2011) and an increase in local fresh green food in their menus (Morgan & Sonnino, 2008; Nölting, Løes, & Strassner, 2009). Therefore, if children are regularly exposed to information about healthy options at school, and they are also allowed to experience and taste such products through the school meals, it is foreseen that they will remain loyal consumers of such products throughout life (Lee et al., 2011).

Research hypotheses based on the Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) provides a model for how a person's behaviour and behavioural intentions are shaped by their attitudes towards behaviour, subjective norms and perceived behavioural control (Ajzen & Fishbein, 1980). The TPB also proposes that behaviour is influenced by attitude, which is one's evaluative orientation towards a person, object, idea, etc (Ajzen, 2001). Beside this, intention is a collection of attitudes (Ajzen, 2001). The relationship between attitudes and behaviour is not always straightforward, and it is mediated often by behavioural intention (Ajzen, 2001; Ajzen & Fishbein, 1980). The TPB was employed in the present study to frame the analysis and provide the theoretical background for the structural modelling.

This study investigates the adoption of organic school food policy and whether this can influence the healthy eating behaviours of schoolchildren. Previous studies indicate that attitudes towards health affect both the intention to eat and the actual consumption of organic foods, whilst knowledge has an influence on attitude and intention towards consuming organic food (Hammitt, 1990;

Magnusson, Arvola, Hursti, Aberg, & Sjoden, 2003; Michaelidou & Hassan, 2008). Consequently, this study focuses on whether organic food policy in the school environment can influence pupils' attitudes, intentions and behaviours towards organic food, healthy eating and health. The organic food policy in the present study refers to a policy practiced by public organizations such as municipality offering food, where a particular amount of specified foods are expected to be organic. Therefore, we created a conceptual model of pupil's attitude toward organic food and health, pupils' intention toward organic food, and their behaviours according to the school food practices. The research hypotheses are based on TPB as illustrated in Fig. 1.

Attitude and intention

H1. A positive attitude towards organic food and health will positively influence intention to consume organic food.

Intention and behaviour

H2. A positive intention towards consumption of organic food will positively influence behaviour leading to healthy food/drink choices.

H3. A positive intention towards consumption of organic food will discourage choices of unhealthy food/drink.

Attitude and behaviour

H4. A positive attitude towards organic food and health will positively influence consumption of healthy food/drink.

H5. A positive attitude towards organic food and health will translate in lower consumption of unhealthy food/drinks.

The aim of this study was to evaluate and discuss the effectiveness of organic school food policy in the context of Danish “folkeskoler” (i.e. combined public primary and lower secondary schools), to explore whether such a policy approach can enhance pupil's awareness of healthy foods and promote sustainable healthy eating habits.

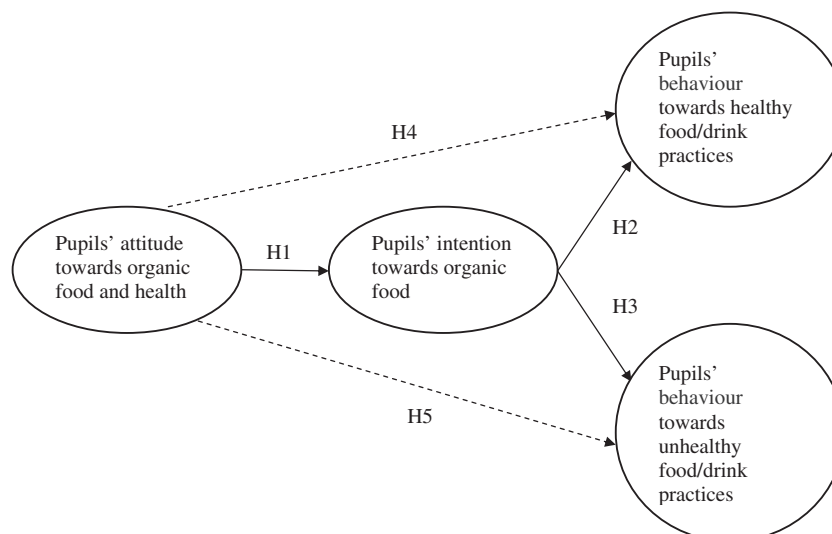


Fig. 1. Conceptual model and research hypotheses based on the Theory of Planned Behaviour.

Methods

Subjects

Participants ($n = 165$) for the study were selected from 4 Danish “folkeskoler”, located in two municipalities. ‘Organic school’ hereafter refers to a type of school that had an organic school food policy in place, which meant serving a certain proportion of organic ingredients in school meals (one organic school used 50% of organic ingredients in its school meals offer, while the other had 24% organic ingredients in its meals). ‘Non-organic school’ hereafter refers to a school without such a policy (two schools with similar characteristics were included for comparison). In each of the 4 schools, 6th grade pupils (average age between 11–13 year old) were invited to participate in the study.

The criteria for choosing schools were: (1) “folkeskoler” located in the middle class neighbourhood/suburbs of the Danish capital, Copenhagen, (2) with canteen facilities, (3) available meals prepared or administered on school site, (4) and with at least 40 pupils at 6th grade. The study was designed to use a combination of a quantitative cross-sectional survey and qualitative semi-structured focus group interviews among 6th grade pupils at the selected 4 schools.

Quantitative data collection

The study was carried out in November and December of 2010. A self-administered web-based questionnaire, the ‘Adapted Food Frequency Questionnaire’ (AFFQ), was distributed through a browser link directly to pupils participating in the study. The pupils were able to open the link through the school intranet and they were asked to complete the questionnaire anonymously and the time for completing the AFFQ was about 15 min. The pupils were presented in the schools’ PC room on the days of the data collection, with a total of 85 pupils from organic schools and 24 of 80 from non-organic schools. These pupils conducted the AFFQ during their curricular time but not as part of class lessons. There was no school staff involved in the actual study. However, we provided the assistance to those children who encountered problems when they were answering the questionnaire. The remaining pupils from the non-organic schools answered the questionnaire as homework due to inconvenience of completing the questionnaire at school. Skilled research staff introduced the questionnaire before the survey and also presented the task during the performance in the school PC rooms.

Questionnaire development

The AFFQ was adapted from the validated Food Frequency Questionnaire (FFQ) previously used in the Pro Children (De Bourdeaudhuij et al., 2005; Neuhauser, Lilley, Lund, & Johnson, 2009; Perez-Rodrigo et al., 2005; Yngve et al., 2005) and Better Health for Mother and Child studies (Bedre Sundhed for Mor og Barn) (Olsen, 1997, 2003). Most of the questions that captured food practices were from Pro Children survey, and four questions were from Better Health for Mother and Child. For most behaviour items, a frequency scale with seven levels of response was used, e.g. from “Never” to “More than two times per day”. The present study only focused on the school environment, and therefore defined the food practices in the AFFQ that only referred to food that was received and/or bought from school. In addition to this, the study included an individual section on pupils’ school lunch habits, including questions such as “How often do you buy school meals?”

Questions on organic food were rather relevant for the current research, and would enable consistency in data analysis with the

qualitative part of this study. Therefore, the study included a number of questions focused on attitude, intention and practice related to organic food at the end of questionnaire. For most of these questions, a Likert-type scale with six levels of response was used, e.g. from “Strongly agree” to “Strongly disagree”. The AFFQ had mainly closed-ended questions, and these questions were categorised into each TPB theme (see Table 1).

Statistical analysis

Data from the AFFQ were tabulated and analysed using SPSS (Version 19.0 IBM SPSS® Inc., Chicago, IL, USA). All p -values reported were two-tailed. The internal consistency of each scale was analysed by reliability analysis (Ambrosini, de Klerk, O’Sullivan, Beilin, & Oddy, 2009; Spiliotopoulou, 2009). As a first step, a descriptive analysis of pupils’ school lunch habits was performed to obtain a profile of the respondents. The Mann-Whitney U Test was used to test the difference in dependent variables between organic and non-organic schools with the level of significance reported at $p < .05$. Fisher’s Exact Test was used to test whether independent variables were associated with dependent variables.

The coefficient of internal consistency (Cronbach’s alpha) does not imply that the measure is unidimensional. Subsequently, exploratory factor analysis was used to identify the dimensionality within each scale based on TBP constructs (pupils’ attitudes towards organic food and health, pupils’ intention towards organic food, pupils’ behaviour towards healthy and unhealthy food/drink practices at school). The correlations among the scales were checked by Spearman’s Rho to determine whether they were related. This study involved ordinal data and therefore employed Spearman’s Rho to evaluate the level of correlation between scales (Hair, Anderson, Tatham, & Black, 1998). Subsequently, Structural equation modelling (SPSS AMOS) served to test model fit between the hypotheses based on the TPB (Pieniak, Perez-Cueto, & Verbeke, 2009; Pieniak, Verbeke, Perez-Cueto, Brunso, & De Henauw, 2008).

Qualitative data collection

To investigate the pupil’s perceptions and ways of thinking in a qualitative way, the focus group interviews explored the pupils’ experiences and opinions towards school meals, healthy and less healthy foods, and their knowledge and attitudes concerning organic food. Their intention for future eating habits was also investigated during the interviews. All the interviews were recorded.

The focus group interviews were of half an hour duration. There were 24 boys and girls from the organic schools that were interviewed immediately after the questionnaire, while 25 pupils from the non-organic schools were interviewed after the day of the questionnaire administration. Before the interviews, pupils in each school were divided into 2 groups and were informed about the recording of voice and video during the dialogue.

Qualitative data analysis

The interviews were analysed using a qualitative content framework analysis, created by Krueger (1994). Firstly, the recorded interviews were transcribed into text word for word. By reading the complete transcript at least three times, the important themes noted and began to become apparent. Secondly, one of the most fundamental and important steps was to define the coding unit. In the current interview data, common themes were gathered via assigning different colors to each. e.g. “pupils’ experience with school meals” blue, “pupils’ attitude towards organic food and health” red, “pupils’ intention towards future eating habits” purple, and “pupils’ school food practice” green. Thirdly, the raw data was categorised inductively into each theme and based on the

Table 1

Number of questions from Adapted Food Frequency Questionnaire and reliability results.

Variables	Example of questions	No. of items	Cronbach's Alpha
Attitude towards organic food and health	I think organic food is healthy. I think organic food is less harmful for environment and me. I think organic food is healthier than non-organic food. Do you think you are healthy? It is important for me to eat healthy meals.	5	.60
Intention towards organic food	I would like to eat organic food than non-organic food. I would like to eat more organic food in the future.	2	.83
Behaviour towards food practice	How often do you eat fresh fruits that you buy or receive from school? How often do you eat salad or grated salad that you buy or receive from school? How often do you eat other raw vegetables that you buy or receive from school? How often do you eat potato that you buy or receive from school? How often do you eat processed vegetables that you buy or receive from school? How often do you eat fish or fish products that you buy or receive from school? How often do you eat white bread that you buy or receive from school? How often do you eat whole wheat bread that you buy or receive from school? How often do you eat rye bread that you buy or receive from school? How often do you drink water that you buy or receive from school? How often do you drink fruit juice that you buy or receive from school? How often do you drink smoothies that you buy or receive from school? How often do you drink skimmed milk that you buy or receive from school? How often do you drink low fat milk that you buy or receive from school? How often do you drink mini fat milk that you buy or receive from school? How often do you eat sweets that you buy or receive from school? How often do you eat chocolate that you buy or receive from school? How often do you eat cake that you buy or receive from school? How often do you eat chips that you buy or receive from school? How often do you drink full fat milk that you buy or receive from school? How often do you drink concentrated juice water that you buy or receive from school? How often do you drink soda water with sugar that you buy or receive from school? How often do you drink soda water without sugar that you buy or receive from school?	23	.90

types of schools. Then the data reduction was done by excluding repeated and irrelevant interview contents. Final steps included interpretation, management and ensuring the consistency of coding with raw data of the quotations in text. Throughout the process of qualitative content analysis, the constant comparative method between organic and non-organic school was applied.

Results

Overall

Table 2 shows the number of responding pupils, their gender and ages in the selected organic and non-organic schools. The response rate was very high in both types of schools. The majority of responding children were 12 years old. There were more girls in the two organic schools and there was an equal distribution of both sexes in the two non-organic schools.

Table 2

Number of respondents, percentage of response rate, their gender and age in four Danish sampling schools.

	Organic schools	Non-organic schools	Total
Distributed (n)	85	80	165
Responded (n)	83	79	161
Response rate (%)	98	99	98.5
Gender			
Boy	30	39	69
Girl	52	40	92
Age			
11	1	2	3
12	67	68	135
13	14	9	23

Descriptive statistics for pupil's school lunch habits in organic and non-organic schools

Data in Table 3 shows that 26% of the pupils in the organic schools never purchase school meals, 22% pupils buy at least once a week, and 21% consume school meals 2–4 days per week. The majority of pupils in the non-organic schools buy school meals less often than 1 day per week and 24% pupils never eat lunches provided by schools. The study also investigated how often the pupils eat lunch boxes from home in both types of schools. In both schools there were a high number of pupils who consumed lunch boxes. In the non-organic schools, 76.3% of pupils consumed lunch boxes every school day and 40% of organic school pupils brought lunch from home at least once a week. Most of the pupils from both schools did not often skip lunches. Significant differences in the frequency of school meals purchased were detected with regard to how often pupils purchase school meals ($p = .012$), bring lunch boxes ($p < .001$), and skip lunches at schools ($p < .001$). Significant associations were found between type of school and the frequency of purchasing school meals ($p < .001$), bringing lunch boxes to school ($p < .001$) and skipping lunch ($p < .001$). For the list of less healthy food items, the data indicates that the majority of pupils in the organic as well as in the non-organic schools rarely consumed these food items. Statistically significant differences were found for these food items.

Most of the pupils in the organic schools reported that they believed that food at their school is healthy. In the non-organic schools, most of the pupils disagreed on this aspect. The difference between the type of school in whether the school food was regarded as healthy was highly significant ($p < .001$), and the relationship between the type of school and children's attitude towards healthy school meals was also highly significant ($p < .001$).

Table 3

Percentage of pupils' school lunch habits, consumption frequency of food items and their attitude towards whether school meals are healthy.

Adapted Food Frequency Questionnaire		Pupils in organic schools (%)	Pupils in non-organic schools (%)	p-Value ^a	p-Value ^b
Variables	Responses				
How often do you buy lunches that are provided by schools?	Never	25.9	23.8	.012	.000
	Less than 1 day per week	14.1	6.3		
	1 day per week	22.4	18.8		
	2–4 days per week	21.2	3.8		
	Every day, 1 time per day	4.7	6.3		
	Every day, 2 times per day	5.9			
	Every day, more than 2 times per day				
How often do you bring lunch box from home to school?	Never	10.6	5.0	.000	.000
	Less than 1 day per week	5.9	2.5		
	1 day per week	3.5			
	2–4 days per week	32.9	13.8		
	Every day, 1 time per day	25.9	50.0		
	Every day, 2 times per day	10.6	16.3		
	Every day, more than 2 times per day	3.5	10.0		
How often do you skip lunch when you are in school?	Never	36.5	63.8	.000	.000
	Less than 1 day per week	20.0	20.0		
	1 day per week	18.8	2.5		
	2–4 days per week	11.8	6.3		
	Every day, 1 time per day	5.9	5.0		
	Every day, 2 times per day				
	Every day, more than 2 times per day				
How often do you eat chips that you get or buy from school?	Never	49.4	77.5	.023	n.s
	Less than 1 day per week	14.1	12.5		
	1 day per week	7.1	5.0		
	2–4 days per week	2.4	1.3		
	Every day, 1 time per day	1.2			
	Every day, 2 times per day	2.4			
	Every day, more than 2 times per day				
How often do you drink smoothies that you get or buy from school?	Never	40.0	76.3	.003	.013
	Less than 1 day per week	16.5	8.8		
	1 day per week	11.8	6.3		
	2–4 days per week	4.7	3.8		
	Every day, 1 time per day		1.3		
	Every day, 2 times per day	1.2			
	Every day, more than 2 times per day				
How often do you drink soda water with sugar that you get or buy from school (e.g. Coca Cola, Pepsi, Sprite, etc.)?	Never	51.8	81.3	.025	n.s
	Less than 1 day per week	12.9	12.5		
	1 day per week	4.7	2.5		
	2–4 days per week	1.2			
	Every day, 1 time per day	1.2			
	Every day, 2 times per day	1.2			
	Every day, more than 2 times per day	1.2			
How often do you drink full fat milk that you get or buy from school?	Never	63.5	92.5	.028	.070
	Less than 1 day per week	3.5	1.3		
	1 day per week	1.2	1.3		
	2–4 days per week	1.2			
	Every day, 1 time per day		1.3		
	Every day, 2 times per day	1.2			
	Every day, more than 2 times per day	3.5			
I think that our school meals are healthy.	Strongly agree	11.8		.000	.000
	Agree	16.5	6.3		
	Partially agree	24.7	26.3		
	Partially disagree	9.4	23.8		
	Disagree	3.5	23.8		
	Strongly disagree	2.4	15.0		

^a Mann-Whitney U Test between organic and non-organic school groups.^b p-Value for Fisher's Exact Test between two school groups and questions addressed in the AFFQ.*Exploratory factor analysis of the AFFQ based on TPB constructs*

Table 4 shows the results of exploratory factor analysis of pupils' attitudes, and intentions towards organic food and health, as well as their behaviour to consume healthy and unhealthy food/drink items in organic and non-organic schools. Cronbach's Alpha for internal consistency (Spiliotopoulou, 2009) was $\geq .50$, implying an acceptable level for all scales (see Table 1). The Kaiser–Meyer–Olkin (KMO) measures of sampling adequacy for all scales were $\geq .50$ at an acceptable level (Hair et al., 1998) and were at a partic-

ularly high level for pupils' behaviour towards healthy and unhealthy food practices, at .89. The Bartlett's tests of Sphericity were significant for all scales. These results suggest that the variables were adequately related for component analysis. Additionally, the initial eigenvalue and extracted variance of the factors suggests that the scale items were unidimensional. It should be noted that attitude scale discovered two factors, "Attitude towards organic food" and "Attitude towards health". Behaviour scale discovered four factors, "Behaviour towards healthy food items", "Behaviour towards healthy drinks", "Behaviour towards healthy

Table 4

Results of exploratory factor analysis related to Theory of Planned Behaviour constructs.

Theory of Planned Behaviour	Components	Eigenvalue	% Extracted variance	KMO ^a	p ^b	χ^2	DF
Attitude	Attitude towards organic food	1.98	39.61	.61	.001	102.25	10
	Attitude towards health	1.30	26.03				
Intention	Intention towards organic food	1.71	85.40	.50	.001	90.77	1
Behaviour	Behaviour towards healthy food items	3.00	13.06	.89	.001	1010.70	253
	Behaviour towards healthy drinks	1.17	5.09				
	Behaviour towards healthy diet	1.39	6.06				
	Behaviour towards unhealthy food and drink practices	8.35	36.31				

^a Kaiser–Meyer–Olkin (KMO) measures of sampling adequacy.^b p-Value for Bartlett's tests of Sphericity.**Table 5**

Correlations among the variables based on the Theory of Planned Behaviour constructs.

Variable	Attitude towards organic food	Attitude towards health	Intention towards organic food	Behaviour towards healthy food items	Behaviour towards healthy drinks	Behaviour towards healthy diet	Behaviour towards unhealthy food and drink practices
Attitude towards organic food	1						
Attitude towards health	-.13	1					
Intention towards organic food	.48 ^b	.24 ^b	1				
Behaviour towards healthy food items	-.07	-.19 ^a	-.17 ^a	1			
Behaviour towards healthy drinks	.17	.05	.11	-.09	1		
Behaviour towards healthy diet	-.14	-.20 ^a	-.04	.09	-.19 ^a	1	
Behaviour towards unhealthy food and drink practices	.04	.32 ^b	.24 ^b	-.05	-.02	.04	1

^a Correlation is significant at the .05 level (two-tailed).^b Correlation is significant at the .01 level (two-tailed).

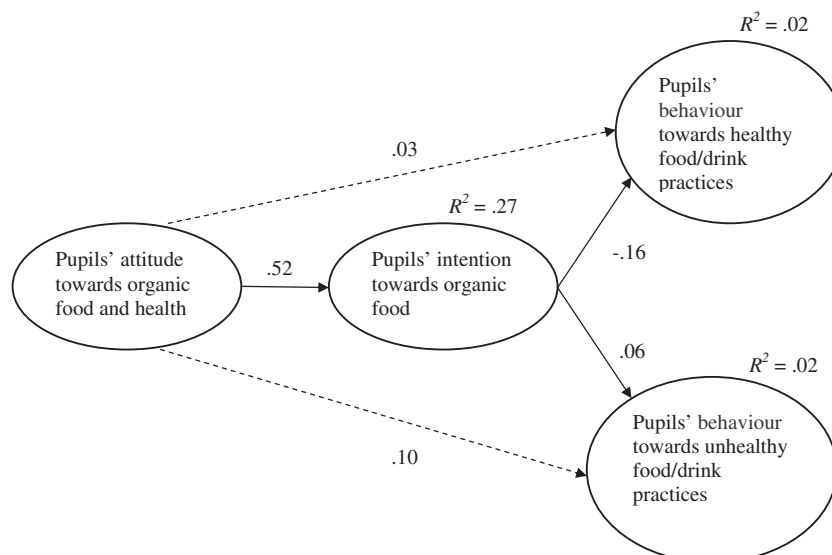
diet", and "Behaviour towards unhealthy food and drink practices". As shown in Table 5, the significant correlations among the scales were found but not for all hypotheses. Overall these results suggest that the attitude items were positively correlated with the intention dimension.

Path analysis of scales based on Theory of Planned Behaviour constructs

A path analysis was undertaken to test effect among the scales for the organic school, non-organic school and both school types. Before the path model analysis, two factors were identified under

the attitude theme: (1) Attitude towards organic food, and (2) Attitude towards health. These were drawn together under an attitude scale in the path model. Three factors were identified under the behaviour theme: (1) Consumption of healthy food items, (2) Consumption of healthy drinks, and (3) Consumption of a healthy diet. These were drawn together under the behaviour scale of consumption of healthy food and drink practices in the model.

The path coefficients, coefficient of determination R^2 , and models are illustrated in Fig. 2 for merged school types, Fig. 3 for the organic schools and Fig. 4 for the non-organic schools. The result summary of path analysis is provided in Table 6. The overall results revealed that the exogenous scale attitude positively impacted the

**Fig. 2.** Path analysis of both school types based on the Theory of Planned Behaviour.

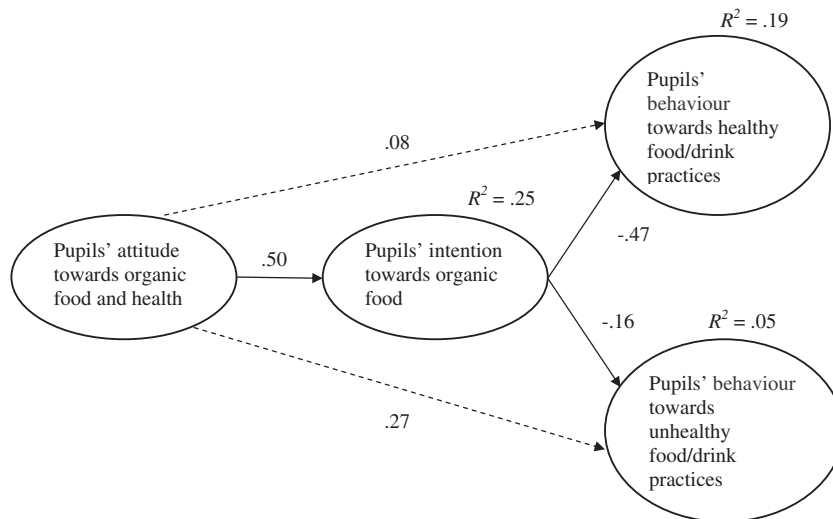


Fig. 3. Path analysis in the organic schools based on the Theory of Planned Behaviour.

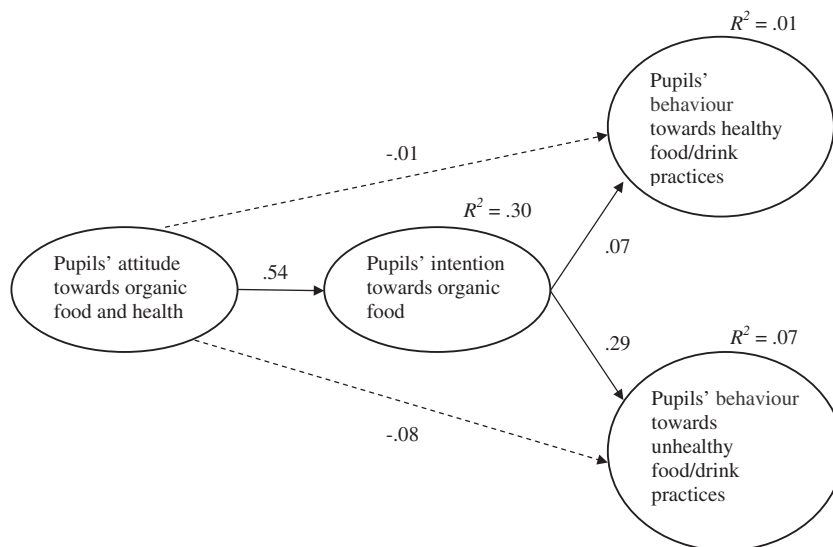


Fig. 4. Path analysis in the non-organic schools based on the Theory of Planned Behaviour.

intention scale in both school types merged, organic schools, and in non-organic schools. Nevertheless, the attitude and intention constructs had no significantly positive impact on behaviour in all cases. The model fit parameters CMIN, DF, *p*-value, CMIN/DF, CFI (Comparative Fit Index), RMSEA (Root Mean Square Error of Approximation) in each case indicated the model fitted the data well, although the model performed not adequately with low R^2 values (<.20) for behaviour constructs in all cases.

Data analysis of interviews in organic and non-organic schools

In organic schools, some pupils indicated that they would like to eat in the school canteen if their friends were to accompany them. Nevertheless, these pupils also reported that their school canteen is not a particularly attractive environment to sit and eat there. Further, the pupils usually liked school meals but this depended on what food was served and the quantity served at the school. They preferred to consume school meals if they had enough money, and if the food announced on the menu was interesting to them. They were more inclined to buy school meals when they

already had experienced the food in question and it had previously been regarded as delicious (see Table 7).

In the non-organic schools, some pupils expressed that they preferred not to eat school meals because they feel that the food is too 'serious', by which they meant the food was difficult to digest afterwards, and that it did not offer enough energy for the rest of the school day. On the other hand, some reported that the lunch box from home often contained boring food that they did not want to eat and thus decided to buy school meals instead. The pupils in the non-organic schools also mentioned that the school usually provides the kind of food that was easiest to sell like muffins and cakes. The pupils complained that the school meals had become more and more expensive with frequent reductions in portion sizes.

Throughout the interviews, pupils in both type of schools had at least a basic knowledge of organic food. They considered organic food as healthy and believed that it was produced in an environmental friendly way with a focus on animal welfare. Most of the pupils believed they currently had a healthy diet, reporting that they often considered controlling their eating and balancing their

Table 6
Result summary of path analysis based on the Theory of Planned Behaviour model.

Path	Direct effect			Indirect effect			Total effect			S.E.		C.R.		Significance		
	Both school type	Organic school	Non-organic school	Both school type	Organic school	Non-organic school	Both school type	Organic school	Non-organic school	Both school type	Organic school	Both school type	Organic school	Both school type	Organic school	Non-organic school
Attitude → intention	.52	.50	.54				.52	.50	.54	.08	.12	.96	4.39	***	***	***
Intention → behaviour ^{1a}	-.16	-.47	.08				-.16	-.47	.08	.10	.11	-.153	-3.44	n.s.	***	n.s.
Intention → behaviour ^{2b}	.06	-.16	.29				.06	-.16	.29	.09	.14	.57	-1.10	n.s.	***	n.s.
Attitude → behaviour ^{1a}	.10	.08	-.02	-.08	-.24	.04	-.06	-.16	.03	.10	.12	.25	.57	n.s.	n.s.	n.s.
Attitude → behaviour ^{2b}	.03	.27	-.08	.03	-.08	.16	.13	.18	.08	.09	.14	.99	1.79	n.s.	n.s.	n.s.
Goodness of fit statistics	CMIN ^c			DF			p-Value			CMIN/DF		CFI ^d		RMSEA ^e		
	Both school type	Organic school	Non-organic school	Both school type	Organic school	Non-organic school	Both school type	Organic school	Non-organic school	Both school type	Organic school	Both school type	Organic school	Both school type	Organic school	Non-organic school
	.07	.25	.48	1	1	1	.79	.62	.49	.07	.25	1.00	1.00	.00	.00	.00

n.s.: not significant.

* Significant at the .05 level.

** Significant at the .01 level.

^a Behaviour towards healthy food and drink practices.^b Behaviour towards unhealthy food and drink practices.^c CMIN: Chi².^d CFI: Comparative Fit Index.^e RMSEA: Root Mean Square Error of Approximation.

diet in order to have a healthy diet when they were going to eat. The pupils believed that organic food is associated with health, although they found it difficult to explain the reasons for this.

The pupils from the organic schools were aware of the part of school meals that were organic and expressed the belief that the environment for food at school was health providing. A number of pupils from the non-organic schools indicated that the school had a theme week concerned with health where they learnt and became influenced with regard to issues related to health.

The interviewed pupils from organic and from non-organic schools reported that they intended to consume more fruits and vegetables, both in and out of school and at home. The pupils in both school groups will be allowed to leave school grounds during their lunch break from their next academic year. Most of the interviewed pupils did not intend to buy food outside school at that time.

Discussion

Our findings suggest that pupils in both school types purchased their meals at school infrequently, although the organic school pupils did so most frequently. In addition, a proportion of pupils in both school categories reported skipping lunch often, which is a public health nutrition concern. Previous evidence suggests that pupils who skip lunch lose concentration in class and display poor learning abilities (Fernandes et al., 2009). The promotion of healthy school meals is an obvious remedy to this problem. New strategies at schools that bring pupils together to eat, improve the quality of meals for example in particular taste satisfaction (Oliver, 1993; Resano et al., 2011) and which create an attractive social eating environment could work together to improve the eating patterns of students and encourage them to avoid meal-skipping (Finch et al., 2006). The finding from the AFFQ also disclosed the positive association between pupils' agreement on whether school meals are healthy and the type of school. Although it is possible that bias may have been introduced via the pupils who filled out the AFFQ outside of school, due to help from peers or family members, the results are consistent within groups. Our findings suggest that pupils in the organic schools consistently agreed that they had healthier school meals compared with the non-organic school pupils.

This is quite a remarkable finding that even quite limited exposure to organic school food might have a direct or indirect positive effect on pupils' attitudes towards consumption of organic foods and towards healthy eating. The findings also indicated that these schools share the Danish tradition of pupils bringing their lunch-boxes with them from home (Osler & Hansen, 1993; Skovgaard et al., 2005) which means that the food provided at school will only supplement their daily intake. Previous studies have shown that lunch boxes often contain rather poor amounts of nutritious foods for children, and they are often considered boring and to not contain attractive foods (Evans, Greenwood, Thomas, & Cade, 2010; Finch et al., 2006). This is in line with our interview findings, where a number of pupils in the non-organic schools complained about their lunch boxes. However, similar views were also expressed by students in the organic schools. Therefore, this study suggests that school meals have the potential to be an effective tool for the promotion of healthier eating habits among students.

It should be noted that schools in Denmark are different from one another, due partly to the high level of self-governance. As a result, the selected four schools have many minor and major differences other than those related to their food provision. Nevertheless, the four selected schools were similar enough in characteristics relating to geography, size and socio-economic status to make meaningful comparisons. Pupils in both school

Table 7

The pupils' knowledge, attitudes, intentions and Behaviours regarding organic food and health, and their experiences whether school meals are healthy.

Interview theme	Example of quotations	
	Pupils in organic schools (n = 24)	Pupils in non-organic schools (n = 25)
Experiences towards school meals	<p>"I eat school meals when there are some of my friends who are going to buy food in school canteen, and then I will also go there and eat together with my friends."</p> <p>"It is because that we know from the menu what food and which day they will serve, then we will have money with us and buy food that we would like to have at that day."</p> <p>"I buy the food I think is the most delicious."</p> <p>"It depends if I have money with me...a bit expensive..."</p> <p>"...the canteen is just some chairs and tables...it is also noisy"</p>	<p>"It feels very heavy in the stomach after eating school meals..."</p> <p>... "You can feel full very fast, and then all energy goes away shortly after."</p> <p>"It depends on what I have in the lunch box, if it is just some boring food that I don't want to eat I just leave and throw it out. Maybe buy school meals...I don't know."</p> <p>"I think they choose to sell the food they sell the best in school like muffin and such."</p> <p>"They are constantly setting up the prices, the portions are getting smaller and smaller and it looks less and less appetizing."</p> <p>"One time a sausage roll costed 7DKK^a, now the kost is 12 DKK, then no one buy it anymore."</p>
Knowledge, attitudes, intentions and behaviours related to organic food and health	<p>"It is something that is produced and processed properly, and there are no chemicals added, if it is from animals, then the animals have good condition, for example have much more space and so on."</p> <p>"I think we have a healthy school because in school we can never buy a cake or something like that. I think we have a healthy school."</p> <p>"I think so, but I don't know how much it does, but I think it helps a bit – maybe I think people get better quality..."</p> <p>"...not all of our school meals are organic, I know milk and butter are organic...I notice the red organic mark."</p> <p>"From now on I'd like to eat fruit instead of a cake in the evening."</p> <p>"I would like to eat a lot salad, it is healthy."</p>	<p>"I got the impression from our theme weeks that the school is very focused on health."</p> <p>"Yes, I think over what I eat, if I eat a package of chips, then I feel myself really fat."</p> <p>"I see it is that when I eat something sweet, I'll be hungry for more so it is difficult to manage, so I try to stop."</p> <p>"I would like to try to eat more fruits and vegetables."</p>

^a DKK is the official currency of Denmark.

categories reported that they never bought unhealthy food during school time, although there were no specific 'banned' foods at the municipal and school levels. This might have been an effect of decisions of the school board. At the same time, this may indicate that food choices by children are associated with what schools provide or regulate, which is in accordance with the findings of a number of studies regarding regulation of food and beverage availability for schoolchildren (Bevans et al., 2011; McKenna, 2010; Townsend et al., 2011).

Factor analysis firstly showed positive correlations between a pupil's attitude towards health and organic food, and behavioural intention (organic food, healthier food items and healthy drinks). Furthermore, the path analysis suggests that pupils' attitude towards organic food and health positively impacted their intention towards the consumption of organic food. This also agrees with TPB model where attitude has direct influence on intention (Ajzen & Fishbein, 1980; Godin & Kok, 1996). A number of studies report that attitude towards organic food and health has a strong influence on the intention to purchase organic food (Shepherd, Magnusson, & Sjoden, 2005). However, a further effect of the attitude and intention scales on pupils' actual consumption of healthy/unhealthy food items was not detected in this study. This was not unexpected since a gap between attitudes and behaviours has been observed previously, particularly in its relation to food and health issues (Lin, Yang, Hang, & Pan, 2007; Schmidt et al., 2010; Shah et al., 2010).

The findings from the interviews draw a picture of two categories of Danish schools that share a focus on health for their pupils. The pupils in both types of schools seem to share a basic knowledge and understanding of what organic food is, and has rather similar opinions with regard to health. The pupils from both school categories seem to have positive intentions concerning their future eating behaviours. However, when it comes to their beliefs about the quality and healthiness of the food offered from their school canteen they differ markedly. In the organic schools, pupils generally agreed that they have a healthy school food environment and

they were aware that meals provided by school were partly organic. Pupils in the organic schools also appeared to have had a better experience from their consumption of food from the canteen, and were more inclined to purchase food from the canteen. Such findings are in accordance with the AFFQ results regarding pupils' agreement on whether school meals are healthy, although during interviews the pupils may have offered imperfect information in order to please the interviewer or avoid being embarrassed (Zhu et al., 2008).

Furthermore, the majority of pupils from the organic schools indicated that they would consume food from the school canteen more often if there was an improvement to the menu plan, a reduction in the price and if the school canteen were cozier, etc. These results provide evidence for studies that aimed at encouraging pupils to consume school meals, for the purpose of developing healthier eating habits, and for supplementing the needed energy for learning (Basch, 2011). In addition to this, the pupils' opinions of health were rather broad and varied, and some found some aspects difficult to express. This could be something which schools could take steps to improve, since previous studies suggest that it is important to take into account pupils' opinions and experiences towards school food arrangement (Lamberti et al., 2010; Townsend et al., 2011).

To our knowledge, no published study with the same focus as the present study is currently available. Such a preliminary study will always have methodological limitations. For example, although the statistical power of this study is high, future modelling could include more TPB constructs (Conner, Norman, & Bell, 2002) particularly for the attitude scale that had a low reliability coefficient compared to intention and behaviour scales. One potential limitation of this study could be its sample size. We have, however, checked the study's power which was sufficient (.99) to perform these analyses. Hence, even larger sample sizes would not uncover other associations. Another limitation of the study was the environment where pupils answered their questionnaires (some of them did this at home). It has not been possible to track

home answers in the original dataset, however, since pupils were not controlled either at home or at school, the response environment is unlikely to be a source of further bias.

Conclusion

This study was one of the first to examine and provide possible associations between an organic school food policy and pupils' awareness of healthy foods and their healthy eating habits. In summary, from the qualitative interviews it appears that the pupils in both school groups possessed basic knowledge about organic food and health, their attitude towards organic food and health positively impacted their intention to purchase organic food, and both groups of pupils intended to adapt to a healthier diet. The organic school pupils had more positive experiences regarding the school eating environment than the non-organic school pupils. From the AFFQ results, the pupils in the organic schools had more positive experiences with school meals and purchased school meals more often than pupils in the non-organic schools. Limiting the choice for unhealthy foods has been addressed in all four schools. This study suggests that even limited exposure to organic foods through school meals and teaching curriculum may have effects in the pupils' attitude towards organic food, towards health and healthy eating, and consequently on their intention towards the consumption of organic food in both the organic and non-organic schools; however this did not translate into any actual behavioural changes towards healthy food and drink choices. All in all, our findings suggest that an organic school food policy might have the potential to improve pupils' awareness of health and healthier eating habits. The future study may focus on collaboration of school staff and pupils on planning, promoting, and implementing innovations in school food service and so that influence on pupils healthier eating habits.

Author contributions

Chen He: Responsible for data collection, results analysis, wrote the draft for the manuscript and finalise the manuscript.

Soren Breiting: Responsible for results analysis, comments on the draft of manuscript and participate in structuring the manuscript.

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References

- Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology*, 52, 27–58.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood-Cliffs, NJ: Prentice Hall.
- Ambrosini, G. L., de Klerk, N. H., O'Sullivan, T. A., Beilin, L. J., & Oddy, W. H. (2009). The reliability of a food frequency questionnaire for use among adolescents. *European Journal of Clinical Nutrition*, 63(10), 1251–1259.
- Aranceta Bartrina, J., Perez Rodrigo, C., Dalmau Serra, J., Gil Hernandez, A., Lama More, R., Martin Mateos, M. A., et al. (2008). School meals. State of the art and recommendations. [El comedor escolar. Situación actual y guía de recomendaciones]. *Anales De Pediatría (Barcelona, Spain: 2003)*, 69(1), 72–88.
- Baker, J. L., & Sorensen, T. I. (2011). The Copenhagen school health records register. *Scandinavian Journal of Public Health*, 39(Suppl. 7), 87–90.
- Basch, C. E. (2011). Healthier students are better learners. High-quality, strategically planned, and effectively coordinated school health programs must be a fundamental mission of schools to help close the achievement gap. *The Journal of School Health*, 81(10), 650–662.
- Bauer, K. W., Larson, N. I., Nelson, M. C., Story, M., & Neumark-Sztainer, D. (2009). Socio-environmental, personal and behavioural predictors of fast-food intake among adolescents. *Public Health Nutrition*, 12(10), 1767–1774.
- Bevans, K. B., Sanchez, B., Teneralli, R., & Forrest, C. B. (2011). Children's eating behavior. The importance of nutrition standards for foods in schools. *The Journal of School Health*, 81(7), 424–429.
- Bua, J., Olsen, L. W., & Sorensen, T. I. (2007). Secular trends in childhood obesity in Denmark during 50 years in relation to economic growth. *Obesity (Silver Spring, Md.)*, 15(4), 977–985.
- Conner, M., Norman, P., & Bell, R. (2002). The theory of planned behavior and healthy eating. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, 21(2), 194–201.
- De Bourdeaudhuij, I., Klepp, K. I., Due, P., Rodrigo, C. P., de Almeida, M., Wind, M., et al. (2005). Reliability and validity of a questionnaire to measure personal, social and environmental correlates of fruit and vegetable intake in 10–11-year-old children in five European countries. *Public Health Nutrition*, 8(2), 189–200.
- Evans, C. E., Greenwood, D. C., Thomas, J. D., & Cade, J. E. (2010). A cross-sectional survey of children's packed lunches in the UK. Food- and nutrient-based results. *Journal of Epidemiology and Community Health*, 64(11), 977–983.
- Fahlman, M. M., Dake, J. A., McCaughy, N., & Martin, J. (2008). A pilot study to examine the effects of a nutrition intervention on nutrition knowledge, behaviors, and efficacy expectations in middle school children. *The Journal of School Health*, 78(4), 216–222.
- Fernandes, P. S., Bernardo Cde, O., Campos, R. M., & Vasconcelos, F. A. (2009). Evaluating the effect of nutritional education on the prevalence of overweight/obesity and on foods eaten at primary schools. *Jornal De Pediatria*, 85(4), 315–321.
- Finch, M., Sutherland, R., Harrison, M., & Collins, C. (2006). Canteen purchasing practices of year 1–6 primary school children and association with SES and weight status. *Australian and New Zealand Journal of Public Health*, 30(3), 247–251.
- Godin, G., & Kok, G. (1996). The theory of planned behavior. A review of its applications to health-related behaviors. *American Journal of Health Promotion: AJHP*, 11(2), 87–98.
- Hair, J. F., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.
- Hammit, J. K. (1990). Risk perceptions and food choice. An exploratory analysis of organic- versus conventional-produce buyers. *Risk Analysis: An Official Publication of the Society for Risk Analysis*, 10(3), 367–374.
- Hansen, S. R., Schmidt, H. W., Nielsen, T., & Kristensen, N. H. (2008). *Organic and conventional public food procurement for youth in Denmark* (No. 40).
- Hoefkens, C., Verbeke, W., Aertsens, J., Mondelaers, K., & Van Camp, J. (2009). The nutritional and toxicological value of organic vegetables consumer perception versus scientific evidence. *British Food Journal*, 111(10), 1062–1077.
- Lamberti, A., Spinelli, A., Baglio, G., Nardone, P., Silani, M. T., Mastantuono, E., et al. (2010). Surveillance system OKkio alla SALUTE. The role of primary school in the promotion of healthy life style. Results of 2008. [Il sistema di sorveglianza OKkio alla SALUTE. Il ruolo della scuola primaria nella promozione di stili di vita salutari. Risultati 2008]. *Annali Di Igiene: Medicina Preventiva E Di Comunità*, 22(6), 555–562.
- Lee, H. A., Lee, W. K., Kong, K. A., Chang, N., Ha, E. H., Hong, Y. S., et al. (2011). The effect of eating behavior on being overweight or obese during preadolescence. *Journal of Preventive Medicine and Public Health = Yebang Uihakhoe Chi*, 44(5), 226–233.
- Lin, W., Yang, H. C., Hang, C. M., & Pan, W. H. (2007). Nutrition knowledge, attitude, and behavior of Taiwanese elementary school children. *Asia Pacific Journal of Clinical Nutrition*, 16(Suppl. 2), 534–546.
- Magnusson, M. K., Arvola, A., Hursti, U. K., Aberg, L., & Sjoden, P. O. (2003). Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite*, 40(2), 109–117.
- Matthiessen, J., Velsing Groth, M., Fagt, S., Biloft-Jensen, A., Stockmarr, A., Andersen, J. S., et al. (2008). Prevalence and trends in overweight and obesity among children and adolescents in Denmark. *Scandinavian Journal of Public Health*, 36(2), 153–160.
- McKenna, M. L. (2010). Policy options to support healthy eating in schools. *Canadian Journal of Public Health. Revue Canadienne De Sante Publique*, 101(Suppl. 2), S14–S17.
- Michaelidou, N., & Hassan, L. M. (2008). The role of health consciousness, food safety concern and ethical identity on attitudes and intentions towards organic food. *International Journal of Consumer Studies*, 32, 163–170.
- Morgan, K., & Sonnino, R. (2008). Procurement matters. Reclaiming the public plate. *The school food revolution. Public food and the challenge of sustainable development*. London: Earthscan, pp. 21–42.
- Neuhouser, M. L., Lilley, S., Lund, A., & Johnson, D. B. (2009). Development and validation of a beverage and snack questionnaire for use in evaluation of school nutrition policies. *Journal of the American Dietetic Association*, 109(9), 1587–1592.
- Nielsen, T., Nörling, B., Kristensen, N. H., & Løes, A. K. (2009). A comparative study of the implementation of organic food in school meal systems in four European countries (No. 145).
- Nörling, B., Løes, A. K., & Strassner, C. (2009). *Constellations of public organic food procurement for youth. An interdisciplinary analytical tool* (No. 7).
- Oliver, R. L. (1993). Cognitive, affective, and attribute bases of the satisfaction response. *Journal of Consumer Research*, 20, 418–430.
- Olsen, J. (1997). Better health for mother and child. A nation-wide study of pregnant women and newborn infants. [Bedre sundhed for mor og barn. Den landsdækkende undersøgelse blandt gravide og nyfødte]. *Ugeskrift for Læger*, 159(22), 3419.
- Olsen, J. (2003). The national birth cohort—better health for mother and child. [Den Nationale Fødselskohorte—Bedre Sundhed for Mor og Barn]. *Ugeskrift for Læger*, 165(46), 4401–4404.

- Osler, M., & Hansen, E. T. (1993). Dietary knowledge and behaviour among schoolchildren in Copenhagen, Denmark. *Scandinavian Journal of Social Medicine*, 21(2), 135–140.
- Panunzio, M. F., Antoniciello, A., Ugolini, G., & Dalton, S. (2009). Bring fruit at school. Promotion of healthy food habit in primary school-children. [Porta la frutta a scuola. Promozione delle corrette abitudini alimentari negli alunni della scuola primaria]. *Annali Di Igiene: Medicina Preventiva E Di Comunità*, 21(4), 403–407.
- Perez Cueto, F. J. (2011). Colorectal cancer prevention with diet and physical activity. Recent update. [Prevención del cáncer colorrectal con dieta y actividad física. Actualización reciente]. *Nutrición Hospitalaria: Órgano Oficial De La Sociedad Española De Nutrición Parenteral Y Enteral*, 26(6), 1491.
- Perez-Rodrigo, C., Wind, M., Hildonen, C., Bjelland, M., Aranceta, J., Klepp, K. I., et al. (2005). The pro children intervention. Applying the intervention mapping protocol to develop a school-based fruit and vegetable promotion programme. *Annals of Nutrition & Metabolism*, 49(4), 267–277.
- Pieniak, Z., Perez-Cueto, F., & Verbeke, W. (2009). Association of overweight and obesity with interest in healthy eating, subjective health and perceived risk of chronic diseases in three European countries. *Appetite*, 53(3), 399–406.
- Pieniak, Z., Verbeke, W., Perez-Cueto, F., Brunso, K., & De Henauw, S. (2008). Fish consumption and its motives in households with versus without self-reported medical history of CVD. A consumer survey from five European countries. *BMC Public Health*, 8, 306.
- Resano, H., Perez-Cueto, F. J., de Barcellos, M. D., Veflen-Olsen, N., Grunert, K. G., & Verbeke, W. (2011). Consumer satisfaction with pork meat and derived products in five European countries. *Appetite*, 56(1), 167–170.
- Schmidt, C. O., Fahland, R. A., Franze, M., Splieth, C., Thyrian, J. R., Plachta-Danielzik, S., et al. (2010). Health-related behaviour, knowledge, attitudes, communication and social status in school children in eastern Germany. *Health Education Research*, 25(4), 542–551.
- Shah, P., Misra, A., Gupta, N., Hazra, D. K., Gupta, R., Seth, P., et al. (2010). Improvement in nutrition-related knowledge and behaviour of urban Asian Indian school children. Findings from the 'medical education for children/adolescents for realistic prevention of obesity and diabetes and for healthy ageing' (MARG) intervention study. *The British Journal of Nutrition*, 104(3), 427–436.
- Shepherd, R., Magnusson, M., & Sjoden, P. O. (2005). Determinants of consumer behavior related to organic foods. *Ambio*, 34(4–5), 352–359.
- Skovgaard, A. M., Olsen, E. M., Houmann, T., Christiansen, E., Samberg, V., Lichtenberg, A., et al. (2005). The Copenhagen county child cohort. Design of a longitudinal study of child mental health. *Scandinavian Journal of Public Health*, 33(3), 197–202.
- Sorensen, T. I. (1988). Obesity in the Scandinavian countries. Prevalence and developmental trends. *Acta Medica Scandinavica. Supplementum*, 723, 11–16.
- Spiliotopoulou, G. (2009). Reliability reconsidered. Cronbach's alpha and paediatric assessment in occupational therapy. *Australian Occupational Therapy Journal*, 56(3), 150–155.
- Townsend, N., Murphy, S., & Moore, L. (2011). The more schools do to promote healthy eating, the healthier the dietary choices by students. *Journal of Epidemiology and Community Health*, 65(10), 889–895.
- Yngve, A., Wolf, A., Poortvliet, E., Elmadfa, I., Brug, J., Ehrenblad, B., et al. (2005). Fruit and vegetable intake in a sample of 11-year-old children in 9 European countries. The pro children cross-sectional survey. *Annals of Nutrition & Metabolism*, 49(4), 236–245.
- Zhu, F., Mariappan, A., Boushey, C. J., Kerr, D., Lutes, K. D., Ebert, D. S., et al. (2008). Technology-assisted dietary assessment. *Proceedings of SPIE*, 6814, 681411.

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