

# Consumption of ultra-processed foods

An assessment of the literature on determinants of  
ultra-processed food consumption  
and an investigation of the potential effect of time scarcity

**Ingrid Laukeland Djupegot & Camilla Bengtson Nenseth**

## **Supervisors**

Tonje Holte Stea & Elling Tufte Bere

*This master's thesis is carried out as a part of the education at the University of Agder and is therefore approved as part of this education. However, this does not imply that the University answers for methods that are used or the conclusions that are drawn.*

## **Forord**

Arbeidet med dette prosjektet har vært en givende og lærerik reise som har bidratt til både personlig og akademisk utvikling. Videre har mange timers arbeid, utveksling av tanker og ideer både sent og tidlig, samt gjennomgående godt samarbeid og hyggelig samvær vært avgjørende for sluttproduktet.

Takk til våre veiledere, Tonje Holte Stea og Elling Bere, for godt samarbeid gjennom hele prosessen med vår masteroppgave. Vi er svært takknemlige for alle konstruktive innspill og samtaler, og setter stor pris på deres støtte gjennom det siste året. Takk også til spesialbibliotekar Ellen Sejersted, for hjelp i arbeidet med utvikling av søkestrategi til vår kunnskapsoppsummering, samt for verdifull opplæring i bruk av EndNote.

Takk til Marthe og våre foreldre for god støtte gjennom hele arbeidet og mange fine stunder med avkobling fra masterboblen.

Til slutt vil vi takke tidligere forelesere som har bidratt til fem fine år ved Universitetet i Agder, deres kompetanse og undervisning har vært svært viktig for utvikling av vår kunnskap og interesse for ernæring og folkehelse.

Kristiansand, mai 2016

Ingrid Laukeland Djupegot & Camilla Bengtson Nenseth

## **Sammendrag**

**Bakgrunn** Sterkt bearbejdede matvarer har blitt klassifisert som *ultra-prosesserte*, og bruk av slike produkter har økt kraftig i løpet av de siste tiårene. Ultra-prosesserte matvarer er ofte lett tilgjengelige, smakfulle og krever lite tilberedning. Høyt forbruk av ultra-prosesserte matvarer har blitt assosiert med økt risiko for blant annet overvekt/fedme og diabetes type II. Målet med dette masterprosjektet var å undersøke faktorer som påvirker inntak av ultra-prosessert mat. Dette resulterte i en generell review-artikkel med unge voksne som utvalg, samt en tverrsnittstudie som tok for seg forholdet mellom opplevd tidspress og forbruk av ultra-prosessert mat.

**Metode** For å identifisere relevant materiale til review-artikkelen, ble det gjennomført et systematisk litteratursøk i fire databaser, med bruk av en todelt søkestreng med termer for ultra-prosesserte matvarer og determinanter. Tverrsnittstudien inkluderte 497 deltakere. En validert score ble brukt som indikator på tidspress, mens tre ulike scorere ble utviklet som indikatorer på bruk av ultra-prosesserte produkter; ultra-prosesserte middagsprodukter, snacks & brus, fast food. Binær logistisk regresjon ble benyttet for å undersøke assosiasjonen mellom tidspress og bruk av ultra-prosesserte matvarer. Analysene ble justert for sosiodemografiske faktorer.

**Resultat** Totalt 65 studier ble inkludert i review-artikkelen, og de fleste undersøkte determinanter på individuelt nivå. Kjønn, yngre alder og mer tv-titting var assosiert med bruk av ultra-prosesserte matvarer. Tverrsnittstudien viste at deltakere med økt grad av tidspress hadde høyere odds for å ha høyt inntak av fast food. Regresjonsanalysene viste også sosiodemografiske forskjeller i bruk av ultra-prosessert mat.

**Konklusjon** Fremtidig forskning bør videre undersøke faktorer som påvirker inntak av ultra-prosesserte matvarer, med særlig fokus på miljøfaktorer, da kun en begrenset mengde slike studier har blitt gjennomført. Bruk av intervensjonsstudier og longitudinelt design vil være hensiktsmessig.

**Nøkkelord** Ultra-prosessert mat, prosessert mat, bearbejdet mat, determinanter, tidspress, unge voksne

## **Summary**

**Background** Highly processed foods have been classified as *ultra-processed*, and consumption of such foodstuffs have expanded rapidly over the last decades. Ultra-processed foods are characterized as being accessible, attractive, palatable and often time-saving. An excess intake of ultra-processed foods has been associated with increased risk of e.g. overweight/obesity and diabetes type II. The aim of this master's project was to investigate factors influencing consumption of ultra-processed foods. This resulted in one review paper on young adults, and one cross-sectional study where the association between time scarcity and ultra-processed food consumption was investigated.

**Methods** In order to identify relevant material for the review paper, a systematic literature search was conducted in four databases, using a two-folded search string with terms indicative of ultra-processed foods and determinants. The cross-sectional study included 497 participants. A validated score was used as an indicator of time scarcity, and three scores were developed as indicators of ultra-processed food consumption; ultra-processed dinner products, snacks & soft drinks, fast foods. Binary logistic regression analyses were used to investigate the association between time scarcity and consumption of ultra-processed foods. Analyses were adjusted for sociodemographic factors.

**Results** In total, 65 studies were included in the review paper, and the majority of these investigated determinants on the individual level. Gender, younger age and more television watching were associated with consumption of ultra-processed foods. The cross-sectional study showed that participants with higher degree of time scarcity had higher odds of being high consumers of fast foods. Regression analyses also showed sociodemographic differences in consumption of ultra-processed foods.

**Conclusions** Future research should further investigate factors influencing consumption of ultra-processed foods, particularly on the environmental level where there is currently a lack of research. Intervention studies and studies with a longitudinal design are needed.

**Keywords** Ultra-processed food, processed food, determinants, time scarcity, young adults

## TABLE OF CONTENTS

<b>1.0 INTRODUCTION .....</b>	<b>1</b>
1.1 BACKGROUND.....	1
1.2 STUDY OBJECTIVES .....	2
REFERENCES .....	3
<b>2.0 THEORETICAL BACKGROUND .....</b>	<b>4</b>
2.1 HISTORICAL CONTEXT: CONSUMPTION OF PROCESSED FOODS .....	4
2.2 CHANGES IN FOOD CONSUMPTION AND TIME SPENT ON COOKING .....	5
2.2.1 <i>Global context</i> .....	5
2.2.2 <i>Norwegian context</i> .....	5
2.3 THE NOVA FOOD CLASSIFICATION .....	7
2.4 DIFFERENT ASPECTS OF FOOD PROCESSING .....	9
2.4.1 <i>Advantages</i> .....	9
2.4.2 <i>Disadvantages</i> .....	10
2.5 CONCEPTUAL FRAMEWORKS OF HEALTH BEHAVIOUR .....	12
REFERENCES .....	14
<b>3.0 RESEARCH PAPER 1. DETERMINANTS OF ULTRA-PROCESSED FOOD CONSUMPTION AMONG YOUNG ADULTS: A REVIEW OF THE LITERATURE .....</b>	<b>18</b>
3.1 ABSTRACT.....	18
3.2 BACKGROUND.....	19
3.3 METHODS .....	20
3.4 RESULTS.....	23
3.5 DISCUSSION.....	44
3.6 CONCLUSIONS .....	47
REFERENCES .....	48
<b>4.0 ELABORATIONS ON THE LITERATURE REVIEW.....</b>	<b>55</b>
4.1 DESIGN AND METHODS .....	55
4.2 METHODOLOGICAL DISCUSSION .....	56
REFERENCES .....	58
<b>5.0 RESEARCH PAPER 2. TIME SCARCITY AND USE OF ULTRA-PROCESSED FOOD PRODUCTS AMONG NORWEGIAN PARENTS: A CROSS-SECTIONAL STUDY .....</b>	<b>59</b>
5.1 ABSTRACT.....	59
5.2 BACKGROUND.....	61
5.3 METHODS .....	62
5.4 RESULTS.....	65
5.5 DISCUSSION.....	67
5.6 CONCLUSIONS .....	70
REFERENCES .....	71
<b>6.0 ELABORATIONS ON THE CROSS-SECTIONAL STUDY .....</b>	<b>74</b>
6.1 DESIGN AND METHODS .....	74
6.2 METHODOLOGICAL DISCUSSION .....	74
REFERENCES .....	76
<b>7.0 OVERALL ASSESSMENT OF FINDINGS .....</b>	<b>77</b>
7.1 GENERAL DISCUSSION .....	77
7.2 IMPLICATIONS FOR PRACTICE .....	79

7.3 IMPLICATIONS FOR RESEARCH.....	79
7.4 CONCLUSIONS.....	80
REFERENCES.....	81

## **APPENDIXES**

APPENDIX 1. LIST OF ABBREVIATIONS

APPENDIX 2. SEARCH STRATEGY - LITERATURE REVIEW

APPENDIX 3. RESEARCH CLEARANCE - HEALTHY AND SUSTAINABLE LIFESTYLE PROJECT

APPENDIX 4. QUESTIONNAIRE - HEALTHY AND SUSTAINABLE LIFESTYLE PROJECT

APPENDIX 5. RESEARCH PAPER 1. TITLE PAGE AND DECLARATIONS AS SUBMITTED TO IJBNPA

APPENDIX 6. RESEARCH PAPER 2. TITLE PAGE AND DECLARATIONS FOR SUBMISSION TO IJBNPA

## **Authors' contributions**

Ingrid Laukeland Djupegot (ILD) & Camilla Bengtson Nenseth (CBN) have equally contributed in all stages of this master's project.

## 1.0 INTRODUCTION

### 1.1 Background

This master's thesis is a collaboration between Camilla Bengtson Nenseth (CBN) and Ingrid Laukeland Djupegot (ILD). As we have previously collaborated on assignments and experienced this to be rewarding, we also chose to write our master's project in public health science together. Nutrition was chosen to be the subject matter for this project, as we both have a particular interest for food and food related behaviour. Our master's thesis resulted in two research articles: One review study and one cross-sectional study. The review study has been submitted to The International Journal of Behavioral Nutrition and Physical Activity (IJBNPA) for publication, and the cross-sectional study will also be submitted to this journal. Main results from both papers will also be presented in poster form at the 11<sup>th</sup> Nordic Nutrition Conference 2016 in Gothenburg.

Today, the majority of foods that humans consume are processed to some extent [1-3]. Food processing includes a transformation of raw ingredients into foods or food products [3-7]. The broad range of food processing techniques are illustrated by Floros et al (p. 579), which states that food processing includes *«one or more of a range of operations, including washing, grinding, mixing, cooling, storing, heating, freezing, filtering, fermenting, extracting, extruding, centrifuging, frying, drying, concentrating, pressurizing, irradiating, microwaving, and packaging»* [8]. In this project, we chose the NOVA<sup>1</sup> classification of foods as a basis for our work, which defines food processing as *«all methods and techniques used by the food, drink and associated industries to turn whole fresh foods into food products»* p. 2040 in [4]. More specifically, we focused on the consumption of ultra-processed foods (UPF). An elaboration of the NOVA classification system and the term ultra-processed will be provided, but in brief ultra-processed foods are industrially produced products, which contain little or no whole foods and can be eaten without, or with minimal, preparation [4]. There has been a rapid increase in the consumption of UPF, especially since the 1980s [3, 9], and this has coincided with the increase in non-communicable diseases and related risk factors, including overweight and obesity [10, 11].

---

<sup>1</sup> A name, not an acronym

## **1.2 Study objectives**

The main objective in this project was to increase the knowledge about important factors to address in order to reduce consumption of UPF. To achieve our main objective, we conducted one literature review and one cross-sectional study. Young adults are an important group for non-communicable disease prevention, and to the best of our knowledge there are currently no reviews summarizing the literature on determinants of ultra-processed food consumption (UPFC) in this age group. The aim of our review was therefore to systematically assess the current evidence on determinants of UPFC among young adults aged 18 to 35 years. Furthermore, as many highly processed foods are considered to be time saving due to minimal preparation [12], the main aim in our cross-sectional study was to investigate the association between time scarcity and UPFC. In order to address our research aim, we analysed data from the Healthy and Sustainable Lifestyle project, conceived and conducted by researchers at the University of Agder.

This master's thesis is structured as follows: In chapter two, a theoretical background is presented, including historical context, description of the NOVA food classification, advantages and disadvantages of food processing and conceptual frameworks of health behaviour. Chapter three includes our review paper, and an elaboration on methods and design issues for this paper is provided in chapter four. In chapter five, our cross-sectional study is presented, followed by an elaboration on methods and design issues in chapter six. Finally, in chapter seven, an overall assessment of findings in our master's project is provided. References are provided at the end of each chapter. Research clearance and the questionnaire from the Healthy and Sustainable Lifestyle project are attached as additional files. Also, title pages and declarations from original manuscripts of our research papers, in accordance with submission guidelines from IJBNPA, are attached.



## References

1. Monteiro C, Cannon G, Levy R, Moubarac JC, Jaime P, Martins AP et al. The food system. Food classification. Public Health. NOVA. The star shines bright. World Nutrition. 2016;7(1-3):28-38.
2. Bere E, Øverby NC. Om mat og ernæring: En introduksjon til hva man bør spise. Kristiansand: Høyskoleforlaget; 2011.
3. Moubarac JC, Parra DC, Cannon G, Monteiro CA. Food classification systems based on food processing: significance and implications for policies and actions: a systematic literature review and assessment. Current Obesity Reports. 2014;3(2):256-72.
4. Monteiro CA, Levy RB, Claro RM, Castro IR, Cannon G. A new classification of foods based on the extent and purpose of their processing. Cadernos de Saude Publica. 2010;26(11):2039-49.
5. Weaver CM, Dwyer J, Fulgoni VL, King JC, Leveille GA, MacDonald RS et al. Processed foods: contributions to nutrition. The American Journal of Clinical Nutrition. 2014;99(6):1525-42.
6. van Boekel M, Fogliano V, Pellegrini N, Stanton C, Scholz G, Lalljie S et al. A review on the beneficial aspects of food processing. Molecular Nutrition & Food Research. 2010;54(9):1215-47.
7. Hogan E, Kelly AL, Sun D-W. High Pressure Processing of Foods: An Overview. In: Sun D-W, editor. Emerging Technologies for Food Processing. London, UK Elsevier Academic Press; 2005. p. 3-27.
8. Floros JD, Newsome R, Fisher W, Barbosa-Cánovas GV, Chen H, Dunne CP et al. Feeding the world today and tomorrow: the importance of food science and technology. Comprehensive Reviews in Food Science and Food Safety. 2010;9(5):572-99.
9. Regmi A, Gehlhar M. Consumer preferences and concerns shape global food trade. (Global Food Trade). Food Review. 2001;24(3):2.
10. World Health Organization. Diet, Nutrition and the Prevention of Chronic Diseases : Report of a Joint WHO/FAO Expert Consultation. Geneva: World Health Organization; 2003.
11. Moodie R, Stuckler D, Monteiro C, Sheron N, Neal B, Thamarangsi T et al. Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries. The Lancet. 2013;381(9867):670-9.
12. Jabs J, Devine CM. Time scarcity and food choices: an overview. Appetite. 2006;47(2):196-204.

## **2.0 THEORETICAL BACKGROUND**

### **2.1 Historical context: Consumption of processed foods**

To understand both the reason and extent of today's processing of foods, it is necessary to take a look back in history and follow the changes of human nutrition and later on the development of different food processing techniques. It is estimated that the earliest form of humans evolved approximately 5-7 million years ago [1]. Human ancestors were hunters and gatherers, and there are few similarities to the diet of modern human beings as the diet of Palaeolithic humans mainly consisted of game and wild plant foods [1-3]. About 700.000 years ago, different methods for preparation such as open fire cooking, drying, salting and smoking were gradually invented [4, 5]. Following the agricultural revolution, 10.000 years ago, the introduction of animal husbandry and the use of grains and dairy foods led to an increased need for methods to preserve foods in order to ensure availability during changing seasons [1, 6].

In the 19<sup>th</sup> century, the first methods of industrial food preserving were invented with the use of machines to produce canned goods for armies and navies [4, 7]. The invention of mechanized steel roller mills during the industrial revolution led to extensive use of highly refined grain flours, and also canning and pasteurizing of dairy products were developed in this period [1, 8]. During the 20<sup>th</sup> century, the techniques of dehydration, freezing, use of ultrahigh temperature, refrigeration, vacuum packaging, fast freezing and use of additives and preservatives were gradually developed [4]. In the following time period, there has been a rapid growth in both the industrial and commercial food processing [7]. Many of the technological food inventions in the 20<sup>th</sup> century was developed to save time and make food preparation easier [7, 9], and a milestone in this relation was the invention of the TV-dinner in the 1950s [10]. The TV-dinner was delivered in compartmentalized trays, which made the meal ready to consume immediate after heating and additionally required no dishwashing. Also, electronically devices such as the micro-waver, rice cooker and bread machine further increased the opportunity to prepare meals in less time and simultaneously reduced the need to plan meals ahead [5, 9]. The development of time saving products has continued into present time, and food retailers now offers pre-cut and pre-washed vegetables, pre-scrambled eggs, pre-fried pancakes etc. [11].

## **2.2 Changes in food consumption and time spent on cooking**

### ***2.2.1 Global context***

Worldwide, there has been a change in meal patterns and time spent on cooking over the past years [12]. Time use surveys have shown that time spent on food preparation in the United States decreased with nearly forty per cent between 1965 (44 minutes/day) and 1995/98 (27 minutes/day) [9]. The reduction in time spent on food preparation might be explained by the increased use of highly processed foods, which demand little or no time for preparation, and therefore can be consumed close to anytime and anywhere during the day [12]. Eating on the run, eating while driving and eating while watching television have become more common, together with a decrease in the traditional family meals with all family members sitting around the table [9]. The larger share of women working outside the home has probably contributed to the increased purchasing and consumption of convenient and pre-prepared foods [4, 12]. Additionally, a cross-sectional study of 471 college students found that over half of the subjects reported lack of time as the number one barrier to healthy eating [13]. Over the last years, fast food outlets have also contributed to increase the availability of cheap and unhealthy foods [14], and in example, McDonalds have today more than 36.000 outlets worldwide [15]. Overall, consumption of highly processed foods and beverages is now increasing most rapidly in low- and middle-income countries, while the growth rate has stabilized on a high level in high-income countries [16]. It is estimated that use of highly processed foods in low and middle income countries will reach the consumption levels of high income countries within three decades [16]. The contribution of highly processed foods to the diet is further described in our two research papers.

### ***2.2.2 Norwegian context***

Research on Norwegian food retailers found that highly processed foods accounted for nearly 60% of all purchases in 2013, and that there was an increase in the share of purchases (+29%) and expenditures (+20%) on ready-to-eat/heat meals from 2005 to 2013 [17]. Overall, consumption and use of food products in Norway has changed dramatically over the last decades, as illustrated by the use of sugar and sugary products [18]. Since the 1950s, consumption of refined sugar such as syrup and granulated sugar has been halved, while the consumption of soft drinks, sweets and candies has more than decupled. As an example, the sales of chocolate increased from about 2 to 9 kg per person per year in the period from 1960 to 2014 [18].

Time use surveys of Norwegian households and their use of time for different activities, including cooking and eating meals, have been conducted by Statistics Norway every tenth year since 1971 [19]. According to these nationally representative surveys, daily time spent on eating meals declined with approximately fifteen minutes from 1971 to 2010, and furthermore the age group between 16-24 years spent the least amount of time on this activity in 2010 [20]. The same study found that less time was spent cooking and preparing meals per person per day in 2010 compared to 1980, although a higher percentage of people reported to be daily involved in cooking and cooking related activities (74% vs. 63%) [20]. The increased share of Norwegians who reported to be involved in cooking was explained by a higher percentage of men who spent time on daily meal preparation (from 40% to almost 70%) [20]. The survey also found that the group with the highest educational level spent less time on cooking and meal preparation compared to the group with the lowest educational level [20].

To the best of our knowledge, few studies have investigated Norwegians' use of highly processed foods such as ready-meals and fast foods. Nevertheless, Bugge et al. [21] conducted a large study, combining quantitative and qualitative data, in order to examine Norwegians' food habits when they were on the run. This study showed that males, those aged 15 to 24 years, and those with a lower educational level were the most frequent consumers of highly processed foods. Furthermore, from 1997 to 2008 there was an increase in the amount of foods purchased and consumed outside the home, and highly processed products like sausages, burgers, fries, sweets and pastries were the dominating foods in this market [21]. Men and study participants with low education reported to buy fast foods mainly because they liked it, while participants with higher education reported that convenience while travelling was a reason to consume fast foods [21]. More than half of the study population reported that they had become more negative to eat fast food over the last years because of the unhealthy nutritional profile. Rising concern for overweight and obesity was also reported to influence consumption, with women expressing more negative attitudes on this matter than men. Finally, many of the study participants reported that they had consumed fast foods due to lack of other options, and expressed a desire for healthier options like fruits and vegetables, whole grain products and salads easier available in the fast food market [21].

### 2.3 The NOVA food classification

Traditionally, dietary guidelines focused on specific nutrients and their role in preventing deficiency diseases [22]. From the 1960s there was a shift towards also preventing lifestyle related diseases (e.g. cardiovascular disease), and there has gradually been an increased scientific interest for health effects of specific foods and dietary patterns [23]. As illustrated by the Norwegian dietary guidelines [23], nutritional recommendations at national level are today mainly focused on the whole diet with consumption of foods from different food groups, as focusing on single nutrients might be inadequate when addressing complex non-communicable diseases [6, 22, 23].

In line with the increased interest for health effects of specific foods and dietary patterns, a Brazilian research team observed an association between the rise in overweight/obesity and consumption of several processed foods (e.g. cookies, soft drinks, sausages, burgers), while no clear association was found between the rise in overweight/obesity and the increased consumption of e.g. sugar or fat [24]. The correlation between consumption of processed foods and overweight/obesity was based on analyses of data from household food purchase surveys in Brazil from the 1970s [25, 26]. To further address the potential negative health effects of excess consumption of processed foods, the research team proposed a new classification of foods, which categorized foods according to the extent and purpose of processing applied during food production [27]. The classification has been a work in progress over the last years, and is today known as the NOVA food classification system, which includes four categories of processed foods [28]. As shown in table 2.1, ultra-processed foods (UPF) are highly processed products that are composed of industrial ingredients (e.g. corn syrup, lactose, soy proteins) and culinary ingredients that are refined or extracted from whole foods (e.g. flour, oil, sugar). Industrial processing has been defined by Monteiro et al (p. 2040) as «...*all methods and techniques used by the food, drink and associated industries to turn whole fresh foods into food products*» [27]. Hence, the classification does not concern methods and food preparation carried out in homes or restaurant kitchens (e.g. bread baking), only industrial food manufacturing.

Table 2.1. Degree of food processing according to the NOVA food classification system

<b>Food groups</b>	<b>Purpose of processing</b>	<b>Examples of processing methods</b>	<b>Examples of foods</b>
<b>1</b> Unprocessed or minimally processed foods	Increase durability (preservation), facilitate and diversify food preparation	Removal of inedible parts, drying, cleaning, peeling, grinding, freezing, vacuum packaging, pasteurisation, roasting	Fresh/chilled/frozen/dried fruits and vegetables, grains, flours, milk, tea, coffee, fresh/dried/chilled/frozen meat, poultry and seafood  No added substances
<b>2</b> Processed culinary ingredients	Make products used when cooking at home or in restaurant kitchens, by extracting and refining substances from group 1 foods	Pressing, refining, milling, grinding, pulverizing, spray drying	Vegetable oils, animal fats, sugars, starches  May contain preservative additives
<b>3</b> Processed foods	Increase durability and palatability, by combining group 1 and 2 foods	Canning, bottling, salting, smoking	Canned or bottled vegetables and fruits, salted nuts, canned fish, un-reconstituted processed meat and fish (e.g. ham, bacon, smoked fish), cheese  Often two or three ingredients
<b>4</b> Ultra-processed food and drink products	Make easily accessible, pre-prepared, ready-to-eat/heat/drink convenience products. Often with long durability, and very profitable  Contains ingredients used in processed foods (group 3), but also a range of additives and ingredients only found in UPF-products (preservatives, fortifiers, emulsifiers, sweeteners, colours, flavours, sensory enhancers, stabilizers etc.)	Hydrogenation, hydrolysis, extruding, moulding, reshaping, pre-processing by frying and baking	Sweet/fatty/salty packaged snacks (e.g. chocolate, crisps), cookies, pre-prepared/ready-to-heat products (e.g. pizza and pasta dishes, sausages, burgers, fish nuggets), french fries, packaged 'instant' soups and noodles, carbonated drinks, sweetened drinks  Usually many ingredients, but little or no whole foods

Adapted from: [28, 29]. UPF: Ultra-processed foods.

Though we chose to ground our work on NOVA, we were aware that there are differing ideas regarding what is the most appropriate way of classifying processed foods. In example, Weaver et al. [4] are critical to the NOVA food classification, as they claim that value-laden terms are used when categorizing foods as unprocessed vs. ultra-processed. Furthermore, they state that use of such value-laden terms are not appropriate when grouping different foodstuffs, as processed foods are not necessarily risk increasing, but might contribute with important nutrients. Rather, Weaver et al. [4] have proposed that a classification scheme for

food products should be based on either characteristics of the food (e.g. amount of sodium, fat or fiber), or by specific attributes of the food product (e.g. types of processing techniques used, use of additives or degree of convenience), thereby referring to a classification of processed foods that has been proposed by the International Food Information Council (IFIC) [30]. These contrasting views illustrate some of the challenges researchers meet when trying to describe dietary patterns and when assessing and comparing previous research. The NOVA classification scheme is meant to be a useful tool in describing dietary patterns and possible effects on health and disease [27], and it is important to highlight that it was not proposed in order to claim that all industrial processing and UPF-products are unhealthy and should be avoided. Rather, Monteiro et al. [24] have emphasised that it is the qualities of UPF-products that make them unhealthy, as they are usually extremely palatable, cheap, accessible, convenient and habit-forming. Consumption of such food products is therefore not necessarily a risk factor for chronic diseases when eaten in modest amounts and accompanied by healthy foods, but the characteristics of UPF-products often result in replacement of more nutritious and healthy foods [12].

## **2.4 Different aspects of food processing**

### ***2.4.1 Advantages***

Although consumption of processed foods might have unfavourable health effects, it is important to emphasise that food processing also has a range of beneficial aspects [5, 31]. During history, knowledge about how to best take care of and store foods has been important for food and nutrition security, and the invention of preservation techniques like drying, salting, smoking, cooling, freezing and heating have been useful in this manner [5]. Vitamins were discovered in the early 1900s, and the knowledge and use of different preservation methods (e.g. bringing dried fruit on voyages to avoid scurvy among sailors) was important in order to avoid nutrition related diseases [6]. The preservation methods described in the historical context chapter, which were invented during the 19th and 20th century, increased food safety (e.g. decreased perishability of dairy products), shelf life and available variety of foods during changing seasons [4, 5]. Furthermore, fortification of food products (e.g. adding extra nutrients in foods) was introduced in the 1920s, [32], and in example, iodine has for a long time been added in salt, vitamin D in dairy products and iron in grain products, in order to reduce the risk of goitre, rickets and anaemia, respectively [6, 32]. The strategy of fortification of food products has the potential to reach large at risk populations, and might

therefore still be important, especially in developing countries, where deficiency diseases continues to be a particular challenge [33, 34].

Food processing has also contributed to increased utilization of foodstuffs, as the use of ultra-high-temperatures for pasteurization and sterilization cause less loss of nutrients compared to traditional methods such as boiling [4, 5]. Additionally, a review by Kyureghian et al. [35] reported that even though processing might cause a reduction of some nutrients in fruits and vegetables, several other nutrients were better retained in frozen than fresh products. Furthermore, processed tomatoes (e.g. tomato sauce) have a higher bioavailability of the antioxidant lycopene than fresh tomatoes, which is favourable as intake of lycopene has been associated with reduced risk of epithelial cancers such as prostate cancer [23, 36]. Higher bioavailability of lycopene after heat treatment implies that the micronutrient is easier absorbed in the human body due to the disruption of the tomato tissue structure, bioavailability might however differ according to the processing method applied [36]. Processing of foods has played an important role in food history, and many people and nations are today depending on commercially processed foods for convenient reasons, but also to ensure adequate food supplies and nutritional quality [4, 37].

#### ***2.4.2 Disadvantages***

Processing methods applied when manufacturing minimally processed foods (e.g. cleaning, pasteurisation, freeze drying), often have little impact on nutritional quality, though this depends on the nutritional composition of the foodstuff [7]. Techniques used to manufacture UPF-products on the other hand (e.g. hydrogenation, extruding, reshaping, baking, frying), often have a negative effect on the nutritional quality of foods [28, 29]. As this master's thesis is written with a public health perspective, we have chosen not to elaborate on all mechanisms that can occur during food processing. However, a brief description of processing in relation to selected components is presented in the following section. In example, during processing a loss of certain nutrients might occur (e.g. vitamin B, vitamin C, lysine), and also the formation of toxic compounds such as acrylamide, furan or acrolein is a particular problem [5, 38]. The formation of acrylamide has received much attention since Swedish researchers first reported its presence in foods in 2002 [39]. Acrylamide is a by-product from the Maillard reaction that occurs when carbohydrate-rich foods are processed or cooked at high temperatures e.g. during baking or frying, resulting in a chemical reaction between reducing sugars and the amino acid asparagine [39]. Based on animal studies, the International Agency



for Research on Cancer (IARC) has classified acrylamide as «probably carcinogenic to humans» (IARC, p. 425) [40]. The formation of trans fatty acids in food products is another example of the unfavourable effects that might occur during food processing, which can be illustrated by the case of margarine [23]. Margarine is industrially manufactured through hydrogenation, a process developed in 1897, which solidify or partially solidify vegetable oils by the use of high pressure and high temperature [1, 23]. Through the hydrogenation process trans fatty acids are produced, and it is well documented that intake of trans fats increase the risk of coronary heart disease and diabetes type 2 [41, 42]. Until the 1990s, margarine was the major source of trans fat [43], but in today's diet UPF-products like deep-fried foods, cookies, bakery products and snack foods are the greatest contributors of trans fat [44].

Both favourable and unfavourable health effects of different foods and food patterns are most likely due to complex interactions of a vast range of food components that are difficult to fully investigate [23]. As illustrated by dietary acrylamide and trans fat, there is reason to believe that there is still a range of food components that are yet to be discovered. Thus, it is challenging to assess how and why highly processed foods affect our health as the processing by itself results not only in altered nutrient compositions, but also in different interactions between components [22]. However, highly processed foods typically have a less favorable composition of micro- and macronutrients than less processed foods [45]. More specifically, they are often energy dense as well as containing particularly high levels of sodium, sugar and fat/saturated fat [4, 46-49]. A recently published cross-sectional study estimated that 57.9% of total energy intake in the US diet was from UPF-products, and that such foods contributed with nearly 90% of the energy intake from added sugars [47]. Furthermore, UPF are also one of the largest sources of sodium in our diet, and studies have found that such food products are responsible for 60-80% of total sodium intake [4, 18]. It is widely acknowledged that the increasing consumption of energy-dense highly processed foods has contributed substantially to the obesity epidemic and the challenge of chronic diseases [50]. The high intake of added sugar, sodium and saturated fat are all mentioned as factors to address in the World Health Organization's global action plan for prevention of non-communicable diseases [51].

## **2.5 Conceptual frameworks of health behaviour**

When investigating health behaviour, the use of conceptual frameworks and theories might be beneficial [52]. A range of theories has been proposed in order to explain determinants influencing health behaviour, and these emphasise different constructs ranging from an individual to an ecological perspective [52, 53]. Kurt Lewin was one of the pioneers in developing theories and models in order to explain health behaviour [54, 55]. Already in 1943, he and his colleagues proposed that the process of food choices included both cultural-sociological- and psychological aspects and thus was a result of complex interactions [56]. Furthermore, his research team also stated that different factors varied in importance among different groups of people and for different foods. Many of today's models of health behaviour have evolved on the grounds of Lewin's work and especially theories on facilitators and barriers to behaviour change and stage-based theories are founded on the Lewinian tradition [57].

Theory of planned behaviour (TPB) is one of the widest acknowledged theories of individual health behaviour [57]. This model is an expansion of the theory of reasoned action (TRA), which was invented by Fishbein and Ajzen in 1975. These theories are value expectancy theories, which implies that they aim to understand the relationship between attitudes, intentions and behaviour [58]. Furthermore, they also emphasise the potential influence of significant others such as family, friends and colleagues [53]. TRA and TPB have been successfully applied when e.g. promoting weight control and smoking cessation [57]. Nevertheless, individual level theories might not be sufficient when addressing complex behaviours, and in this relation there has been a development towards gradually considering a wider range of factors that potentially influence behaviour [52]. The social cognitive theory (SCT) addresses how interactions between the individual and the environment influence change in health behaviour [59]. SCT offers a number of constructs including psychological determinants of behaviour, modelling/observational learning, environmental determinants of behaviour, self-regulation, self-efficacy and moral disengagement. Regarding the use of this theory, the use of selected constructs instead of the whole theory is widely applied.

The investigation of factors influencing health behaviour, and more specifically food choices can be approached from different angles and research has showed that e.g. psychological-, anthropological-, biological-, economical- and cultural perspectives can be useful and relevant in this manner [55, 60-64]. Thus, it is understandable that ecological models with their

holistic perspective have gained increasing attention over the last decades [65]. Common for ecological models is that they provide comprehensive frameworks, as they emphasise the interactions between individual and environmental factors when investigating health behaviour [65, 66]. Distinct for such models is the importance of considering multiple levels of influence including intrapersonal (biological, psychological), interpersonal (social, cultural), organizational, community, physical environmental and policy level. Additionally, a core principle for ecological models is that they should be behaviour specific [65], which can be illustrated by the assumption that there are different factors influencing e.g. ultra-processed food consumption (UPFC) vs. fruit/vegetable consumption. These behaviours should therefore be investigated and approached differently.

To create favourable changes in dietary behaviour knowledge about determinants related to consumption of selected foods is of great importance [52, 66]. It is safe to state that food related behaviour is both complex and multifaceted and therefore factors on different levels need to be taken into consideration. As such, investigating the diverse determinants of UPFC might contribute to the development of effective interventions and strategies to promote public health.

## References

1. Cordain L, Eaton SB, Sebastian A, Mann N, Lindeberg S, Watkins BA et al. Origins and evolution of the Western diet: health implications for the 21st century. *American Journal of Clinical Nutrition*. 2005;81(2):341-54.
2. Eaton SB, Strassman BI, Nesse RM, Neel JV, Ewald PW, Williams GC et al. Evolutionary Health Promotion. *Preventive Medicine*. 2002;34(2):109-18.
3. Eaton SB, Konner M. Paleolithic nutrition revisited: A twelve-year retrospective on its nature and implications. *European Journal of Clinical Nutrition* 1997. p. 207-16.
4. Weaver CM, Dwyer J, Fulgoni VL, King JC, Leveille GA, MacDonald RS et al. Processed foods: contributions to nutrition. *The American Journal of Clinical Nutrition*. 2014;99(6):1525-42.
5. van Boekel M, Fogliano V, Pellegrini N, Stanton C, Scholz G, Lalljie S et al. A review on the beneficial aspects of food processing. *Molecular Nutrition & Food Research*. 2010;54(9):1215-47.
6. Bere E, Øverby NC. *Om mat og ernæring: En introduksjon til hva man bør spise*. Kristiansand: Høyskoleforlaget; 2011.
7. Fellows PJ. *Food processing technology: Principles and practice*. 3rd ed. Boca Raton, FL: CRC Press Woodhead Publishing; 2009.
8. Hogan E, Kelly AL, Sun D-W. High Pressure Processing of Foods: An Overview. In: Sun D-W, editor. *Emerging Technologies for Food Processing*. London, UK Elsevier Academic Press; 2005. p. 3-27.
9. Jabs J, Devine CM. Time scarcity and food choices: an overview. *Appetite*. 2006;47(2):196-204.
10. Keith B, Vitasek K, Manrodt K, Kling J. *The Only Person Who Likes Change Is a Wet Baby. Strategic Sourcing in the New Economy: Harnessing the Potential of Sourcing Business Models for Modern Procurement*. New York: Palgrave Macmillan US; 2016. p. 39-48.
11. Nestle M. *Food politics: How the food industry influences nutrition and health*. 2nd rev. ed. California studies in food and culture. Berkeley, California: University of California Press; 2007.
12. Monteiro CA, Moubarac JC, Cannon G, Ng SW, Popkin B. Ultra-processed products are becoming dominant in the global food system. *Obesity Reviews*. 2013;14 Suppl 2:21-8.
13. Silliman K, Rodas-Fortier K, Neyman M. A Survey of Dietary and Exercise Habits and Perceived Barriers to Following a Healthy Lifestyle in a College Population. *Californian Journal of Health Promotion*. 2004;2(2):10-9.
14. Schlosser E. *Fast food nation : the dark side of the all-American meal*. Boston: Houghton Mifflin; 2001.
15. Fraser LK, Edwards KL, Cade J, Clarke GP. The geography of Fast Food outlets: a review. *International Journal of Environmental Research and Public Health*. 2010;7(5):2290-308.
16. Stuckler D, McKee M, Ebrahim S, Basu S. Manufacturing epidemics: the role of global producers in increased consumption of unhealthy commodities including processed foods, alcohol, and tobacco. *PLoS Medicine*. 2012;9(6):e1001235.
17. Solberg SL, Terragni L, Granheim SI. Ultra-processed food purchases in Norway: a quantitative study on a representative sample of food retailers. *Public Health Nutrition*. 2015;FirstView:1-12.
18. Helsedirektoratet. *Utviklingen i norsk kosthold 2015*. IS-2382. Helsedirektoratet; 2015.

19. Statistics Norway. Tidsbruksundersøkelsen 2010. 2012. [https://www.ssb.no/kultur-og-fritid/statistikker/tidsbruk/hvert-10-aar/2012-01-18 - content](https://www.ssb.no/kultur-og-fritid/statistikker/tidsbruk/hvert-10-aar/2012-01-18-content). Accessed 15.09 2015.
20. Vaage OF. Tidene skifter : tidsbruk 1971-2010. vol 125. Oslo: Statistisk sentralbyrå; 2012.
21. Bugge A, Lillebø K, Lavik R. Mat i farten - Muligheter og begrensninger for nye og sunnere spisekonsepter i hurtigmatmarkedet. Statens Institutt for Forbruksforskning; 2009.
22. Mozaffarian D, Ludwig DS. Dietary guidelines in the 21st century - a time for food. *JAMA*. 2010;304(6):681-2.
23. Nasjonalt råd for ernæring. Kostråd for å fremme folkehelsen og forebygge kroniske sykdommer : metodologi og vitenskapelig kunnskapsbidrag. Oslo: Helsedirektoratet; 2011.
24. Monteiro C, Cannon G, Levy RB, Claro R, Moubarac JC. The food system. Ultra-processing. The big issue for nutrition, disease, health, well-being. *World Nutrition*. 2012;3(12):527-69.
25. Levy-Costa RB, Sichieri R, Pontes NS, Monteiro CA. Household food availability in Brazil: distribution and trends (1974-2003). *Revista de Saude Publica*. 2005;39:530-40.
26. Monteiro CA, Mondini L, Levy-Costa RB. Secular changes in dietary patterns in the metropolitan areas of Brazil (1988-1996). *Revista de Saude Publica*. 2000;34:251-8.
27. Monteiro CA, Levy RB, Claro RM, Castro IR, Cannon G. A new classification of foods based on the extent and purpose of their processing. *Cadernos de Saude Publica*. 2010;26(11):2039-49.
28. Monteiro C, Cannon G, Levy R, Moubarac JC, Jaime P, Martins AP et al. The food system. Food classification. *Public Health. NOVA. The star shines bright. World Nutrition*. 2016;7(1-3):28-38.
29. Moubarac JC, Parra DC, Cannon G, Monteiro CA. Food classification systems based on food processing: significance and implications for policies and actions: a systematic literature review and assessment. *Current Obesity Reports*. 2014;3(2):256-72.
30. International Food Information Council Foundation. Understanding our food communications tool kit: Leader guide. 2010. <http://www.foodinsight.org/articles/understanding-our-food-communications-tool-kit>. Accessed April 11, 2016.
31. Scrinins G. Nutritionism. New York: Columbia University Press; 2013.
32. Dwyer JT, Wiemer KL, Dary O, Keen CL, King JC, Miller KB et al. Fortification and health: challenges and opportunities. *Advances in Nutrition*. 2015;6(1):124-31.
33. Rautiainen S, Manson JE, Lichtenstein AH, Sesso HD. Dietary supplements and disease prevention - A global overview. *Nature Reviews Endocrinology*. 2016;Advance online publication.
34. Das JK, Salam RA, Kumar R, Bhutta ZA. Micronutrient fortification of food and its impact on woman and child health: a systematic review. *Systematic Reviews*. 2013;2:67.
35. Kyureghian G, Stratton J, Bianchini A, Albrecht J. Nutritional comparison on frozen and non-frozen fruits and vegetables: literature review. NE: The Food Processing Center, University of Nebraska-Lincoln. 2010. [http://www.frozenfoodfacts.org/assets-foundation/misc/files/Nutritional\\_Comparison\\_WP.pdf](http://www.frozenfoodfacts.org/assets-foundation/misc/files/Nutritional_Comparison_WP.pdf).
36. Shi J, Le Maguer M. Lycopene in tomatoes: chemical and physical properties affected by food processing. *Critical Reviews in Biotechnology*. 2000;20(4):293-334.

37. Floros JD, Newsome R, Fisher W, Barbosa-Cánovas GV, Chen H, Dunne CP et al. Feeding the world today and tomorrow: the importance of food science and technology. *Comprehensive Reviews in Food Science and Food Safety*. 2010;9(5):572-99.
38. Seal CJ, de Mul A, Eisenbrand G, Haverkort AJ, Franke K, Lalljie SPD et al. Risk-Benefit Considerations of Mitigation Measures on Acrylamide Content of Foods – A Case Study on Potatoes, Cereals and Coffee. *British Journal of Nutrition*. 2008;99(S2):S1-S46.
39. Virk-Baker MK, Nagy TR, Barnes S, Groopman J. Dietary acrylamide and human cancer: a systematic review of literature. *Nutrition and Cancer*. 2014;66(5):774-90.
40. International Agency for Research on Cancer. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 60 Some industrial chemicals. World Health Organization, Lyon, France. 1994. <http://monographs.iarc.fr/ENG/Monographs/vol60/>. Accessed May 2016.
41. Mozaffarian D, Aro A, Willett WC. Health effects of trans-fatty acids: experimental and observational evidence. *European Journal of Clinical Nutrition*. 2009;63 Suppl 2:S5-21.
42. Fats and fatty acids in human nutrition. Proceedings of the Joint FAO/WHO Expert Consultation. November 10-14, 2008. Geneva, Switzerland. *Annals of Nutrition & Metabolism*. 2009;55(1-3):5-300.
43. Johansson L, Borgejordet Å, Pedersen JI. Transfettsyre i norsk kosthold. *Tidsskrift for den Norske Lægeforening*. 2006;126(6):760-3.
44. Mozaffarian D, Katan MB, Ascherio A, Stampfer MJ, Willett WC. Trans Fatty Acids and Cardiovascular Disease. *New England Journal of Medicine*. 2006;354(15):1601-13.
45. World Health Organization. Diet, Nutrition and the Prevention of Chronic Diseases : Report of a Joint WHO/FAO Expert Consultation. Geneva: World Health Organization; 2003.
46. Adams J, White M. Characterisation of UK diets according to degree of food processing and associations with socio-demographics and obesity: cross-sectional analysis of UK National Diet and Nutrition Survey (2008-12). *International Journal of Behavioral Nutrition and Physical Activity*. 2015;12(1):160.
47. Martinez Steele E, Baraldi LG, Louzada ML, Moubarac JC, Mozaffarian D, Monteiro CA. Ultra-processed foods and added sugars in the US diet: evidence from a nationally representative cross-sectional study. *BMJ Open*. 2016;6(3):e009892.
48. Monteiro CA, Levy RB, Claro RM, de Castro IR, Cannon G. Increasing consumption of ultra-processed foods and likely impact on human health: evidence from Brazil. *Public Health Nutrition*. 2011;14(1):5-13.
49. Moubarac JC, Martins AP, Claro RM, Levy RB, Cannon G, Monteiro CA. Consumption of ultra-processed foods and likely impact on human health. Evidence from Canada. *Public Health Nutrition*. 2013;16(12):2240-8.
50. Moodie R, Stuckler D, Monteiro C, Sheron N, Neal B, Thamarangsi T et al. Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries. *The Lancet*. 2013;381(9867):670-9.
51. World Health Organization. Global action plan for the prevention and control of noncommunicable diseases 2013-2020. 2013. <http://www.who.int/nmh/publications/ncd-action-plan/en/>. Accessed April 12 2016.
52. Brewer NT, Rimer BK. Perspectives on health behavior theories that focus on individuals. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behavior and health*

- education : theory, research, and practice. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 149-65.
53. Wills J, Earle S. Theoretical perspectives on promoting public health. In: Earle S, Lloyd CE, Sidell M, Spurr S, editors. Theory and research in promoting public health. London: SAGE Publications; 2007. p. 129-61.
  54. Glanz K, Rimer BK, Viswanath K. The scope of health behavior and health education. In: Glanz K, Rimer BK, Viswanath K, editors. Health behavior and health education : theory, research, and practice. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 3-22.
  55. Winter Falk L, Bisogni CA, Sobal J. Food Choice Processes of Older Adults: A Qualitative Investigation. *Journal of Nutrition Education*. 1996;28(5):257-65.
  56. Lewin K. Forces Behind Food Habits and Methods of Change. In: Guthe CE, Mead M, editors. The Problem of Changing Food Habits. Washington, D. C.: The National Research Council - National Academy of Sciences,; 1943. p. 35-65.
  57. Rimer BK. Models of individual health behavior. In: Glanz K, Rimer BK, Viswanath K, editors. Health behavior and health education : theory, research, and practice. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 41-4.
  58. Montaña DE, Kasprzyk D. Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In: Glanz K, Rimer BK, Viswanath K, editors. Health behavior and health education : theory, research, and practice. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 67-96.
  59. McAlister AL, Perry CL, Parcel GS. How individuals, environments, and health behavior interact. Social cognitive theory. In: Glanz K, Rimer BK, Viswanath K, editors. Health behavior and health education : theory, research, and practice. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 169-210.
  60. McClain AD, Chappuis C, Nguyen-Rodriguez ST, Yaroch AL, Spruijt-Metz D. Psychosocial correlates of eating behavior in children and adolescents: A review. *The International Journal of Behavioral Nutrition and Physical Activity* Vol 6 Aug 2009, ArtID 54. 2009;6.
  61. Logue AW, Smith ME. Predictors of food preferences in adult humans. *Appetite*. 1986;7(2):109-25.
  62. Gustavsen GW, Rickertsen K. The effects of taxes on purchases of sugar-sweetened carbonated soft drinks: a quantile regression approach. *Applied Economics*. 2011;43(6):707-16.
  63. Cruwys T, Bevelander KE, Hermans RC. Social modeling of eating: A review of when and why social influence affects food intake and choice. *Appetite*. 2015;86:3-18.
  64. van der Horst K, Oenema A, Ferreira I, Wendel-Vos W, Giskes K, van Lenthe F et al. A systematic review of environmental correlates of obesity-related dietary behaviors in youth. *Health Education Research*. 2007;22(2):203-26.
  65. Sallis JF, Owen N, Fisher EB. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K, editors. Health behavior and health education: theory, research, and practice. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 465-85.
  66. Bartholomew LK, Parcel GS, Kok G, Gottlieb NH, Fernández ME. Planning health promotion programs : an intervention mapping approach. 3rd ed. San Francisco: Jossey-Bass; 2011.

### **3.0 RESEARCH PAPER 1. DETERMINANTS OF ULTRA-PROCESSED FOOD CONSUMPTION AMONG YOUNG ADULTS: A REVIEW OF THE LITERATURE**

#### **3.1 Abstract**

**Background** Highly processed foods and beverages (e.g. ready-meals, fast foods, soft drinks) have been classified as ultra-processed, and are now to a large extent dominating the global food market. High consumption of such foods has been positively associated with risk of e.g. overweight/obesity and diabetes type 2. In order to develop interventions, which are feasible and effective in reducing consumption of ultra-processed foods, knowledge about determinants related to intake of such products is essential. The aim of this paper was to systematically assess the current evidence on determinants of ultra-processed food consumption among young adults aged 18 to 35 years.

**Methods** A systematic literature search was conducted using the Medline, PsycInfo, SocIndex and Business Source Complete databases. Original research publications in English language were identified using search terms indicative of ultra-processed food consumption in combination with search terms indicative of determinants. Two researchers independently assessed the material based on inclusion and exclusion criteria, and the strength of evidence was evaluated. An ecological approach was applied, and determinants were organized according to level of influence.

**Results** Sixty-five papers published from 1983 to 2015 were included. A wide range of potential determinants has been investigated, and the majority of these were factors on the individual level. For many of the presumed determinants the evidence was inconsistent or there was a lack of research using comparable measures. However, male gender, younger age and increased television watching were consistently associated with higher consumption of ultra-processed foods.

**Conclusion** The determinants best supported by evidence were gender, age and television watching. Future research should investigate determinants of ultra-processed food consumption more thoroughly, preferably with longitudinal study design. An ecological approach would be appropriate, and especially regarding determinants on the environmental level there is a lack of consistent evidence.



### 3.2 Background

Highly processed foods and beverages like ready-meals, fast foods, soft drinks and snacks are now to a large extent dominating the global food market [1-6]. Analyses of Canadian food expenditures, showed that such foods contributed to total household energy availability with 24.4% in 1938 and 54.9% in 2001 [7]. Furthermore, Juul & Hemmingsson [5] estimated a 142% increase in consumption of highly processed foods in Sweden from 1960 to 2010, with a particularly marked rise from the 1980's. Highly processed foods have been classified as *ultra-processed*, a term proposed by Monteiro et al. [8] in the NOVA food classification system [9]. The industrial manufacturing of these goods make them durable, accessible, palatable and habit-forming [8], and such products are often referred to as convenience foods or fast foods as they are ready to eat with little or no preparation. Today, an endless number of ultra-processed foods (UPF) are being sold in grocery stores, gas stations, fast food restaurants, schools and workplaces. Nevertheless, several studies confirm that UPF on average are more energy-dense, higher in total fat, saturated fat, sugars and salt compared to unprocessed and minimally processed foods, as well as being lower in dietary fibre, protein and micronutrients [2, 3, 10].

While there has been a major development in industrially manufactured food products over the last decades, lifestyle related diseases like obesity and diabetes type 2 have also increased severely in the same period [11, 12]. Results from a recently published cohort study suggested that ultra-processed food consumption (UPFC) was a predictor of children's lipid profile [13]. In addition, studies have shown a positive association between UPFC and prevalence of metabolic syndrome in adolescence [14], and between household availability of UPF and prevalence of overweight and obesity in all age groups [15]. Furthermore, systematic reviews have reported a strong association between high soft drink consumption and poorer dietary status, high energy intake and excess body weight in children and adults [16-18], as well as high prevalence of diabetes type 2 and metabolic syndrome in adults [19, 20]. Consumption of fast foods has been positively associated with Body Mass Index (BMI) and insulin resistance in young adults [21, 22], and high use of ready-made meals has been associated with low diet quality, high energy intake and prevalence of abdominal obesity in adults [23, 24].

A recent systematic review concluded that parental modelling, TV-viewing and school policy are modifiable determinants of young children's sugar-sweetened beverage consumption [25].

Young adults are also an important, yet often neglected, group for non-communicable disease prevention [26], and to the best of our knowledge there is currently no review assessing the evidence on determinants of UPFC in this age group. Decreasing the consumption of UPF among young adults may yield positive health outcomes both for themselves and their children, and thereby has the potential of lifelong positive effects [27, 28]. On this basis, the aim of the present paper was to systematically assess the current evidence on determinants of UPFC among young adults aged 18 to 35 years.

### **3.3 Methods**

#### ***Data collection***

The present study followed standard procedures for conducting systematic reviews [29]. We started out with an exploratory approach, which revealed a lack of studies summarizing determinants of UPFC. With basis in the NOVA classification of food products, we developed a two-folded search string (Appendix 2) [8, 9]. Search terms indicative of UPFC were used in combination with search terms indicative of determinants in order to identify relevant papers. The search was conducted between October 2015 and February 2016 using four databases: MEDLINE (1946 to October 2015) and PsycINFO (1806 to October 2015) via OvidSP, and SocINDEX and Business Source Complete via Ebsco. The following limitations were applied when searching the databases: Available abstract, English language, peer-reviewed journals and academic journals. Two researchers (ILD and CBN) independently screened titles, abstracts and full texts to ensure agreement and reduce the risk of any reviewer-related biases. In case of disagreement, the other authors (THS and EB)<sup>2</sup> were asked to reach a decision.

A total of 3919 potential articles were identified through the literature search. After screening titles and abstracts, and removing duplicates, 282 articles were further assessed for eligibility. Due to our exploratory approach the criterion of sample age group (18-35) was applied at this stage, as shown in figure 3.1. Based on the inclusion and exclusion criteria (table 3.1), 48 articles were thoroughly read and considered for inclusion. This process yielded 21 papers that were included in the review. Bibliographies of identified papers were thoroughly screened in an iterative process until no new material emerged, and this yielded an additional 44 papers.

---

<sup>2</sup> THS: Tonje Holte Stea and EB: Elling Bere

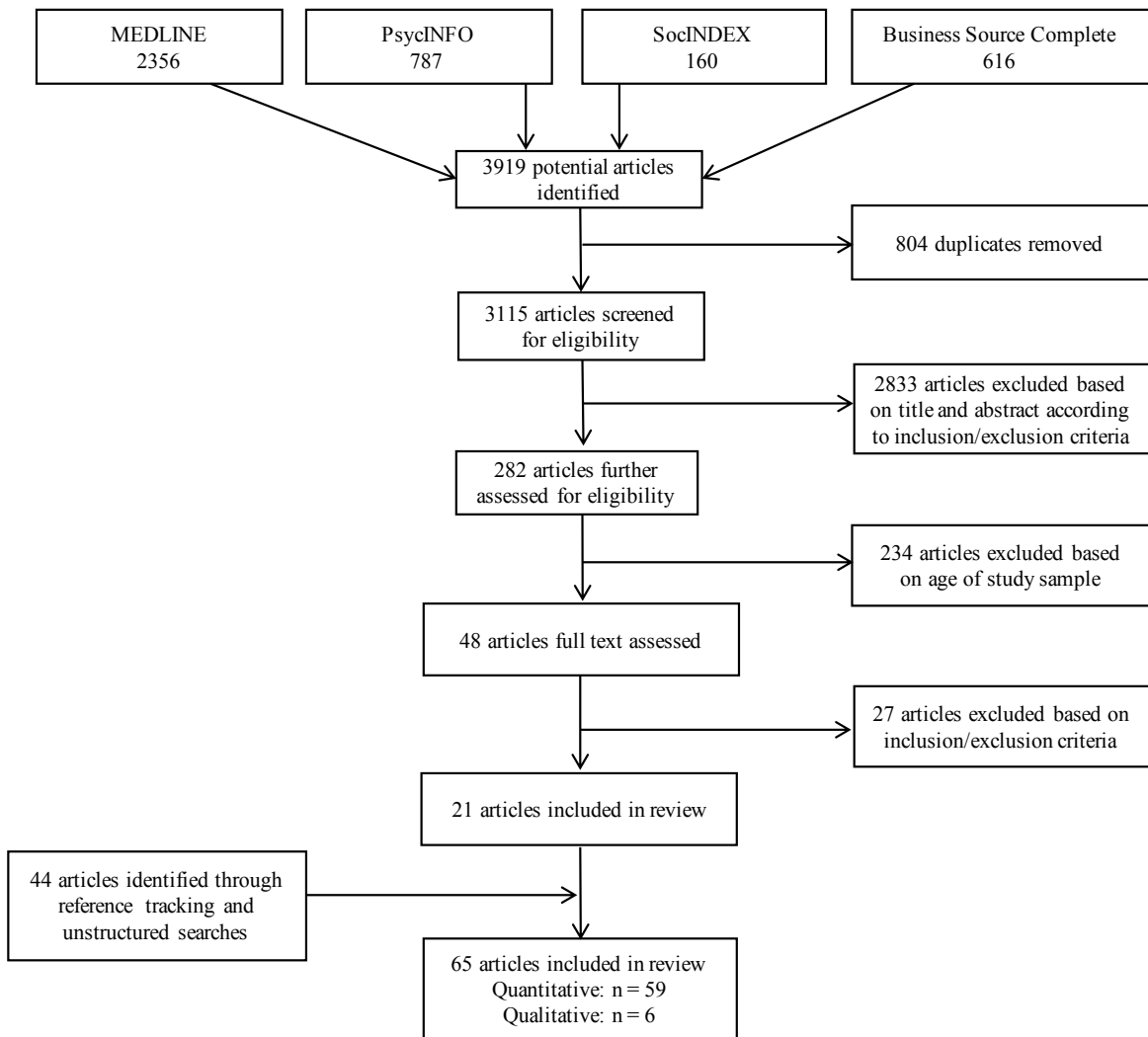


Figure 3.1. Flowchart of the literature search

Table 3.1. Criteria for inclusion and exclusion

<b>Papers to be included are studies:</b>
<ul style="list-style-type: none"> <li>• That examine determinants of UPFC (e.g. fast foods, soft drinks, ready-meals) as the main aim of the study, or when consumption UPF-products is investigated as one of more outcomes</li> <li>• Where consumption of UPF is differentiated from other outcomes, either as single UPF-products (e.g. chocolate, soft drinks), a combined UPF-measure (e.g. convenience foods, fast foods) or as a defined UPF-pattern (e.g. junk food pattern)</li> <li>• Where the study sample consists of participants in the age range from 18 to 35 years</li> <li>• Where the study subjects are human beings</li> <li>• Including healthy participants only (non-clinical populations; excluding e.g. people with eating disorders, alcoholism, Alzheimer’s disease, Diabetes type I and II) <ul style="list-style-type: none"> <li>○ Overweight, obesity and hypertension are not regarded as diseases, but risk factors</li> </ul> </li> <li>• Written in English language</li> <li>• With quantitative and/or qualitative design</li> </ul>
<b>Papers to be excluded are:</b>
<ul style="list-style-type: none"> <li>• Review papers</li> <li>• Experimental studies with inappropriate design for our purpose (e.g. they are not conducted under circumstances that are representative of a real-life/authentic setting for UPFC)</li> <li>• Studies with methodological aim as the main purpose (e.g. validation papers, development of measures)</li> <li>• Studies where UPFC is not stated as an outcome variable, but rather as a determinant or correlate without any hypothetical causal association</li> <li>• Evaluation papers from intervention studies, unless the intervention explicitly aims to influence UPFC</li> <li>• Studies regarding dental health</li> </ul>

UPF: Ultra-processed foods; UPFC: Ultra-processed food consumption

**Data extraction**

To extract data and assess the quality of included papers a standardized template was used as proposed in Polit & Beck [29], containing the following headlines: Title, year, authors, aim, independent variables (determinants), dependent variables (measure of UPF), key findings, study design, data source and sample characteristics. To provide an overview of the included papers descriptive characteristics were extracted and summarized (table 3.2-3.3). An ecological approach was applied, and the investigated determinants of UPFC was organized according to levels of influence, in accordance with Sallis et al. [30]. Findings on determinants of UPFC from papers with quantitative study design were extracted and presented by direction of association (table 3.4). Qualitative findings that appeared to be consistent across papers were summarized and narratively presented.

### 3.4 Results

#### *Descriptive characteristics of included papers*

A total of 65 articles, published between 1983 and 2015, were included in the current review. As shown in table 3.2, the majority of the included papers were conducted in Europe (30 papers) and North America (28 papers). Regarding study design, 13 studies were experimental, 8 studies had a longitudinal design, 7 studies were prospective, 28 studies were cross-sectional, 6 studies had a qualitative design and 3 studies used mixed methods. Of the included papers, 11 were explicitly theory based and 5 of these applied the Social Cognitive Theory (SCT).

Table 3.2. Summary of descriptive characteristics of the included papers

<b>Characteristics</b>	<b>Papers included (n)</b>
<b>Published</b>	
← 1999	4
2000 - 2009	27
2010 →	34
<b>Geography</b>	
Europe	30
North America	28
South America	1
Oceania	5
Asia	1
<b>Participants</b>	
< 100	14
100 - 500	24
500 - 1000	7
> 1000	20
<b>Study design</b>	
Experimental	13
Longitudinal	8
Prospective	7
Cross-sectional	28
Mixed methods*	3
Qualitative	6
<b>Theoretical basis</b>	
Based on theory	11
No theory applied	54

\*A combination of study designs was applied

More than two thirds of the included papers had intake of fast foods, sweetened beverages and snacks, or a combination of these products, as measure of UPFC. Determinants most thoroughly investigated were gender (21 papers), age (9 papers), socioeconomic status (11 papers) and weight status (10 papers). Only findings on determinants investigated in several papers are presented in the following section. Different directions of association were found between investigated determinants and UPFC in some papers. Findings of different directions of association was due to the use of several measures of UPF (e.g. fast foods and soft drinks) and/or several investigated groups (e.g. men and women), and these papers were therefore counted more than once. A comprehensive overview of descriptive characteristics and results are presented in tables 3.2-3.4.

Table 3.3. Descriptive characteristics of included papers

Author (Year) [Ref. no.]	Design	Theoretical basis	Geography		Sample characteristics			Data source		Investigated determinants
			Country	Continent	n	Gender distribution (male/female)	Mean age OR age range	General measure	Specific measure of UPF	
Bingham et al (2012) [31]	Experimental (Intervention)		Finland	Europe	604	M: 100 %	18-21	FFQ	Fat Index (meat pies, pastries, pizza, kebab, hot dogs, hamburgers, french fries, potato crisps), Sugar Index (desserts, sugared soft drinks, sweet pastries, chocolate and sweets)	Availability
Kattelman et al (2014) [32]	Experimental (Intervention, RCT)	Precede- Proceed	USA	North America	973	M: 30 % F: 70 %	19.3	Self-report questionnaire	Sugar-sweetened beverages	Educational health lessons, reinforcing health e-mail messages
Blass et al (2006) [33]	Experimental		USA	North America	20	M: 25 % F: 75 %	Undergraduate students (age not specified)	Weighing	High-density foods (macaroni and cheese, pizza)	Television viewing, BMI
Hermans et al (2008) [34]	Experimental		Netherlands	Europe	102	F: 100 %	20.5	Weighing	M&Ms	Modelling/matching
Hermans et al (2009) [35]	Experimental		Netherlands	Europe	100	F: 100 %	20.2	Weighing	M&Ms	Modelling/matching
Hermans et al (2010) [36]	Experimental		Netherlands	Europe	59	M: 100 %	21.7	Weighing	Cocktail nuts	Modelling/matching
Hermans et al (2013) [37]	Experimental		Netherlands	Europe	85	F: 100 %	20.2	Counting	M&Ms	Modelling/matching
Oh & Taylor (2012) [38]	Experimental		England	Europe	78	M: 42 % F: 58 %	24.9	Weighing	Chocolate	Physical activity, change in affective state
Robinson et al (2013) [39]	Experimental		England	Europe	129	M: 35 % F: 65 %	22.4	Weighing	High calorie snack (cookies, crisps, biscuits)	Health message, social norm message, hunger, junk food consumption
Robinson et al (2014) [40]	Experimental		England	Europe	75	M: 12 % F: 88 %	19.1	Weighing	High-calorie snacks (crisps, cookies)	Health message, social norm message

Table 3.3. Descriptive characteristics of included papers (continued)

Author (Year) [Ref. no.]	Design	Theoretical basis	Geography		Sample characteristics			Data source		Investigated determinants
			Country	Continent	n	Gender distribution (male/female)	Mean age OR age range	General measure	Specific measure of UPF	
Turner et al (2010) [41]	Experimental		England	Europe	106	M: 30 % F: 70 %	23.5	Observation	Cookies	Positive mood enhancement, emotional/uncontrolled eating style, age, gender
Nederkoom et al (2009) [42]	Experimental (2 studies)		Netherlands	Europe	1: 57 2: 94	1: F: 100 %  2: M: 18 % F: 82 %	1: 20.0 2: 20.3	1: Weighing 2: Web-based food supermarket	Snack foods (e.g. pizza, crisps, chocolate)	Impulsivity, hunger, gender, BMI, dietary restraint
Prestwich et al (2011) [43]	Experimental (2 studies)		England	Europe	1: 40 2: 36	1: M: 25 % F: 75 %  2: M: 14 % F: 86 %	1: 22.6 2: 21.8	Observation	Chocolate	Implicit and explicit attitudes
Evers et al (2013) [44]	Mixed methods  Experimental (study 1 & 2)  Prospective (study 3)		Netherlands	Europe	1: 68 2: 84 3: 38	1: M: 24 % F: 76 %  2: F: 100 %  3: F: 100 %	1: 21.9 2: University students (age not specified) 3: 17-25	1 & 2: Weighing 3: Snack diary (reported unhealthy snacking only)	1: M&Ms, coated peanuts and wine gums 2: Chocolate, crisps, biscuits and crackers 3: Unhealthy snacking	Positive and negative emotions
Zellner et al (2006) [45]	Mixed methods  Experimental /cross-sectional (2 studies)		USA	North America	1: 34 2: 169	1: F: 100 %  2: M: 24 % F: 76 %	1: 22 2: 24	1: Weighing 2: Self-report questionnaire	High-calorie snacks (M&Ms, potato chips)	Stress
Martínez-Ruiz et al (2014) [46]	Mixed methods  Experimental/ prospective		Mexico	North America	121	M: 36 % F: 64 %	21.1	Food diary	Fast foods (hamburger, hot dog, pizza)	Oral sensitivity to linoleic acid



Table 3.3. Descriptive characteristics of included papers (continued)

Author (Year) [Ref. no.]	Design	Theoretical basis	Geography		Sample characteristics			Data source		Investigated determinants
			Country	Continent	n	Gender distribution (male/female)	Mean age OR age range	General measure	Specific measure of UPF	
Bingham et al (2012) [47]	Longitudinal cohort		Finland	Europe	256	M: 100 %	18-21	FFQ	Fat Index (meat pies, pastries, pizza, kebab, hot dogs, hamburgers, french fries, potato crisps), Sugar Index (desserts, sugared soft drinks, sweet pastries, chocolate and sweets)	Joining military service (nutritionally planned diet, controlled environment, high physical activity level)
Jallinoja et al (2011) [48]	Longitudinal cohort		Finland	Europe	290	M: 100 %	18-21	FFQ	Fat Index (meat pies, pastries, pizza, kebab, hot dogs, hamburgers, french fries, potato crisps), Sugar Index (desserts, sugared soft drinks, sweet pastries, chocolate and sweets)	Joining military service, general health interest, cravings, using food as reward, pleasure of food
Kvaavik et al (2005) [49]	Longitudinal cohort		Norway	Europe	422	M: 49 % F: 51 %	1991: 25 1999: 33	Self-report questionnaire	Soft drinks	Prior soft drink consumption, gender
Larson et al (2007) [50]	Longitudinal cohort		USA	North America	1710	M: 45 % F: 55 %	20.4	FFQ	Soft drinks	Family meal frequency during adolescence
Larson et al (2008) [51]	Longitudinal cohort	Social Cognitive Theory	USA	North America	1686	M: 45 % F: 55 %	20.5	FFQ	Fast food	Age, gender, SES, personal factors (e.g. self-efficacy), behavioural factors (e.g. meal frequency, television viewing), socioenvironmental factors (e.g. social support, availability)
Laska et al (2012) [52]	Longitudinal cohort		USA	North America	1321	M: 43 % F: 57 %	26.2	FFQ	Sugar-sweetened beverages, fast foods	Food preparation involvement
Lien et al (2001) [53]	Longitudinal cohort		Norway	Europe	521	M: 46 % F: 54 %	21.0	FFQ	Sugar-sweetened soft drinks, sweets/chocolate	Consumption of soft drinks and sweets/chocolate in adolescence, gender
Barr-Anderson et al (2009) [54]	Longitudinal cohort (two age groups)		USA	North America	564 / 1366	M: 44 / 45 % F: 56 / 55 %	17.2 / 20.5 (at follow-up)	FFQ	Fast foods, sugar- sweetened beverages	Prior television viewing

Table 3.3. Descriptive characteristics of included papers (continued)

Author (Year) [Ref. no.]	Design	Theoretical basis	Geography		Sample characteristics			Data source		Investigated determinants
			Country	Continent	n	Gender distribution (male/female)	Mean age OR age range	General measure	Specific measure of UPF	
Adriaanse et al (2011) [55]	Prospective (2 studies)		Netherlands	Europe	1: 151 2: 184	F: 100 %	1: 20.53 2: 21.11	Snack diary	Unhealthy snacks (e.g. crisps, cookies)	BMI, emotional eating, external eating, restraint eating, habit strength
Adriaanse et al (2014) [56]	Prospective		Netherlands	Europe	77	M: 8 % F: 92 %	21.03	Snack diary	Unhealthy snacks (e.g. candy bars, crisps)	Gender, age, BMI, self-control, intention, habit strength
Brinberg & Durand (1983) [57]	Prospective	Theory of Reasoned action, Theory of Behaviour, Subjective Probability Model	USA	North America	154	Not specified	College students (age not specified)	Self-report questionnaire	Fast food	Intention, habit, facilitating conditions (ease of getting to fast food restaurant)
Hankonen et al (2013) [58]	Prospective	Health Action Process Approach	Finland	Europe	855	M: 100 %	20.0	FFQ	Fast food index (french fries, chips, pizza, kebab, hamburgers, hot dogs, meat pies)	Intention, planning
Hankonen et al (2014) [59]	Prospective	Health Action Process Approach	Finland	Europe	854	M: 100 %	20.0	FFQ	Fast food index (french fries, chips, pizza, kebab, hamburgers, hot dogs, meat pies)	Trait self-control
Laska et al (2011) [60]	Prospective		USA	North America	48	M: 44 % F: 56 %	21.0	Food diary	Calorically sweetened beverages, sweet/salty snacks	Away-from-home eating, social context of eating, multi-tasking while eating, time of eating occasion
McDade et al (2011) [61]	Prospective		USA	North America	10142	M: 50 % F: 50 %	18-26	In-home interviews	Fast food	Expectations for the future in adolescence, gender, SES, nativity status

Table 3.3. Descriptive characteristics of included papers (continued)

Author (Year) [Ref. no.]	Design	Theoretical basis	Geography		Sample characteristics			Data source		Investigated determinants
			Country	Continent	n	Gender distribution (male/female)	Mean age OR age range	General measure	Specific measure of UPF	
Baric et al (2003) [62]	Cross-sectional		Croatia	Europe	2075	M: 48 % F: 52 %	21.7	FFQ	Fast foods, soft drinks	Gender
Beerman et al (1990) [63]	Cross-sectional		USA	North America	152	M: 44 % F: 56 %	University students (74 % < 21 years)	FFQ	Cookies, soft drinks, fast foods	Living arrangements, gender
Bielemann et al (2015) [64]	Cross-sectional		Brazil	South America	4202	M: 51 % F: 49 %	22.8	FFQ	Ultra-processed foods (e.g. soft drinks, sausages)	Gender, marital status, education, income change, BMI
Bingham et al (2010) [65]	Cross-sectional		Finland	Europe	2905	M: 100 %	18.8	FFQ	Extra Food Index (e.g. fast foods, candy, chocolate, soft drinks)	Season, region, education, BMI, smoking status, physical activity, eating breakfast, drinking beer
Brunt & Rhee (2008) [66]	Cross-sectional		USA	North America	585	M: 38 % F: 62 %	21.1	Self-report questionnaire	Processed meats, soft drinks, salty snacks, candy	Living arrangements
Davison et al (2015) [67]	Cross-sectional		Ireland	Europe	168	M: 58 % F: 42 %	18.4	FFQ	Junk food pattern (e.g. candy, chocolate, crisps, chips), fast food pattern (e.g. energy drinks, hamburgers, sausages)	Age, gender, age at leaving school, food self-efficacy, food involvement, physical activity
Deshmukh-Taskar et al (2007) [68]	Cross-sectional		USA	North America	1266	M: 39% F: 61 %	29.7	FFQ	Sweetened beverages, snacks/desserts (e.g. chips, crackers, donuts, candy bars)	Income, education, gender, ethnicity, marital status, physical activity
Driskell et al (2006) [69]	Cross-sectional		USA	North America	226	M: 50 % F: 50 %	Students ≥ 19 years (mean/range not specified)	Self-report questionnaire	Fast foods, soft drinks	Gender
El Ansari et al (2012) [70]	Cross-sectional		Germany, Denmark, Poland and Bulgaria	Europe	2402	M: 39% F: 61%	University students (age not specified)	FFQ	Sweets, snacks, fast foods	Living arrangements, gender

Table 3.3. Descriptive characteristics of included papers (continued)

Author (Year) [Ref. no.]	Design	Theoretical basis	Geography		Sample characteristics			Data source		Investigated determinants
			Country	Continent	n	Gender distribution (male/female)	Mean age OR age range	General measure	Specific measure of UPF	
El Ansari et al (2015) [71]	Cross-sectional		Finland	Europe	1076	M: 29 % F: 71 %	University students (median: 21 years)	FFQ	Sweets, cookies and snacks pattern	Perceived stress, gender, BMI
Graham & Laska (2012) [72]	Cross-sectional		USA	North America	1201	M: 47 % F: 53 %	21.5	Dietary screeners	Fast food	Nutrition label use
Kim et al (2011) [73]	Cross-sectional		Korea	Asia	407	M: 100 %	21.8	Self-report questionnaire	Delivery foods, processed foods, sweets	Commercial beverage consumption
Kremmyda et al (2008) [74]	Cross-sectional		Greece/Scotland	Europe	135	M: 42 % F: 58 %	23.5	Self-administered questionnaire	Snack foods (e.g. crisps, fries, sweets, soft drinks), convenience food	Living arrangements (away from home, with the family), acculturation
Larson et al (2006) [75]	Cross-sectional		USA	North America	1710	M: 45 % F: 55 %	20.4	FFQ	Fast food	Food preparation behaviour
Larson et al (2009) [76]	Cross-sectional	Social Cognitive Theory	USA	North America	1687	M: 44 % F: 56 %	20.5	FFQ	Soft drinks, fast foods	Social eating, eating on the run
Larson et al (2011) [77]	Cross-sectional		USA	North America	2287	M: 45 % F: 55 %	25.3	FFQ	Sugar-sweetened beverages, fast-food restaurant use	Restaurant use, gender, age, SES, parental status, weight status
Laska et al (2010) [78]	Cross-sectional		USA	North America	1687	M: 44 % F: 56 %	20.5	FFQ	Soft drinks, fast foods	Living arrangements
Li et al (2012) [79]	Cross-sectional		USA	North America	488	M: 35 % F: 65 %	19.6	Self-report questionnaire	Fast food	Gender, age, race, marital status, student status, BMI
Lloyd-Richardson et al (2008) [80]	Cross-sectional		USA	North America	282	M: 39 % F: 61 %	18.6	Self-report questionnaire	Junk food	Alcohol use
Milligan et al (1998) [81]	Cross-sectional		Australia	Oceania	504	M: 49 % F: 51 %	18.0	2x 24-hour diet record	Energy-dense food pattern (e.g. sugary foods, sweet drinks, convenience foods)	Gender, SES
Morse & Driskell (2009) [82]	Cross-sectional		USA	North America	259	M: 39 % F: 61 %	19-24	Self-report questionnaire	Fast food	Gender

Table 3.3. Descriptive characteristics of included papers (continued)

Author (Year) [Ref. no.]	Design	Theoretical basis	Geography		Sample characteristics			Data source		Investigated determinants
			Country	Continent	n	Gender distribution (male/female)	Mean age OR age range	General measure	Specific measure of UPF	
Northstone et al (2008) [83]	Cross-sectional		England	Europe	12053	F: 100 %	96 % < 30 years	FFQ	Processed pattern (e.g. sausages, hamburgers, chips), confectionary pattern (e.g. chocolate, biscuits)	SES, age, marital status, parity, ethnicity, feels energetic, smoking status, depression, anxiety, weight status, dieting, vegetarian status, season
Papadaki & Scott (2002) [84]	Cross-sectional		Greece/Scotland	Europe	80	M: 50 % F: 50 %	25.5	FFQ	Chips, sweets/chocolate, crisps/savoury snacks, soft drinks, biscuits	Acculturation (temporary translocation)
Papadaki et al (2007) [85]	Cross-sectional		Greece	Europe	84	M: 38 % F: 62 %	22.3	FFQ	Eating habits (e.g. chocolate, crisps, convenience meals)	Living arrangements
Pelletier et al (2013) [86]	Cross-sectional	Integrated Behavioral Model	USA	North America	1201	M: 47 % F: 53 %	21.9	Self-report questionnaire	Fast foods, sugar-sweetened beverages	Attitudes towards alternative food production practices
Smith et al (2009) [87]	Cross-sectional		Australia	Oceania	2862	M: 45 % F: 55 %	M: 31.7 F: 31.6	FFQ	Takeaway foods (e.g. pizza, hamburgers, fried chicken)	Age, gender, education, employment status, marital status, smoking status, alcohol consumption, physical activity, sitting time, TV viewing
Smith et al (2010) [88]	Cross-sectional		Australia	Oceania	2814	M: 44 % F: 56 %	M: 31.7 F: 31.5	FFQ	Takeout-type foods (e.g. hamburgers, pizza, sausages)	Involvement in meal preparation
West et al (2006) [89]	Cross-sectional	Stages of change	USA	North America	265	M: 34 % F: 66 %	College students (51 % < 21, 35 % > 25)	FFQ	Sugar-sweetened beverages	Age, gender, race
Betts et al (1995) [90]	Qualitative		USA	North America	270	M: 39 % F: 61 %	18-24	Focus group interviews	Fast foods, microwave foods	Factors influencing food choice (e.g. time constraints, financial barriers, health concerns)
Chang et al (2008) [91]	Qualitative	Social cognitive theory	USA	North America	80	F: 100 %	27.2	Focus group interviews	High-fat foods, unhealthy foods (e.g. candy bars, crisps, chips)	Outcome expectancies, self-control, self-efficacy, emotional coping, physical environment, social support, situation, lifestyle
Davison et al (2015) [92]	Qualitative	Social cognitive theory	Ireland	Europe	14	M: 71 % F: 29 %	16-20	Focus group interviews	Junk foods, fast foods	Self-efficacy, perceived control, availability, cost, drugs, caught in a spiral

Table 3.3. Descriptive characteristics of included papers (continued)

Author (Year) [Ref. no.]	Design	Theoretical basis	Geography		Sample characteristics			Data source		Investigated determinants
			Country	Continent	n	Gender distribution (male/female)	Mean age OR age range	General measure	Specific measure of UPF	
du Plessis (2012) [93]	Qualitative		Australia	Oceania	53	M: 100 %	17-24	Focus group interviews	Food choices (e.g. take- out foods)	Convenience, availability, cost of foods, nutritional beliefs, peer influence, body image
Hattersley et al (2009) [94]	Qualitative		Australia	Oceania	35	M: 34 % F: 66 %	18-30	Focus group interviews	Soft drinks	Social and environmental cues, intrinsic qualities of beverages, health-related beliefs, gender
Nelson et al (2009) [95]	Qualitative	Social Cognitive Theory	USA	North America	50	M: 12 % F: 88 %	19.4	Focus group interviews + one- on-one interviews	Unhealthy foods (e.g. cookies, soda, take-out pizza, fast food)	Key modifiable factors underlying weight-related behaviour: e.g. availability, price, lifestyle (time management, stress, alcohol use)

UPF: Ultra-processed foods; FFQ: Food frequency questionnaire; BMI: Body Mass Index; SES: Socioeconomic status; F: Female; M: Male

Table 3.4. Quantitatively investigated determinants of UPFC in young adults

Determinants	Direction of association with UPFC* [Reference number]		
	+	-	0
<b>Individual level factors</b>			
<i><b>Sociodemographics</b></i>			
Gender (ref. women)	[41, 49, 51, 53, 61-63, 67, 69, 70, 77, 79, 81, 82, 87, 89]	[63, 64, 69-71]	[42, 56, 67, 68, 70]
Age (younger)	[41, 67, 77, 83, 87, 89]	[51]	[51, 56, 79, 87]
Race (white vs. non-white)	[83]	[83]	[79]
Race (white vs. black)		[89]	
European American vs. African American	[68]	[68]	
Nativity status (foreign-born vs. US-born)			[61]
Marital status (ref. married/with partner)	[64, 87]	[68, 83]	[68, 79, 83, 87]
Parental status (no children vs. one or more children)		[77, 83]	[77, 83]
Region (Southern Brigade vs. Northern Brigade, Finland)			[65]
<i><b>Socioeconomic status</b></i>			
Educational level (higher)	[64]	[83]	[65, 68, 83, 87]
Education (left school before the age of 16)	[67]		[67]
Parental educational level (higher)		[51, 61, 77]	[77]
Income (higher)			[68]
Income change (never poor)	[64]		
Financial difficulties (some/many vs. none)	[83]		[83]
Employment status (employed vs. not employed)	[77, 87]		[77, 87]
Worked third trimester when pregnant	[83]		[83]
Student vs. non-student		[77]	[77]
Student (freshman)			[79]
Area based socioeconomic status			[81]
Housing tenure (owning vs. council housing/renting)	[83]	[83]	
Food insecurity in adolescence			[51]
<i><b>Physiological factors</b></i>			
Body Mass Index (higher)		[42, 64, 65]	[33, 55, 56, 71, 79]
Weight status (overweight/obese vs. not overweight)	[77]	[83]	[77, 83]
Hunger (more hungry)	[36, 39, 42]		[42]
Oral perception/sensitivity of fat (high)		[46]	
<i><b>Self-control</b></i>			
Self-control (higher)		[56, 59]	
Uncontrolled eating style			[41]
Uncontrolled eating style and positive mood enhancement	[41]	[41]	
<i><b>Habits</b></i>			
Unhealthy habit strength	[55, 56]		[57]
Healthy habit strength (fruit)		[56]	
<i><b>Intentions</b></i>			
Intention (to eat UPF)	[57]		
Intention (to eat fruit)		[56]	
Intention (to avoid fat/limit unhealthy snack)		[58]	[56]

Table 3.4. Quantitatively investigated determinants of UPFC in young adults (continued)

Determinants	Direction of association with UPFC* [Reference number]		
	+	-	0
<b>Attitudes</b>			
Positive attitudes towards alternative food production practices (organic, local, sustainable)		[86]	
Implicit attitudes towards chocolate (positive)	[43]		
Explicit attitudes towards buying/eating chocolate (positive)			[43]
<b>Affective state/emotions</b>			
Perceived stress	[45]		[45, 71]
Positive emotions	[44]		
Negative emotions	[44]		
Positive mood enhancement			[41]
Emotional eating style and positive mood enhancement			[41]
Emotional eating style			[41, 55]
Using food as reward	[48]		[48]
Being depressed (in pregnancy)			[83]
Being anxious (in pregnancy)	[83]		[83]
Feels energetic during pregnancy (yes vs. no)		[83]	[83]
Change in affective state after physical activity intervention			[38]
<b>Lifestyle related factors</b>			
Prior television viewing (more)	[51, 54]		[51, 54]
Television viewing (while eating)	[33, 60]		[60]
Television viewing (more)	[87]		
Smoking status (high)	[65]		
Current smoker vs. never/former smoker	[87]		[87]
Smoking in third trimester of pregnancy (yes)	[83]		[83]
Physical Activity (high)		[65]	[67, 68, 87]
Brisk walking (15 min. of exercise)		[38]	
Sitting time (more)	[87]		
Sport involvement in adolescence			[51]
Weight control behaviours in adolescence			[51]
General health interest (high)		[48]	[48]
Joining military service	[47, 48]	[48]	[47, 48]
<b>Dietary behaviours</b>			
Alcohol use (more)	[65, 80]		[87]
Commercial beverage consumption (frequent)	[73]		
Junk food consumption (frequent)	[39]		
Prior soft drink consumption (in adolescence)	[49, 53]		[49]
Prior soft drink consumption (in early adulthood)	[49]		
Prior sweets/chocolate consumption in adolescence	[53]		
Full service restaurant use			[77]
Fast food restaurant use (primarily serves burger-and-fries)	[77]		
Fast food restaurant use (primarily serves sandwich/subs)			[77]
Pleasure of food			[48]
Craving for sweet food	[48]		[48]
Nutrition label use (higher)		[72]	



Table 3.4. Quantitatively investigated determinants of UPFC in young adults (continued)

Determinants	Direction of association with UPFC* [Reference number]		
	+	-	0
<b><i>Dietary behaviours (continued)</i></b>			
Being a vegetarian		[83]	[83]
Dieting during pregnancy		[83]	[83]
<b><i>Meal patterns</i></b>			
Tend to eat on the run	[76]		
Eating breakfast (daily)		[65]	
Breakfast frequency in adolescence			[51]
Lunch frequency in adolescence	[51]		[51]
Dinner frequency in adolescence			[51]
Snack frequency in adolescence	[51]		[51]
Location of eating occasion (away from home vs. home)	[60]	[60]	[60]
Multitasking while eating (e.g. using computer, texting, driving)			[60]
Time of eating occasion (ref. 11 am to 7 pm)	[60]	[60]	[60]
<b><i>Food involvement</i></b>			
Food preparation involvement (more)		[52, 75]	
Prior food preparation in young adulthood			[88]
Food preparation involvement in adolescence			[51, 52]
Uninvolved/uninterested in food	[67]		[67]
Enjoyment of food/cooking		[67]	[67]
Being involved in the kitchen (cleaning)	[67]	[67]	
<b><i>Other personal factors</i></b>			
Self-efficacy (higher) (to reduce unhealthy and increase healthy food intake)		[67]	[67]
Self-efficacy for healthy eating in adolescence			[51]
Action planning (planning future eating behaviour, what, when, where)		[58]	
Coping planning (risk situations and coping response)			[58]
Impulsivity (higher)	[42]		[42]
Impulsivity (higher) and hunger (more hungry)	[42]		
External eating style			[55]
Restraint eating style		[55]	[42]
Concern about health in adolescence			[51]
Perceived taste barriers to healthy eating in adolescence	[51]		[51]
Perceived time barriers to healthy eating in adolescence			[51]
Perceived benefits of healthy eating in adolescence			[51]
Perceived chances of living to age 35 (in adolescence)			[61]
Perceived chances of attending college (in adolescence)			[61]
Body satisfaction in adolescence			[51]
Weight concerns in adolescence			[51]
Weight/shape concerns in pregnancy		[83]	[83]

Table 3.4. Quantitatively investigated determinants of UPFC in young adults (continued)

Determinants	Direction of association with UPFC* [Reference number]		
	+	-	0
<b>Environmental level factors</b>			
<i>Family/friends-related factors</i>			
Parental support for healthy eating in adolescence			[51]
Peer support for healthy eating in adolescence		[51]	[51]
Family meal frequency during adolescence (high)		[50]	[50, 51]
Social eating (usually eat dinner with others)			[76]
Social context of eating (by myself vs. with others)	[60]	[60]	[60]
<i>Modelling</i>			
Modelling of ultra-processed food intake (unknown same-sex confederate with high intake)	[34, 37]		[35, 36]
Modelling and effect of perceived body weight (high intake of UPF in normal weight vs. slim same-sex unknown confederate)	[34]		
Modelling and effect of quality of social interaction (unsociable vs. sociable unknown same-sex confederate)	[35]		
Modelling and effect of hunger (unknown same-sex confederate with high intake of UPF)	[36]		
Modelling and effect of low impulsivity (unknown same-sex confederate with high intake of UPF)	[37]		
Modelling and effect of attention to food related cues (unknown same-sex confederate with high intake of UPF)			[37]
<i>Nutritional strategies/interventions</i>			
Educational lessons to promote healthy eating			[32]
Reinforcing e-mail nudges to promote healthy eating			[32]
Health message regarding junk food (vs. no message)		[39]	
Social norm message regarding junk food (vs. no message)		[39]	
Descriptive norm message regarding fruit and vegetables (vs. health message)		[40]	[40]
Injunctive norm message regarding fruit and vegetables (vs. health message)			[40]
<i>Availability</i>			
Availability in the military (more healthy foods, less unhealthy foods)		[31]	[31]
Ease of getting to fast food restaurant			[57]
Healthy food availability at home in adolescence			[51]
Unhealthy food availability at home in adolescence	[51]		[51]
<i>Living arrangements</i>			
Living on university campus (ref. living off campus or in family home)		[78]	[66, 78]
Living on university campus (ref. living off campus or in Greek housing)	[63]		[63]
Other living arrangements (ref. living in parental home)	[85]	[78]	[70, 78]
Living in parental home after starting university (change in consumption)	[85]		[74, 85]

Table 3.4. Quantitatively investigated determinants of UPFC in young adults (continued)

Determinants	Direction of association with UPFC* [Reference number]		
	+	-	0
<b>Living arrangements (continued)</b>			
Living away from home after starting university (change in consumption)	[85]		[74, 85]
Acculturation (Greek students moving to Scotland for university)	[74, 84]		[74, 84]
<b>General</b>			
Season (winter vs. summer)	[65]	[83]	[83]

\*Positive association (+), negative association (-), no association (0)

Some papers included several measures of UPF and/or several groups and certain determinants may therefore be marked as having different direction of association

UPF: Ultra-processed foods

UPFC: Ultra-processed food consumption

## **Individual level factors**

### ***Sociodemographics***

**Gender** The association between gender and UPFC was investigated in twenty-one papers. Men were found to be the most frequent consumers of UPF in sixteen papers [41, 49, 51, 53, 61-63, 67, 69, 70, 77, 79, 81, 82, 87, 89], while five papers found women to be the most frequent consumers [63, 64, 69-71]. Five papers did not find significant gender differences in UPFC, either for some or all measures of UPF-products [42, 56, 67, 68, 70]. A closer view of the findings suggested that there were different consumption patterns of UPF, with men consuming the largest amounts of fast foods and sugar sweetened soft drinks and women consuming the largest amounts of sweets and artificially sweetened beverages.

**Age** Nine papers investigated the association between age and UPFC. Younger age was associated with higher UPFC among young adults in six papers [41, 67, 77, 83, 87, 89]. In one of the cross-sectional studies [87], results were only significant for males, although the evidence indicated that age was inversely associated with UPFC in both genders. Conversely, one longitudinal cohort study found that younger age was associated with lower UPFC [51]. In the latter study, fast food consumption had significantly increased from baseline (mean age 15.9 years) to follow-up (mean age 20.5 years) in males, but not females. Two papers did not find any significant associations between age and UPFC [56, 79]. Overall, findings in the included papers indicated that age might be more closely linked to UPFC in males than females.

**Race/ethnicity** Five papers investigated the association between race/ethnicity and UPFC [61, 68, 79, 83, 89], though non-comparable groups were used across papers.

**Marital status** Five papers investigated the association between marital status and UPFC. Two cross-sectional studies found that being single was positively associated with use of UPF [64, 87]. In one of these studies [87], the results were significant only for males, though the evidence was also close to reaching significance in females. Conversely, another cross-sectional study found that being married was positively associated with consumption of snacks and desserts, while no association was found for sweetened beverages [68]. Two papers had study samples with highly unequal distribution (respectively 8% married and 97.5% married), and the findings regarding marital status and UPFC in these papers could therefore not be emphasised [79, 83].

**Socioeconomic status (SES)** The association between SES and UPFC was investigated in eleven papers. Different measures of SES lead to difficulties regarding comparisons across studies. However, one longitudinal, one prospective and one cross-sectional study found that higher parental educational level was associated with less frequent use of UPFC [51, 61, 77], while four papers found no association between participant's own educational level and UPFC [65, 68, 83, 87]. Two cross-sectional papers found that being employed (part-time or full-time) was positively associated with UPFC [77, 87], as those being in the workforce had a higher takeaway food consumption and a more frequent use of fast food restaurants serving sandwiches/subs. No association was found between employment status and the use of fast food restaurants serving burgers and fries [77].

### ***Lifestyle factors***

**Television watching** Five papers investigated the association between television watching and UPFC. Some inconsistencies were found across age groups and gender, nevertheless, two longitudinal cohorts found that increased hours of television watching in adolescence were predictive of a higher consumption of fast foods [51, 54] and sugar-sweetened beverages [54] in young adulthood. Furthermore, results from one prospective study and one experimental study indicated that watching television while eating was associated with higher consumption of sweetened beverages [60] and pre-prepared meals [33], but not candy or salty snacks [60]. Finally, one cross-sectional study found that those who spent more hours watching television were more likely to eat takeaway foods like pizza, burgers or fried chicken at least twice a week [87].

**Smoking** Three cross-sectional papers examined the association between smoking status and UPFC, and findings indicated that being a smoker was positively associated with UPFC [65, 83, 87]. However, one study found significant differences in smoking status and UPFC only for males [87], and another study reported that being a smoker was associated with following a processed dietary pattern (e.g. sausages, burgers, fried foods), but not a confectionary pattern (e.g. sweets, chocolate, crisps) [83].

**Physical activity** Six papers investigated the association between physical activity and UPFC. One cross-sectional study indicated that those being more physically active had a lower intake of UPF [65], and one experimental study found that a 15 minute brisk walk reduced subsequent chocolate consumption during breaks at the workplace [38]. Furthermore,

one cross-sectional study found that sitting time was positively associated with frequency of UPFC, while no association was found for weekly hours of physical activity during leisure time and UPFC [87]. Two additional studies found no association between level of physical activity and UPFC [67, 68], and finally no association was found for sport involvement in adolescence and UPFC in young adulthood [51].

**Alcohol use** Three cross-sectional studies investigated the association between alcohol use and UPFC. Two of these studies found a positive association between alcohol use and UPFC [65, 80], while one study found no association [87]. In two qualitative papers, findings from focus group interviews and one-on-one interviews with university students, indicated that alcohol consumption increased intake of UPF-products such as fast foods and soft drinks [94, 95].

**Meal patterns** The association between meal patterns and UPFC was investigated in four papers. One cross-sectional study found that eating on the run was associated with higher consumption of soft drinks and fast foods in both genders [76]. Another cross-sectional study indicated that eating breakfast daily was associated with lower UPFC (fast foods, soft drinks, candies, chocolate) when compared to eating breakfast 3-4 times a week or less [65]. One longitudinal cohort found that both lunch frequency and snack frequency (eat in-between meals) in adolescence were positively associated with fast food consumption in young adulthood, although the results were only significant for females [51]. One prospective study found that consumption of different UPF-products differed according to time of eating occasion, as consumption of sweetened baked goods was most frequent in the morning and consumption of salty snacks was most frequent in the evening [60]. The latter mentioned study also found that consumption of sweetened beverages and fried side dishes was most frequent when eating away from home, while consumption of cookies and sweetened baked goods was most frequently consumed at home [60].

**Involvement in food preparation** Food involvement and UPFC was examined in five quantitative papers. Two cross-sectional and one longitudinal study reported that a higher involvement in food preparation (buying fresh vegetables, writing a grocery list, preparing dinner with vegetables, enjoyment of cooking etc.) was associated with lower consumption of fast foods [52, 67, 75]. Additionally, one of these [67] found that being uninterested in food was associated with higher use of fast foods, but had no association with junk food

consumption. Three studies found that prior involvement in food preparation had no association with fast food consumption in young adulthood [51, 52, 88]. In four qualitative papers, convenience and ease of preparation were stated as reasons for eating UPF-products such as pre-prepared microwavable food (e.g. instant noodles, soup), fast foods, candy bars or chips [90, 91, 93, 95].

### ***Physiological factors***

**Weight status** Ten papers investigated the association between weight status and UPFC. Five studies found no association [33, 55, 56, 71, 79], while one experimental and two cross-sectional studies reported that BMI was inversely associated with UPFC [42, 64, 65]. Additionally, one cross-sectional paper reported that being overweight was negatively associated with following a confectionery dietary pattern, but had no association with following a processed dietary pattern [83]. Only one cross-sectional study found a positive association between overweight/obesity and use of certain types of fast food restaurants (burger and fries, fried chicken, Mexican foods) [77]. A closer view of the evidence indicated no notable differences in the UPF-measures applied, when comparing the papers that found an association and the papers that found no association between weight status and UPFC.

**Hunger** Three papers with experimental design examined the effect of hunger on UPFC, and found that being hungry was positively associated with intake of UPF as measured by snack products [36, 39, 42]. One of these studies found that hunger and impulsivity interact, and that those being both hungrier and more impulsive purchased more snack foods [42].

### ***Psychological factors***

**Habits** Three papers with prospective design examined the potential effect of healthy/unhealthy eating habits on UPFC. Of these, two studies found that strength of unhealthy snack habits (measured by a 12-item scale) had a positive association with UPFC [55, 56], while one study found no effect of unhealthy habits as measured by frequency of eating at hamburger restaurants [57]. Finally, in one study, strength of healthy snack habits (measured by a 12-item scale) was inversely associated with UPFC [56].

**Intention** The influence of intention on UPFC was investigated in three papers with prospective design. One study found that intention to eat at a fast food restaurant within two weeks predicted consumption of fast foods [57], while two studies found that intention to eat

fruit and intention to avoid fat was associated with a lower intake of unhealthy snacks and fast foods [56, 58]. No association was found for intention to limit unhealthy snack intake and UPFC [56].

**Self-control** Three papers investigated the association between self-control and UPFC. Two prospective studies found that study participants with higher self-control had a lower consumption of fast foods and unhealthy snacks [56, 59]. Additionally, one experimental study found that having a controlled or uncontrolled eating style influenced the effect of a mood enhancing intervention on UPFC [41].

**Affective state/emotions** The association between affective state/emotions and UPFC was investigated in eight quantitative papers [38, 41, 44, 45, 48, 55, 71, 83]. Different measures lead to difficulties regarding comparisons across studies. However, one study using a combination of experimental and prospective design, found that both positive and negative emotions were associated with higher unhealthy snack consumption [44], while one experimental and one prospective study found no association between having an emotional eating style and unhealthy snack consumption [41, 55]. Furthermore, using food as a reward was positively associated with consumption of sweet foods in one longitudinal study analysing baseline data [48]. In three qualitative papers, eating in response to stress, negative emotions or boredom, and also using food as a reward, was associated with higher consumption of UPF-products such as soft drinks, fast foods and high-calorie snacks [91, 94, 95].

### **Environmental level factors**

**Social context of eating** Four papers investigated the association between eating in a social context and UPFC. One longitudinal study found no association between family meal frequency during adolescence and fast food consumption in young adulthood [51]. Results from another longitudinal study indicated an inverse association between family meal frequency in adolescence and soft drink consumption in young adulthood in both genders, though findings were only significant in females [50]. Social eating, as indicated by usually eating dinner with others, was not associated with consumption of soft drinks or fast foods in one cross-sectional study [76]. Finally, one prospective study found that consumption of different UPF-products differed when eating alone or with others, as cookies and baked goods



was most frequently eaten alone, and sweetened beverages was most frequently consumed with others [60].

**Social influence** Four studies experimentally tested the effect of social modeling of food intake on UPFC. In two studies, participants who were exposed to a confederate (eating companion) with high intake of UPF, ate significantly more than participants who were exposed to a confederate with low or no intake of UPF [34, 37]. Results from these studies indicated that other factors such as impulsivity [37] and perceived body weight of confederate [34] might moderate the association between social modeling and UPFC. Two studies did not find any association between social modeling and UPFC [35, 36]. Five qualitative papers assessed the effect of social influence on UPFC, and in four of these, socializing with friends was associated with increased fast food, junk food and soft drink intake [91, 92, 94, 95]. Furthermore, preferences and eating habits of family and co-workers strongly affected food choice, and consequently poor role models often resulted in eating more unhealthy foods [91, 93]. In example, du Plessis [93] found that young Australian construction apprentices reported to buy take out foods during breaks, as they followed the lead of their supervisors and colleagues.

**Availability** The association between availability of healthy/unhealthy food items and UPFC was investigated in three quantitative papers. One intervention study targeting the food environment in the Finnish military, was successful in reducing consumption of several fatty (e.g. pizza and kebab) and sugar-rich foods (e.g. soft drinks), by decreasing the availability of unhealthy foods and increasing the availability of healthy foods [31]. Furthermore, one longitudinal study reported that high availability of unhealthy foods at home during adolescence was positively associated with fast food consumption in females, but not males, five years later [51]. Home availability of healthy foods during adolescence had no association with fast food consumption in young adulthood [51]. Additionally, one prospective study found that ease of getting to a fast food restaurant was not predictive of fast food consumption in the following two weeks [57]. In five papers with qualitative design, high availability of UPF-products at home, at school and at work was consistently stated to increase UPFC [91-95]. Also, neighbourhood infrastructure was reported to influence UPFC in these qualitative papers, as close proximity to e.g. convenience stores and fast food restaurants made UPF-products easily available.

**Food costs** The influence of food costs on UPFC was assessed in five qualitative papers using focus group interviews. These studies reported that unhealthy UPF-products (e.g. fast foods, chocolate, chips) were consistently perceived as being cheaper than «healthy» foods [91-95], and that price and financial restraints therefore influenced the purchasing and consumption of UPF [92, 93, 95].

**Living arrangements** Seven studies investigated the association between place of residence (e.g. family home vs. university campus) and UPFC [63, 66, 70, 74, 78, 84, 85]. Six of these studies included only students. Comparisons across papers were challenging as differing living arrangement measures were applied, and most studies reported inconsistent findings.

A range of other individual and environmental factors was also investigated as potential determinants of UPFC. There was however a lack of studies using comparable measures, and many of the determinants were only examined in one paper. A comprehensive view of the investigated determinants is presented in table 3.4, and these include e.g. self-efficacy, attitudes, health/weight concerns, prior soft drink consumption, nutrition label use, taste/time barriers, parental/peer support, educational lessons to promote healthy eating, and the effect of health/social norm messages.

### **3.5 Discussion**

There has been a remarkable increase in the amount of research investigating determinants of UPFC among young adults over the last years. As shown in table 3.2 more than fifty per cent of the included papers in the current review were published from the year of 2010. The overall existing evidence found that men had a higher consumption of UPF than women [41, 49, 51, 53, 61-63, 67, 69, 70, 77, 79, 81, 82, 87, 89]. The evidence also suggested that men were the most frequent consumers of sugar sweetened soft drinks [49, 53, 62, 63, 69, 89], while women were the most frequent consumers of artificially sweetened soft drinks [63, 69]. These gender differences might be a reflection of women's greater concern about health and weight gain [96]. Furthermore, results in the included papers indicated that younger age was associated with higher UPFC in adults aged 18 to 35 years [41, 67, 77, 83, 87, 89]. The inverse association between age and UPFC was in line with a study by Adams & White [4], which found that consumption of highly processed foods was highest for those aged 18-29 years, with gradually decreasing consumption in older age groups. The transition from childhood and adolescence to young adulthood is often accompanied by adverse changes in

diet, such as increased consumption of fast foods, soft drinks and salty snacks [26]. On this basis, young adults in their late teens and early twenties emerge as a particularly important target group for interventions aiming to reduce UPFC.

Socioeconomic inequalities in health related behaviour was to some extent supported by the investigated literature in the current review, as three studies indicated that higher parental educational level might be associated with lower use of UPF in young adults [51, 61, 77]. Data from two of these studies was however drawn from two waves of the same cohort. Socioeconomic status has been associated with different lifestyle behaviours also in previous research, with e.g. smoking and low fruit and vegetable consumption being more frequent in lower socioeconomic groups [97, 98]. Dietary behaviours and habits are often established in young age [99], and this might be the underlying cause for the potential association between parental educational level and UPFC in the current study.

The studies included in this review indicated a positive association between television watching and UPFC, especially consumption of fast foods and sweetened beverages [33, 51, 54, 60, 87]. In line with these results, previous reviews have reported increased hours of television watching to be associated with high sugar sweetened beverage consumption and low fruit and vegetable consumption in children and adolescents [25, 100]. Television watching has also been positively associated with frequent consumption of fast foods in adults [101, 102]. On this basis, it is reasonable to assume that high television watching might be related to higher UPFC and lower diet quality across age groups.

Results presented in this review indicated that spending more time on cooking proper meals with fresh ingredients and experiencing enjoyment of cooking might be associated with a lower consumption of fast foods [52, 67, 75]. However, two of these studies used the same data material for different analyses. In line with these results, low time spent on cooking, lack of cooking skills, dislike toward cooking and perceived convenience of food products, have in previous studies been related to high consumption of ready-meals and fast foods among adults in general [103-108]. Thus, interventions focusing on increasing e.g. cooking skills and enjoyment of cooking might contribute to reduce the consumption of unhealthy UPF-products. In example, a recently published online nutrition and cooking intervention yielded positive changes in eating behaviours, including an increased share of participants cooking dinner at home using mostly fresh ingredients [109].

The current review revealed a lack of research examining environmental level determinants of UPFC among young adults. Although theoretical frameworks have emphasised the importance of social influence on health related behaviour [30, 110], there was a lack of quantitative research investigating the potential influence of friends, family and colleagues on UPFC among young adults. Likewise, though qualitative studies indicated that availability of unhealthy foods influenced UPFC [91-95], there was a lack of quantitative research supporting these findings. Home availability of unhealthy foods, however, has been positively associated with UPFC in adolescents [111, 112], and it is reasonable to assume that there might be similar associations between availability and UPFC in young adults.

### ***Strengths and limitations***

To the best of our knowledge, this was the first review to assess the current evidence on determinants of UPFC among young adults. An important strength in the present study was the screening and assessment of all papers and results conducted independently by two researchers. The systematic approach and the exploratory design were also favourable. Additionally, the development of a search string based on a previously established classification of food products was beneficial, as well as the inclusion of both significant and non-significant findings. Thorough screening of reference lists and the use of databases covering the fields of health science, medicine, psychology, sociology and business were also considered strengths in the current study. It is reasonable to assume that there might be different factors influencing UPFC in different life stages, and therefore, the use of a limited age group seemed to be appropriate. Nevertheless, it can be argued that an even narrower age sample could have been suitable, as determinants might have differing effects among eighteen-year-olds and thirty-five-year-olds. Furthermore, the majority of the included papers used self-report data and were based on cross-sectional analyses. When assessing the findings in these papers, it can be argued that the term «correlate» would be more suitable than «determinant», and inferences regarding cause and effect must be done cautiously. Preferably, strength analyses of findings in the included papers should also have been conducted, but meta-analyses were not feasible due to the diversity in the use of measures and the investigated UPF-products.

### **3.6 Conclusions**

The determinant best supported by evidence was gender. Age and television watching were also associated with UPFC to some extent. To this date, most research on determinants of UPFC among young adults has been conducted on the individual level. A more comprehensive understanding of environmental factors influencing UPFC is needed in order to develop effective nutritional strategies. Intervention studies in a natural setting and longitudinal studies with an ecological approach, would be suitable when further investigating determinants of UPFC, preferably stratified by gender, age and socioeconomic status.

## References

1. Slimani N, Deharveng G, Southgate DA, Biessy C, Chajes V, van Bakel MM et al. Contribution of highly industrially processed foods to the nutrient intakes and patterns of middle-aged populations in the European Prospective Investigation into Cancer and Nutrition study. *European Journal of Clinical Nutrition*. 2009;63 Suppl 4:S206-25.
2. Moubarac JC, Martins AP, Claro RM, Levy RB, Cannon G, Monteiro CA. Consumption of ultra-processed foods and likely impact on human health. Evidence from Canada. *Public Health Nutrition*. 2013;16(12):2240-8.
3. Monteiro CA, Levy RB, Claro RM, de Castro IR, Cannon G. Increasing consumption of ultra-processed foods and likely impact on human health: evidence from Brazil. *Public Health Nutrition*. 2011;14(1):5-13.
4. Adams J, White M. Characterisation of UK diets according to degree of food processing and associations with socio-demographics and obesity: cross-sectional analysis of UK National Diet and Nutrition Survey (2008-12). *International Journal of Behavioral Nutrition and Physical Activity*. 2015;12(1):160.
5. Juul F, Hemmingsson E. Trends in consumption of ultra-processed foods and obesity in Sweden between 1960 and 2010. *Public Health Nutrition*. 2015;18(17):3096-107.
6. Poti JM, Mendez MA, Ng SW, Popkin BM. Is the degree of food processing and convenience linked with the nutritional quality of foods purchased by US households? *American Journal of Clinical Nutrition*. 2015;101(6):1251-62.
7. Moubarac JC, Batal M, Martins AP, Claro R, Levy RB, Cannon G et al. Processed and ultra-processed food products: consumption trends in Canada from 1938 to 2011. *Canadian Journal of Dietetic Practice and Research*. 2014;75(1):15-21.
8. Monteiro CA, Levy RB, Claro RM, Castro IR, Cannon G. A new classification of foods based on the extent and purpose of their processing. *Cadernos de Saude Publica*. 2010;26(11):2039-49.
9. Moubarac JC, Parra DC, Cannon G, Monteiro CA. Food classification systems based on food processing: significance and implications for policies and actions: a systematic literature review and assessment. *Current Obesity Reports*. 2014;3(2):256-72.
10. Monteiro CA, Moubarac JC, Cannon G, Ng SW, Popkin B. Ultra-processed products are becoming dominant in the global food system. *Obesity Reviews*. 2013;14 Suppl 2:21-8.
11. Chen L, Magliano DJ, Zimmet PZ. The worldwide epidemiology of type 2 diabetes mellitus - Present and future perspectives. *Nature Reviews Endocrinology*. 2012;8(4):228-36.
12. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*. 384(9945):766-81.
13. Rauber F, Campagnolo PD, Hoffman DJ, Vitolo MR. Consumption of ultra-processed food products and its effects on children's lipid profiles: a longitudinal study. *Nutrition Metabolism & Cardiovascular Diseases*. 2015;25(1):116-22.
14. Tavares LF, Fonseca SC, Garcia Rosa ML, Yokoo EM. Relationship between ultra-processed foods and metabolic syndrome in adolescents from a Brazilian Family Doctor Program. *Public Health Nutrition*. 2012;15(1):82-7.
15. Canella DS, Levy RB, Martins AP, Claro RM, Moubarac JC, Baraldi LG et al. Ultra-processed food products and obesity in Brazilian households (2008-2009). *PLoS One*. 2014;9(3):e92752.

16. Vartanian LR, Schwartz MB, Brownell KD. Effects of soft drink consumption on nutrition and health: a systematic review and meta-analysis. *American Journal of Public Health*. 2007;97(4):667-75.
17. Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: a systematic review. *American Journal of Clinical Nutrition*. 2006;84(2):274-88.
18. Malik VS, Pan A, Willett WC, Hu FB. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *American Journal of Clinical Nutrition*. 2013;98(4):1084-102.
19. Malik VS, Popkin BM, Bray GA, Despres JP, Willett WC, Hu FB. Sugar-sweetened beverages and risk of metabolic syndrome and type 2 diabetes: a meta-analysis. *Diabetes Care*. 2010;33(11):2477-83.
20. Greenwood DC, Threapleton DE, Evans CE, Cleghorn CL, Nykjaer C, Woodhead C et al. Association between sugar-sweetened and artificially sweetened soft drinks and type 2 diabetes: systematic review and dose-response meta-analysis of prospective studies. *British Journal of Nutrition*. 2014;112(5):725-34.
21. Duffey KJ, Gordon-Larsen P, Jacobs DR, Jr., Williams OD, Popkin BM. Differential associations of fast food and restaurant food consumption with 3-y change in body mass index: the Coronary Artery Risk Development in Young Adults Study. *American Journal of Clinical Nutrition*. 2007;85(1):201-8.
22. Pereira MA, Kartashov AI, Ebbeling CB, Van Horn L, Slattery ML, Jacobs DR, Jr. et al. Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis. *The Lancet*. 2005;365(9453):36-42.
23. Thorpe MG, Kestin M, Riddell LJ, Keast RS, McNaughton SA. Diet quality in young adults and its association with food-related behaviours. *Public Health Nutrition*. 2014;17(8):1767-75.
24. Alkerwi A, Crichton GE, Hebert JR. Consumption of ready-made meals and increased risk of obesity: findings from the Observation of Cardiovascular Risk Factors in Luxembourg (ORISCAV-LUX) study. *British Journal of Nutrition*. 2014:1-8.
25. Mazarello Paes V, Hesketh K, O'Malley C, Moore H, Summerbell C, Griffin S et al. Determinants of sugar-sweetened beverage consumption in young children: a systematic review. *Obesity Reviews*. 2015;16(11):903-13.
26. Nelson MC, Story M, Larson NI, Neumark-Sztainer D, Lytle LA. Emerging adulthood and college-aged youth: an overlooked age for weight-related behavior change. *Obesity*. 2008;16(10):2205-11.
27. Anderson DA, Shapiro JR, Lundgren JD. The freshman year of college as a critical period for weight gain: an initial evaluation. *Eating Behaviors*. 2003;4(4):363-7.
28. Niemeier HM, Raynor HA, Lloyd-Richardson EE, Rogers ML, Wing RR. Fast food consumption and breakfast skipping: predictors of weight gain from adolescence to adulthood in a nationally representative sample. *Journal of Adolescent Health*. 2006;39(6):842-9.
29. Polit DF, Beck CT. *Essentials of nursing research : appraising evidence for nursing practice*. 8th ed. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins; 2014.
30. Sallis JF, Owen N, Fisher EB. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behavior and health education: theory, research, and practice*. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 465-85.
31. Bingham CML, Lahti-Koski M, Puukka P, Kinnunen M, Jallinoja P, Absetz P. Effects of a healthy food supply intervention in a military setting: positive changes in cereal, fat and sugar containing foods. *International Journal of Behavioral Nutrition and Physical Activity*. 2012;9:91-101.

32. Kattelman KK, Bredbenner CB, White AA, Greene GW, Hoerr SL, Kidd T et al. The Effects of Young Adults Eating and Active for Health (YEAH): A Theory-Based Web-Delivered Intervention. *Journal of Nutrition Education and Behavior*. 2014;46(6):S27-S41.
33. Blass EM, Anderson DR, Kirkorian HL, Pempek TA, Price I, Koleini MF. On the road to obesity: Television viewing increases intake of high-density foods. *Physiology & Behavior*. 2006;88(4-5):597-604.
34. Hermans RCJ, Larsen JK, Herman CP, Engels RCME. Modeling of palatable food intake in female young adults. Effects of perceived body size. *Appetite*. 2008;51(3):512-8.
35. Hermans RCJ, Engels RCME, Larsen JK, Herman CP. Modeling of palatable food intake. The influence of quality of social interaction. *Appetite*. 2009;52(3):801-4.
36. Hermans RC, Herman C, Larsen JK, Engels RC. Social modeling effects on snack intake among young men. The role of hunger. *Appetite*. 2010;54(2):378-83.
37. Hermans RC, Larsen JK, Lochbuehler K, Nederkoorn C, Herman CP, Engels RC. The power of social influence over food intake: examining the effects of attentional bias and impulsivity. *British Journal of Nutrition*. 2013;109(3):572-80.
38. Oh H, Taylor AH. Brisk walking reduces ad libitum snacking in regular chocolate eaters during a workplace simulation. *Appetite*. 2012;58(1):387-92.
39. Robinson E, Harris E, Thomas J, Aveyard P, Higgs S. Reducing high calorie snack food in young adults: a role for social norms and health based messages. *International Journal of Behavioral Nutrition and Physical Activity*. 2013;10:73.
40. Robinson E, Fleming A, Higgs S. Prompting healthier eating: testing the use of health and social norm based messages. *Health Psychology*. 2014;33(9):1057-64.
41. Turner SA, Luszczynska A, Warner L, Schwarzer R. Emotional and uncontrolled eating styles and chocolate chip cookie consumption. A controlled trial of the effects of positive mood enhancement. *Appetite*. 2010;54(1):143-9.
42. Nederkoorn C, Guerrieri R, Havermans RC, Roefs A, Jansen A. The interactive effect of hunger and impulsivity on food intake and purchase in a virtual supermarket. *International Journal of Obesity*. 2009;33(8):905-12.
43. Prestwich A, Hurling R, Baker S. Implicit shopping: attitudinal determinants of the purchasing of healthy and unhealthy foods. *Psychology & Health*. 2011;26(7):875-85.
44. Evers C, Adriaanse M, de Ridder DT, de Witt Huberts JC. Good mood food. Positive emotion as a neglected trigger for food intake. *Appetite*. 2013;68:1-7.
45. Zellner DA, Loaiza S, Gonzalez Z, Pita J, Morales J, Pecora D et al. Food selection changes under stress. *Physiology & Behavior*. 2006;87(4):789-93.
46. Martinez-Ruiz NR, Lopez-Diaz JA, Wall-Medrano A, Jimenez-Castro JA, Angulo O. Oral fat perception is related with body mass index, preference and consumption of high-fat foods. *Physiology & Behavior*. 2014;129:36-42.
47. Bingham CML, Lahti-Koski M, Absetz P, Puukka P, Kinnunen M, Pihlajamäki H et al. Food choices and health during military service: increases in sugar- and fibre-containing foods and changes in anthropometric and clinical risk factors. *Public Health Nutrition*. 2012;15(07):1248-55.
48. Jallinoja P, Tuorila H, Ojajarvi A, Bingham C, Uutela A, Absetz P. Conscripts' attitudes towards health and eating. Changes during the military service and associations with eating. *Appetite*. 2011;57(3):718-21.
49. Kvaavik E, Andersen LF, Klepp KI. The stability of soft drinks intake from adolescence to adult age and the association between long-term consumption of soft drinks and lifestyle factors and body weight. *Public Health Nutrition*. 2005;8(2):149-57.



50. Larson NI, Neumark-Sztainer D, Hannan PJ, Story M. Family meals during adolescence are associated with higher diet quality and healthful meal patterns during young adulthood. *Journal of the American Dietetic Association*. 2007;107(9):1502-10.
51. Larson NI, Neumark-Sztainer DR, Story MT, Wall MM, Harnack LJ, Eisenberg ME. Fast food intake: longitudinal trends during the transition to young adulthood and correlates of intake. *Journal of Adolescent Health*. 2008;43(1):79-86.
52. Laska MN, Larson NI, Neumark-Sztainer D, Story M. Does involvement in food preparation track from adolescence to young adulthood and is it associated with better dietary quality? Findings from a 10-year longitudinal study. *Public Health Nutrition*. 2012;15(7):1150-8.
53. Lien N, Lytle LA, Klepp KI. Stability in consumption of fruit, vegetables, and sugary foods in a cohort from age 14 to age 21. *Preventive Medicine*. 2001;33(3):217-26.
54. Barr-Anderson DJ, Larson NI, Nelson MC, Neumark-Sztainer D, Story M. Does television viewing predict dietary intake five years later in high school students and young adults? *International Journal of Behavioral Nutrition and Physical Activity*. 2009;6:7.
55. Adriaanse MA, de Ridder DTD, Evers C. Emotional eating: Eating when emotional or emotional about eating? *Psychology & Health*. 2011;26(1):23-39.
56. Adriaanse MA, Kroese FM, Gillebaart M, De Ridder D. Effortless inhibition: Habit mediates the relation between self-control and unhealthy snack consumption. *Frontiers in Psychology*. 2014;5: 444.
57. Brinberg D, Durand J. Eating at fast-food restaurants: An analysis using two behavioral intention models. *Journal of Applied Social Psychology*. 1983;13(6):459-72.
58. Hankonen N, Absetz P, Kinnunen M, Haukkala A, Jallinoja P. Toward identifying a broader range of social cognitive determinants of dietary intentions and behaviors. *Applied Psychology: Health and Well-Being*. 2013;5(1):118-35.
59. Hankonen N, Kinnunen M, Absetz P, Jallinoja P. Why do people high in self-control eat more healthily? Social cognitions as mediators. *Annals of Behavioral Medicine*. 2014;47(2):242-8.
60. Laska MN, Graham D, Moe SG, Lytle L, Fulkerson J. Situational characteristics of young adults' eating occasions: a real-time data collection using Personal Digital Assistants. *Public Health Nutrition*. 2011;14(3):472-9.
61. McDade TW, Chyu L, Duncan GJ, Hoyt LT, Doane LD, Adam EK. Adolescents' expectations for the future predict health behaviors in early adulthood. *Social Science & Medicine*. 2011;73(3):391-8.
62. Barić IC, Šatalić Z, Lukešić Ž. Nutritive value of meals, dietary habits and nutritive status in Croatian university students according to gender. *International Journal of Food Sciences & Nutrition*. 2003;54(6):473.
63. Beerman KA, Jennings G, Crawford S. The Effect of Student Residence on Food Choice. *Journal of American College Health*. 1990;38(5):215-20.
64. Bielemann RM, Santos Motta JV, Minten GC, Horta BL, Gigante DP. Consumption of ultra-processed foods and their impact on the diet of young adults. *Revista de Saude Publica*. 2015;49:28.
65. Bingham CM, Jallinoja P, Lahti-Koski M, Absetz P, Paturi M, Pihlajamäki H et al. Quality of diet and food choices of Finnish young men: a sociodemographic and health behaviour approach. *Public Health Nutrition*. 2010;13(Special Issue 6A):980-6.
66. Brunt AR, Rhee YS. Obesity and lifestyle in U.S. college students related to living arrangements. *Appetite*. 2008;51(3):615-21.

67. Davison J, Share M, Hennessy M, Bunting B, Markovina J, Stewart-Knox B. Correlates of food choice in unemployed young people: The role of demographic factors, self-efficacy, food involvement, food poverty and physical activity. *Food Quality and Preference*. 2015;46:40-7.
68. Deshmukh-Taskar P, Nicklas TA, Yang S-J, Berenson GS. Does food group consumption vary by differences in socioeconomic, demographic, and lifestyle factors in young adults? The Bogalusa Heart Study. *Journal of the American Dietetic Association*. 2007;107(2):223-34.
69. Driskell JA, Meckna BR, Scales NE. Differences exist in the eating habits of university men and women at fast-food restaurants. *Nutrition Research*. 2006;26(10):524-30.
70. El Ansari W, Stock C, Mikolajczyk RT. Relationships between food consumption and living arrangements among university students in four European countries - A cross-sectional study. *Nutrition Journal*. 2012;11(1):1-7.
71. El Ansari W, Suominen S, Berg-Beckhoff G. Mood and food at the University of Turku in Finland: nutritional correlates of perceived stress are most pronounced among overweight students. *International Journal of Public Health*. 2015;60(6):707-16.
72. Graham DJ, Laska MN. Nutrition label use partially mediates the relationship between attitude toward healthy eating and overall dietary quality among college students. *Journal of the Academy of Nutrition & Dietetics*. 2012;112(3):414-8.
73. Kim H, Han SN, Song K, Lee H. Lifestyle, dietary habits and consumption pattern of male university students according to the frequency of commercial beverage consumptions. *Nutrition Research & Practice*. 2011;5(2):124-31.
74. Kremmyda L-S, Papadaki A, Hondros G, Kapsokefalou M, Scott JA. Differentiating between the effect of rapid dietary acculturation and the effect of living away from home for the first time, on the diets of Greek students studying in Glasgow. *Appetite*. 2008;50(2-3):455-63.
75. Larson NI, Perry CL, Story M, Neumark-Sztainer D. Food preparation by young adults is associated with better diet quality. *Journal of the American Dietetic Association*. 2006;106(12):2001-7.
76. Larson NI, Nelson MC, Neumark-Sztainer D, Story M, Hannan PJ. Making time for meals: meal structure and associations with dietary intake in young adults. *Journal of the American Dietetic Association*. 2009;109(1):72-9.
77. Larson N, Neumark-Sztainer D, Laska MN, Story M. Young adults and eating away from home: associations with dietary intake patterns and weight status differ by choice of restaurant. *Journal of the American Dietetic Association*. 2011;111(11):1696-703.
78. Laska MN, Larson NI, Neumark-Sztainer D, Story M. Dietary patterns and home food availability during emerging adulthood: do they differ by living situation? *Public Health Nutrition*. 2010;13(2):222-8.
79. Li KK, Concepcion RY, Lee H, Cardinal BJ, Ebbeck V, Woekel E et al. An examination of sex differences in relation to the eating habits and nutrient intakes of university students. *Journal of Nutrition Education and Behavior*. 2012;44(3):246-50.
80. Lloyd-Richardson EE, Lucero ML, Dibello JR, Jacobson AE, Wing RR. The relationship between alcohol use, eating habits and weight change in college freshmen. *Eating Behaviors*. 2008;9(4):504-8.
81. Milligan RA, Burke V, Beilin LJ, Dunbar DL, Spencer MJ, Balde E et al. Influence of gender and socio-economic status on dietary patterns and nutrient intakes in 18-year-old Australians. *Australian and New Zealand Journal of Public Health*. 1998;22(4):485-93.

82. Morse KL, Driskell JA. Observed sex differences in fast-food consumption and nutrition self-assessments and beliefs of college students. *Nutrition Research*. 2009;29(3):173-9.
83. Northstone K, Emmett P, Rogers I. Dietary patterns in pregnancy and associations with socio-demographic and lifestyle factors. *European Journal of Clinical Nutrition*. 2008;62(4):471-9.
84. Papadaki A, Scott JA. The impact on eating habits of temporary translocation from a Mediterranean to a Northern European environment. *European Journal of Clinical Nutrition*. 2002;56(5):455.
85. Papadaki A, Hondros G, Scott JA, Kapsokefalou M. Eating habits of University students living at, or away from home in Greece. *Appetite* 2007;49:169-76.
86. Pelletier JE, Laska MN, Neumark-Sztainer D, Story M. Positive attitudes toward organic, local, and sustainable foods are associated with higher dietary quality among young adults. *Journal of the Academy of Nutrition & Dietetics*. 2013;113(1):127-32.
87. Smith KJ, McNaughton SA, Gall SL, Blizzard L, Dwyer T, Venn AJ. Takeaway food consumption and its associations with diet quality and abdominal obesity: a cross-sectional study of young adults. *International Journal of Behavioral Nutrition and Physical Activity*. 2009;6:29.
88. Smith KJ, McNaughton SA, Gall SL, Blizzard L, Dwyer T, Venn AJ. Involvement of young Australian adults in meal preparation: cross-sectional associations with sociodemographic factors and diet quality. *Journal of the American Dietetic Association*. 2010;110(9):1363-7.
89. West DS, Bursac Z, Quimby D, Prewitt TE, Spatz T, Nash C et al. Self-reported sugar-sweetened beverage intake among college students. *Obesity*. 2006;14(10):1825-31.
90. Betts NM, Amos RJ, Georgiou C, Hoerr SL, Ivaturi R, Keim KS et al. What young adults say about factors affecting their food intake. *Ecology of Food and Nutrition*. 1995;34(1):59-64.
91. Chang M-W, Nitzke S, Guilford E, Adair CH, Hazard DL. Motivators and barriers to healthful eating and physical activity among low-income overweight and obese mothers. *Journal of the American Dietetic Association*. 2008;108(6):1023-8.
92. Davison J, Share M, Hennessy M, Knox BS. Caught in a 'spiral'. Barriers to healthy eating and dietary health promotion needs from the perspective of unemployed young people and their service providers. *Appetite*. 2015;85:146-54.
93. du Plessis K. Factors influencing Australian construction industry apprentices' dietary behaviors. *American Journal of Men's Health*. 2012;6(1):59-66.
94. Hattersley L, Irwin M, King L, Allman-Farinelli M. Determinants and patterns of soft drink consumption in young adults: a qualitative analysis. *Public Health Nutrition*. 2009;12(10):1816-22.
95. Nelson MC, Kocos R, Lytle LA, Perry CL. Understanding the perceived determinants of weight-related behaviors in late adolescence: A qualitative analysis among college youth. *Journal of Nutrition Education and Behavior*. 2009;41(4):287-92.
96. Paeratakul S, White MA, Williamson DA, Ryan DH, Bray GA. Sex, Race/Ethnicity, Socioeconomic Status, and BMI in Relation to Self-Perception of Overweight. *Obesity Research*. 2002;10(5):345-50.
97. Hosseinpoor AR, Bergen N, Kunst A, Harper S, Guthold R, Rekve D et al. Socioeconomic inequalities in risk factors for non communicable diseases in low-income and middle-income countries: results from the World Health Survey. *BMC Public Health*. 2012;12(1):1-13.

98. Giskes K, Turrell G, Patterson C, Newman B. Socio-economic differences in fruit and vegetable consumption among Australian adolescents and adults. *Public Health Nutrition*. 2002;5(05):663-9.
99. Kumanyika SK, Obarzanek E, Stettler N, Bell R, Field AE, Fortmann SP et al. Population-based prevention of obesity: the need for comprehensive promotion of healthful eating, physical activity, and energy balance: a scientific statement from American Heart Association Council on Epidemiology and Prevention, Interdisciplinary Committee for Prevention (formerly the expert panel on population and prevention science). *Circulation*. 2008;118(4):428-64.
100. Rasmussen M, Krolner R, Klepp KI, Lytle L, Brug J, Bere E et al. Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part I: Quantitative studies. *International Journal of Behavioral Nutrition and Physical Activity*. 2006;3:22.
101. French SA, Harnack L, Jeffery RW. Fast food restaurant use among women in the Pound of Prevention study: dietary, behavioral and demographic correlates. *International Journal of Obesity & Related Metabolic Disorders*. 2000;24(10):1353-9.
102. Scully M, Dixon H, Wakefield M. Association between commercial television exposure and fast-food consumption among adults. *Public Health Nutrition*. 2009;12(1):105-10.
103. van der Horst K, Brunner TA, Siegrist M. Ready-meal consumption: associations with weight status and cooking skills. *Public Health Nutrition*. 2011;14(2):239-45.
104. Dave JM, An LC, Jeffery RW, Ahluwalia JS. Relationship of attitudes toward fast food and frequency of fast-food intake in adults. *Obesity*. 2009;17(6):1164-70.
105. Brunner TA, van der Horst K, Siegrist M. Convenience food products. Drivers for consumption. *Appetite*. 2010;55(3):498-506.
106. Hartmann C, Dohle S, Siegrist M. Importance of cooking skills for balanced food choices. *Appetite*. 2013;65:125-31.
107. van der Horst K, Brunner T, Siegrist M. Fast food and take-away food consumption are associated with different lifestyle characteristics. *Journal of Human Nutrition and Dietetics*. 2011;24(6):596-602.
108. Monsivais P, Aggarwal A, Drewnowski A. Time spent on home food preparation and indicators of healthy eating. *American Journal of Preventive Medicine*. 2014;47(6):796-802.
109. Adam M, Young-Wolff KC, Konar E, Winkleby M. Massive open online nutrition and cooking course for improved eating behaviors and meal composition. *International Journal of Behavioral Nutrition and Physical Activity*. 2015;12:143.
110. McAlister AL, Perry CL, Parcel GS. How individuals, environments, and health behavior interact. Social cognitive theory. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behavior and health education : theory, research, and practice*. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 169-210.
111. Bauer KW, Larson NI, Nelson MC, Story M, Neumark-Sztainer D. Socio-environmental, personal and behavioural predictors of fast-food intake among adolescents. *Public Health Nutrition*. 2009;12(10):1767-74.
112. French S, Story M, Neumark-Sztainer D, Fulkerson J, Hannan P. Fast food restaurant use among adolescents: Associations with nutrient intake, food choices and behavioral and psychosocial variables. *International Journal of Obesity*. 2001;25(12):1823-33.

## **4.0 ELABORATIONS ON THE LITERATURE REVIEW**

### **4.1 Design and methods**

In order to achieve the main objective of our master's project, the aim of our literature review was to systematically assess the current evidence on determinants of UPFC among young adults. We started out with the NOVA classification of foods [1, 2], and created a comprehensive overview of specific terms indicative of UPFC (Appendix 2, table 1). With guidance from Ellen Sejersted (librarian at The Faculty of Health and Sport Sciences) we further created a draft for the design of our search strategy (Appendix 2, table 2). As we were somewhat unfamiliar with both the amount of research investigating determinants of UPFC and the procedure of conducting systematic reviews, we decided to apply an exploratory approach after discussion with our supervisors. Thus, no limitations regarding age, geography, study design or year of publication were used. Further, we decided to conduct a search consisting of only two search strings: One with terms indicative of UPFC and one with terms indicative of determinants. Initially, a test search was conducted in Medline, PsycInfo, SocIndex and Business Source Complete, using all search terms shown in table 1, appendix 2. We experienced that this strategy yielded a massive amount of results (>100.000), and that most of this was irrelevant material. After an iterative process of including, excluding and combining the previously identified search terms we found it most appropriate to use only general terms for UPF-products (e.g. ready-to-eat, fast food, soft drinks, convenience, snacks) and exclude single food items (e.g. ice cream, chocolate, pizza). We also limited the search string indicative of determinants to include only «determinant», «correlate», «mediator» and «moderator». This strategy dramatically reduced the amount of identified research when searching the databases (3919 articles).

In order to limit the material to a feasible amount and to be able to interpret findings in a meaningful way we found it appropriate to focus on a defined age group. Based on unstructured searches we discovered that a few reviews on determinants of health behaviours (e.g. fruit and vegetable consumption [3] and sugar sweetened beverage consumption [4]) have focused on children and adolescents. Even though this age group is important, knowledge about factors influencing health behaviour in older age groups is also necessary in order to promote public health [5]. The transition from adolescence to young adulthood is often accompanied by adverse changes in lifestyle and dietary habits [5-8], and furthermore, as young adults are already in a transition period from youth to adulthood, it is reasonable to assume that this group might be particularly susceptible for changes in dietary habits. Dietary

interventions aimed at reducing UPFC in young adults also have great possibilities of lifelong effects, both for themselves and their children [6, 8], and thus, promotion of healthy dietary habits in this age group might yield beneficial contagion effects in future generations. Finally, we found it appropriate to investigate similar age groups in our review paper and cross-sectional paper. Based on this, we chose to focus on determinants of UPFC among young adults aged 18-35 in our literature review.

#### **4.2 Methodological discussion**

The extensive and time consuming process of conducting our literature review has given us valuable experiences that we would not be without. Nevertheless, knowing what we know today, we acknowledge that our review could have benefitted from focusing on a limited age group from the start. This would have reduced both the time used for inclusion and exclusion of papers as well as the amount of irrelevant material. Also, if specific UPF-products had been investigated separately, the extraction of findings on determinants and interpretation of results could have been more precise. It can thus be argued that it would have been suitable to assess the evidence on determinants for e.g. fast food consumption or ready-meal consumption separately, instead of all UPF-products together. Based on the findings of the assessed evidence in our review, there seems to be a knowledge gap regarding determinants influencing the use of pre-prepared and ready-to-eat food products. If we were to conduct our master's project over again it could therefore have been interesting to examine the specific factors influencing consumption of ready-meals separately.

As described, ecological models are particularly useful when investigating determinants of complex behaviours like UPFC [9, 10], and we therefore decided to apply an ecological approach when extracting and summarizing the determinants assessed in the included papers. It can be argued that determinants preferably should have been organized by several levels of influence (e.g. intrapersonal, interpersonal, organizational, physical environment, policy) [9]. Nevertheless, as the majority of the investigated determinants in our literature review was individual factors, and also with guidance from our supervisors, we found it most appropriate to organize determinants in subgroups on the individual and environmental level. When investigating factors influencing health and health related behaviour, quantitative research gives valuable information, and furthermore, findings from longitudinal studies and interventions are particularly useful [11]. However, when exploring determinants of health behaviour, qualitative studies might also be useful as such research is well suited to capture

complex attitudes and behaviour [10, 12]. On this basis, we included both quantitative and qualitative research papers in our review study. Nevertheless, it is worth mentioning that it might be challenging to assess the validity of qualitative studies as all methodological decisions and steps are not always accounted for [13]. The included qualitative papers in our review examined reasons why young adults eat healthy/unhealthy foods (including e.g. fast food and snacks), and only one study specifically aimed to assess factors influencing consumption of highly processed foods (soft drink consumption). As such, in our review paper we mainly based our conclusions on the quantitative findings, and used the qualitative findings as additional support.

## References

1. Monteiro CA, Levy RB, Claro RM, Castro IR, Cannon G. A new classification of foods based on the extent and purpose of their processing. *Cadernos de Saude Publica*. 2010;26(11):2039-49.
2. Moubarac JC, Parra DC, Cannon G, Monteiro CA. Food classification systems based on food processing: significance and implications for policies and actions: a systematic literature review and assessment. *Current Obesity Reports*. 2014;3(2):256-72.
3. Rasmussen M, Krolner R, Klepp KI, Lytle L, Brug J, Bere E et al. Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part I: Quantitative studies. *International Journal of Behavioral Nutrition and Physical Activity*. 2006;3:22.
4. Mazarello Paes V, Hesketh K, O'Malley C, Moore H, Summerbell C, Griffin S et al. Determinants of sugar-sweetened beverage consumption in young children: a systematic review. *Obesity Reviews*. 2015;16(11):903-13.
5. Nelson MC, Story M, Larson NI, Neumark-Sztainer D, Lytle LA. Emerging adulthood and college-aged youth: an overlooked age for weight-related behavior change. *Obesity*. 2008;16(10):2205-11.
6. Anderson DA, Shapiro JR, Lundgren JD. The freshman year of college as a critical period for weight gain: an initial evaluation. *Eating Behaviors*. 2003;4(4):363-7.
7. Demory-Luce D, Morales M, Nicklas T, Baranowski T, Zakeri I, Berenson G. Changes in food group consumption patterns from childhood to young adulthood: The Bogalusa Heart Study. *Journal of the American Dietetic Association*. 2004;104(11):1684-91.
8. Niemeier HM, Raynor HA, Lloyd-Richardson EE, Rogers ML, Wing RR. Fast food consumption and breakfast skipping: predictors of weight gain from adolescence to adulthood in a nationally representative sample. *Journal of Adolescent Health*. 2006;39(6):842-9.
9. Sallis JF, Owen N, Fisher EB. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behavior and health education: theory, research, and practice*. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 465-85.
10. Bartholomew LK, Parcel GS, Kok G, Gottlieb NH, Fernández ME. *Planning health promotion programs : an intervention mapping approach*. 3rd ed. San Francisco: Jossey-Bass; 2011.
11. Sidell M, Lloyd CE, Katz J. Studying the population's health. In: Earle S, Lloyd CE, Sidell M, Spurr S, editors. *Theory and research in promoting public health*. London: SAGE Publications; 2007. p. 231-71.
12. Finlay L. Qualitative research towards public health. In: Earle S, Lloyd CE, Sidell M, Spurr S, editors. *Theory and research in promoting public health*. London: SAGE Publications; 2007. p. 273-96.
13. Polit DF, Beck CT. *Essentials of nursing research : appraising evidence for nursing practice*. 8th ed. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins; 2014.



## **5.0 RESEARCH PAPER 2. TIME SCARCITY AND USE OF ULTRA-PROCESSED FOOD PRODUCTS AMONG NORWEGIAN PARENTS: A CROSS-SECTIONAL STUDY**

### **5.1 Abstract**

**Background** Use of highly processed foods, also classified as ultra-processed foods, have expanded rapidly over the last decades. These products are often highly palatable, attractive, accessible and habit-forming. Furthermore, ultra-processed foods offer convenience as they require minimal time for preparation, and it is therefore reasonable to assume that such foods are consumed more often among people with time scarcity. The main aim of this study was to investigate the association between time scarcity and consumption of ultra-processed foods. A secondary aim was to investigate the association between sociodemographic factors, weight status and consumption of ultra-processed foods.

**Methods** This cross-sectional study included 497 participants, and was part of the Healthy and Sustainable Lifestyle project. A validated score, which was used as an indicator of time scarcity, was trichotomized into low, medium and high time scarcity. Additionally, three scores reflecting consumption of ultra-processed dinner products, snacks & soft drinks and fast foods were presented as dichotomized variables. Chi-square and cross tabulations were used to calculate proportions of high vs. low consumption of ultra-processed foods in relation to time scarcity, sociodemographic factors and weight status. Binary logistic regression analyses were used to test the relationship between independent variables and consumption of ultra-processed foods.

**Results** Participants reporting medium and high time scarcity were more likely to have a high consumption of fast foods compared to participants reporting low time scarcity (OR = 1.98, 95% CI = 1.26 – 3.11 and OR = 1.66, 1.03 – 2.67). Men were more likely to be high consumers of fast foods than women (OR = 1.92, 1.05 – 3.54), and native Norwegians were more likely to have high consumption of both snacks & soft drinks (OR = 2.82, 1.44 – 5.51) and fast foods (OR = 2.02, 1.05 – 3.90) compared to non-natives. Finally, participants with higher education were less likely to be high consumers of snacks & soft drinks, than participants without higher education (OR = 0.64, 0.43 – 0.96).

**Conclusions** The current study found that time scarcity, gender, ethnicity and educational status were associated with ultra-processed food consumption. Future research should further investigate the potential influence of these factors on the use of specific ultra-processed food products.

## 5.2 Background

During the 20<sup>th</sup> century, whole and fresh foods have increasingly been replaced with convenient pre-prepared and ready-to-eat products that require minimal preparation [1, 2]. A large prospective study conducted in ten European countries found that highly processed foods contributed with 61-79% (Spain vs. Germany) of mean energy intake [3]. These results are consistent with findings from Canada and the United States, where approximately 60% of household food expenditure and mean energy intake was explained by purchasing and consumption of highly processed foods and beverages [4-6]. Highly processed foods have been classified as *ultra-processed* by Monteiro et al. [7], and include products that are industrially produced and usually highly accessible, attractive, palatable and habit-forming. Ultra-processed foods (UPF) are often referred to as convenience foods or fast foods, and examples include ready-meals, soft drinks, chocolate and chips [7]. Furthermore, UPF-products are typically energy-dense, low in dietary fibre, protein and micronutrients, and they often contain more sugar, sodium and fat/saturated fat than unprocessed and minimally processed foods [2, 8, 9]. An excess intake of UPF might therefore have severe implications for human health, and has been linked to several lifestyle related diseases including obesity, diabetes type 2, metabolic syndrome, cardiovascular disease and cancer [10-20].

A range of factors might influence the use of UPF-products, and among these are time scarcity which «...refers to people's perceptions or feelings of not having enough time to do all they want or need to in a day» (Godbey, Lifset & Robinson, 1998, in Jabs & Devine 2006 p. 197) [21]. Qualitative studies have reported that employed mothers often experienced a general lack of time, which also influenced their food choices [22, 23]. Preparation of healthy foods was perceived to be a time consuming activity among these mothers, and thereby highly processed convenience foods were often used as a time saving strategy [22, 23]. Although qualitative research have indicated that feelings of time scarcity might contribute to less home-prepared meals with fresh ingredients and an increased use of e.g. ready-meals and fast foods, there is a lack of consistent quantitative evidence regarding this association [24]. Many families operate on a tight schedule juggling work, domestic work and leisure activities [21, 22], and as parents' behaviour might influence the eating habits of their children [25, 26], investigating the influence of time scarcity on the use of convenience foods and fast foods in this group is of particular interest. Furthermore, quantitative studies have reported sociodemographic differences in ultra-processed food consumption (UPFC) [27, 28], and in example low socioeconomic status has been associated with less healthy diets, including

higher consumption of fast foods and soft drinks [29-32]. On this basis it is appropriate to adjust for sociodemographic variables when investigating factors potentially influencing UPFC.

The main aim of this study was to investigate the association between time scarcity and use of UPF-products among Norwegian kindergarten parents. As a secondary aim, we investigated the association between sociodemographic factors (gender, ethnicity, education and number of children in the household), weight status and UPFC.

### **5.3 Methods**

#### ***Design and study sample***

This cross-sectional study was part of an on-going project: The Healthy and Sustainable Lifestyle project and the Child Food Courage project. Research clearance was obtained from Norwegian Social Science Data Services, and data collection were conducted between October 2014 and January 2015. About 3000 parents in the counties of Aust-Agder and Vest-Agder in Southern Norway, with children born in 2012, received information about the project through their kindergarten. Participants completed an electronically self-report questionnaire, which comprised questions about lifestyle behaviours, self-perceived health and life quality among parents and toddlers. In total, 605 parents signed up to participate. Only participants who completed the survey (n = 497) were included in the current study, which yielded a response rate on approximately 17%. In our final sample, 90% of study participants were women and 90% were born in Norway. Age ranged from 20 to 46 years (M = 32.2), and mean Body Mass Index (BMI) was 24.9 (SD = 6.1). Regarding educational status, 69% had higher education at university/college level. Approximately 33% of the study participants had one child living in the household, 47% had two children, and 20% had three or more children.

#### ***Outcome measures***

Questions from the Healthy and Sustainable Lifestyle-survey were used to develop three scores to measure consumption of UPF-products. The selection of questions was based on the NOVA classification of food products proposed by Monteiro et. al [7, 33]. For all outcome scores, cut-offs were estimated to get the most equal sized groups, and the variables were then dichotomized into a low and high consumption group.

### *Ultra-processed dinner products*

This score comprised 5 items measuring frequency of consumption of ready-to-eat/pre-prepared dinner products. Questions included «How often do you eat ... Noodles; Ready meals; Sausages; Pommes frites; Dinners based on minced meat (e.g. tacos, pasta)». Response alternatives were assigned different values, and ranged from «never» to «every day» (never = 0, less than once a month = 0.25, 1-3 times/month = 0.5, once a week = 1, 2 times/week = 2, 3 times/week = 3, 4 times/week = 4, 5 times/week = 5, 6 times/week = 6, every day = 7). Total score ranged from 0 to 35, with higher score indicating a higher consumption of ultra-processed dinner products.

### *Snacks & soft drinks*

This score comprised 4 items measuring frequency of consumption of salty/sweet snacks and soft drinks. Questions included «How often do you eat ... Salted snacks (e.g. chips, cheese doodles, salted nuts); Confectionery (e.g. sweets, chocolate)», and «How often do you drink ... Sugar sweetened beverages (e.g. soft drinks, juice, ice tea, ice coffee); Artificially sweetened beverages (e.g. diet soft drinks, diet juice, diet ice tea)». Response alternatives were assigned different values, and ranged from «never» to «several times a day» (never = 0, less than once a week = 0.5, once a week = 1, 2 times/week = 2, 3 times/week = 3, 4 times/week = 4, 5 times/week = 5, 6 times/week = 6, every day = 7, several times a day = 10). Total score ranged from 0 to 40, with higher score indicating a higher consumption of snacks & soft drinks.

### *Fast food away from home*

This score comprised 2 items measuring frequency of consumption of food from fast food restaurants, gas stations and convenience stores. Questions included «How often do you eat food from fast food restaurants (e.g. McDonalds, snack bar)» and «How often do you eat food bought at a gas station/convenience store (e.g. 7-eleven)». Response alternatives were assigned different values, and ranged from «never» to «every day» (never = 0, less than once a week = 0.5, once a week = 1, 2 times/week = 2, 3 times/week = 3, 4 times/week = 4, 5 times/week = 5, 6 times/week = 6, every day = 7). Total score ranged from 0 to 14, with higher score indicating a more frequent use of fast foods.

## ***Independent variables***

### *Time scarcity*

Van der Lippe's adjusted version of Garhammer's index of time pressure, was used to measure time scarcity [34, 35]. In this 7 item scale, study participants were asked to what extent the following statements coincided with their experiences: «I am under time pressure», «I wish I had more time for myself», «I feel I am under time pressure from others», «I cannot deal with important things properly due to lack of time», «I cannot get proper sleep», «I cannot recover properly from illness due to lack of time» and «I am under so much time pressure that my health suffers». Response alternatives ranged from «never» to «always» (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always). Total score ranged from 7 to 35, with higher score indicating a higher degree of time scarcity. In previous studies, the time pressure scale has shown a high level of internal consistency, with a Cronbach's alpha of 0.79 [34] and 0.87 [36]. In the present study, the scale had a Cronbach's alpha of 0.87. Cut-offs were estimated to get the most equal sized groups, and the time scarcity variable was then trichotomized into a low, medium and high group.

### *Sociodemographic factors and weight status*

Gender (men vs. women), ethnicity (native vs. non-native), educational level (higher education at university/college vs. no higher education), number of children in the household (2 vs. 1 and  $\geq 3$  vs. 1) and BMI ( $\geq 25.0$  vs.  $\leq 24.9$ ) were also tested as possible predictors of UPFC.

### ***Statistical analyses***

All analyses were performed with the statistical software package IBM SPSS Statistics version 22.0 (IBM Corp., Somers, NY, USA.). Proportions of study participants having a high consumption of ultra-processed dinner products, snacks & soft drinks and fast foods, in relation to proposed determinants, were calculated using cross tabulations and chi-square. Proportions of high experienced time scarcity in relation to gender, ethnicity, educational level, number of children in the household and BMI were also calculated with cross tabulation and Chi-square.

Binary logistic regression analyses were used to test the relationship between the independent variables (time scarcity, gender, ethnicity, educational level, number of children and BMI) and the dependent variables (consumption of ultra-processed dinner products, snacks & soft

drinks and fast foods). The variables were entered in two blocks: First, the unadjusted relationship of time scarcity and UPFC was tested, and then the sociodemographic factors and weight status were included in the model.

## 5.4 Results

### *Time scarcity*

Mean score of experienced time scarcity in the study sample were  $20.3 \pm 5.1$  (not reported in table). As shown in table 5.1, there were no significant differences between groups for proportions of participants experiencing a high degree of time scarcity (men vs. women, native vs. non-native, overweight/obese vs. not overweight, higher education vs. no higher education, 2/ $\geq$ 3 children vs. 1 child).

Table 5.1. Descriptive statistics of the association between time scarcity, gender, age, ethnicity, BMI, education, number of children and dichotomized indicators of ultra-processed food consumption

	Time scarcity		Ultra-processed dinner products	Snacks & Soft drinks	Fast food away from home
	n	% in high category	% in high category	% in high category	% in high category
All	497	29.6	48.9	48.3	43.7
<b>Time scarcity</b>					
Low	157		43.3	43.9	35.7
Medium	193		49.7	49.2	49.2
High	147		53.7	51.7	44.9
p			0.183	0.380	0.037*
<b>Gender</b>					
Men	52	21.2	57.7	44.2	55.8
Women	445	30.6	47.9	48.8	42.2
p		0.160	0.180	0.536	0.063
<b>Ethnicity (born in Norway)</b>					
Yes	442	30.3	50.5	50.9	45.2
No	54	24.1	37.0	25.9	29.6
p		0.343	0.063	0.001*	0.029*
<b>BMI</b>					
$\leq 24.9$	293	29.0	46.8	45.1	40.6
$\geq 25.0$	197	29.9	52.8	54.3	49.2
p		0.823	0.190	0.044*	0.059
<b>Education</b>					
No higher education	153	28.1	53.6	56.9	51.0
Higher education	344	30.2	46.8	44.5	40.4
p		0.631	0.162	0.011*	0.028*
<b>Number of children in the household</b>					
1	163	28.2	47.2	48.5	44.8
2	231	30.7	48.1	47.2	42.9
$\geq 3$	101	28.7	53.5	51.5	44.6
p		0.849	0.580	0.771	0.918

Percentage of participants in high category of time scarcity, processed dinner products, snacks & soft drinks and fast food away from home. BMI: Body Mass Index; \* $p < 0.05$

In the descriptive analyses, respectively 35.7% of participants with low time scarcity, 49.2% of participants with medium time scarcity and 44.9% of participants with high time scarcity were categorized as high consumers of fast foods ( $p = 0.037$ , table 5.1). Unadjusted regression analyses showed that participants with medium time scarcity were more likely to be high consumers of fast foods compared to participants with low time scarcity (OR = 1.75, 95% CI = 1.14 – 2.69, table 5.2, model 5). When adjusting for sociodemographic factors and weight status, participants with both medium time scarcity and high time scarcity had higher odds of being categorized as high consumers of fast foods, when compared to participants with low time scarcity (OR = 1.98, 1.26 – 3.11 and OR = 1.66, 1.03 – 2.67, table 5.2, model 6). No significant differences were found for degree of experienced time scarcity and consumption of ultra-processed dinner products or snacks & soft drinks (table 5.2, model 1-4).

Table 5.2. Odds ratios for the associations between time scarcity, sociodemographic factors, weight status and high consumption of ultra-processed foods

	Ultra-processed dinner products				Snacks & Soft drinks				Fast food away from home			
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Time scarcity</b>												
Medium (vs. low)	1.30	0.85 - 1.98	1.37	0.88 - 2.11	1.24	0.81 - 1.89	1.35	0.87 - 2.09	1.75*	1.14 - 2.69	1.98*	1.26 - 3.11
High (vs. low)	1.52	0.97 - 2.39	1.51	0.95 - 2.41	1.37	0.87 - 2.15	1.45	0.91 - 2.32	1.47	0.93 - 2.33	1.66*	1.03 - 2.67
<b>Gender</b>												
Men (vs. women)			1.50	0.82 - 2.71			0.92	0.50 - 1.68			1.92*	1.05 - 3.54
<b>Ethnicity</b>												
Native (vs. non-native)			1.65	0.90 - 3.05			2.82*	1.44 - 5.51			2.02*	1.05 - 3.90
<b>BMI</b>												
Overweight/obese (vs. not overweight)			1.23	0.85 - 1.78			1.37	0.94 - 1.99			1.33	0.91 - 1.94
<b>Education</b>												
Higher education (vs. no higher education)			0.76	0.51 - 1.12			0.64*	0.43 - 0.96			0.67	0.45 - 1.00
<b>Number of children in the household</b>												
2 (vs. 1)			1.03	0.68 - 1.55			0.90	0.59 - 1.38			0.84	0.55 - 1.28
$\geq 3$ (vs. 1)			1.26	0.76 - 2.10			1.02	0.61 - 1.70			0.87	0.52 - 1.46

OR: Odds ratio; CI: Confidence interval; BMI: Body Mass Index; \* $p < 0.05$

### ***Sociodemographic factors and weight status***

Men had higher odds of being categorized as high consumers of fast foods than women (OR = 1.92, 1.05 – 3.54, table 5.2, model 6). Furthermore, native Norwegians had higher odds of being categorized as high consumers of both snacks & soft drinks (OR = 2.82, 1.44 – 5.51, table 5.2, model 4) and fast foods (OR = 2.02, 1.05 – 3.90, table 5.2, model 6) when compared to non-natives. As shown in table 5.1, a lower proportion of participants with higher education, than participants without higher education, was categorized in the high consumption group of snacks & soft drinks (44.5% vs. 56.9%,  $p = 0.011$ ) and fast foods (40.4% vs. 51.0%,  $p = 0.028$ ). Also in the regression analyses, participants with higher



education had lower odds of being high consumers of snacks & soft drinks when compared to participants without higher education (OR = 0.64, 0.43 – 0.96, table 5.2, model 4), while the difference in educational status and consumption of fast foods was marginally close to reaching significance (OR = 0.67, 0.45 – 1.00, table 5.2, model 6). A greater proportion of overweight/obese participants than non-overweight participants was categorized as high consumers of snacks & soft drinks (54.3% vs. 45.1%,  $p = 0.044$ , table 5.1). However, in the regression analyses, no differences were found for weight status and consumption of ultra-processed dinner products, snacks & soft drinks or fast foods, respectively.

## **5.5 Discussion**

### ***Time scarcity***

Findings in the present study indicated that time scarcity was predictive of consuming food from fast food restaurants and convenience stores. Those experiencing a medium or high degree of time scarcity, were respectively almost twice as likely and sixty-six percent more likely to be categorized as high consumers of fast foods when compared to those with low time scarcity. The findings on time scarcity and consumption of fast foods are consistent with previous studies, where time shortage has been identified as a barrier to healthy eating and associated with increased consumption of fast foods [37, 38]. Time pressure, having a paid job and number of working hours have also been positively associated with the use of ready-meals such as frozen pizzas and TV dinners in previous research [39, 40], indicating that use of ready-meals might be a convenient way of managing time pressure. The lack of significant findings on the association between time scarcity and use of ultra-processed dinner products in the current study was therefore rather surprising. Nevertheless, the ultra-processed dinner score comprised questions on both ready-meals and products that were only pre-prepared to some extent. It is possible that some of the included foodstuffs did not offer enough convenience, and that time scarcity therefore did not yield a significant effect on consumption. It is also reasonable to assume that parents of small children often are above average interested in maintaining a healthy diet for themselves and their children [41]. Hence, it is likely that this group cook dinner from scratch more often than adults without children, also when experiencing time scarcity. The lack of significant findings between time scarcity and consumption of snacks & soft drinks in the current study might not be surprising, as previous qualitative research has shown that such products might be purchased and consumed for other reasons than to save time (e.g. taste preferences, social influence, cost, availability) [42, 43].

Several studies have shown that more time spent on cooking is negatively associated with fast food consumption [44-46]. Monsivais et al. [45] found that spending less than 1 hour a day on preparing homemade meals was predictive of more frequent use of fast food restaurants among adults, while more time spent on food preparation was positively associated with indicators of healthy eating. Those who spent the least amount of time on food preparation, were also those who placed high priority on convenience in food choices [45]. Furthermore, Larson et al. [46] reported a negative association between involvement in food preparation and fast food consumption in young adults, as well as a lack of time being the most important barrier to cooking. Strategies aimed at increasing time spent on cooking, might therefore be suitable in order to decrease UPFC, and this might be more feasible than aiming to influence people's experienced time pressure.

### ***Sociodemographic factors and weight status***

In the current study, men were almost twice as likely to be classified as high consumers of fast foods when compared to women, while no significant gender differences were found for consumption of either snacks & soft drinks or ultra-processed dinner products. These results were to some extent supported by previous studies, which have reported that men consume more fast foods, sugar sweetened soft drinks and processed meat than women, whereas women consume more sweets than men [28, 32, 47]. Furthermore, analyses in the present study, showed that participants with higher education had 36% lower odds of being categorized as high consumers of snacks & soft drinks. The effect of educational status on consumption of fast foods was also marginally close to reaching significance, and the odds of being a high consumer was 33% lower for participants with higher education, when compared to participants without higher education. In line with these results, Thornton et al. [30] found that increased fast food purchasing was associated with lower education, decreased household income and being a blue-collar employee. Similarly, Larson et al. [48] found that frequent fast food intake was most common among individuals with low-middle socioeconomic status, and Davison et al. [49] reported that leaving school before the age of sixteen was associated with low levels of food involvement in the kitchen, which led to more frequent consumption of junk foods.

Non-natives had lower odds of being categorized as high consumers of both snacks & soft drinks and fast foods when compared to native Norwegians in the present study. As ethnic minorities in Western societies often belong to low-income groups with lower living

standards than the majority population [50], the findings on ethnicity in the current study was rather surprising. Nevertheless, only 10% of the study sample was non-natives and countries of origin for these participants were unknown. It is reasonable to assume that this small group was not representative of all non-native parents in Norway, and furthermore there might be differences in UPFC in non-natives with different countries of origin. In the current study, no association was found between number of children in the household and UPFC. However, Akbay et al. [51] found that number of children influenced frequency of fast food consumption, as households with one child consumed more fast foods than households with no children. Further, the results indicated that households with more than one child consumed less fast foods than households with only one child [51]. These findings appear reasonable since it might be more economical for larger households to prepare food at home. On this basis, the lack of significant findings on the association between number of children and UPFC in the current study, might suggest that a comparison of adults with and without children could have been more interesting.

Descriptive analyses in the current study indicated that a larger proportion of overweight/obese participants had a high consumption of snacks & soft drinks than non-overweight participants. No significant effect was however found for weight status on UPFC in the regression analyses, though findings for both snacks & soft drinks and fast foods were close to reaching significance. As only two categories were applied for weight status (overweight/obese vs. not overweight), it is possible that differences in UPFC were not detected. Previous studies have assessed the potential association between weight status and intake of highly processed foods [10, 11, 16, 18], though the majority of these has investigated food intake as a predictor of overweight/obesity, rather than an outcome.

### ***Strengths and limitations***

An important strength in the current study was the use of a validated measure on time scarcity. The use of three separate scores indicative of UPFC (ultra-processed dinner products, snacks & soft drinks and fast foods) was also considered to be a strength, as it is reasonable to assume that there might be different factors influencing consumption of e.g. ready-meals and soft drinks. To the best of our knowledge, few previous studies have investigated the effect of time scarcity on UPFC, and the current study might therefore provide valuable input when developing future interventions and nutritional strategies. Nevertheless, there were also some limitations to this study. The distribution of the study

sample was rather homogenous as participants were mainly female and native Norwegians. Also, data collection was conducted in only two of Norway's nineteen counties, and findings in this study were therefore not necessarily representative of Norwegian kindergarten parents in general. The scores on UPFC had not been validated, and furthermore, as we analysed cross-sectional data, conclusions regarding cause and effect must be done cautiously. Considering sociodemographics, the variables were not tested independently, but entered as covariates in the logistic model. All data was based on self-report questionnaires, which might have increased the risk of social desirability bias.

## **5.6 Conclusions**

Findings in the present study indicate that time scarcity is associated with a higher intake of fast foods, also when adjusting for sociodemographic factors. However, time scarcity may not influence consumption of all UPF-products to the same extent, as no significant differences were found for consumption of either ultra-processed dinner products or snacks & soft drinks. Furthermore, gender, ethnicity and educational level were found to influence consumption of certain types of UPF. Studies with longitudinal design would be suitable to further explore the relationship between time scarcity and UPFC, preferably stratified by sociodemographic factors in order to identify disparities in different groups.

## References

1. Popkin BM, Adair LS, Ng SW. Global nutrition transition and the pandemic of obesity in developing countries. *Nutrition Reviews*. 2012;70(1):3-21.
2. Monteiro CA, Moubarac JC, Cannon G, Ng SW, Popkin B. Ultra-processed products are becoming dominant in the global food system. *Obesity Reviews*. 2013;14 Suppl 2:21-8.
3. Slimani N, Deharveng G, Southgate DA, Biessy C, Chajes V, van Bakel MM et al. Contribution of highly industrially processed foods to the nutrient intakes and patterns of middle-aged populations in the European Prospective Investigation into Cancer and Nutrition study. *European Journal of Clinical Nutrition*. 2009;63 Suppl 4:S206-25.
4. Moubarac JC, Batal M, Martins AP, Claro R, Levy RB, Cannon G et al. Processed and ultra-processed food products: consumption trends in Canada from 1938 to 2011. *Canadian Journal of Dietetic Practice and Research*. 2014;75(1):15-21.
5. Poti JM, Mendez MA, Ng SW, Popkin BM. Is the degree of food processing and convenience linked with the nutritional quality of foods purchased by US households? *American Journal of Clinical Nutrition*. 2015;101(6):1251-62.
6. Martinez Steele E, Baraldi LG, Louzada ML, Moubarac JC, Mozaffarian D, Monteiro CA. Ultra-processed foods and added sugars in the US diet: evidence from a nationally representative cross-sectional study. *BMJ Open*. 2016;6(3):e009892.
7. Monteiro CA, Levy RB, Claro RM, Castro IR, Cannon G. A new classification of foods based on the extent and purpose of their processing. *Cadernos de Saude Publica*. 2010;26(11):2039-49.
8. Moubarac JC, Martins AP, Claro RM, Levy RB, Cannon G, Monteiro CA. Consumption of ultra-processed foods and likely impact on human health. Evidence from Canada. *Public Health Nutrition*. 2013;16(12):2240-8.
9. Monteiro CA, Levy RB, Claro RM, de Castro IR, Cannon G. Increasing consumption of ultra-processed foods and likely impact on human health: evidence from Brazil. *Public Health Nutrition*. 2011;14(1):5-13.
10. Alkerwi A, Crichton GE, Hebert JR. Consumption of ready-made meals and increased risk of obesity: findings from the Observation of Cardiovascular Risk Factors in Luxembourg (ORISCAV-LUX) study. *British Journal of Nutrition*. 2014:1-8.
11. Pereira MA, Kartashov AI, Ebbeling CB, Van Horn L, Slattery ML, Jacobs DR, Jr. et al. Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis. *The Lancet*. 2005;365(9453):36-42.
12. Tavares LF, Fonseca SC, Garcia Rosa ML, Yokoo EM. Relationship between ultra-processed foods and metabolic syndrome in adolescents from a Brazilian Family Doctor Program. *Public Health Nutrition*. 2012;15(1):82-7.
13. Bouvard V, Loomis D, Guyton KZ, Grosse Y, Ghissassi FE, Benbrahim-Tallaa L et al. Carcinogenicity of consumption of red and processed meat. *The Lancet Oncology*. 2015.
14. Chan DS, Lau R, Aune D, Vieira R, Greenwood DC, Kampman E et al. Red and processed meat and colorectal cancer incidence: meta-analysis of prospective studies. *PLoS One*. 2011;6(6):e20456.
15. Greenwood DC, Threapleton DE, Evans CE, Cleghorn CL, Nykjaer C, Woodhead C et al. Association between sugar-sweetened and artificially sweetened soft drinks and type 2 diabetes: systematic review and dose-response meta-analysis of prospective studies. *British Journal of Nutrition*. 2014;112(5):725-34.
16. Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: a systematic review. *American Journal of Clinical Nutrition*. 2006;84(2):274-88.

17. Malik VS, Popkin BM, Bray GA, Despres JP, Willett WC, Hu FB. Sugar-sweetened beverages and risk of metabolic syndrome and type 2 diabetes: a meta-analysis. *Diabetes Care*. 2010;33(11):2477-83.
18. Malik VS, Pan A, Willett WC, Hu FB. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *American Journal of Clinical Nutrition*. 2013;98(4):1084-102.
19. Micha R, Michas G, Mozaffarian D. Unprocessed red and processed meats and risk of coronary artery disease and type 2 diabetes--an updated review of the evidence. *Current Atherosclerosis Reports*. 2012;14(6):515-24.
20. Micha R, Wallace SK, Mozaffarian D. Red and processed meat consumption and risk of incident coronary heart disease, stroke, and diabetes mellitus: a systematic review and meta-analysis. *Circulation*. 2010;121(21):2271-83.
21. Jabs J, Devine CM. Time scarcity and food choices: an overview. *Appetite*. 2006;47(2):196-204.
22. Jabs J, Devine CM, Bisogni CA, Farrell TJ, Jastran M, Wethington E. Trying to find the quickest way: employed mothers' constructions of time for food. *Journal of Nutrition Education and Behavior*. 2007;39(1):18-25.
23. Slater J, Sevenhuysen G, Edginton B, O'Neil J. 'Trying to make it all come together': structuration and employed mothers' experience of family food provisioning in Canada. *Health Promotion International*. 2012;27(3):405-15.
24. Brunner TA, van der Horst K, Siegrist M. Convenience food products. Drivers for consumption. *Appetite*. 2010;55(3):498-506.
25. van der Horst K, Oenema A, Ferreira I, Wendel-Vos W, Giskes K, van Lenthe F et al. A systematic review of environmental correlates of obesity-related dietary behaviors in youth. *Health Education Research*. 2007;22(2):203-26.
26. Ohly H, Pealing J, Hayter AK, Pettinger C, Pikhart H, Watt RG et al. Parental food involvement predicts parent and child intakes of fruits and vegetables. *Appetite*. 2013;69:8-14.
27. Deshmukh-Taskar P, Nicklas TA, Yang S-J, Berenson GS. Does food group consumption vary by differences in socioeconomic, demographic, and lifestyle factors in young adults? The Bogalusa Heart Study. *Journal of the American Dietetic Association*. 2007;107(2):223-34.
28. Eicher-Miller HA, Fulgoni VL, Keast DR. Energy and Nutrient Intakes from Processed Foods Differ by Sex, Income Status, and Race/Ethnicity of US Adults. *Journal of the Academy of Nutrition and Dietetics*. 2015;115(6):907-18.e6.
29. Næss Ø, Elstad JI, Westin S, Mæland JG. *Sosial epidemiologi : sosiale årsaker til sykdom og helsesvikt*. Oslo: Gyldendal Akademisk; 2009.
30. Thornton LE, Bentley RJ, Kavanagh AM. Individual and area-level socioeconomic associations with fast food purchasing. *Journal of Epidemiology and Community Health*. 2011;65(10):873-80.
31. Larson N, Story M. A review of environmental influences on food choices. *Annals of Behavioral Medicine*. 2009;38 Suppl 1:S56-73.
32. Paeratakul S, Ferdinand DP, Champagne CM, Ryan DH, Bray GA. Fast-food consumption among US adults and children: Dietary and nutrient intake profile. *Journal of the American Dietetic Association*. 2003;103(10):1332-8.
33. Moubarac JC, Parra DC, Cannon G, Monteiro CA. Food classification systems based on food processing: significance and implications for policies and actions: a systematic literature review and assessment. *Current Obesity Reports*. 2014;3(2):256-72.
34. Van Der Lippe T. Dutch workers and time pressure: household and workplace characteristics. *Work, Employment & Society*. 2007;21(4):693-711.

35. Garhammer M. Pace of Life and Enjoyment of Life. *Journal of Happiness Studies*. 2002;3(3):217-56.
36. Beshara M, Hutchinson A, Wilson C. Preparing meals under time stress. The experience of working mothers. *Appetite*. 2010;55(3):695-700.
37. Welch N, McNaughton SA, Hunter W, Hume C, Crawford D. Is the perception of time pressure a barrier to healthy eating and physical activity among women? *Public Health Nutrition*. 2009;12(7):888-95.
38. Darian JC, Chicago J. Segmenting by consumer time shortage. *Journal of Consumer Marketing*. 1995;12(1):32.
39. de Boer M, McCarthy M, Cowan C, Ryan I. The influence of lifestyle characteristics and beliefs about convenience food on the demand for convenience foods in the Irish market. *Food Quality and Preference*. 2004;15(2):155-65.
40. Verlegh PWJ, Candel MJJM. The consumption of convenience foods: reference groups and eating situations. *Food Quality and Preference*. 1999;10(6):457-64.
41. Jancey JM, Dos Remedios Monteiro SM, Dhaliwal SS, Howat PA, Burns S, Hills AP et al. Dietary outcomes of a community based intervention for mothers of young children: A randomised controlled trial. *The International Journal of Behavioral Nutrition and Physical Activity*. 2014;11(120).
42. Hattersley L, Irwin M, King L, Allman-Farinelli M. Determinants and patterns of soft drink consumption in young adults: a qualitative analysis. *Public Health Nutrition*. 2009;12(10):1816-22.
43. Nelson MC, Kocos R, Lytle LA, Perry CL. Understanding the perceived determinants of weight-related behaviors in late adolescence: A qualitative analysis among college youth. *Journal of Nutrition Education and Behavior*. 2009;41(4):287-92.
44. van der Horst K, Brunner T, Siegrist M. Fast food and take-away food consumption are associated with different lifestyle characteristics. *Journal of Human Nutrition and Dietetics*. 2011;24(6):596-602.
45. Monsivais P, Aggarwal A, Drewnowski A. Time spent on home food preparation and indicators of healthy eating. *American Journal of Preventive Medicine*. 2014;47(6):796-802.
46. Larson NI, Perry CL, Story M, Neumark-Sztainer D. Food preparation by young adults is associated with better diet quality. *Journal of the American Dietetic Association*. 2006;106(12):2001-7.
47. Silliman K, Rodas-Fortier K, Neyman M. A Survey of Dietary and Exercise Habits and Perceived Barriers to Following a Healthy Lifestyle in a College Population. *Californian Journal of Health Promotion*. 2004;2(2):10-9.
48. Larson NI, Neumark-Sztainer DR, Story MT, Wall MM, Harnack LJ, Eisenberg ME. Fast food intake: longitudinal trends during the transition to young adulthood and correlates of intake. *Journal of Adolescent Health*. 2008;43(1):79-86.
49. Davison J, Share M, Hennessy M, Bunting B, Markovina J, Stewart-Knox B. Correlates of food choice in unemployed young people: The role of demographic factors, self-efficacy, food involvement, food poverty and physical activity. *Food Quality and Preference*. 2015;46:40-7.
50. Jenum AK. Etniske og kulturelle faktorerers betydning for helse. In: Næss Ø, Elstad JI, Westin S, Mæland JG, editors. *Sosial epidemiologi : sosiale årsaker til sykdom og helsesvikt*. Oslo: Gyldendal Akademisk; 2009.
51. Akbay C, Tiryaki GY, Gul A. Consumer characteristics influencing fast food consumption in Turkey. *Food Control*. 2007;18(8):904-13.

## **6.0 ELABORATIONS ON THE CROSS-SECTIONAL STUDY**

### **6.1 Design and methods**

UPF-products (e.g. frozen pizza, Fjordland) might be convenient and time saving [1], and we therefore hypothesized that people who experienced a high degree of time scarcity also had a high consumption of UPF-products. As we gained access to data from the Healthy and Sustainable Lifestyle project, the initial work with our cross-sectional study centred around developing suitable scores to measure UPFC. In accordance with the NOVA classification of processed foods [2], we selected questions from the Healthy and Sustainable Lifestyle questionnaire (Appendix 4), which distinctly measured consumption of UPF-products, and simultaneously excluded foods that could not be classified as ultra-processed. The original idea was to develop one score measuring UPFC, but after an iterative process of considering different questions to include, we decided that it was more appropriate to develop several scores in order to measure UPFC more accurately. Furthermore, based on previous research [3, 4], we assumed that time scarcity would not influence consumption of all UPF-products to the same extent, as use of ready-meals might be more strongly influenced by time scarcity than consumption of snacks and soft drinks. In the initial stages of our project, we also decided to adjust for sociodemographic factors and weight status in the logistic model, as this was suitable to control for possible confounding factors when investigating the association between time scarcity and UPFC [5]. Based on unstructured literature searches in different databases and guidance from our supervisors we ended up adjusting for gender, age, ethnicity, BMI and number of children.

### **6.2 Methodological discussion**

As the evidence assessed in our literature review indicated that age was inversely associated with UPFC, we acknowledge that it would have been appropriate to also adjust for age in our logistic regression analyses. We were also aware that continuous variables are representing data on a higher level than categorical, and therefore often are preferable when conducting statistical analyses [5, 6]. Nevertheless, in our research paper we applied time scarcity as a categorical variable because, in collaboration with our supervisors, we found this to be the most appropriate method to address the aim of our paper. Categorizing the time scarcity variable made it feasible to assess differences in consumption of UPF-products in study participants with low, medium and high degree of time scarcity. Also, test-retest analyses of the data used for this cross-sectional study would have been desirable in order to measure the



stability of each UPF-score [5, 6]. Due to the time consuming work of our whole master's project, especially with the review paper, test-retest analyses were however not possible.

The outcome score measuring consumption of snacks & soft drinks included both sugar sweetened and artificially sweetened beverages. As our literature review indicated that men had a higher consumption of sugar sweetened soft drinks [7-12], while women had a higher consumption of artificially sweetened soft drinks [8, 9], we acknowledge that our cross-sectional study could have benefitted from investigating sugar sweetened and artificially sweetened beverages separately. Furthermore, as we estimated cut-offs in order to dichotomize the variables indicative of UPFC, we noticed that the overall consumption of UPF-products was rather low. It is reasonable to assume that a larger and more heterogeneous study sample, together with the use of scores capturing a larger diversity of UPF-products, could have yielded results more in line with previously described studies, which have reported that UPF-products are contributing with a large share of both food expenditures and energy intake [13-15]. On this basis, it can be argued that it would have been beneficial to develop a new questionnaire specifically aimed at assessing consumption of UPF-products rather than using previously gathered data. In order to develop a new questionnaire, consulting statistics on consumer expenditures in advance would have been appropriate to better capture overall UPFC and to ensure content validity of the survey [5]. Additionally, examples of foodstuffs would be presented in the survey to make sure the questions measured consumption of industrially manufactured products and not home-made products (e.g. frozen pizza vs. home-made pizza). The use of examples in the questionnaire would help to enhance the construct validity [5].

## References

1. Jabs J, Devine CM. Time scarcity and food choices: an overview. *Appetite*. 2006;47(2):196-204.
2. Monteiro CA, Levy RB, Claro RM, Castro IR, Cannon G. A new classification of foods based on the extent and purpose of their processing. *Cadernos de Saude Publica*. 2010;26(11):2039-49.
3. Monsivais P, Aggarwal A, Drewnowski A. Time spent on home food preparation and indicators of healthy eating. *American Journal of Preventive Medicine*. 2014;47(6):796-802.
4. Slater J, Sevenhuysen G, Edginton B, O'Neil J. 'Trying to make it all come together': structuration and employed mothers' experience of family food provisioning in Canada. *Health Promotion International*. 2012;27(3):405-15.
5. Polit DF, Beck CT. *Essentials of nursing research : appraising evidence for nursing practice*. 8th ed. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins; 2014.
6. Hellevik O. *Forskningsmetode i sosiologi og statsvitenskap*. 7th ed. Oslo: Universitetsforl.; 2002.
7. Barić IC, Šatalić Z, Lukešić Ž. Nutritive value of meals, dietary habits and nutritive status in Croatian university students according to gender. *International Journal of Food Sciences & Nutrition*. 2003;54(6):473.
8. Beerman KA, Jennings G, Crawford S. The Effect of Student Residence on Food Choice. *Journal of American College Health*. 1990;38(5):215-20.
9. Driskell JA, Meckna BR, Scales NE. Differences exist in the eating habits of university men and women at fast-food restaurants. *Nutrition Research*. 2006;26(10):524-30.
10. Kvaavik E, Andersen LF, Klepp KI. The stability of soft drinks intake from adolescence to adult age and the association between long-term consumption of soft drinks and lifestyle factors and body weight. *Public Health Nutrition*. 2005;8(2):149-57.
11. Lien N, Lytle LA, Klepp KI. Stability in consumption of fruit, vegetables, and sugary foods in a cohort from age 14 to age 21. *Preventive Medicine*. 2001;33(3):217-26.
12. West DS, Bursac Z, Quimby D, Prewitt TE, Spatz T, Nash C et al. Self-reported sugar-sweetened beverage intake among college students. *Obesity*. 2006;14(10):1825-31.
13. Martinez Steele E, Baraldi LG, Louzada ML, Moubarac JC, Mozaffarian D, Monteiro CA. Ultra-processed foods and added sugars in the US diet: evidence from a nationally representative cross-sectional study. *BMJ Open*. 2016;6(3):e009892.
14. Slimani N, Deharveng G, Southgate DA, Biessy C, Chajes V, van Bakel MM et al. Contribution of highly industrially processed foods to the nutrient intakes and patterns of middle-aged populations in the European Prospective Investigation into Cancer and Nutrition study. *European Journal of Clinical Nutrition*. 2009;63 Suppl 4:S206-25.
15. Solberg SL, Terragni L, Granheim SI. Ultra-processed food purchases in Norway: a quantitative study on a representative sample of food retailers. *Public Health Nutrition*. 2015;FirstView:1-12.

## **7.0 OVERALL ASSESSMENT OF FINDINGS**

### **7.1 General discussion**

Until the 20<sup>th</sup> century, preserving and processing of foods were mainly done in private homes through e.g. boiling, cleaning, salting and drying, and thereafter, food processing has become more industrialized [1, 2]. Despite favourable aspects of industrial food processing, the increased availability of a wide range of new UPF-products has resulted in an increased consumption of pre-prepared and ready-to-eat food products with high energy density and low nutrient content [3, 4]. As a result of changes in the food environment, there has been a shift in the nutritional challenges during the last century, and one of the main issues in Western societies today is to ensure an adequate intake of nutrients and at the same time maintain energy-balance in order to prevent lifestyle diseases [5]. In Western societies we are also witnessing changing demographic structures as an increasing share of the population is of older age in addition to a more complex diversity of ethnical groups [6, 7]. Changing food consumption patterns accompanied by the demographic changes in society yields new challenges in public health, including the promotion of favourable dietary habits in different sociodemographic groups.

In today's society where the dual-career family is common and much time is spent on work and leisure activities, cooking meals from scratch might feel like a time consuming activity that are unnecessary when convenience products offer an easy way out [8, 9]. In our literature review, time scarcity was not investigated as a determinant of UPFC in any of the quantitative papers, though convenience and ease of preparation was associated with use of UPF-products among young adults in four of six qualitative papers [10-13]. In line with these qualitative findings, our cross-sectional paper indicated that time scarcity was positively associated with consumption of fast foods, while no association was found between degree of time scarcity and consumption of either ultra-processed dinner products or snacks & soft drinks. As many people operate on a tight schedule, it is reasonable to assume that time spent on meals and cooking might not be prioritized if interest and skills for food preparation is lacking. Although not conclusively, findings from our review indicated that being more involved in food preparation might reduce consumption of UPF-products [14-16]. On this basis it would have been interesting to further investigate if e.g. cooking skills and enjoyment of cooking might act as moderating factors for the association between time scarcity and UPFC. Thus, future research should consider investigating these factors together in order to assess potential interacting effects, and clarify the underlying mechanisms.

Findings from the included papers in our review indicated that parental educational level was inversely associated with UPFC [17-19]. Similarly, results from our cross-sectional study indicated an inverse association between participants' educational level and UPFC, although only significant for snacks & soft drinks. It is however worth mentioning that the association between educational status and UPFC might differ in high- and low/middle-income countries, as studies have found a positive association between educational level and UPFC in Brazil [20, 21]. As previously described, the availability and use of UPF-products are mostly increasing in low- and middle-income countries [22]. The different direction of association in educational status and UPFC might therefore be explained by the Diffusion of Innovations Theory, which states that individuals with high socioeconomic status often are the first to adopt new trends [23, 24].

Although the studies included in our literature review investigated a range of different determinants of UPFC with the use of different measures, there were still some overall similarities in the assessed material. The majority of the included studies were conducted in Western countries, and only a small proportion of the studies were based on a theoretical framework. In the papers with a theoretical framework, SCT was most frequently applied. As previously described, theoretical frameworks are beneficial when investigating complex health behaviours such as UPFC [25], and the lack of studies applying theoretical frameworks was therefore noteworthy. Furthermore, even though strategies targeting multiple levels of influence are favourable when promoting healthy lifestyle behaviours [26, 27], none of the included studies in our literature review applied an ecological approach. Investigating determinants on the individual level might be easier and more feasible than investigating determinants on multiple/higher levels [26, 27], and this might be a possible explanation for the lack of research applying an ecological approach.

As stated in our review paper, we were surprised by the lack of research addressing environmental determinants of UPFC. In example, the lack of quantitative papers investigating the effect of high/low UPF-availability and UPF-costs was noteworthy and furthermore, the influence of advertising and marketing strategies of unhealthy foods was not investigated in any of the included papers. Though the initial stages of our project revealed papers examining the effect of e.g. free toy promotion and television commercials on UPFC in children [28, 29], it is possible that our search strategy did not capture all relevant material

on advertising and UPFC in young adults. Nevertheless, a previous review on environmental influences of food choices reported that most studies investigating marketing strategies as a determinant of food related behaviour have focused on children [30]. As nutritional strategies on governmental level such as price, tax and marketing regulations have the potential to promote public health and decrease social inequalities, the influence of e.g. food costs and advertising needs to be investigated more thoroughly [26, 27].

## **7.2 Implications for practice**

The main objective in this project was to increase the knowledge about important factors that should be addressed in order to reduce UPFC. Although decreasing the use of such products is desirable, aiming to fully exclude UPF-products from the diet is not realistic. Therefore, facilitating the use of whole, fresh and minimally processed foods should be accompanied by an effort to produce healthier pre-prepared meals and offer UPF-products with a more favourable nutritional composition. Participants in the qualitative studies in our review consistently perceived unhealthy processed foods (e.g. fast food, chips, chocolate) as being cheaper and more accessible than healthier unprocessed foods (e.g. fruit, vegetables) [10, 12, 13, 31, 32], and furthermore, a study of Norwegians' food habits, reported that participants expressed a desire for healthier options to be easier available [33]. An effort should therefore be done in order to make healthy food choices easier by addressing facilitators and barriers. Higher taxation of UPF (e.g. soft drinks and chips) and marketing regulations on such products are methods to address this issue. Offering minimally processed foods with favourable prices in schools, work places and convenience stores as well as more beneficial placement of healthy options in grocery stores are also actions to encourage.

## **7.3 Implications for research**

This project revealed a wide range of determinants potentially influencing the consumption of UPF-products. To this date, most research on determinants of UPFC among young adults has focused on the individual level, and in particular sociodemographic factors have been quite thoroughly investigated. Nevertheless, there is still a need for research on the individual level determinants associated with UPFC using comparable measures. There is a knowledge gap regarding determinants of UPFC on the environmental level. Based on the qualitative findings assessed in our review paper, the potential effect of social influence (friends, family, co-workers) on UPFC should be further investigated [10, 12, 13, 31, 32]. Also, food costs were not investigated as a determinant of UPFC in any of the quantitative papers. It is however

reasonable to assume that young adults might be strongly affected by price in their food choices, which was also supported by the qualitative findings in our review [10, 13, 32]. The potential effect of food costs on UPFC should therefore be further addressed.

As many of the included papers were conducted using a study sample consisting of students only, there is also a need to further address factors influencing UPFC among non-students aged 18 to 35 years. Although determinants influencing the use of fast foods, soft drinks and unhealthy snacks have been investigated to some extent, there seems to be a knowledge gap regarding determinants influencing the use of pre-prepared and ready-to-eat food products. Future research should also consider investigating the consumption of different UPF-products separately, as there might be different determinants influencing the use of e.g. soft drinks and ready-meals. Illustrated by the findings in our master's thesis, high UPFC might be a particular challenge in certain groups, as both young age and being male was associated with higher consumption. As such, interventions should be adapted to meet the needs of specific subgroups in order to be effective. The use of theory and an ecological approach would be beneficial when further investigating the determinants influencing use of UPF-products among young adults. Furthermore, qualitative studies specifically aimed at exploring the factors affecting the use of different UPF-products would yield valuable information to guide the development and enhance the quality of future longitudinal studies and interventions.

#### **7.4 Conclusions**

This project revealed that gender, younger age and increased television watching were associated with UPFC in young adults. Also, time scarcity was positively associated with fast food consumption in Norwegian parents. Overall, there seems to be a knowledge gap on environmental determinants of UPFC in young adults. Intervention studies in a natural setting and longitudinal studies with an ecological approach, would be suitable when further investigating determinants of UPFC, preferably stratified by gender, age and socioeconomic status in order to identify disparities in different groups.

## References

1. Weaver CM, Dwyer J, Fulgoni VL, King JC, Leveille GA, MacDonald RS et al. Processed foods: contributions to nutrition. *The American Journal of Clinical Nutrition*. 2014;99(6):1525-42.
2. Cordain L, Eaton SB, Sebastian A, Mann N, Lindeberg S, Watkins BA et al. Origins and evolution of the Western diet: health implications for the 21st century. *American Journal of Clinical Nutrition*. 2005;81(2):341-54.
3. Moodie R, Stuckler D, Monteiro C, Sheron N, Neal B, Thamarangsi T et al. Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries. *The Lancet*. 2013;381(9867):670-9.
4. Monteiro CA, Moubarac JC, Cannon G, Ng SW, Popkin B. Ultra-processed products are becoming dominant in the global food system. *Obesity Reviews*. 2013;14 Suppl 2:21-8.
5. Nasjonalt råd for ernæring. Kostråd for å fremme folkehelsen og forebygge kroniske sykdommer : metodologi og vitenskapelig kunnskapsbidrag. Oslo: Helsedirektoratet; 2011.
6. Jenum AK. Etniske og kulturelle faktorerers betydning for helse. In: Næss Ø, Elstad JI, Westin S, Mæland JG, editors. *Sosial epidemiologi : sosiale årsaker til sykdom og helsesvikt*. Oslo: Gyldendal Akademisk; 2009.
7. Buckley M, Cowan C, McCarthy M. Consumer attitudes towards convenience foods. In: Frewer L, van Trijp H, editors. *Understanding consumers of food products*. Boca Raton, FL: CRC Press Woodhead Publishing; 2007. p. 200-20.
8. de Boer M, McCarthy M, Cowan C, Ryan I. The influence of lifestyle characteristics and beliefs about convenience food on the demand for convenience foods in the Irish market. *Food Quality and Preference*. 2004;15(2):155-65.
9. Buckley M, Cowan C, McCarthy M. The convenience food market in Great Britain: Convenience food lifestyle (CFL) segments. *Appetite*. 2007;49(3):600-17.
10. Nelson MC, Kocos R, Lytle LA, Perry CL. Understanding the perceived determinants of weight-related behaviors in late adolescence: A qualitative analysis among college youth. *Journal of Nutrition Education and Behavior*. 2009;41(4):287-92.
11. Betts NM, Amos RJ, Georgiou C, Hoerr SL, Ivaturi R, Keim KS et al. What young adults say about factors affecting their food intake. *Ecology of Food and Nutrition*. 1995;34(1):59-64.
12. Chang M-W, Nitzke S, Guilford E, Adair CH, Hazard DL. Motivators and barriers to healthful eating and physical activity among low-income overweight and obese mothers. *Journal of the American Dietetic Association*. 2008;108(6):1023-8.
13. du Plessis K. Factors influencing Australian construction industry apprentices' dietary behaviors. *American Journal of Men's Health*. 2012;6(1):59-66.
14. Davison J, Share M, Hennessy M, Bunting B, Markovina J, Stewart-Knox B. Correlates of food choice in unemployed young people: The role of demographic factors, self-efficacy, food involvement, food poverty and physical activity. *Food Quality and Preference*. 2015;46:40-7.
15. Larson NI, Perry CL, Story M, Neumark-Sztainer D. Food preparation by young adults is associated with better diet quality. *Journal of the American Dietetic Association*. 2006;106(12):2001-7.
16. Laska MN, Larson NI, Neumark-Sztainer D, Story M. Does involvement in food preparation track from adolescence to young adulthood and is it associated with better dietary quality? Findings from a 10-year longitudinal study. *Public Health Nutrition*. 2012;15(7):1150-8.

17. Larson NI, Neumark-Sztainer DR, Story MT, Wall MM, Harnack LJ, Eisenberg ME. Fast food intake: longitudinal trends during the transition to young adulthood and correlates of intake. *Journal of Adolescent Health*. 2008;43(1):79-86.
18. Larson N, Neumark-Sztainer D, Laska MN, Story M. Young adults and eating away from home: associations with dietary intake patterns and weight status differ by choice of restaurant. *Journal of the American Dietetic Association*. 2011;111(11):1696-703.
19. McDade TW, Chyu L, Duncan GJ, Hoyt LT, Doane LD, Adam EK. Adolescents' expectations for the future predict health behaviors in early adulthood. *Social Science & Medicine*. 2011;73(3):391-8.
20. Olinto MT, Willett WC, Gigante DP, Victora CG. Sociodemographic and lifestyle characteristics in relation to dietary patterns among young Brazilian adults. *Public Health Nutrition*. 2011;14(1):150-9.
21. Bielemann RM, Santos Motta JV, Minten GC, Horta BL, Gigante DP. Consumption of ultra-processed foods and their impact on the diet of young adults. *Revista de Saude Publica*. 2015;49:28.
22. Stuckler D, McKee M, Ebrahim S, Basu S. Manufacturing epidemics: the role of global producers in increased consumption of unhealthy commodities including processed foods, alcohol, and tobacco. *PLoS Medicine*. 2012;9(6):e1001235.
23. Oldenburg B, Glanz K. Diffusion of Innovations. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behavior and health education : theory, research, and practice*. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 313- 33.
24. Sund ER, Jørgensen SH. Folkehelsens geografiske fordeling. In: Næss Ø, Elstad JI, Westin S, Mæland JG, editors. *Sosial epidemiologi : sosiale årsaker til sykdom og helsesvikt*. Oslo: Gyldendal Akademisk; 2009.
25. Brewer NT, Rimer BK. Perspectives on health behavior theories that focus on individuals. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behavior and health education : theory, research, and practice*. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 149-65.
26. Sallis JF, Owen N, Fisher EB. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behavior and health education: theory, research, and practice*. 4th ed. San Francisco, Calif: Jossey-Bass; 2008. p. 465-85.
27. Bartholomew LK, Parcel GS, Kok G, Gottlieb NH, Fernández ME. *Planning health promotion programs : an intervention mapping approach*. 3rd ed. San Francisco: Jossey-Bass; 2011.
28. Jones JM. Free Toy Promotions, Fast Food Children's Meals and Social Responsibility: Examining the Effects of Toy Value, Nutrition Information and Moderating Variable. *Journal of Managerial Issues*. 2014;26(3):240-58.
29. Jeffrey DB, McLellarn RW, Fox DT. The development of children's eating habits: the role of television commercials. *Health Education Quarterly*. 1982;9(2-3):174-89.
30. Larson N, Story M. A review of environmental influences on food choices. *Annals of Behavioral Medicine*. 2009;38 Suppl 1:S56-73.
31. Hattersley L, Irwin M, King L, Allman-Farinelli M. Determinants and patterns of soft drink consumption in young adults: a qualitative analysis. *Public Health Nutrition*. 2009;12(10):1816-22.
32. Davison J, Share M, Hennessy M, Knox BS. Caught in a 'spiral'. Barriers to healthy eating and dietary health promotion needs from the perspective of unemployed young people and their service providers. *Appetite*. 2015;85:146-54.
33. Bugge A, Lillebø K, Lavik R. Mat i farten - Muligheter og begrensninger for nye og sunnere spisekonsepter i hurtigmatmarkedet. Statens Institutt for Forbruksforskning; 2009.



## **APPENDIXES**

### **Appendix 1. List of abbreviations**

BMI: Body Mass Index

CI: Confidence interval

F: Female

FFQ: Food frequency questionnaire

IARC: International Agency for Research on Cancer

IFIC: International Food Information Council

IJBNPA: International Journal of Behavioral Nutrition and Physical Activity

M: Male (review paper)

M: Mean (cross-sectional paper)

OR: Odds ratio

PA: Physical activity

SCT: Social Cognitive Theory

SD: Standard deviation

SES: Socioeconomic status

TPB: Theory of Planned Behaviour

TRA: Theory of Reasoned Action

UPF: Ultra-processed foods

UPFC: Ultra-processed food consumption

CBN: Camilla Bengtson Nenseth

EB: Elling Bere

ILD: Ingrid Laukeland Djupegot

THS: Tonje Holte Stea

## Appendix 2. Search strategy - Literature review

### *Two-folded search string used in our systematic literature search*

Search terms string 1: ultra processing OR ultra processed OR ready to eat OR ready to heat OR convenience ADJ5 food\* OR fast food\* OR pre prepared OR process\* food\* OR ready meal\* OR ready prepared OR junk food\* OR snack\* OR dessert\* OR sweets OR sugar\* drink\* OR sugar\* beverage\* OR soft drink\*

AND

Search terms string 2: determinant\* OR correlat\* OR mediat\* OR moderat\*

### *Basis for development of search strategy*

Table 1. Map of relevant search terms

Search terms			
Based on the NOVA classification of foods			Other
General	Snacks/desserts	Ready-to-eat	
Ultra-processed	Bread	Frozen pasta	Processed (process*)
Ready-to-eat	Biscuits / cookies	Frozen pizza	Highly processed
Ready-to heat	Cereal bars	Processed meat	Food processing
Convenience	Chips / crisps	Hot dogs	Sweets
food	Cake	Burgers	Food products
Fast food / fast-	Pastries	Stews	Canned food
food	Ice cream	Pot noodle	Sugared beverages
Snack	Soft drink	Sausage	Yoghurt
	Sugared / sugar sweetened soft drinks / no cal cola	Fish sticks	TV-dinner
	Jam	Chicken nuggets	Ready-meal
	Canned fruit	Canned/dehydrated soup	Ready-prepared / pre-prepared
	Chocolate	Sauces	Junk-food
	Confectionary / candies	Cheese	
	Breakfast cereal with added sugar	Sugared fruit / milk drinks	Dietary pattern / acquisition pattern
	Savoury snacks	Pre-prepared meat / poultry / fish / vegetable	Diet behaviour / food choice
	Sweet snacks	Salted / pickled / smoked / cured meat and fish	Food habit / habit
		Vegetables bottled/canned in brine	Preferences
		Fish canned in oil	Unhealthy eating
		Infant formula	Intake
		Follow-on milks	Consumption
		Baby food	
			Environmental
			Social
			Psychological
			Sociodemographic
			Lifestyle
			Determinant
			Correlate
			Factor
			Influence
			Characteristics

Table 2. Draft for design of search string

Search terms for:	Examples of search terms
Processed food	Fast food, processed food, snacks, convenience food, ice cream, pre-prepared, ready meal
<b>AND</b> Determinants	Determinant, correlate, characteristics, influence, preferences, environmental, sociodemographic
<b>AND</b> Study design	Cross-sectional, intervention, survey, questionnaire
<b>AND</b> Age	
<b>AND</b> Geography	
<b>AND</b> Year	

## Appendix 3. Research clearance - Healthy and Sustainable Lifestyle project

### Norsk samfunnsvitenskapelig datatjeneste AS

NORWEGIAN SOCIAL SCIENCE DATA SERVICES



Harald Hårfages gate 29  
N-5007 Bergen  
Norway  
Tel: +47-55 58 21 17  
Fax: +47-55 58 96 50  
nsd@nsd.uib.no  
www.nsd.uib.no  
Org.nr. 985 321 884

Elling Bere  
Institutt for folkehelse, idrett og ernæring Universitetet i Agder  
Serviceboks 422  
4604 KRISTIANSAND S

Vår dato: 26.03.2014

Vår ref: 37459 / 3 / LT

Deres dato:

Deres ref:

#### TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 04.02.2014. Meldingen gjelder prosjektet:

<i>37459</i>	<i>Sunn og bærekraftig livsstil (SBL) og barns matmot</i>
<i>Behandlingsansvarlig</i>	<i>Universitetet i Agder, ved institusjonens øverste leder</i>
<i>Daglig ansvarlig</i>	<i>Elling Bere</i>

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, <http://www.nsd.uib.no/personvern/meldeplikt/skjema.html>. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, <http://pvo.nsd.no/prosjekt>.

Personvernombudet vil ved prosjektets avslutning, 30.06.2018, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Katrine Utaaker Segadal

Lis Tenold

Kontaktperson: Lis Tenold tlf: 55 58 33 77

Vedlegg: Prosjektvurdering

*Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.*

*Avdelingskontorer / District Offices*

*OSLO:* NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. [nsd@uio.no](mailto:nsd@uio.no)  
*TRONDHEIM:* NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. [kyrre.svarva@svt.ntnu.no](mailto:kyrre.svarva@svt.ntnu.no)  
*TROMSØ:* NSD, SVF, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 43 36. [nsdmaa@svt.uit.no](mailto:nsdmaa@svt.uit.no)

## Appendix 4. Questionnaire - Healthy and Sustainable Lifestyle project

Takk for at du tar deg tid til å delta i forskningsstudien Sunn og bærekraftig livsstil og Barns matmot, som pågår blant småbarnsforeldre i Aust- og Vest-Agder. Studien inngår som en del av to doktorgradsprosjekt ved UiA og ledes av professorene Elling Bere og Nina Øverby.

Familien bestemmer selv hvem av foreldrene/de foresatte som besvarer spørreskjemaet. Den som fyller ut skjemaet besgjøre det ut fra det som stemmer for seg selv og barnet født i 2012. Spørreskjemaet består av to deler og vil ta ca 50 min å besvare. Første del dreier seg i hovedsak om dine kost- og aktivitetsvaner, mens du i andre del får spørsmål om barnets mat- og spisevaner.

Sett deg gjerne et sted hvor du kan sitte uforstyrret, les spørsmålene nøye og svar så godt du kan. Lykke til!

Trykk på neste for å komme i gang.

TUSEN TAKK FOR AT DU DELTAR!

Vennlig hilsen

Doktorgradsstipendiat Helga Birgit Bjørnarå

Doktorgradsstipendiat Sissel H. Helland

### Først vil vi stille deg noen spørsmål om mat, drikke og spisevaner:

Hvor ofte spiser du:

	Mindre								Hver dag
	Aldri	enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	
Frokost	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Lunsj	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Middag	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Kveldsmat	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Mellommåltider	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>

Hvor ofte drikker du?

	Mindre							Hver dag	Flere ganger daglig	
	Aldri	enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke		
Melk	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>	(10) <input type="checkbox"/>
Fruktjuice uten tilsatt sukker	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>	(10) <input type="checkbox"/>
Vann	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>	(10) <input type="checkbox"/>
Drikker med tilsatt sukker (eks. brus, saft, iste, iskaffe)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>	(10) <input type="checkbox"/>

	Aldri	Mindre enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	Hver dag	Flere ganger daglig
Drikker med kunstig søtning (eks. lettbrus, lettsaft, lett iste)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>	(10) <input type="checkbox"/>
Kaffe	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>	(10) <input type="checkbox"/>
Te	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>	(10) <input type="checkbox"/>
Alkohol	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>	(10) <input type="checkbox"/>

### Hvor ofte spiser du?

	Aldri	Mindre enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	Hver dag	Flere ganger daglig
Typisk nordiske frukter (eple, pære, plomme)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Andre frukter (eks. banan, appelsin, kiwi, ananas)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Bær	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Rotgrønnsaker (eks. gulrot, kålrot, løk)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Kål (eks. blomkål, brokkoli, rosenkål, grønnkål)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Andre grønnsaker (eks. tomat, agurk, paprika, salat)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Belgfrukter (eks. erter, bønner, kikerter)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Usaltede nøtter	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>

### Hvor ofte spiser du?

	Aldri	Mindre enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	Hver dag	Flere ganger daglig
Poteter	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Ris	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Pasta	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>

### Hvor ofte spiser du følgende varmrett?

	Aldri	Mindre enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	Hver dag	Flere ganger daglig
Viltkjøtt (elg, reinsdyr, rådyr)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Rent kjøtt av eks. okse, svin, lam, kalkun, kylling (ikke viltkjøtt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Mager fisk (torsk, sei, hyse)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Fet fisk (makrell, sild, kveite)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Laks og/eller ørret	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Annen sjømat (eks. reker, krabber, blåskjell)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>

### Hvor ofte spiser du?

	Aldri	Mindre enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	Hver dag	Flere ganger daglig
Suppe	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Gryterett (eks. lapskaus, frikassè, fiskegryte, Toro-gryte)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Nudler	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Pizza	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Ferdigretter fra eks. Findus, Fjordland	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Pølser	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Pommes frites	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Hamburger/karbonade/kjøttkake/kjøttpudding	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Kjøttdeigbaserte middagsretter (eks. taco, pasta)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Fiskepinner/fiskekake/fiskepudding	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>

**Hvor ofte spiser du?**

	Aldri	Mindre enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	Hver dag	Flere ganger daglig
Fint brød/rundstykker/loff	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Grovt brød/rundstykker (minst 50% sammalt mel/hele korn og kjerner)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Grove knekkebrød	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Havregrøt	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Musli/havregryn uten tilsatt sukker	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Andre frokostblandinger	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>

**Hvor ofte spiser du?**

	Aldri	Mindre enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	Hver dag	Flere ganger daglig
Salte kjeks	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Søte kjeks/cookies	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Søtt bakverk (eks. kaker, boller)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Salt snacks (eks. chips, ostepop, salte nøtter)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Søtsaker (eks. smågodt, sjokolade)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(10) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>

**Hvor ofte salter du maten du spiser?**

- (1)  Aldri
- (2)  Mindre enn 1 gang/uke
- (3)  1 gang/uke
- (4)  2 ganger/uke
- (5)  3 ganger/uke
- (6)  4 ganger/uke
- (7)  5 ganger/uke
- (8)  6 ganger/uke
- (9)  Hver dag
- (10)  Flere ganger daglig



## I hvilken grad er du enig i følgende påstander?

	Helt uenig	.....	.....	Verken enig eller uenig	.....	.....	Helt enig
Jeg prøver stadig ny og ulik type mat	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(7) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Jeg stoler ikke på ukjent mat	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(7) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Hvis jeg ikke kjenner til hva som er i maten, vil jeg ikke smake	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(7) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Jeg er redd for å spise ting jeg ikke har spist før	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(7) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Jeg er veldig kresen på hva slags mat jeg vil spise	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(7) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Jeg spiser nesten all slags mat	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(7) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>

## Hvor ofte?

	Aldri	Mindre enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	Hver dag
Spiser du på restaurant/kafé	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Spiser du mat fra fast-food restaurant (eks. McDonalds, gatekjøkken)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Spiser du mat kjøpt på bensinstasjon/stor-kiosk (eks. 7-eleven, Narvesen)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>

## Har du hovedansvar for matlagingen hjemme?

- (1)  Ja  
 (2)  Nei  
 (3)  Ansvaret er delt

## Hvor ofte?

	Aldri	Mindre enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	Hver dag
Kutter du opp grønnsaker	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>

	Mindre								Hver dag
	Aldri	enn 1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke		
Kutter du opp frukt	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>
Lager du middag fra bunnen	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>

#### Hvor mye salt tilsetter du i de hjemmelagede middagsrettene?

- (1)  Mindre enn det som står i oppskriften  
 (2)  Mengden som står i oppskriften  
 (3)  Mer enn det som står i oppskriften  
 (4)  Bruker aldri oppskrift

#### Hvor ofte lager du?

	Aldri	Mindre enn 1 g/måned	Månedlig, men mindre enn 1 g/uke	1 g/uke	Mer enn 1 g/uke
Amerikansk pizza (tykk bunn og mye fyll)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Italiensk pizza (tynn bunn og begrenset med fyll)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

#### Når du lager pizza, hvor ofte er?

	Alltid	Ofte	Av og til	Sjelden	Aldri
Sausen hjemmelaget (ikke fra glass/pose)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Bunnen hjemmelaget (ikke fra pose/rull)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

#### Hvor ofte baker du?

	Aldri	Mindre enn 1 g/måned	Månedlig, men mindre enn i g/uke	1 g/uke	Mer enn 1 g/uke
Fint brød/rundstykker (0-25% sammalt mel/ hele korn og kjerner)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Halvgrovt brød/rundstykker (25-50% sammalt mel/ hele korn og kjerner)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

	Aldri	Mindre enn 1 g/måned	Månedlig, men mindre enn i g/uke	1 g/uke	Mer enn 1 g/uke
Grovt brød/rundstykker (50-75% sammalt mel/hele korn og kjerner)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Ekstra grovt brød/rundstykker (50-75% sammalt mel/hele korn og kjerner)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

#### Når du baker brød, hvor ofte bruker du?

	Alltid	Ofte	Av og til	Sjelden	Aldri
Brød-mix	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Gjær eller andre hevemidler	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Hjemmelaget surdeig	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

#### Hvor ofte lager du?

	Aldri	Mindre enn 1 g/måned	Månedlig, men mindre enn 1 g/uke	1 g/uke	Mer enn 1 g/uke
Suppe	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Gryterett som eks. frikassè, lapskaus, fiskegryte, Toro-gryte	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

#### Når du lager suppe eller andre "gryteretter", hvor ofte bruker du?

	Alltid	Ofte	Av og til	Sjelden	Aldri
Pose	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Buljong (industrifremstilt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Hjemmelaget kraft	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

#### I hvilken grad er du enig i følgende påstander?

	Helt enig	Delvis enig	Verken enig eller uenig	Delvis uenig	Helt uenig
Jeg kjøper ofte lokalprodusert mat	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg kjøper ofte sesongens råvarer	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg kjøper ofte økologisk mat	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

	Helt enig	Delvis enig	Verken enig eller uenig	Delvis uenig	Helt uenig
Jeg velger bevisst matvarer som er miljømerket	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg er flink til å kildesortere husholdningsavfallet	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg kaster sjelden mat	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg dyrker spiselige planter hjemme til eget forbruk	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg sanker spiselige ville planter/bær/sopp	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg jakter	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg fisker fisk/skalldyr	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

**I hvilken grad stemmer følgende påstander for deg?**

	Stemmer ikke i det hele tatt			Stemmer til dels			Stemmer helt
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Å nyte mat er en av de viktigste gledene i livet mitt	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Jeg vil heller spise mitt favorittmåltid enn å se mitt favoritt TV-program	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Jeg tenker på mat på en positiv og forventningsfull måte	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Penger brukt på mat er vel anvendte penger	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Dersom jeg kunne tilfredsstill mine ernæringsmessige behov trygt, billig og uten sult ved å ta en daglig pille, ville jeg gjøre dette	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>

**Så noen spørsmål om transportvaner:****Hvor langt er det fra hjemmet ditt til?**

Fyll inn antall km. For eksempel 3,4

Arbeidsplassen/studiestedet? \_\_\_\_\_

Barnehagen \_\_\_\_\_

Nærmeste matvarebutikk \_\_\_\_\_

Nærmeste sentrum \_\_\_\_\_

**Har du egen sykkel?**(1)  Ja(2)  Nei**Har du el-sykkel?**(1)  Ja(2)  Nei**Hvor mange dager i uka er du på jobb/skole (ikke hjemmekontor)?**

—

**Hvordan kommer du deg som oftest til og fra i sommerhalvåret når du?**

	Til fots	Sykkle/el-sykkel	Bil/motorsykke l/moped/skute r	Offentlig transport	Ikke aktuelt
Skal på jobb/studere	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Handler matvarer	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Handler andre varer	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Transporterer deg selv på fritiden	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Transporterer barn til/fra barnehagen	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>

**Hvordan kommer du deg som oftest til og fra i vinterhalvåret når du?**

	Til fots	Sykkle/el-sykkel	Bil/motorsykke l/moped/skute r	Offentlig transport	Ikke aktuelt
Skal på jobb/studere	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Handler matvarer	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>

	Til fots	Sykkle/el-sykkle	Bil/motorsykkle /moped/skute r	Offentlig transport	Ikke aktuelt
Handler andre varer	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Transporterer deg selv på fritiden	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>
Transporterer barn til/fra barnehagen	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>

### Noen spørsmål om fysisk aktivitet

Hvor ofte er du fysisk aktiv i minst 30 minutter totalt i løpet av dagen (i minst 10 minutter om gangen)? Med fysisk aktivitet menes all aktivitet hvor hjertet ditt slår fortere enn vanlig og hvor du blir andpusten innimellom, for eksempel rask gange.

- (1)  Aldri
- (2)  Mindre enn 1 g/uke
- (3)  1 g/uke
- (4)  2 g/uke
- (5)  3 g/uke
- (6)  4 g/uke
- (7)  5 g/uke
- (8)  6 g/uke
- (9)  Hver dag

### Hvor ofte trener du eller driver med idrett?

	Aldri	Mindre enn 1 g/uke	1 g/uke	2 g/uke	3 g/uke	4 g/uke	5 g/uke	6 g/uke	Hver dag	Flere ganger daglig
Utendørs (alle typer idrett)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>	(10) <input type="checkbox"/>
Innendørs (alle typer idrett, i gymsal, i treningsstudio, i basseng etc.)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>	(8) <input type="checkbox"/>	(9) <input type="checkbox"/>	(10) <input type="checkbox"/>

### Hvor ofte driver du med utendørs aktiviteter som eks. hagearbeid, bading/svømming, lek, aking, snømåking, vedstabling?

- (1)  Aldri
- (2)  Mindre enn 1 g/måned
- (3)  Månedlig, men mindre enn 1 g/uke
- (4)  1 g/uke
- (5)  Mer enn 1 g/uke

De to neste spørsmålene omhandler deg OG din familie- hvor ofte dere er på tur sammen:

Hvor ofte er du og din familie på tur i sommerhalvåret?

	Aldri	Mindre enn 1 g/måned	Månedlig, men mindre enn 1 g/uke	1 g/uke	Mer enn 1 g/uke
I nærmiljøet (ikke i grøntområder)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I naturen (eks. i skogen, på fjellet, ved sjøen)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I andre grøntområder (eks. parker)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Hvor ofte er du og din familie på tur i vinterhalvåret?

	Aldri	Mindre enn 1 g/måned	Månedlig, men mindre enn 1 g/uke	1 g/uke	Mer enn 1 g/uke
I nærmiljøet (ikke i grøntområder)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I naturen (eks. i skogen, på fjellet, ved sjøen)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I andre grøntområder (eks. parker)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

I hvilken grad stemmer følgende påstander om fysisk aktivitet (generelt) for deg?

	Stemmer ikke i det hele tatt	-	-	Stemmer til dels	-	-	Stemmer helt
Jeg liker fysisk aktivitet svært godt	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Det er moro å drive med fysisk aktivitet	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Jeg synes fysisk aktivitet er kjedelig	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Jeg er ikke opptatt av fysisk aktivitet i det hele tatt	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Jeg vil beskrive fysisk aktivitet som svært motiverende	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Jeg synes fysisk aktivitet er ganske fornøylig	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Mens jeg er fysisk aktiv, tenker jeg på hvor mye jeg liker det	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>

## I hvilken grad er du enig i følgende påstander?

	Helt enig	Delvis enig	Verken enig eller uenig	Delvis uenig	Helt uenig
Jeg tar trappene i stedet for heisen	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg tar trappene i stedet for rulletrappa	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

## Spørsmål om dine skjermvaner:

## På fritiden, omtrent hvor mange timer om dagen ser du vanligvis på TV/film?

	Ingen	Mindre enn 1/2 t	1/2-1 t	2-3 t	4 t	Mer enn 4 t
På hverdagene	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(8) <input type="checkbox"/>
I helgene	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(8) <input type="checkbox"/>

## Hvor ofte spiser du mens du ser på TV/film (både jobb og fritid)?

- (1)  Aldri
- (2)  Mindre enn 1 g/uke
- (3)  1 g/uke
- (4)  2 g/uke
- (5)  3 g/uke
- (6)  4 g/uke
- (7)  5 g/uke
- (8)  6 g/uke
- (9)  Hver dag
- (10)  Flere ganger daglig

## På fritiden, omtrent hvor mange timer om dagen bruker du vanligvis PC/nettbrett/smarttelefon/spillkonsoll?

	Ingen	Mindre enn 1/2 t	1/2-1 t	2-3 t	4 t	Mer enn 4 t
På hverdagene	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(8) <input type="checkbox"/>
I helgene	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(8) <input type="checkbox"/>



**Hvor ofte spiser du mens du bruker PC/nettbrett/ smarttelefon/spillkonsoll (både jobb og fritid)?**

- (1)  Aldri  
 (2)  Mindre enn 1 g/uke  
 (3)  1 g/uke  
 (4)  2 g/uke  
 (5)  3 g/uke  
 (6)  4 g/uke  
 (7)  5 g/uke  
 (8)  6 g/uke  
 (9)  Hver dag  
 (10)  Flere ganger daglig

**Noen spørsmål om tid og tidsbruk:****En vanlig hverdag, omtrent hvor mye tid bruker du på å?**

	Mindre enn 15 min	15-30 min	30-60 min	1-1 1/2 t	1 1/2-2 t	2-3 t	Mer enn 3 t
Lage middag	(8) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Lage alle dagens måltider (totalt)	(8) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Spise middag	(8) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Spise alle dagens måltider (totalt)	(8) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>

**En vanlig lørdag eller søndag, omtrent hvor mye tid bruker du på å?**

	Mindre enn 15 min	15-30 min	30-60 min	1-1 1/2 t	1 1/2-2 t	2-3 t	Mer enn 3 t
Lage middag	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Lage alle dagens måltider (totalt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Spise middag	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Spise alle dagens måltider (totalt)	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>

**Hvor ofte stemmer følgende påstander for deg?**

	<b>Aldri</b>	<b>Sjelden</b>	<b>Av og til</b>	<b>Ofte</b>	<b>Alltid</b>
Jeg kjøper hurtigmat til middag fordi jeg verken har tid eller ork til å lage middag	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg har ikke tid til å tilberede de sunne måltidene som jeg ønsker å lage	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Vi har ikke tid til å sette oss ned sammen og spise middag som et familiemåltid	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg spiser lunsjen min på kontoret, siden jeg ikke har tid til lunsjpause	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg har ikke tid til å trene så mye som jeg ønsker	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

**Hvor ofte stemmer følgende påstander for deg?**

	<b>Aldri</b>	<b>Sjelden</b>	<b>Av og til</b>	<b>Ofte</b>	<b>Alltid</b>
Jeg er under tidspress	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg ønsker at jeg hadde mer tid til meg selv	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg føler jeg er under tidspress fra andre	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg får ikke håndtere viktige ting riktig grunnet mangel på tid	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg får ikke ordentlig søvn	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg får ikke restituert meg ordentlig etter sykdom grunnet mangel på tid	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Jeg er under så mye tidspress at det går ut over helsa	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

**Så noen spørsmål om andre levevaner:****Hvor mange timer sover du vanligvis om natten på hverdagene?**

Fyll inn antall timer. For eksempel 7,5

\_\_\_\_\_

**Hvor mange timer sover du vanligvis om natten i helgene?**

Fyll inn antall timer. For eksempel 7,5

\_\_\_\_\_

**Prøver du å slanke deg?**

- (1)  Nei, vekten min er passe
- (2)  Nei, men jeg trenger å gå ned i vekt
- (3)  Ja

**Røyker du?**

- (1)  Nei, jeg har aldri røykt regelmessig
- (2)  Nei, jeg har sluttet
- (3)  Ja, men ikke daglig
- (4)  Ja, daglig

**Snuser du?**

- (1)  Nei, jeg har aldri snust regelmessig
- (2)  Nei, jeg har sluttet
- (3)  Ja, men ikke daglig
- (4)  Ja, daglig

**De neste spørsmålene dreier seg om opplevelse av egen helse****Hvordan vil du beskrive din egen helse?**

- (1)  Meget god
- (2)  God
- (3)  Verken god eller dårlig
- (4)  Dårlig
- (5)  Meget dårlig

**I hvilken grad begrenser din helse dine hverdagslige gjøremål?**

- (1)  I stor grad
- (2)  I noen grad
- (3)  I liten grad
- (4)  Ikke i det hele tatt

**Har du, eller har du hatt følgende?**

	Ja	Nei	Vet ikke
Spiseforstyrrelser	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
Angst	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
Depresjon	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>

## I løpet av de siste 7 dagene, hvor ofte har du?

	Hele tiden	Mye av tiden	Deler av tiden	Noe av tiden	Ikke i det hele tatt
Følt deg rolig og harmonisk	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Hatt overskudd av energi	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
Følt deg nedfor og deprimert	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

## Og så noen bakgrunnsspørsmål om deg og barnet som deltar i undersøkelsen:

## Hvilket kjønn er du?

- (1)  mann  
 (2)  kvinne

## Er du gravid?

- (1)  Ja  
 (2)  Nei

## Hvilken relasjon har du til barnet som deltar i undersøkelsen?

- (1)  Barnets mor  
 (2)  Barnets far  
 (4)  Annen person

## Hva er din fødselsdato?

Fyll inn dato. XX.XX.XX (for eksempel 24.10.76)

\_\_\_\_\_

## Hvor høy er du (cm)?

cm

\_\_\_\_\_

## Hvor mye veier du (kg)?

kg

\_\_\_\_\_

## Etnisk bakgrunn

	Ja	Nei	Vet ikke
Ble du født i Norge?	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
Ble din mor født i Norge?	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>

	<b>Ja</b>	<b>Nei</b>	<b>Vet ikke</b>
Ble din far født i Norge?	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
Ble barnet som deltar i undersøkelsen født i Norge?	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
Ble barnets andre forelder født i Norge?	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>

**Hva er din sivile status?**

- (1)  Enslig  
 (2)  Gift  
 (3)  Samboer  
 (4)  Separert  
 (5)  Skilt  
 (6)  Annet

**Bor barnets mor og far/barnets foresatte sammen?**

- (1)  Ja  
 (2)  Nei

**Hvor mange personer bor det i husholdningen din?**

Fyll inn antall

—

**Hvor mange av personene som bor i husholdningen er barn?**

Fyll inn antall

—

**Hvilken utdannelse har du? Marker høyeste fullførte utdannelse**

- (1)  Mindre enn 10 års grunnskole  
 (2)  Grunnskole  
 (3)  Videregående skole (inkl. gymnas/yrkesskole)  
 (4)  Universitet eller høyskole (inntil 4 år)  
 (5)  Universitet eller høyskole (mer enn 4 år)  
 (6)  Annet

**Utdannelse til barnets andre forelder/foresatt? Marker høyeste fullførte utdannelse.**

- (1)  Mindre enn 10 års grunnskole  
 (2)  Grunnskole  
 (3)  Videregående skole (inkl. gymnas/yrkesskole)  
 (4)  Universitet eller høyskole (inntil 4 år)

- (5)  Universitet eller høyskole (mer enn 4 år)
- (6)  Annet
- (7)  Vet ikke

**Hva er din hovedaktivitet?**

- (1)  Arbeid, heltid
- (2)  Arbeid, deltid
- (3)  Hjemmевærende
- (4)  Sykemeldt
- (5)  Permisjon
- (6)  Uføretrygdet
- (7)  Under attføring/rehabilitering
- (8)  Student/skoleelev
- (9)  Arbeidsledig
- (10)  Annet

Tusen takk for dine svar!

De er nå lagret.

Med vennlig hilsen  
Doktorgradsstipendiat Helga Birgit Bjørnarå og  
Doktorgradsstipendiat Sissel H. Helland

Universitetet i Agder  
Institutt for folkehelse, idrett og ernæring



## **Appendix 5. Research paper 1. Title page and declarations as submitted to IJBNPA**

### **Determinants of ultra-processed food consumption among young adults: a review of the literature**

Camilla Bengtson Nenseth<sup>1†</sup>

Ingrid Laukeland Djupegot<sup>1†</sup>

The following co-authors was stated when submitting the article to International Journal of Behavioral Nutrition and Physical Activity (IJBNPA): Elling Bere<sup>1</sup> and Tonje Holte Stea<sup>1\*</sup>

<http://ijbnpa.biomedcentral.com/>

† Shared first authorship

<sup>1</sup> University of Agder, Department of Public Health, Sport and Nutrition, Kristiansand, Norway

E-mail addresses:

CBN: cambn\_1@hotmail.no

ILD: ingriddjup\_91@hotmail.com

EB: elling.bere@uia.no

THS: tonje.h.stea@uia.no

\*Corresponding author:

Tonje Holte Stea, Department of Public Health, Sport and Nutrition, University of Agder, Postboks 422, 4604 Kristiansand, Norway. Phone: +47 38142324, Fax: +47 38141301, e-mail: tonje.h.stea@uia.no

Word count abstract: 293

Word count text: 4606

Keywords: Ultra-processed food, processed food, determinants, young adults

## **Declarations**

### *Abbreviations*

BMI: Body Mass Index

F: Female

FFQ: Food frequency questionnaire

M: Male

PA: Physical Activity

SCT: Social Cognitive Theory

SES: Socioeconomic status

UPF: Ultra-processed foods

UPFC: Ultra-processed food consumption

### *Competing interests*

The authors declare that they have no competing interests.

### *Authors' contributions*

CBN, ILD, EB and THS developed the search strategy. CBN and ILD conducted the literature search, screened all the material, analysed the data and drafted the manuscript under the supervision of THS and EB. All authors critically revised the article and approved the final manuscript.

### *Acknowledgements*

We thank Ellen Sejersted, librarian at the University of Agder, Department of Public Health, Sport and Nutrition, who gave valuable input regarding development of the search strategy.

### *Authors' information*

CBN and ILD are joint first authors.

## **Additional information**

Original manuscript, which has been submitted to IJBNPA, is identical to chapter 3 in this master's thesis, with exception of line spacing, line and page numbering and placement of tables.



## **Appendix 6. Research paper 2. Title page and declarations for submission to IJBNPA**

### **Time scarcity and use of ultra-processed food products among Norwegian parents: a cross-sectional study**

Ingrid Laukeland Djupegot<sup>1†</sup>

Camilla Bengtson Nenseth<sup>1†</sup>

The following co-authors will be stated when submitting the article to International Journal of Behavioral Nutrition and Physical Activity (IJBNPA): Tonje Holte Stea<sup>1</sup>, Helga Birgit Torgeirsdotter Bjørnara<sup>1</sup>, Sissel Heidi Helland<sup>1</sup>, Nina Cecilie Øverby<sup>1</sup>, Monica Klungland Torstveit<sup>1</sup> and Elling Bere<sup>1\*</sup>

<http://ijbnpa.biomedcentral.com/>

<sup>†</sup> Shared first authorship

<sup>1</sup> University of Agder, Department of Public Health, Sport and Nutrition, Kristiansand, Norway

E-mail addresses:

ILD: [ingriddjup\\_91@hotmail.com](mailto:ingriddjup_91@hotmail.com)

CBN: [cambn\\_1@hotmail.no](mailto:cambn_1@hotmail.no)

THS: [tonje.h.stea@uia.no](mailto:tonje.h.stea@uia.no)

HBTB: [helga.birgit.bjornara@uia.no](mailto:helga.birgit.bjornara@uia.no)

SHH: [sissel.h.helland@uia.no](mailto:sissel.h.helland@uia.no)

NCØ: [nina.c.overby@uia.no](mailto:nina.c.overby@uia.no)

MKT: [monica.k.torstveit@uia.no](mailto:monica.k.torstveit@uia.no)

EB: [elling.bere@uia.no](mailto:elling.bere@uia.no)

\*Corresponding author:

Elling Bere, Department of Public Health, Sport and Nutrition, University of Agder, Postboks 422, 4604 Kristiansand, Norway. Phone: +47 38142329, Fax: +47 38141301, e-mail: [elling.bere@uia.no](mailto:elling.bere@uia.no)

Word count abstract: 356

Word count text: 3384

Keywords: Ultra-processed food, processed food, time scarcity, convenience, adults

## **Declarations**

### *Abbreviations*

BMI: Body Mass Index

CI: Confidence interval

M: Mean

OR: Odds ratio

SD: Standard deviation

UPF: Ultra-processed foods

UPFC: Ultra-processed food consumption

### *Ethics approval*

Research Clearance was obtained from Norwegian Social Science Data Services.

### *Competing interests*

The authors declare that they have no competing interests.

### *Authors' contributions*

EB, THS, NCØ and MKT conceived the Healthy and Sustainable Lifestyle-project. HBTB and SH created the questionnaire and conducted the survey. ILD, CBN, EB and THS developed ideas as well as the scores and statistical models for the current study. ILD and CBN analysed the data and drafted the manuscript under the supervision of THS and EB. All authors critically revised the article and approved the final version of the manuscript (*not yet conducted*).

### *Authors' information*

ILD and CBN are joint first authors.

**Additional information**

Original manuscript, ready for submission to IJBNPA, is identical to chapter 5 in this master's thesis, with exception of line spacing, line and page numbering and placement of tables.