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Exploring physical activity and dietary choices among adolescents in Troms County, with focus on a potential association between the two health-related behaviors

A cross-sectional study based on Fit Futures – part of The Tromsø Study

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The past two years taking this master degree in public health has been a fantastic experience. I have looked forward to every day coming to the university and learning about new and motivating topics. In addition I have had some amazing class mates, and we have shared many interesting conversations and many good laughs.

The past months I have been privileged to be able to focus on a topic I long have had personal interest in; physical activity and dietary choices. To integrate this in a thesis with focus on adolescents has been very motivating. First of all I would like to thank Guri Skeie for her time and constructive feedback. I've been fortunate to have had her as my supervisor. I would also like to thank the Fit Futures study and Anne Sofie Furberg for providing me with data making it possible to write this thesis.

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Abstract

Background: Overweight has increased dramatically the last 30 years and has become an important public health issue. The balance between energy expenditure and energy intake plays an important role in prevention of overweight and obesity. Increased knowledge about physical activity (PA) and dietary choices among adolescents could therefore be valuable when preventive measures against overweight are planned and carried out. The main aim of the thesis was therefore to explore PA and dietary choices among 15 to 17-year-olds in Troms County, furthermore to investigate if there was an association between these two health-related behaviors.

Data and methods: This thesis is a cross-sectional analysis from Fit Futures 1, a part of the Tromsø Study, including 865 adolescents attending 1st year of high schools in the municipalities of Tromsø and Balsfjord. Recommendations from The Norwegian Directorate of Health were used as source for creating four dichotomous dependent variables on dietary choices. By considering duration of PA outside of school hours a cut-off 60 minutes (min) daily was set when the independent variable "60 min PA daily" was created. Contingency tables with chi-square tests were used for descriptive analyses and unadjusted analyses. While logistic regression was used to investigate the association between PA and the chosen dietary outcomes. The logistic regression analyses were adjusted for main high school program, screen time, frequency of eating breakfast and dinner, smoke-, snuff- and alcohol use, living arrangements and body mass index. Main analyses were stratified by gender.

Results: Nearly 42% of adolescents ate fish at least twice per week, while approximately 15% of girls and 9% of boys ate "5 a day" About 20% ate unhealthy foods daily and 32% of girls and 61% of boys drank sugar sweetened beverages daily (SSB). 14% of girls and 21% of boys spent 60 min or more daily on PA outside of school hours. A significant gender difference was found for "60 min PA daily", "5 a day" and "SSB daily". In the adjusted analyses "60 min PA

daily" significantly increased odds ratio (OR) only for "5 a day" (Girls: OR 3,18 95% CI 1,49-6,79. Boys: OR 3,67 95% CI 1,54-8,73).

Key words: Adolescents, cross-sectional study, dietary advice, dietary choices, health-related behavior, physical activity, public health, prevention, Troms County.

Abbreviations

CI	Confidence intervals
E%	Percentage of daily energy intake
FFQ	Food frequency questionnaire
FF1	Fit Futures 1
HBSC	Health Behavior in School-aged Children
HEVAS	The Norwegian part of the HBSC survey ("Helsevaner blant skoleelever")
KJ	Kilojoule
Min	Minutes
PA	Physical activity
REK	Regional Committees for Medical and Health Research Ethics
SES	Socioeconomic status
SSB	Sugar sweetened beverages
UiT	University of Tromsø
UNGKOST	A national dietary survey for pupils of 4th and 8th grade
UNN	University Hospital of North Norway
VIF	Variance inflation factor

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1 Introduction

Even if recent statistics show that the increase in proportion of overweight and obese adolescents in Norway might have leveled of (1), the prevalence of overweight has increased in such a manner over the past 30 years that it has become a serious public health concern (1, 2). The root for the problem is complex. As our gene material changes slowly, the explanation is more likely to be connected to the development of an obesogenic environment (3). Exemplified with a decline in physical activity (PA) associated with a more sedentary lifestyle, as well as a change in diet with reduced intake of fruit, vegetables, dietary fiber and unrefined carbohydrates, and an increased consumption of foods high in fat and added sugars (4). Changes in these health-related behaviors have received much political attention, and strategies to prevent adverse health consequences have been developed. Among others The Norwegian Directorate of Health released dietary recommendations in 2011, targeting promotion of public health and protection against chronic disease (5). Part of the focus in these recommendations are balance between energy expenditure and energy intake, as it plays an important role in prevention of overweight and obesity.

Adolescence is a period of change in many areas such as height, weight, body composition, psychological issues, as well as health-related behavior like PA and dietary choices (6). Certain health-related behaviors formed early in life can track into adulthood (7, 8). Children and adolescents are therefore an essential group of focus when looking into behavioral factors related to energy balance, and therefore important when targeting the problem of overweight and obesity.

1.1 Nutrition

The Norwegian Directorate of Health's recommendations were founded on evidence based knowledge and research within the field of nutrition and PA (5). Primarily they target healthy adults, but can for the main part also be applied to adolescents (5). These

recommendations were chosen as a basis when dietary choices, PA and a potential association between the two health-related behaviors among adolescents in Troms County was investigated.

Table 1-1 Dietary advice to promote public health and prevent chronic disease

1: It is recommended to keep a diet based primarily on plants, containing a lot of vegetables, fruit, berries, whole grains and fish, and to limit amounts of red meat, salt, added sugar and energy-dense foods.
2: It is recommended to sustain a balance between energy intake and energy expenditure.
3: Eat at least five servings of vegetables, fruit and berries every day.
4: Eat at least four servings of whole-grain products per day.
5: Eat fish equivalent of two to three dinner servings per week.
6: It is recommended that low fat dairy products should be a part of the daily diet.
7: It is recommended to choose lean meat and low fat meat products, and to limit intake of red meat and processed meat.
8: It is recommended to use vegetable oil, liquid margarine or soft margarine.
9: Water is recommended as beverage.
10: Limit intake of added sugar.
11: Limit intake of salt.
12: Supplements may be necessary to secure nutrient intake in some groups of the population.
13: It is recommended that everybody should be physically active at least 30 minutes (min) per day.

Reference; the Norwegian Directorate of Heath (5)

Due to the limited extent of a master thesis and availability of dietary data on the target population, a selection of these recommendations was used as basis for this thesis. The accompanying subchapters will therefore briefly look into the applicable recommendations.

1.1.1 Intake of fish

It is recommended to eat about 300-450g of fish per week, equivalent to two to three dinner portions, at least 200g of this should be fatty fish (5)[1]. Six servings of fish as bread spread counts as one dinner portion. Fish used as bread spread makes a large contribution to the total intake in Norway compared to other countries (10).

Adolescents have reported to eat substantially less fish than adults (11), and a large share of young people in Norway never or rarely eat fish (10, 12). Honkanen and Olsen found that adolescents on average ate fish or fish products 1,6 times per week, with highest consumption in Northern Norway (12). Data from a national nutritional survey for 4th and 8th graders from 2000 (UNGKOST-2000) showed that 8th graders on average consumed about 160-180g of fish per week (13).

1.1.2 Intake of fruits and vegetables

The Directorate of Health gives the following advise concerning vegetables, fruit and berries (5): It is recommended to eat at least five servings per day ("5 a day"). A maximum of one glass of juice can be included as one daily serving. About half of the daily intake should be vegetables, but potatoes are not to be included. One serving equals 100g.

Only a small part of the Norwegian population eat "5 a day" (5). UNGKOST-2000 reported that 10% of pupils in 8th grade had a consumption of more than 500g daily (13). Health Behavior in School-aged Children (HBSC) is an international survey which collects various health-related data on adolescents every four years (14). The Norwegian part of this study (HEVAS) reported from 2005 that among 16-year-olds 23% ate vegetables and 30% ate fruit daily (15). This is an increase compared to data from HEVAS-2001 (15).

[1] The Directorate of Health released 17.06.2013 new specification regarding fish intake, recommending that young and/ or pregnant women should not eat more than two servings of fatty fish per week over time due to environmental pollutants (9).

UNGKOST-2000 included potatoes in vegetables consumption (13), whereas this was not specified by the HEVAS questionnaire (15).

1.1.3 Intake of energy-dense foods

Energy density reflects the energy content in foods, usually expressed per unit weight. Foods containing more than 950-1150kilojoule (kJ)/100g are categorized as energy-dense, the Directorate of Health recommends limiting intake of these foods and consumed foods should on average contain 525KJ/100g (5). Energy-dense foods are often unhealthy, and pizza, hamburgers and hot-dogs would generally fit into this category, in addition to certain snacks (i.e chocolate, potato chips) (16). UNGKOST-2000 showed that 8th graders on average ate about 70g of pizza and hot-dogs daily, and 60g of cakes and snacks (potato chips etc.) and they had higher consumption of fat compared to recommended levels (13). The recommendations specifies that 25-35% of daily energy intake (E%) should stem from fat (5).

1.1.4 Intake of added sugar

Even if foods high in sugar can be included in the group of energy-dense foods, limiting intake of added sugar is specified as a separate point in the recommendations. A maximum of 10 E% should stem from sugar, for 16 to19-year-olds with normal activity levels this is equivalent to 55-70g (5). Sugar-sweetened beverages (SSB) contribute to a large part of sugar consumed by young people (11). HEVAS-2005 showed that 18% of 16-year-olds drank SSB daily (15). Even if there seems to be a decreasing trend in intake of SSB among adolescents (15, 17), it still contributed to an intake of 6,5kg sugar per person in Norway in 2010 (18). Various sweets are also consumed frequently. HEVAS-2005 showed that 16-year-olds ate candy on average 3,5 times per week and 13% ate candy daily, a decreased intake compared to data from 2001 (15).

1.2 Physical activity

PA can be defined as any bodily movement produced by skeletal muscles that result in energy expenditure (19). It consist of several dimensions, including duration (units of time), frequency (number of sessions per time unit) and intensity (20). PA influences energy balance and bodyweight, and has an effect on risks for several chronic diseases (5). It is therefore included in the recommendations from the Directorate of Health. For adults it is recommended to be moderately[2] physically active for at least 30 min per day, while schoolchildren should be physically active with varying intensity for at least 60 min daily (5).

Data from 2011 showed that among 15-year-olds 43,2% of girls and 58,1% of boys met the recommended level of PA (22). HEVAS-2005 reported that among 16-year-olds, 7% of girls and 12% of boys were physically active daily outside of school to the point where they would break a sweat, and spent a weekly average of 3-3,5 hours on PA outside of school (15).

1.3 The relationship between physical activity and dietary choices

Dietary choices and levels of PA can be regarded as health-related behaviors. Klepp and Aarø defined health-related behavior as behavior to which epidemiological or other health-related research found an association with risk for disease, death or injury, or behavior with an association to positive health and quality of life (8). Even if health-related behaviors are not independent of each other, they do not always form a distinct pattern (8). Therefore one should not make assumptions about certain types of behavior automatically correlating. For instance, by assuming that more physically active adolescents make healthier dietary choices than less active adolescents.

While Taliaferro et al. reported a positive association between sport participation and consumption of fruit and vegetables for both genders (23), Bauer et al. found a positive

[2] Moderate PA is equivalent to activity with 60-75% of maximal heart rate (21).

association between sport participation and intake of certain unhealthy foods for boys (24). Among girls in 8th grade UNGKOST-2000 found a positive association between level of PA and consumption of "5 a day" (13). They also showed that girls with higher levels of PA had lower energy consumption from fat. No such association was reported for boys, and no association was found between PA and energy intake from sugar. In relation to SSB there can be different associations depending on type of SSB. Ranjit et al. reported that while there was an inverse association between level of PA and consumption of sugary sodas (carbonated beverages), there was a positive association between level of PA and the consumption of sugary sports drinks (25).

This small selection of literature exemplifies how PA and dietary choices can show inconsistent patterns. Hence, additional research can be beneficial to create an increased understanding of a potential relationship between these health-related behaviors.

1.4 Other potentially influential factors for PA and dietary choices

Many factors can influence health-related behaviors like PA and dietary choices. Gender is for instance an important category of social differentiation, with distinct differences for many health behaviors in young people (14). Often showing a tendency of boys being more physically active and girls making healthier food choices (14, 15, 17, 26, 27).

Levels of sedentary behavior can be associated with a decline in energy expenditure (4). An association between sedentary behavior and higher consumption of energy-dense snacks and drinks, as well as lower consumption of fruit and vegetables among adolescents has also been identified (28). Sedentary behavior is often assessed by screen time (3, 28). HEVAS-2005 reported that 20% of 16-year-old boys spent four hours or more on screen time activities daily, whereas only a few percentage of the girls did the same (15).

Socioeconomic status (SES) is often considered when health-related behaviors are studied. For children and adolescents, SES can be measured by parental educational level,

income or occupational status. Higher family affluence has been found to be associated with higher levels of PA and consumption of fruit and vegetables, and lower consumption of SSB among adolescents (14). However, the association between SES and dietary behavior or PA is not consistent (7). Family can also be an important influence when it comes to communicating norms and values. Which might explain why family meals have been found to have a beneficial effect on certain dietary choices among adolescents (29). However, it is not uncommon in rural areas that adolescents have to move out of the family home due to long distances to the nearest high school. These adolescents can to a large extent become "invisible" for both parents' and the local community's social control-mechanisms, and an association between living on their own and unhealthy dietary behaviors has been found (30).

Choice of main high school program could also influence adolescents' health-related behavior. For instance time spent on PA could be affected by the curriculum and students studying nutrition could receive knowledge regarding diet which is not taught in other study programs (31). In addition adolescents rate friends as highly influential on their food choices (12) and peers at school can be an important part of adolescents' social circle.

Smoking-, snuff- and alcohol habits are also considered health-related behaviors (8). Data from recent years show that smoking among adolescents have decreased, while use of snuff has increased (32). Smoking has been related to unhealthy dietary patterns (14), and it is of interest to investigate if snuff has similar associations. Consumption of alcohol has also been linked to unhealthy health-related behavior (14, 23, 33).

Overweight is a result of long-term energy imbalance with energy intake exceeding energy expenditure (3), hence PA and dietary behaviors are important determinants for overweight (7). However, a clear relationship between certain dietary choices and overweight has not always been found (14, 26, 34, 35)

1.5 Objective of the thesis

Understanding a broad range of factors influencing adolescents' dietary choices can be important when programs promoting a healthy lifestyle are planned and carried out. An improved understanding of a potential associations between different health behaviors among adolescents could help to identify high-risk groups (27) and give an opportunity to address more than one risk factor at a time (4). The main aim of the present thesis was to explore PA and dietary choices among 15 to 17-year-olds in Troms County, furthermore to investigate if there was an association between these two health-related behaviors. The thesis also aimed to investigate whether the selected dietary choices was associated with gender and other potential confounders such as; main high school program, sedentary behavior, frequency of breakfast and dinner consumption, smoking-, snuff- and alcohol habits, having moved out of home or not, body mass index (BMI), cultural belonging, chronic disease and SES. Previous research on the topic for this region is limited. Findings could therefore provide valuable knowledge when effective health promoting measures are planned and carried out.

2 Material and methods

The Fit Futures study (FF) provided data used in this cross-sectional study. FF is a population based longitudinal study with repeated measures of various indicators on lifestyle and health among young people. FF was carried out by the Department of Community Medicine at the University of Tromsø (UiT), and is a collaboration between UiT, The Norwegian Institute of Public Health and the University Hospital of Northern Norway (UNN).

FF1 forms the baseline in this cohort. 1st grade students during 2010-2011 from the eight different high schools in Tromsø and Balsfjord were invited to participate. In 2012-2013 the same group of people, in addition to new students of 3rd grade, were invited for the repeated survey FF2. Only data from FF1 were used in this thesis.

FF is an extension of the Tromsø Study. The first Tromsø Study was conducted in 1974 and Tromsø Study 6 was performed in 2007-2008. The Tromsø Studies has collected data for research related to major public health problems, such as cardiovascular disease, diabetes mellitus, osteoporosis and fractures (36). The majority of participants in these surveys were older than 20 years of age and no cross-sectional information on those under 30 years of age after 1995 has been collected (36). The main objective of FF has been to expand data material from Tromsø 6 with a younger cohort (37).

2.1 Study population for FF1

Schools which participated in FF1 included various academic disciplines, like general studies, media and communications, vocational programs, maritime high school and elite sports high school. In 2010 there were 1301 students enrolled in 1st year of high school, of which 70 persons quit before FF1 was conducted. Furthermore 114 students were sick or not reached for other reasons, leaving 1117 students invited to participate (Guri Grimnes, personal communication, 19.03.2013). A total of 1038 students joined, forming a 93% participation rate.

2.2 Inclusion criteria

Age ranged between 15 and 28 in FF1. Adolescents following a typical Norwegian educational progress would normally be between the ages of 15-17 at 1st year of high school. In order to focus on a more homogenous group participants older than 17 years of age were excluded from the analyses. As it was preferable to use the same group of students as basis for the analyses exclusions were also made for those missing data on variables used in the main analyses.

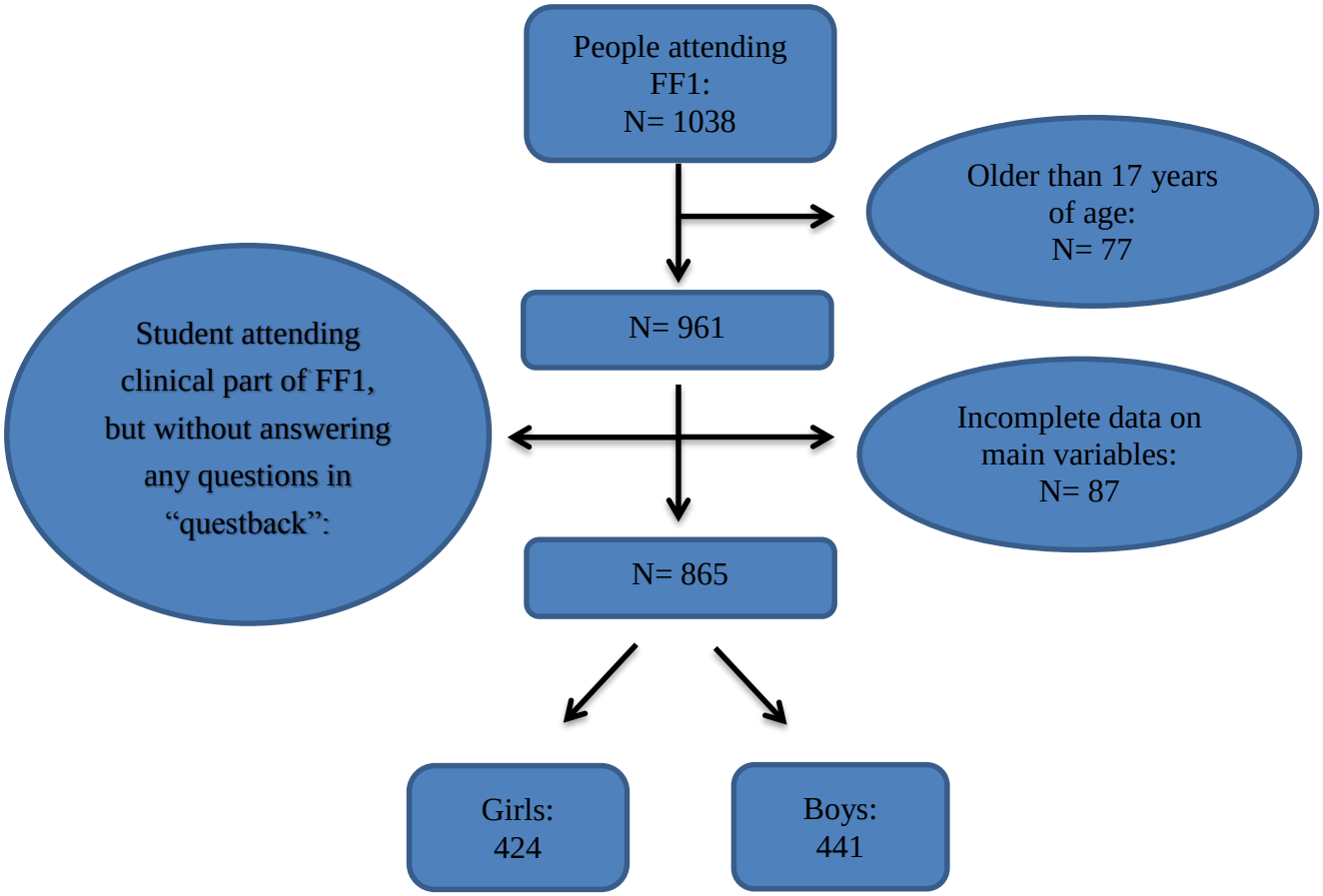

Figure 2-1 Flowchart for the thesis

2.3 Data collection

Students were given time off from school and taken to UNN's clinical research unit where anthropometrical measures were performed by trained personnel. Students were measured in light clothing and no footwear using a Jenix DS-102 stadiometer (Dong Sahn Jenix Co., Ltd.,

Seoul, Korea). Weight were registered to the nearest 100g and height were registered to the nearest 1 mm. This is in concordance with the National guidelines for weighing and measuring in the school health services (2).

A clinical interview was also conducted by trained personnel, collecting among others information regarding chronic disease. At the same visit students completed self-administered questionnaires on computers by using the data program "questback". Information regarding academic discipline was collected from school records.

Data used for this thesis are described further in chapter 3.2 and 3.3.

2.4 Ethical considerations and consents

The Norwegian Data Protection Authorities approved FF by a license extension from the Tromsø Study. FF was approved by the Regional Committees for Medical and Health Research Ethics (REK), reference nr. 2009/1282. The present thesis was also approved by REK, reference nr. 2012/1904.

All subjects in FF1 signed an informed consent for participation (appendix 10). For students under the age of 16 an additional written consent was provided by their guardians. If tests disclosed disease or issues which needed follow-up from a doctor or specialist, students and guardians were informed.

A copy of the information leaflet given to students describing the study is provided in appendix (appendix 9).

3 Data analyses

Descriptive and analytical analyses were carried out using the statistical program IBM SPSS, version 20. Two-sided p-values<0,05 were considered statistically significant for all conducted analyses.

As variables included in the analyses were categorical, unadjusted analyses were performed using contingency tables with chi-square test. This test compares frequencies of cases observed in each category to the value that would be expected if no association between the two measured variables existed (38). Adjusted analyses were performed using logistic regression. When multiple variables are included in a logistic regression model the analysis adjusts for the effect on the outcome caused by other included variables and therefore provides a measure for each variables separate impact on the outcome (38). The adjusted logistic regression model was constructed by including independent variables which showed a significant association with any of the selected food choices in the unadjusted analyses. However, certain exceptions were made, which are described in chapter 4.1. In the adjusted analyses the same model for all selected food choices was used in order to compare results across outcomes. Reference categories were selected after controlling distributions from the contingency tables, choosing the most populated category as reference. If this differed across outcomes, the most populated category for the majority of outcomes was chosen as reference. A "forced entry method" was considered appropriate as there was no specific hypothesis regarding order or importance of included predictor variables (38).

Main analyses were stratified by gender. However, differences related to gender within variables were tested in unadjusted analyses by chi-square tests. For independent variables with more than two categories showing gender difference by chi-square tests, subgroup gender differences were tested using Bonferroni's adjusted p-value. Additional logistic analyses were

also performed including gender as an independent variable to identify the impact on the outcome caused by this variable.

When an individual predictor in a model is tested it is recommended to have a minimum sample size of 104 + number of predictors (39). The significance of each predictor in the model was judged by 95% confidence intervals (CI). To test the overall fit of a regression model it is recommended to have a minimum sample size of 50 + 8x number of predictors and (39). Overall fit of the regression models was evaluated by a goodness-of-fit test where chi-square tests and accompanying p-values were assessed. A significant p-value indicated that the model was able to distinguish between students who belonged in either of the two categories for the outcome variable. In order to evaluate level of variance in the outcome which the model explained, Cox & Snell and Nagelkerke R square were assessed. Due to the manner Cox & Snell R square is calculated it cannot reach a theoretical maximum of one, which would indicate that the model perfectly predicts the outcome (39). Nagelkerke therefore suggested an adjustment of this measure (39), and Nagelkerke R square always gives a higher value than Cox & Snell. Hence, both values are reported in this thesis.

With a population of 424 girls and 441 boys, sample size requirements for individual predictors' significance and overall model fit were met.

3.1 Assumptions of the data analyses

In order to use chi-square tests for contingency tables the expected frequencies in each cell should not be less than five for a 2x2 table, while expected frequencies in larger tables should be greater than one and no more than 20% less than five (38, 39). This assumptions was met. Adequate expect frequencies is also essential when using the goodness-of-fit test in logistic regression (39). The assumption of no multicollinearity should also be met for logistic regression to be a suitable method for testing hypotheses. Multicollinearity exists when there is a strong correlation between two or more independent variables in a regression model. It poses

a problem since it for instance could make it difficult to assess the individual importance each predictor (39). The assumption of multicollinearity was checked by running a linear regression including the same variables as in the adjusted logistic regression and then evaluating the variance inflation factor (VIF). None of the variables showed a VIF higher than 10, indicating no problem of multicollinearity between the variables in the model.

3.2 Dependent variables for the main analyses

A copy of questions from FF1's questionnaire used for making the dependent and independent variables is provided in the appendix 8.

Concerning dietary habits FF1 asked about frequencies of breakfast, dinner and bringing lunch from home, as well as consumption frequency of 14 different foods/food-groups and 10 different beverages. For the purpose of this thesis information regarding foods perceived relevant for the Directorate of Health's recommendations of "5 a day", "fish at least twice per week", "intake of energy-dense foods" and "intake of added sugar" were extracted. For these variables FF1 gave the response alternatives "seldom/never", "1-3 times per month", "1-3 times per week" or "4-6 times per week". For fish and various energy-dense foods, the option "every day" was also given, while vegetables and fruits included the alternatives "1-2 times per day", "3-4 times per day" or "5 times per day". Questions regarding beverages gave the options "seldom/never", "1-6 glasses per week", "1 glass per day", "2-3 glasses per day" or "4 glasses or more per day".

Several questions were incorporated into each of the four dependent variables. Mean values for every response alternative were used when summing up average intake for foods included in these outcomes. This average made the basis for constructing binary outcomes. Furthermore, the following procedures were used for constructing these dependent variables:

- “Fish twice a week”: This variable included two separate questions regarding intake of fatty fish and lean fish. Based on the recommendation of eating fish at least twice per week, cut-off was set to having an average consumption of twice per week or more.

- “5 a day”: The questionnaire contained separate questions regarding intake of fruit, vegetables and pure fruit juice. Following the recommendations, consumption of fruit juice was included and a maximum of one glass per day incorporated as one daily serving (5). Cut-off for this variable was set to a minimum daily average consumption of five fruits and/or vegetables including one glass of fruit juice.

- Energy-dense foods: Recommendations concerning energy-dense foods were operationalized by including questions on “usual intake of pizza, hamburgers or hot-dogs”, “usual intake of sweets (i.e. chocolate, candy)” and “usual intake of snacks (i.e. chips, biscuits, cakes, buns)” and labeled “unhealthy foods”. This variable differentiated between those who consumed “unhealthy foods daily” or not.

- Intake of added sugar: Based on questions regarding “usual intake of sugary soft drinks” (brus) and “usual intake of juice with sugar” (saft) a binary variable was constructed, distinguishing between those who consumed “SSB daily” or not.

3.3 Independent variables

- PA: Based on the question “approximately how many hours per week do you spend in total on sports/ PA outside of school hours?” the binary variable “60 min PA daily” was created, differentiating between students who were physically active for 60 min outside of school hours daily and those who were not. Those who answered “no” to the question “are you active with sports or other PA (for instance skateboard, soccer, dance, running) outside of school hours?” did not receive this question, however, for the analyses they were included as not achieving “60 min PA daily”.

The main logistic regression model adjusted for several potential confounders:

- Main high school program: The dataset provided by FF1 had classified main high school program as “general studies”, “sports and physical education” (“sports”) and “vocational program”. These classifications were kept in the analyses.

- Screen time: Students were asked about average time spent watching PC, TV, DVD or similar outside of school hours, differentiating between school days and non-school days. Answers were given with intervals of “none”, “about 30 min”, “about 1 hour-1hour 30 min”, “about 2-3 hours”, “about 4-6 hours”, “about 7-9 hours” or “10 hours or more”. Mean values of each interval were used when one single variable of daily average screen time outside of school hours was constructed. School days and non-school days were weighted differently when mean daily use was calculated, 5/7 and 2/7 respectively. The variable was split into categories of “up to 2 hours”, “between 2-4 hours” and “4 hours or more”.

- Dinner/breakfast: Students were asked how often they ate dinner and breakfast, with options of “every day”, “4-6 times per week”, “1-3 times per week” or “rarely or never”. For both variables the category “never or rarely” contained few individuals, the category “3 times per week or less” was therefore created.

- Smoking/snuff: Students were asked about smoking and snuff habits, with response alternatives “no, never”, “sometimes” or “daily”. Due to few responders in the category of daily smokers, this category was collapsed with “sometimes”.

- Alcohol consumption: Students were asked how often they drank alcohol, with options of “never”, “once per month or less”, “2-4 times per month”, “2-3 times per week” or “4 times or more per week”. The categories with highest frequency of consumptions had few responders and were collapsed into the category “2 times per month or more”.

- Moving out of family home: FF1 asked who students lived with (some form of guardian, friends or alone), followed with “if you live alone, in an institution or with friends, when did you move out of home?” Based on these questions a variable differentiating between those who

had “moved out of home” or not was made. Seven students answered that they lived both with parents and had moved out of home. A possible reason for students reporting both living conditions could be due to commuting, living by themselves during the school week and with guardian/-s in weekends/holidays. If this was the case they would spend most of their time away from their guardian/-s and they were therefore included in the group that had moved out of home. Two students answered living in an institution and having moved out of home. They were included in the group “living at home”, as it is likely that an institution would have some form of adult in charge of the food environment at the institution.

- BMI: BMI was calculated as weight in kg divided by the square of height in meters (kg/m2) and Cole and Lobstein’s revised cut-offs (40) were used for classification of categories. Due to few students in the categories “underweight” and “obese” these groups were merged with the categories of “normal weight” and “overweight” respectively.

- Cultural belonging: Students were asked whether they considered themselves Norwegian, Sami, Kven/Finnish or other. Based on this the binary variable “cultural belonging” was constructed, differentiating between “Norwegian” and “others”.

- Chronic disease: During the clinical interview students were asked if they had any chronic disease (one or several). Answers were very heterogeneous, a variable differentiating only between those having a diagnosis of chronic disease or not was therefore created.

- SES: Students were asked about parents’ educational level. The categories of “primary school” and “high school” were collapsed into one due to few responders in each category. Furthermore, this variable differentiated between higher education with categories of less or more than four years. The category of “do not know” was collapsed with “missing” and excluded from the logistic regression analyses.

4 Findings

4.1 Baseline characteristics

Baseline characteristics of variables used in the main analyses is presented in table 4.1 (including age), characteristic concerning variables excluded from main analyses are provided in appendix 1.

The population in this thesis consists of 865 students between 15 and 17 years of age, with the majority being 16 (girls 82,3%, boys 79,6%). Students were from eight different schools in the municipalities of Tromsø and Balsfjord. Distribution across main study programs displayed gender differences in choice of study program ($p<0,01$). While most girls were in general programs (53,3%), most boys had chosen vocational studies (55,1%). More boys than girls had chosen sports as main program (14,1% and 8,3% respectively). Most students lived with their parents/guardian (girls 86,1% and boys 87,3%).

It was evident that prevalence of overweight/obesity was high, 18,9% of girls and 23,4% of boys. The adolescents spent much time watching PC, TV, DVD or similar and there was a significant overall difference between girls and boys ($p<0,01$). Over the whole week 35,4% of girls and 47,6% of boys spent an average of four hours or more daily, outside of school hours, on screen time activities.

Besides the dietary choices used as outcomes in the analyses, frequency of eating dinner and breakfast was used for adjustment. No significant difference between patterns of eating breakfast between genders was detected and about 50% ate breakfast every day. However, there was a significant difference between frequency of eating dinner between genders ($p<0,01$), 59% of girls and 73,2% of boys ate dinner daily.

While 80,7% of girls and 76,4% of boys never smoked, 67,7% of girls and 59,9% of boys never used snuff. The overall difference between genders in regards to use of snuff was significant ($p<0,01$). Concerning alcohol most students reported drinking once per month or

less (girls 47,2% and boys 37,4%). The share of students that reported never drinking alcohol was quite low (girls 23,3% and 32,4%). The overall difference in consumption of alcohol between genders was significant (p<0,01), although there was no statistical difference between genders in the group with highest consumption.

Table 4-1 Characteristics of the study participants

		Girls (n:424)	**Boys** (n:441)
Age *	15 years[#]	2,8	6,6
	16 years	82,3	79,6
	17 years	14,9	13,8
60 min PA daily **	No[#]	86,1	78,9
	Yes[#]	13,9	21,1
Main high school program**	Vocational [#]	38,4	55,1
	General [#]	53,3	30,8
	Sports [#]	8,3	14,1
Screen time**	Up to 2 hours[#]	25,7	14,1
	Between 2-4 hours	38,9	38,3
	4 hours or more[#]	35,4	47,6
Breakfast	Every day	50,5	52,4
	4-6 times per week	20,0	20,4
	3 times per week or less	29,5	27,2
Dinner**	Every day[#]	59,0	73,2
	4-6 times per week[#]	27,6	19,5
	3 times per week or less[#]	13,4	7,3
Smoking status	No, never	80,7	76,4
	Sometimes/daily	19,3	23,6
Use of snuff**	No, never[#]	67,7	59,9
	Sometimes	13,9	12,5
	Daily[#]	18,4	27,7
Alcohol consumption**	Never[#]	23,3	32,4
	Once per month or less[#]	47,2	37,4
	2 times per month or more	29,5	30,2
Moved out of home	No	86,1	87,3
	Yes	13,9	12,7
BMI	Underweight/normal	81,1	76,6
	Overweight/obese	18,9	23,4

Prevalence is given in percentages. Differences between genders were significant at * p<0,05 or ** p<0,01 (chi-square test). For variables with more than three categories that proved an overall significant difference between genders, Bonferronies test was used to test gender difference within each subgroup. # indicate statistical difference between gender at p<0,05 level.

Regarding chronic disease 24,3% of girls and 19,5% of boys had one or several diagnosis. When running a chi-square test differentiating only between "having or not having" a chronic disease it proved significant (p=0,046) for boys in relation to PA (table not provided). As it was a very heterogeneous variable and did not prove significant to any of the outcomes of interest, it was not included in the main logistic regression analyses.

Between 20-30% of students did not know their parents' educational level, hence they would be classified as missing in analyses including SES. In order not to lose a large number of students from the population and create loss of power in the analyses, these variables were excluded from the main logistic regression. However, a chi-square test (table not provided) showed a significant association between mother's educational level and "fish twice per week" and "5 a day" for girls, while father's educational level was significant in relation to "fish twice per week" for boys and "5 a day" for girls". An unadjusted logistic regression (appendix 7) showed that students of parents with higher levels of education had higher odds of consuming fish twice per week and eating "5 a day".

Few students regarded themselves as not being Norwegian (girls 2,4% and boys 4,5%). Even if ethnicity could influence dietary choices and/or PA level, it was not included in further analyses since few individuals in the category of "others" would create problems of adequate cell counts, as well as potential problems of anonymity.

4.1.1 Physical activity

There was a significant difference in PA between genders (p<0,01). While 13,9% of girls and 21,1% of boys were psychically active 60 min daily outside of school hours (table 4-1), 30,4% of girls and 33,3% of boys spent no time on PA outside of school (appendix 6).

Further analyses indicated that PA differed across study programs (table 4.2). An unadjusted logistic regression showed a borderline significant difference between vocational and general studies for boys (OR 1,86 95% CI 1,00-3,44), while for girls the difference was

significant (OR 3,81 95% CI 1,64-8,85). Among those studying sports, both genders were about 26 times more likely to be physically active 60 min daily outside of school hours compared to students in vocational programs. In this analysis CI did not cross, indicating a significant difference in "60 min PA daily" between students in general and sport programs.

Table 4-2 Association between "60 min PA daily" and main high school study program

	Girls (n: 424)			**Boys** (n: 441)		
	"60 min PA daily" % (n)	OR	95% CI	**"60 min PA daily"** % (n)	OR	95% CI
Vocational	4,3 (7)	1, 0		9,9 (24)	1, 0	
General	14,6 (33)	3,81	1,64-8,85	16,9 (23)	1,86	1,00-3,44
Sport	54,3 (19)	26,46	9,66-72,50	74,2 (46)	26,23	12,92-53,53

4.1.2 Dietary choices

Of those who reported eating "5 a day" 14,9% were girls and 9,3% boys, while 41,7% of girls and 42,2% of boys ate fish at least twice per week. Daily consumption of unhealthy foods were reported by 18,6% of girls and 20,9% of boys, in addition 61% of boys and 32,3% of girls reported drinking SSB daily. There was a statistically significant difference in "SSB daily" ($p<0,01$) and "5 a day" ($p=0,01$) between genders. Specifics are provided in figure 4.1, while details of consumption within each category are given in appendix 2-4.

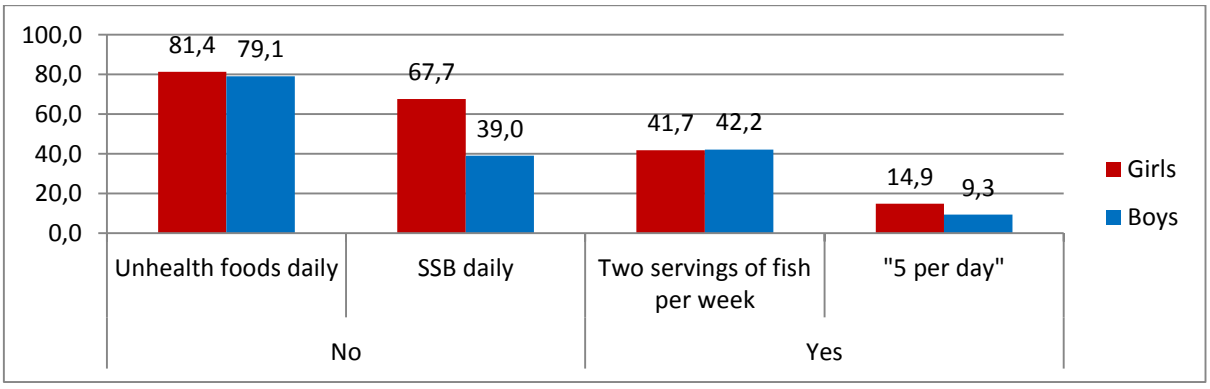

Figure 4-1 Compliance with dietary advice (%), by gender

4.2 Main analyses

The unadjusted and adjusted analyses showed that there were differences between the dietary choices and how they correlated with “60 min PA daily” and potential confounders. The following subchapters describe findings separately for each outcome.

4.2.1 Fish twice per week

The unadjusted analysis showed a significant association for boys between “60 min PA daily” and “fish twice per week”. However, the adjusted model showed no significant relationship. The unadjusted analysis also showed a significant association between eating fish at least twice per week and “main high school program”, “screen time”, “dinner”, “smoking status”, and “moved out of home” for both genders, in addition to “use of snuff” for girls and “breakfast” for boys.

The adjusted model showed an inverse association between “screen time” and odds of eating fish at least twice per week. Both girls and boys who spent less than two hours on screen time activities were more than twice as likely to eat fish at least twice per week compared to those who spent four hours or more. For boys “smoking” and “moved out of home” also showed an inverse association with “fish twice per week”. Boys who ate breakfast three times per week or less were also less likely to eat fish at least twice per week compared to those who ate breakfast daily. This was also the case for girls who ate dinner three times per week or less compared to those who ate dinner daily. Girls in general studies were more likely to eat fish at least twice per week compared to those in vocational programs.

The adjusted model was statistically significant and explained 12,6% (Cox & Snell R square) and 17% (Nagelkerke R square) of the variation in “fish twice per week” for girls and between 13,9% (Cox & Snell R square) and 18,7% (Nagelkerke R Square) for boys.

4.2.2 “5 a day”

For both genders there was a significant association between “60 min PA daily” and “5 a day” in the adjusted and unadjusted analyses. According to the adjusted model those in the most physically active group were three times more likely to eat “5 a day” compared to those in the less active group.

For girls all variables included in the unadjusted analyses were significant except “BMI” and “alcohol consumption”, while for boys “screen time”, “breakfast”, “smoking status” and “alcohol consumption” were significant. The adjusted model showed an inverse association between screen time and odds for eating “5 a day”. For girls odds of eating “5 a day” were three times higher among those who spent less than two hours on screen time compared to those who spent four hours or more, for boys the odds were more than five times higher. Girls who ate dinner 4-6 times per week were 0,32 times as likely to eat “5 a day” compared to those who ate dinner daily. And boys who ate breakfast three times per week or less were 0,23 times as likely to eat “5 a day” compared to those who ate breakfast daily. Girls who drank alcohol twice per month or more had higher chance of eating “5 a day”, compared to those who drank once per month or less. The adjusted model explained between 14,5% (Cox & Snell R square) and 25,4% (Nagelkerke R Square) of the variation in “5 a day” for girls and between 11,4% (Cox & Snell R square) and 24,7% (Nagelkerke R Square) for boys.

As a chi-square test showed a significant difference in “5 a day” between genders additional analyses were performed including gender as an adjustment variable in the logistic model (data not included in tables). These analyses showed that girls had almost twice the odds of meeting the recommendations compared to boys (OR 1,93 95% CI 1,19-3,16. Cox & Snell R 0,11 - Nagelkerke R Square 0,21).

Table 4-3 Predictors for eating "fish twice per week", unadjusted and adjusted gender specific analyses

		Girls (n: 424)				**Boys** (n:441)			
		Unadjusted		Adjusted		Unadjusted		Adjusted	
		Yes (n:177)		OR	95% CI	Yes (n: 186)		OR	95% CI
Variable		% (N)	p-value			% (N)	p- value		
60 min PA daily	No	40,3 (147)	0,13	1		38,8 (135)	0,01	1	
	Yes	50,8 (30)		1,56	0,80-3,03	54,8 (51)		1,13	0,62-2,05
Main high school program	Vocational program	31,9 (52)	<0,001	1		35,4 (86)	0,003	1	
	General studies	51,3 (116)		1,73	1,08-2,75	47,8 (65)		1,28	0,80-2,07
	Sports	25,7 (9)		0,47	0,18-1,22	56,5 (35)		1,67	0,80-3,49
Screen time	4 hours or more	34,0 (51)	0,04	1		33,3 (70)	0,001	1	
	Between 2-4 hours	44,2 (73)		1,50	0,91-2,48	47,9 (81)		1,79	1,13-2,83
	Up to 2 hours	48,6 (53)		2,02	1,15-3,58	56,5 (35)		2,81	1,47-5,38
Breakfast	Every day	46,7 (100)	0,08	1		51,5 (119)	<0,001	1	
	4-6 times per week	40,0 (34)		0,88	0,50-1,55	38,9 (35)		0,73	0,43-1,26
	3 times per week or less	34,4 (43)		0,98	0,57-1,68	26,7 (32)		0,51	0,30-0,87
Dinner	Every day	49,2 (123)	<0,001	1		47,1 (152)	0,002	1	
	4-6 times per week	38,5 (45)		0,75	0,46-1,22	31,4 (27)		0,69	0,39-1,20
	3 times per week or less	15,8 (9)		0,24	0,11-0,55	21,9 (7)		0,64	0,24-1,70
Smoking status	No, never	45,0 (154)	0,01	1		47,8 (161)	<0,001	1	
	Sometimes/daily	28,0 (23)		0,86	0,45-1,65	24,0 (25)		0,37	0,20-0,71
Use of snuff	No, never	48,1 (138)	0,001	1		45,8 (121)	0,14	1	
	Sometimes	30,5 (18)		0,55	0,28-1,08	40,0 (22)		1,16	0,57-2,35
	Daily	26,9 (21)		0,58	0,30-1,12	35,2 (43)		1,50	0,81-2,79
Alcohol consumption	Once per month or less	39,2 (78)	0,1	1		38,2 (63)	0,06	1	
	2 times per month or more	38,4 (48)		1,39	0,82-2,37	38,3 (51)		1,27	0,74-2,18
	Never	51,0 (51)		1,07	0,63-1,84	50,3 (72)		1,12	0,66-1,89
Moved out of home	No	43,8 (160)	0,03	1		45,5 (175)	<0,001	1	
	Yes	28,8 (17)		0,79	0,41-1,53	19,6 (11)		0,28	0,13-0,61
BMI	Underweight/normal	41,0 (141)	0,51	1		42,6 (144)	0,74	1	
	Overweight/obese	45,0 (36)		1,39	0,81-2,39	40,8 (42)		1,28	0,77-2,13

Distribution between "yes" and "no" responders to "fish twice per week" within each independent variable is presented with percentages and number of subjects. The "no" column is excluded from the table as figures can be calculated from the displayed information. P-value shows significance for difference between the categories (unadjusted analyses). The two last columns within each gender contain adjusted OR with 95% CI based on logistic regression.

Table 4-4 Predictors for eating "5 a day" unadjusted and adjusted gender specific analyses

		Girls (n: 424)				**Boys** (n:441)			
		Unadjusted		Adjusted		Unadjusted		Adjusted	
		Yes (n: 63)				Yes (n: 41)			
Variable		% (N)	P-value	OR	95% CI	% (N)	P-value	OR	95% CI
60 min PA daily	No	11,5 (42)	<0,001	1		6,3 (22)	<0,001	1	
	Yes	35,6 (21)		3,18	1,49-6,79	20,4 (19)		3,67	1,54-8,73
Main high school program	Vocational program	9,2 (15)	0,002	1		7,4 (18)	0,29	1	
	General studies	16,4 (37)		1,04	0,51-2,15	11,0 (15)		1,51	0,66-3,45
	Sports	31,4 (11)		1,94	0,64-5,90	12,9 (8)		0,51	0,16-1,64
Screen time	4 hours or more	7,3 (11)	0,002	1		6,2 (13)	<0,001	1	
	Between 2-4 hours	16,4 (27)		2,14	0,94-4,89	7,1 (12)		0,9	0,38-2,18
	Up to 2 hours	22,9 (25)		3,02	1,29-7,05	25,8 (16)		5,11	2,04-12,83
Breakfast	Every day	20,6 (44)	0,003	1		14,3 (33)	0,001	1	
	4-6 times per week	11,8 (10)		0,84	0,36-1,93	4,4 (4)		0,35	0,11-1,09
	3 times per week or less	7,2 (9)		0,81	0,33-2,01	3,3 (4)		0,23	0,07-0,81
Dinner	Every day	21,2 (53)	<0,001	1		10,8 (35)	0,18	1	
	4-6 times per week	6,8 (8)		0,32	0,14-0,76	4,7 (4)		0,86	0,27-2,74
	3 times per week or less	3,5 (2)		0,22	0,05-1,02	6,2 (2)		1,63	0,31-8,61
Smoking status	No, never	17,3 (59)	0,01	1		11,0 (37)	0,03	1	
	Sometimes/daily	4,9 (4)		0,43	0,12-1,51	3,8 (4)		0,4	0,11-1,49
Use of snuff	No, never	18,5 (53)	0,01	1		11,0 (29)	0,33	1	
	Sometimes	10,2 (6)		0,55	0,19-1,58	7,3 (4)		0,79	0,21-2,94
	Daily	5,1 (4)		0,32	0,10-1,07	6,6 (8)		2,26	0,73-7,01
Alcohol consumption	Once per month or less	12,1 (24)	0,12	1		8,5 (14)	0,04	1	
	2 times per month or more	14,4 (18)		2,53	1,14-5,64	5,3 (7)		0,61	0,21-1,76
	Never	21,0 (21)		1,18	0,57-2,43	14,0 (20)		1,39	0,56-3,43
Moved out of home	No	16,4 (60)	0,02	1		10,1 (39)	0,12	1	
	Yes	5,1 (3)		0,34	0,09-1,25	3,6 (2)		0,32	0,06-1,59
BMI	Underweight/normal	14,8 (51)	0,97	1		8,6 (29)	0,35	1	
	Overweight/obese	15,0 (12)		1,44	0,66-3,11	11,7 (12)		2,32	0,98-5,51

Distribution between "yes" and "no" responders to "5 a day" within each independent variable is presented with percentages and number of subjects. The "no" column is excluded from the table as figures can be calculated with the displayed information. P-value shows significance for difference between the categories (unadjusted analyses). The two last columns within each gender contain adjusted OR with 95% CI based on logistic regression.

4.2.3 Unhealthy foods daily

"60 min PA daily" was not associated with "unhealthy foods daily" in the unadjusted or adjusted model. For both genders the unadjusted analyses for "breakfast" and "smoking status" proved significantly associated to the outcome. This was also the case regarding "dinner" and "alcohol consumptions" for girls. In the adjusted model only "breakfast" was significant, showing that for both genders those who ate breakfast three times per week or less, had more than twice the odds of eating unhealthy foods daily compared to daily breakfast eaters. "BMI" was significant for boys in the unadjusted analysis, in the adjusted analyses it could be considered borderline significant with an OR 0,53 95% CI 0,27-1,03.

The adjusted model was significant and explained between 7,5% (Cox & Snell R square) and 12,1% (Nagelkerke R square) of the variation in "unhealthy foods daily" for girls, while for boys it explained between 6,6% (Cox & Snell R square) and 10,3% (Nagelkerke R Square).

4.2.4 SSB

"60 min PA daily" was not significantly associated with "SSB daily" in the unadjusted or adjusted analyses. In the unadjusted analyses "main high school program", "breakfast", "smoking status" and "use of snuff" showed a significant association with the outcome for both genders. "Screen time" was also significant for girls, in addition to "alcohol consumption" for boys.

The adjusted model showed that students in general studies were about half as likely to drink SSB daily compared to those in vocational programs. This was also the case for girls with the lowest level of screen time compared to those with the highest level and for boys with the highest consumption of alcohol compared to those who drank once per month or less. Those who ate breakfast three times per week or less had higher odds of drinking SSB daily compared to those who ate breakfast daily (borderline significant for boys). Use of snuff was also

positively associated with drinking SSB daily. BMI was not significant in the unadjusted analysis, but turned out borderline significant in the adjusted analysis for girls (OR 0,3-1,0).

The adjusted model was significant and explained between 16,7% (Cox & Snell R square) and 23,3% (Nagelkerke R square) of the variation in "SSB daily" for girls and between 8,7% (Cox & Snell R square) and 11,7% for boys (Nagelkerke R square).

As a chi-square test showed a significant difference in "SSB daily" between genders additional analyses were performed including gender as an adjustment variable in the logistic model (data not included in tables). This analyses showed that girls had 0,34 times the odds of drinking SSB daily (95% CI 0,25-0,47. Cox & Snell R 0,18 - Nagelkerke R Square 0,25).

Table 4-5 Predictors for eating "unhealthy foods daily", unadjusted and adjusted gender specific analyses

		Girls (n: 424)				**Boys** (n:441)			
		Unadjusted		Adjusted		Unadjusted		Adjusted	
		Yes (n: 79)				Yes (n: 92)			
Variable		% (N)	P-value	OR	95% CI	% (N)	P-value	OR	95% CI
60 min PA daily	No	19,7 (72)	0,15	1		21,0 (73)	0,91	1	
	Yes	11,9 (7)		0,84	0,33-2,13	20,4 (19)		0,86	0,4-1,84
Main high school program	Vocational program	21,5 (35)	0,2	1		21,4 (52)	0,23	1	
	General studies	18,1 (41)		1,14	0,65-2	16,9 (23)		0,79	0,44-1,44
	Sports	8,6 (3)		0,58	0,15-2,3	27,4 (17)		2,04	0,86-4,8
Screen time	4 hours or more	24,0 (36)	0,09	1		20,5 (43)	0,08	1	
	Between 2-4 hours	17,0 (28)		0,78	0,43-1,42	24,9 (42)		1,38	0,82-2,3
	Up to 2 hours	13,8 (15)		0,62	0,3-1,26	11,3 (7)		0,55	0,22-1,34
Breakfast	Every day	11,2 (24)	<0,001	1		16,0 (37)	0,02	1	
	4-6 times per week	18,8 (16)		1,56	0,75-3,23	22,2 (20)		1,4	0,73-2,70
	3 times per week or less	31,2 (39)		2,58	1,36-4,88	29,2 (35)		2,12	1,17-3,85
Dinner	Every day	14,4 (36)	0,01	1		19,5 (63)	0,51	1	
	4-6 times per week	21,4 (25)		1,25	0,68-2,31	24,4 (21)		1,02	0,55-1,88
	3 times per week or less	31,6 (18)		1,84	0,85-4,01	25,0 (8)		0,81	0,31-2,11
Smoking status	No, never	16,4 (56)	0,02	1		18,4 (62)	0,02	1	
	Sometimes/daily	28,0 (23)		1,13	0,57-2,25	28,8 (30)		1,57	0,81-3,07
Use of snuff	No, never	16,0 (46)	0,12	1		18,6 (49)	0,08	1	
	Sometimes	22,0 (13)		1,32	0,61-2,88	16,4 (9)		0,63	0,26-1,54
	Daily	25,6 (20)		1,15	0,55-2,4	27,9 (34)		1,06	0,54-2,09
Alcohol consumption	Once per month or less	17,1 (34)	0,04	1		20,0 (33)	0,08	1	
	2 times per month or more	25,6 (32)		1,28	0,7-2,24	27,1 (36)		1,28	0,71-2,3
	Never	13,0 (13)		0,96	0,54-2,03	16,1 (23)		0,8	0,41-1,55
Moved out of home	No	17,5 (64)	0,15	1		20,8 (80)	0,99	1	
	Yes	25,4 (15)		1,37	0,66-2,81	21,4 (12)		0,76	0,35-1,63
BMI	Underweight/normal	19,8 (68)	0,21	1		23,1 (78)	0,04	1	
	Overweight/obese	13,8 (11)		0,54	0,26-1,12	13,6 (14)		0,53	0,27-1,03

Distribution between "yes" and "no" responders to "unhealthy foods daily" within each independent variable is presented with percentages and number of subjects. The "no" column is excluded from the table as figures can be calculated with the displayed information. P-value shows significance for difference between the categories (unadjusted analyses). The two last columns within each gender contain adjusted OR with 95% CI based on logistic regression.

Table 4-6 Predictors for drinking "SSB daily", unadjusted and adjusted gender specific analyses

		Girls (n: 424)				**Boys** (n:441)			
		Unadjusted		Adjusted		Unadjusted		Adjusted	
		Yes (n: 137)				Yes (n: 269)			
Variable		% (N)	p-value	OR	95% CI	% (N)	p- value	OR	95% CI
60 min PA daily	No	34,0 (124)	0,07	1		61,8 (215)	0,51	1	
	Yes	22,0 (13)		1,03	0,47-2,23	58,1 (54)		1,41	0,78-2,56
Main high school program	Vocational program	46,6 (76)	<0,001	1		68,7 (167)	0,001	1	
	General studies	23,9 (54)		0,49	0,3-0,79	50,7 (69)		0,51	0,32-0,81
	Sports	20,0 (7)		0,46	0,16-1,31	53,2 (33)		0,55	0,27-1,14
Screen time	4 hours or more	42,0 (63)	0,003	1		64,8 (136)	0,27	1	
	Between 2-4 hours	29,7 (49)		0,83	0,49-1,39	58,6 (99)		0,87	0,55-1,37
	Up to 2 hours	22,9 (25)		0,47	0,25-0,88	54,8 (34)		0,69	0,37-1,28
Breakfast	Every day	22,9 (49)	<0,001	1		53,7 (124)	0,004	1	
	4-6 times per week	30,6 (26)		1,32	0,71-2,46	66,7 (60)		1,55	0,9-2,66
	3 times per week or less	49,7 (62)		2,36	1,35-4,14	70,8 (85)		1,68	0,99-2,84
Dinner	Every day	29,2 (73)	0,1	1		59,1 (191)	0,41	1	
	4-6 times per week	33,3 (39)		0,82	0,48-1,42	66,3 (57)		1,03	0,6-1,78
	3 times per week or less	43,9 (25)		2,36	0,55-2,4	65,6 (21)		0,79	0,34-1,87
Smoking status	No, never	26,9 (92)	<0,001	1		57,3 (193)	0,004	1	
	Sometimes/daily	54,9 (45)		1,73	0,92-3,22	73,1 (76)		1,38	0,74-2,56
Use of snuff	No, never	23,7 (68)	<0,001	1		54,5 (144)	0,001	1	
	Sometimes	39,0 (23)		2,17	1,08-2,36	61,8 (34)		1,08	0,54-2,18
	Daily	59,0 (46)		3,52	1,85-6,72	74,6 (91)		1,92	1,04-3,55
Alcohol consumption	Once per month or less	29,1 (58)	0,09	1		67,9 (112)	0,01	1	
	2 times per month or more	40,0 (50)		0,84	0,48-1,46	62,4 (83)		0,55	0,32-0,93
	Never	29,0 (29)		1,65	0,89-3,04	51,7 (74)		0,64	0,38-1,09
Moved out of home	No	32,9 (120)	0,54	1		61,0 (235)	0,96	1	
	Yes	28,8 (17)		0,71	0,35-1,42	60,7 (34)		0,75	0,39-1,45
BMI	Underweight/normal	33,4 (115)	0,31	1		61,5 (208)	0,67	1	
	Overweight/obese	27,5 (22)		0,55	0,30-1,0	59,2 (61)		0,66	0,40-1,10

Distribution between "yes" and "no" within each independent variable is presented with percentages and number of subjects. The "no" column is excluded from the table as figures can be calculated with the displayed information. P-value shows significance for difference between the categories (unadjusted analyses). The two last columns within each gender contain adjusted OR with 95% CI based on logistic regression.

5 Discussion

This master thesis is a cross-sectional study. The design is appropriate for describing prevalence of given risk factors and outcomes in a defined population, in addition to generating and testing hypothesis about an association (41). As exposure and outcome is measured at the same point in time, it cannot be used to define causality (41). Positive and negative aspects of the design should be taken into account when findings are considered. A brief summary of findings will therefore be followed by arguments related to methodology. Findings are thereafter discussed in relation to previous research. Main points regarding methodology and findings in relation to previous research will be summarized in the conclusion.

5.1 Summary of findings

Main analyses found that less than half of students included in this study ate fish at least twice per week and even fewer students ate "5 a day". Approximately one in five reported daily intakes of unhealthy foods and 61% of boys and 32% of girls drank SSB daily. Significantly more boys than girls were physically active besides school hours, 14% of girls and 21% of boys. Logistic regression analyses showed that "60 min PA daily" was a significant predictor only for "5 a day", with an OR of 3,18 (95% CI 1,49-6,79) for girls and 3,67 (95% CI 1,54-8,73) for boys.

There were no consistent findings in the adjusted analyses of associations between the other predictors across the selected food choices. However, some patterns might be deduced. There seemed to be indications of less screen time and more frequent breakfast consumption being associated with healthier food choices. Dinner consumption only showed a positive association for girls related to "fish twice per week" and "5 a day". No consistent pattern was evident for smoking, snuff and alcohol, although use of snuff was associated with daily consumption of SSB for both genders. Boys who had moved out of home ate fish less frequent, otherwise living arrangement was not associated with healthier or less healthy dietary choices.

BMI was not significant in relation to any of the food choices (borderline in relation to "SSB daily" for girls and for "unhealthy foods daily" for boys). Compared to students in vocational programs those in general studies had elements of healthier food choices, while no difference was evident between those in vocational programs and sport studies.

5.2 Discussion of Methodology

The validity of a study can be assessed through its internal and external validity (42):

- Internal validity can be viewed as to which extent the study reflects the true situation in the study sample without being a result of bias, chance or confounding. The internal validity of this study will be discussed through the use of self-reported data, how the variables were constructed and the statistical methods used.

- External validity refers to the generalizability from the study population to a more universal population. This can for instance be assessed by evaluating the study's population selection process. Internal validity is also a prerequisite for external validity.

5.2.1 The use of self-reported data

Most of the data used for this thesis were collected from self-administered questionnaires filled out by students through questback. Self-reported data is not an objective measure, and precision of the information is influenced by subjects ability to accurately recall all relevant information retrospectively (43). This could cause concern of reporting bias. Social pressure could also introduce risk of bias by reporting of behaviors considered desirable. As adolescents can be considered an age where social belonging and acceptance are important, a tendency of overreporting behaviors perceived healthy and underreporting unhealthy behaviors can be a risk. This has for instance been found in food frequency questionnaires (FFQ) completed by adolescents (44). Reporting bias related to food intake is higher among adolescents compared to younger age groups (44, 45), and higher among teenaged girls than boys (45). The

questionnaire differs somewhat from studies like previous Tromsø Studies, UNKOST-2000 and HBSC and validation studies specific for FF1's FFQ are to date not published. However, a systematic review assessing the validity and reliability of using FFQ for adolescents found that questionnaires which not assessed portion size, measured a shorter time span, were of medium length and were administered by the participant not by parents, had highest average validity (46). Although FF1 asked about average intake without reference to a timespan, the other factors are descriptive of FF1's questionnaire.

Reporting bias could also be a problem in regards to the measure of PA. However, Rangul et al. found a tendency of self-reported PA being underestimated compared to "ActiReg"[3] among adolescents, nevertheless they concluded that overall data showed acceptable validity and reliability (47). For FF1 PA was also objectively measured by "actigraph"[3]. It would have been preferable to compare the self-reported information with data from the actigraphs, but these data were not available at the point of writing the thesis. Even if use of objective methods like actigraph measures activity in real time, it could still cause bias as study subjects can alter behavior for the time period they are being observed ("the Hawthorne effect")(43). PA can be difficult to measure (20, 47) and the available methods have both advantages and disadvantages (20, 43).

Effects on results caused by reporting bias can differ depending on its nature. If error in measurements of the dependent or independent variable is the same across all participants in a study, it would be classified as non-differential misclassification (42). For instance if all students underreported intake of unhealthy foods, regardless of whether the true consumption was seldom or frequent. This would almost always underestimate an effect between exposure and outcome; the result will be biased towards the null (42). The effect of differential misclassification on the other hand, can be harder to predict (42). It occurs when measurement

[3] Actigraph/ ActiReg are activity monitors worn on the body.

error is greater in one group compared to the other. People with higher BMI can be more inclined to underreport in FFQs, which could cause differential misclassification (45).

There is a risk of bias occurring in any studies using self-reported data, and it is not likely to be of greater concern in the present study compared to similar studies.

5.2.2 Construction of variables

When the internal validity of the study is considered the process of constructing the variables could be assessed. As a selection of the Directorate of Health's dietary advice was chosen as basis for the dependent variables, it should be looked into whether data used in this thesis were sufficient for making conclusions regarding these recommendations. The Directorate of Health gives specific advice regarding amount of consumption in the recommendations chosen for this thesis (5). However, for solid foods FF1 phrased questions in terms of frequency without details on quantity, for drinks questions were phrased in terms of "how many glasses". As portion size can vary considerably converting "times eaten" or "how many glasses" into portion size might not be representative of what was truly consumed. In addition, information on all foods that could be included in the recommendations were not available. For instance information on consumption of berries which is included in "5 a day" is lacking, and the selection of foods considered energy-dense or high in added sugar are limited. This could cause an underestimate of the true consumption. On the other hand an overestimate of "5 a day" could also have occurred as potato is likely to be included in the variable of "5 a day" due to the phrasing of the question in FF1, however potato is not included in the recommendation (5).

Regarding energy-dense foods and added sugar the Directorate of Health recommends to limit intake and they give exact advice in terms of E%. The FFQs used in FF1 contained insufficient information for calculating daily energy intake. As drinks and solid foods have different effects on satiation (3, 48), assessing solid foods and drinks separately could be

appropriate. These recommendations were therefore operationalized through "unhealthy foods daily" and "SSB daily". The foods included in "unhealthy foods daily" are commonly eaten by adolescents (12, 49), and energy density in these foods generally exceeds the recommended average (16). Daily intake is therefore likely to be contraindicative with a limited intake of energy-dense foods and keeping within the Directorate of Health's recommendation. However, this variable contained only three subcategories and could underestimate number of students who ate unhealthy foods daily. SSB are consumed daily by many adolescents (15, 49) and can make up a large part of the intake of added sugar (5, 18). Sugary soda or lemonade contain about 50g of sugar per ½ liter, which is close to the maximum recommended daily intake (5). Many commonly eaten foods contain added sugar, as a consequence people could have a high intake of added sugar from other foods, leaving no "room" for SSB in the energy accounting (5). Daily consumption of SSB could therefore be contraindicated with a limited sugar consumption and keeping within the recommended 10 E%. Hence this variable could be appropriate for making assumptions regarding recommendation to reduce intake of added sugar. SSB is also used by other studies as an indicator of sugar intake (17, 25, 49).

When the outcome variables and "screen time" were constructed mean-values were used (as described in chapter 3.2 and 3.3). This created possibilities for misclassifications when cut-offs for these variables were set, as people in one end of the range in an answer alternative could be wrongly classified when mean values were summed. Since the effect is likely be evenly distributed it would cause a non-differential misclassification.

The recommendations on PA from the Directorate of Health includes duration, frequency and intensity (5). The present study considers duration by constructing a variable for daily PA based on the reported weekly average time spent on PA outside of school hours. Even if several studies phrase questions in terms of PA outside of school hours (14, 15, 33), this measure is likely to underestimate the total time spent on PA. Adjusting for such an underestimate is a

possibility, for instance by setting a different cut-off for reaching recommended 60 min of PA daily (33). Even if all study programs should include a minimum of 56 hours of PA during 1st year of high school, more hours could be included and especially those studying sport would have considerably more PA in their curriculum (50). Hence, such an adjustment could be inaccurate. The measure for PA in the present study was therefore kept a crude measures. Of those who were classified as not being physically active for 60 min daily 4,5% were in sport programs. Unless these students were injured or for some other reason unable to participate in school activities, their total daily PA is likely to be 60 min or more. Separate analyses were conducted, where those studying sports who did not reach the cut-off for PA were recoded as being physically active for 60 min daily (data not shown). For boys the significance level in the adjusted and unadjusted analyses for the association between "60 min daily" and the four different outcome variables did not change. However, for girls the previously non-significant unadjusted association between "60 min PA daily" and "SSB daily" turned significant (p=0,049), in the adjusted logistic regression it was not significant. In addition the adjusted logistic regression showed no significant association between "60 min PA daily" and "5 a day", which in the original adjusted model was significant. None of the other independent variables changed significance level in this analysis. These additional analyses emphasized that making assumptions about total PA based on the measure of PA outside of school hours might not be appropriate.

Weight and height were based on objective measures. According to national guidelines 500g should be deducted from weight if children are measured wearing light clothing (2). This was not done by FF1 or in the thesis. A lack of deduction for clothes could have caused non-differential misclassification, overestimating weight and BMI. However, lack of deduction only had a minor effect on BMI estimates in the FF1 cohort (51), which is considered acceptable for the thesis. BMI in childhood changes substantially with age and according to gender (2, 52),

and categorizing children by adult cut-offs would therefore be inappropriate. Cole et al. (52) retrieved age- and gender adjusted BMIs equivalent of BMI 25 for overweight and BMI 30 for obesity by basing their cut-off on the adult values and extrapolate them back into childhood. The revised cut-offs from 2012 (40) were used in the present study. Using Cole's cut-offs for classifying overweight and obesity probably reflects the Western population adequately, but lacks representations of other parts of the world like parts of Asia and Africa (3, 52). As few students in this study viewed themselves as non-Norwegian (3,5%), this was likely to be of little influence. Sexual maturation influences body fatness (3, 6), hence timing of puberty could affect the sensitivity of these cut-offs. This was not adjusted for in the analyses. But delays of less than two years are unlikely to make much difference (52). Despite its limitations when used for research, Cole's cut-offs are a suitable measure for use in studies as they provide a standard benchmark which all population groups can be compared and trends assessed (3).

The variable regarding main high school program included eight different schools, but were split in three categories including various academic disciplines. Vocational programs for instance, includes study programs with different curriculum (31) (e.g nutritional studies and technical studies), which could have different influence on health-related behavior. This classification might disguise differences within each category, but could still indicate an overall effect. Study program was also included as an indicators of peer-influence of health-related behavior, and influence caused by friends enrolled in other programs would not be accounted for by this variable. The variable of main high school program was not transformed from the original form provided in the dataset by FF1, hence looking at study programs separately was not an available option.

Despite highlighted weaknesses variables on dietary choices are considered valid as indications on whether the target population follow the Directorate of Health's dietary advice.

The other above mentioned variables are also considered to have acceptable validity. However, assertive conclusions should be made with caution.

5.2.3 Statistical methods

The validity of a study could be compromised if findings are caused by unidentified confounding factors or chance. Confounding exist when a third factor, associated with both exposure and outcome, cause a distortion of the measured effect between exposure and outcome (42). It can influence the size of the real effect in any direction (42). Confounding can either be dealt with in the design stage of the study, by randomization, restriction or matching (42). As data were provided by FF1 randomization and matching was not an option. Restriction for age was made by including only 15 to 17-year-olds in the analyses. In statistical analyses confounding can be dealt with by stratification or using a multivariable model (42). Main analyses were stratified by gender and a selection of variables thought to have an association with both exposure and outcome based on previous literature were included in the logistic regression models. However, it is rarely possible to control for all confounding (42) and residual confounding can therefore not be ruled out.

Certain variables showed association with the outcome in the contingency tables, but no significant predictive ability in the logistic regression. This change in significance level could potentially be caused by the fact that in a forced entry method only a variables unique contribution is assigned to that variable. Any overlapping contribution between two or more variables still contribute to R square, but is not assigned to any of the individual variables predictive ability (38). Hence this could cause loss of significance.

The present study performed many tests and therefore it cannot be ruled out that any of the findings were due to chance. However, cut-off for significance was set at p-value<0,05 and 95% CI limits to minimize risk of findings being due to chance. Even if assumption of adequate

cell count was met certain cell counts in the cross-tables and the logistic regression were low, which could result in the analysis failing to identify an excising association (type II error).

5.2.4 Selection

FF1 included 1038 students, based on those who were invited 93% participated, which equals 80% of those who enrolled 1st year of high school. Both can be considered high participation rates. For the analyses 96 students were excluded due to missing data on main variables, of which nine students had not answered any questions on the self-administered questionnaire. Leaving those nine students out of the following analysis, approximately 9% from both genders had variables with missing information. The total number of missing values was 0,8% for girls and 0,7% for boys. The variable concerning dinner had the most missing values (3,1% for boys and 2,4% for girls), otherwise five variables for girls and four for boys had more than 1% missing. According to Tabachnick and Fidell (38) randomly missing datapoints of 5% or less in a large data set pose less of a serious problem. Although selection bias cannot be ruled out as further missing values analyses were not carried out, it is not likely to be of large impact on the result due to the relatively few missing values.

Health-related behavior could as previously mentioned differ by age, 77 students older than 17 years of age were therefore excluded in order to look at a more homogenous group.

5.2.5 Conclusion regarding methodology

It cannot be ruled out that the study has been affected by bias due to use of self-reported data, constructions of variables or the selection process. Despite limitations the study is considered to have acceptable internal validity.

In Troms County and nationally more than 97% of adolescents enters high school same year as completing compulsory school (31). Findings in this study are therefore likely to be representative of high school students, as well as the defined age group (15 to 17-year-olds). Hence, the external validity is also considered acceptable. However, there could be regional

differences related to the topic and caution should be taken if findings are extrapolated beyond the geographical region and age group set by the study.

5.3 Findings in relation to other studies

Consistency between findings in the present study and previous studies could also give indications regarding the validity of our findings.

5.3.1 Intake of fish, "5 a day", unhealthy foods and SSB

Fish is by tradition a key part of Northern Norwegian diet (49) and adolescents here generally consume more fish compared to other regions (12). By comparing our findings where about 40% of adolescents ate fish at least twice per week to national figures from Honkanen and Olsen where about 25% of adolescents age 12-20 did the same (12) this could be supported. Even if Honakanen and Olsen's publication dates back to 2001, figures could still be valid as an indication of regional differences since consumption of fish has declined recent years (18). Øvrebø reported that among 15-year-olds in Tromsø 50,4% of girls and 46,9% of boys ate fish for dinner 1-3 times per week (49). Despite a difference in cut-off, Øvrebø's figures are similar to our findings. It could also be noted that FF1's questionnaire did not specify if consumption of fish referred only to dinner or all consumption. As fish used as bread spread can make a large contribution to the total intake (10), including fish as bread spread could have increased frequency of consumption in the present study compared to the referenced studies which focused on dinner (12, 49).

In the population as a whole consumption of fruit and vegetables has increased the past 15 years (18). The present study found that about 15% of girls and 9% of boys ate "5 a day", while in UNGKOST-2000 10% of girls and 11% of boys in 8th grade did the same (13). This might indicate an increased consumption among adolescent only for girls. Looking at more recent findings the HBSC-survey from 2009/2010 reported that 49% of girls and 29% of boys

among Norwegian 15-year-olds ate fruit daily (4), an increase from HEVAS-2005 where 38% of girls and 21% of boys age 16 did the same (15). Also indicating a greater increase among girls. Compared to the HBSC-survey we found a lower daily consumption of fruit (40% of girls and 24% of boys) (appendix 3). Our findings were also somewhat lower than those of Øvrebø, who reported that among 15-year-olds 44% of girls and 30% of boys ate fruit and berries daily (49). When comparing students of high schools to students of elementary schools, it is important to note that elementary schools offers fruit and vegetables at school (53). However, figures for fruit consumption show a clear pattern of girls having a more frequent consumption than boys.

The present study found that approximately 20% ate "unhealthy foods" daily. Looking at each item less than 3% ate sweets daily, 2% ate snacks daily and less than 1% ate junk-food daily (appendix 3). Øvrebø's figures from 2005 showed that among 15-year-olds in Tromsø close to 16% ate chocolate daily (49). For the population as a whole consumption of chocolate has increased slightly since 2005 (18). Discrepancies might indicate a change in consumption by age. Although HEVAS-2005 also reported a more frequent intake compared to our findings, where 7% of 16-year-olds ate sweets daily (15).

Consumption of SSB has decreased recent years (4, 15, 17, 18) and HEVAS-2005 reported that among 16-year-olds 14% of girls and 22% of boys consumed SSB daily. However, we found that more than 32% of girls and 61% of boys drank SSB daily. A high consumption of SSB among adolescents in Tromsø has been reported previously by Øvrebø, who found that among 15-year-olds 47% of girls and 74% of boys drank SSB daily (49). This might imply that there are regional differences in consumption of SSB. Our findings add to previous research showing gender differences consumption of SSB (13-15, 49).

5.3.2 Physical activity

The present study found that approximately 14% of girls and 21% of boys were physically active for 60 min or more daily outside of school hours. That boys spent more time on PA

compared to girls has been reported by several other studies (15, 20, 22, 26, 33). Even if PA during school hours was not included, it might not be unrealistic to say that a large share of students probably did not meet recommended levels of PA, especially as 30,4% of girls and 33,3% of boys reported spending no time on PA outside of school hours (appendix 6). HEVAS-2005 reported that among 16-year-olds 7% of girls and 12% of boys were physically active to the extent where they broke a sweat daily outside of school hours, while 6% of girls and 8% of boys never exercised to the extent where they broke a sweat (15). However, HEVAS referred to intensity and frequency, whereas the present study included duration with no reference to intensity. When comparing prevalence of PA from the present study with other studies inconsistency in methods of classification and measurement, as well as phrasing of questions could cause inaccurate comparisons. Since the present study did not include intensity, it could have caused a lower estimate of inactive students compared to HEVAS. Indicating that the difference in prevalence might be even greater.

PA during school hours can vary across different study programs due to curriculum requirements (50). PA during school hours could affect level of PA outside of school hours, for instance if students who are highly active during school hours do not feel the need for further exercise after school hours, separate chi-square tests were therefore conducted. They showed that students in sports programs were most likely and those in vocational programs were least likely to be physically active 60 min daily outside of school hours. Rangul et al. has previously reported that students in vocational programs were least physically active compared to other study programs (33).

5.3.3 Association between physical activity and dietary choices

Previous studies has reported that PA does not always relate to a healthier diet among adolescents (26, 54), which is consistent with our findings.

We found an association between “60 min PA daily” and “fish twice per week” for boys in the unadjusted analyses. Honkanen and Olsen reported that adolescents who liked and frequently ate fish were more physically active compared to those who did not eat fish as frequent (12). A positive association between PA and consumption of fish was also found in other studies, although fish was included as part of food-groups with other items (54, 55), and might therefore not be directly related to our findings. However, not much literature was found on this topic. Adjusted for the other variables in the logistic model there was no longer a significant association between PA and “fish twice per week”, which could indicate a confounding effect with one or more of the included variables in the model.

Adjusted for the other variables in the logistic model we found that among both genders those who were physically active at least 60 min daily outside of school hours had more than three times the odds for meeting the recommended consumption of fruit and vegetables compared to those who were less active. This is consistent with previous studies which reported a positive association between PA and consumption of fruit (26, 54) or vegetables (23) separately, or fruit and vegetables combined (13, 23, 27). Fruit juice was also included in “5 a day” with maximum one daily serving and a positive association between consumption of fruit juice and PA has been reported previously (25).

No association was detected between “60 min PA daily” and “unhealthy foods”. PA can also be measured through sports involvement, to which previous findings show inconsistent associations with unhealthy foods. Exemplified with Larson who found no significant association between fast-food consumption and sports involvement (56), while Bauer et al. found sports team participation to be a strong risk factor for increased fast-food intake among males (24). This association was explained by adolescents which engaged in sports teams had little time for meals at home and had to rely on fast food. “Unhealthy foods” included fast-foods, in addition to other unhealthy foods. Investigating the individual components in this

variable against “60 min PA daily” would have caused small cell counts, creating unreliable analyses. Dietary information was inadequate to make assumptions about energy intake from fat. UNGKOST-2000 found that a significantly less part of the daily energy intake for girls who exercised more stemmed from fat (13).

No association between “60 min PA daily” and “SSB daily” was detected in the analyses. However, SSB were measured by a single category, as this measure would include a variety of beverages this method could mask a potential association to certain types of SSB (25). Ranjit et al. found that even if PA decreased with level of soda consumption, there was a positive association between PA and consumption of sport drinks and sugary fruit drinks (25). This difference was explained by the possibility that while sodas were perceived as unhealthy, sports drinks had successfully been marketed as beverages consistent with a healthy lifestyle (25).

5.3.4 Other factors analyzed in relation to dietary choices

A multitude of environmental, cultural, organizational, interpersonal and personal factors could affect health-related behaviors like PA and dietary choices (8). Only a selection was included in this thesis.

Gender differences in the selected health-related behaviors have been well documented. In short girls tend to have elements of a healthier diet (14, 15, 17, 26, 27, 49, 56), while boys tend to be more physically active (15, 26, 27). Adding to this evidence we found that more girls consumed “5 a day”, fewer drank SSB daily and were physically active for at least 60 min daily outside of school hours compared to boys.

Age should also be considered in studies on health-related behavior due to indications of an unhealthy trend throughout adolescence. For instance a tendency of decreasing levels of PA (13-15, 20, 22, 26, 27, 54, 57), decreasing consumption of fruit and vegetables (57) and increasing consumption of unhealthy foods (49, 56). The present study did not adjust for age due to few individuals in the categories of 15 and 17-year-olds which could have caused

problems of adequate cell count. However, differences across the narrow age gap in this study are likely to be small and would presumably not affect the internal validity. But when comparing results to other findings difference in results might be affected by differences in the populations' age. The change by age could be an indication of increased autonomy, resulting in adolescents for instance being more in charge of their own food environment and choosing by their own preference. This could be an explanation why we found that fewer boys who had moved out of home reported eating fish at least twice per week than those living at home. Living in a studio has previously been reported to have a negative association with PA and healthy dietary behaviors (30). In the present study few students had moved away from home (13,3%) causing low cell count in the analyses, especially for "5 a day". This could potentially have affected results.

Interpersonal factors are found to play a pronounced role in dietary behaviors among adolescents (7), and adolescents rate parents and peers as highly influential when it comes to dietary choices (12). No exact measures regarding parental influence on the adolescents' dietary choices were available. However, family mealtimes could be seen as an arena where parents' attitude towards diet could be apparent, breakfast and dinner consumption were therefore included as measures of family meals. The present study found a positive association between breakfast frequency and "fish twice a week" and "5 a day" for boys, while for girls dinner frequency showed the same pattern. A positive association between consumption of fruit and vegetables and family meals has previously been reported (29). Although previous studies reported no association between consumption of junk-food and family meals (24, 56). We found less frequent consumption of breakfast to be associated with a more frequent intake of unhealthy foods for both genders, the same pattern was evident also for SSB (including a borderline association for boys). No exact measure of peer influence was available. However, main high school program could be seen as a measure of peer influence as students in the same school

could be an important part of adolescents' social circle. Analyses showed that girls in general studies ate fish more frequent than those in vocational programs, and both genders in general studies consumed SSB less frequent than those in vocational programs.

Smoking, use of snuff and alcohol could be associated with other unhealthy behaviors (14, 23, 33). This is supported by our findings where use of snuff showed a positive association with "SSB daily" for both genders and an inverse association between smoking and "fish twice per week" for boys. However, the analysis also showed that among those who drank alcohol at least twice per month more girls ate "5 a day" and fewer boys drank SSB daily, compared to those who drank alcohol once per month or less. This displays that substance use does not always relate to unhealthy behaviors. Also exemplified by Taliaferro et al. who reported a positive association between sports participation and use of alcohol and snuff/ chewing tobacco for boys (23). However, we found no significant difference between those who never drank alcohol and the most frequent consumers related to these variables, hence it cannot be ruled out that the significance is due to chance findings or unidentified confounders.

Sedentary behavior has been associated with elements of a less healthy diet, in particular with higher consumption of energy-dense snacks and drinks and lower consumption of fruit (28). This was supported by the present study which found less screen time to be associated with a more frequent consumption of fish, as well as fruit and vegetables, for both genders. Less screen time also showed less frequent consumption of SSB for girls. All sedentary behavior are not necessarily associated with an unhealthy diet. Sedentary time devoted to homework has for instance been found compatible with a healthy diet (26, 58). The variable used in the analyses did not differentiate between different screen time activities, which potentially could have influenced results.

Energy imbalance due to PA and diet are as mentioned two of the most important factors in relation to overweight (54). In the adjusted analyses BMI was borderline significant in

relation to “SSB daily” for girls, although it was not significant in the unadjusted analysis. This could be related to an unidentified interaction effect. No association was detected between BMI and the other dietary outcomes. Diet could affect BMI over time or vice versa, hence a cross-sectional study design could be inappropriate for detecting a potential association. A lack of association could also be related to reporting bias as previously discussed. However, previous studies also reported lack of a significant association with diet (14, 26, 34, 35).

Even if the adjusted logistic regression models as a whole reliably distinguished between the two alternatives within each of the four dietary outcomes, none of the models explained a large amount of their variance. The model for unhealthy foods showed lowest explanatory ability, while “5 a day” showed the highest. The relatively low ability to explain the variance in the outcomes could be due to important factors not being included in the models. As previously mentioned main analyses were stratified by gender as many health-related behaviors could differ by gender. Even if additional analyses including gender as an adjustment variable confirmed an association between gender and both “5 a day” and “SSB daily”, it did not make much difference in the models explanatory ability. Other variables were initially considered (appendix 1), however they were excluded from the final analyses. Even if SES was associated with both “5 a day” and “fish twice per week” in unadjusted analyses, the variable was excluded from the final analyses due to high numbers of missing values. SES measured through parents’ educational level or income was found to be an important factor for food choices by other studies (17, 59) and including the variable could potentially have increased the explanatory ability of the model, however it would have caused loss of power to the study. Even if chronic disease and cultural belonging could influence dietary choices, it is less likely that including these variables would have increased explanatory ability of the models due to heterogeneity of the variable regarding chronic disease and few non-Norwegian students.

Investigating the association between PA and dietary choices was part of the main objective of this thesis and even if adding variables certain variables could have increased the models explanatory ability, it would not have affected the lack of association between most of the outcomes and PA.

5.3.5 Conclusion regarding findings in relation to other studies

Comparing results across studies can be complicated by differences in methods of measures, constructions of variables, cut-offs or other methodological issues. Despite this, many findings from the present study were supported by results from other studies. Summarizing main findings, consumption of "5 a day" and certain unhealthy foods were similar to national figures, findings of associations between PA and consumption of fish, "5 a day" and unhealthy foods were also similar to other studies. However, in comparison with other national figures we found a more frequent consumption of fish and SSB, and less time spent on PA outside of school hours. Even if it cannot be ruled out that these dissimilarities could be a result of methodological issues, it is likely that these findings are indications of true differences. And, as discusses above, they could be associated with regional differences, age of study population or change that have occurred over time. In addition, the association between PA and SSB between the present study and exemplified literature differed, however this could as mentioned be due to the variable used in the present study for SSB not differentiating between various types of SSB.

5.4 Factors which could influence an potential association between physical activity and dietary choices

The analyses showed no consistent pattern of PA being associated with healthy or unhealthy dietary choices. In the adjusted logistic analyses "60 min PA daily" was a significant predictor only for "5 a day". These results could be related to various factors.

There has been much focus on increased consumption of fruit and vegetables (11, 18) and these foods are easily connected with a healthy lifestyle. For instance "Bama", one of Norway's large producers of fruit and vegetables, has become an important sponsor for sport events for young people (often handing out free fruits) and they have sponsor agreements with different sport teams and figures (60). However, there has also been focus on increased consumption of fish and adolescents perceive fish as healthy foods, but many rate it as undesirable and less healthy options like pizzas and hamburgers are preferred (12). Which might indicate that health consciousness is less important when adolescents make decision regarding diet. Although, certain unhealthy foods marketed with connections to a healthy lifestyle has been found positively associated with PA (25). For instance by producers of certain energy drinks sponsoring popular sports profiles (61). Even if adolescents do not rate sports- and popstars as important influential factors for dietary choices (12), such marketing strategies could give false impressions of the product being a healthy food choice.

However, younger people could have less knowledge about dietary advice than older people (11), which could raise questions whether adolescents have sufficient knowledge to make choices where health-related behavior like PA would correlate with healthier dietary choices.

Access could also be an important factor. Certain fruits and vegetables are "ready to eat" and easy to bring as a snack right after PA or they are often sold at gyms or sport events, creating easy access. Fish on the other hand are generally less available as snacks and would often require more time for preparation. The importance of availability could be exemplified with Bauer et al. who found that sports-team participation was a risk factor for consumption of fast food, explained by the lack of time to eat at home which could cause adolescents to rely on fast food (24). The present study did not include any variables which could be directly interpreted as an indicator for access to the included foods. FF1 included a question regarding how often

student brought lunch from home, which could have been assessed as an indicator of availability of food in the home. Although not bringing lunch from home could not have been interpreted as an indicator about food available at schools cantina as students might not eat lunch or food could be purchased elsewhere. Even if breakfast and dinner often would be eaten in the home and therefore also could give a certain indication of what were available in the home, this was not certain by the phrasing of the question.

5.5 Conclusion

Less than half of adolescents in this study ate fish at least twice per week and even fewer ate "5 a day". Regarding unhealthy foods approximately one in five ate "unhealthy foods" daily, and a relatively high number of students drank SSB daily. Girls showed healthier dietary choices, with a more frequent intake of fruit and vegetables, and less frequent consumption of SSB compared to boys. However, boys spent more time on PA outside of school hours than girls. Dietary choices among adolescents are based on a multitude of factors which complicates exploring its association with PA. The study showed that PA outside of school hours was a significant predictor only for "5 a day". Revealing lack in difference of the other dietary choices between more active or less active adolescents could be important for recognizing that PA is not automatically correlated with a healthier diet. This could also be useful knowledge when intervention strategies to change unhealthy behaviors are designed, as one can recognize that physically active adolescents also could be relevant targets for campaigns promoting a healthier diet.

Findings has to be seen in relation to the discussed negative and positive aspects of the study. First of all the variable for PA was based on duration of activity outside of school hours. When this thesis was initiated it was planned to include data from actigraph as a measure of total PA, which might have been a more applicable measure for evaluating a potential association between PA and dietary choices. However these data were not available at time of

writing the thesis. Limitations due to the use of self-reported data and the possibility that variables might not be sufficiently accurate for making assessments related to the dietary advises given by The Directorate of Health has been discusses. And these limitations were not considered to be of greater concern in the present study compared to similar studies. As long as conclusions regarding the variables are not drawn beyond limits discussed in chapter 5.2.1 and 5.2.2, the internal validity of the present study was found acceptable. The external validity of the study is also considered acceptable. Size of the population, high participation rates and the fact that findings are likely to be representative of the true situation for the studied age group in Troms County are important strengths of the study. Several of the findings were also supported by exemplified literature. However, frequency of consumption of SSB daily differed from national number and number of inactive students outside of school hours were also high compared to exemplified literature. Additional research could be beneficial to confirm these findings, as well as to identify factors which could be associated with these differences.

The fact that "60 min PA daily" was associated to only "5 a day" raises questions of what drives health related behaviors like PA and dietary choices among adolescents, and factors like health consciousness, access and knowledge were discussed. Supplementary research including these factors, as well as using a measure of total PA to further explore findings of association and lack of association between PA and dietary choices could be beneficial. Such further research might provide important knowledge for planning public health measures.

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7 Appendices

Apendix 1: Frequency distribution, variables excluded from main analyses (%), by gender

		Girls (N:424)	**Boys** (N:441)
SES; mothers educational level	Primary school/high school	34,0	32,7
	Higher education<4 years	19,3	16,3
	Higher education>4 years	23,6	22,0
	Do not know/missing	23,1	29,0
SES; fathers educational level	Primary school/high school	38,2	39,0
	Higher education<4 years	13,2	13,4
	Higher education>4 years	19,1	18,4
	Do not know/missing	29,5	29,3
Chronic disease	No	75,7	80,5
	Yes	24,3	19,5
Do you consider yourself Norwegian	No	2,4	4,5
	Yes	97,6	95,5

No variables showed a statistical difference between genders at .05 level (chi-square test)

Apendix 2: Consumption of fish (%), by gender

	Lean fish		Fatty fish	
	Girls	**Boys**	**Girls**	**Boys**
Rarely/never	20,8	19,5	19,8	23,4
1-3 times per month	46,9	47,2	50,7	44,9
1-3 times per week	28,3	29,7	25,7	27,0
4-6 times per week	4,0	3,2	3,8	4,1
Every day		,5		,7

Apendix 3: Consumption of fruits, vegetables and fruit juice (%), by gender

	Fruit		Vegetables			Fruit juice	
	Girls	**Boys**	**Girls**	**Boys**		**Girls**	**Boys**
Rarely/never	2,4	6,8	2,6	6,1	Rarely/never	16,5	16,3
1-3 times per month	7,3	14,7	9,2	9,5	1-6 glasses per week	49,3	47,8
1-3 times per week	27,8	34,7	20,8	27,7	1 glass per day	18,9	21,1
4-6 times per week	22,9	19,7	33,3	31,3	2-3 glasses per day	14,2	12,7
1-2 times per day	24,1	15,2	24,3	19,3	4 or more glasses per day	1,2	2,0
3-4 times per day	11,8	6,6	6,4	3,9			
5 times or more per day	3,8	2,3	3,5	2,3			

Apendix 4: Consumption of "unhealthy foods" (%), by gender

	Sweets		Snacks		Junk-food	
	Girls	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**
Rarely/never	5,9	6,1	4,5	5,2	10,1	5,0
1-3 times per month	24,1	24,7	30,9	26,3	50,9	37,9
1-3 times per week	55,7	56,5	51,2	55,3	34,7	48,5
4-6 times per week	10,8	11,1	11,1	11,6	4,2	7,9
Every day	3,5	1,6	2,4	1,6		,7

Apendix 5: Consumption of “SSB” (%), by gender

	Sugary soft drinks ("brus")		Juice with sugar ("saft")	
	Girls	**Boys**	**Girls**	**Boys**
Rarely/never	34,4	10,2	68,4	68,4
1-6 glasses per week	53,3	56,2	24,3	24,3
1 glass per day	7,3	15,9	4,5	4,5
2-3 glasses per day	2,6	12,2	2,4	2,4
4 or more glasses per day	2,4	5,4	,5	,5

Apendix 6: Weekly physical activity (%), by gender

	Physical activity	
	Girls	**Boys**
None	30,4	33,3
About 30 min	2,1	2,0
About 1-1,5 hours	7,8	7,5
About 2-3 hours	20,3	16,8
About 4-6 hours	25,5	19,3
7 hours or more	13,9	21,1

Apendix 7: Unadjusted logistic regression for SES by "fish twice per week" and "5 a day"

		"Fish twice per week"				**"5 a day"**			
		Girls		**Boys**		**Girls**		**Boys**	
		OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
SES; mothers' educational level	Primary school/ high school	1		1		1		1	
	Higher education <4 years	1,65	0,95-2,87	1,33	0,75-2,35	2,43	1,13-5,53	0,84	0,31-2,3
	Higher education > 4 years	1,90	1,13-3,19	1,13	0,67-1,91	2,47	1,19-5,13	1,07	0,45-2,51
SES; fathers' educational level	Primary school/ high school	1		1		1		1	
	Higher education <4 years	1,37	0,74-2,54	1,25	0,68-2,29	2,58	1,16-5,73	1,65	0,62-4,35
	Higher education >4 years	1,83	1,07-3,14	2,52	1,47-4,32	2,44	1,18-5,04	1,34	0,53-3,37

OR 1 indicate reference group

Apendix 8: Questions from FF1 questionnaire used in the analyses (in Norwegian).

2) Hvem bor du sammen med nå? (sett ett eller flere kryss)

- ☐ Mor
- ☐ Far
- ☐ 1-2 søsken
- ☐ 3 eller flere søsken
- ☐ Mors nye mann/samboer
- ☐ Fars nye kone/samboer
- ☐ Fosterforeldre
- ☐ Adoptivforeldre
- ☐ Besteforeldre
- ☐ Venner
- ☐ Alene/på hybel
- ☐ Institusjon
- ☐ Annet

Denne informasjonen vises kun i forhåndsvisningen

Følgende kriterier må være oppfylt for at spørsmålet skal vises for respondenten:

- (
  - Hvis Hvem bor du sammen med nå? (sett ett eller flere kryss) *er lik* Venner
  - eller
  - Hvis Hvem bor du sammen med nå? (sett ett eller flere kryss) *er lik* Institusjon
  - eller
  - Hvis Hvem bor du sammen med nå? (sett ett eller flere kryss) *er lik* Alene/på hybel
-)

3) Hvor lenge er det siden du flyttet hjemmefra?

- ○ Mindre enn 6 måneder
- ○ 6 - 11 måneder
- ○ 1 - 2 år
- ○ Mer enn 2 år

6) Hva er den høyeste fullførte utdanningen til dine foreldre? (sett kryss for alle utdanningene du vet om for mor og far)

	Grunnskole	Yrkesfaglig videregående, yrkesskole	Allmennfaglig videregående skole eller gymnas	Høyskole eller universitet, mindre enn 4 år	Høyskole eller universitet, 4 år eller mer	Vet ikke
Mors utdanning	○	○	○	○	○	○
Fars utdanning	○	○	○	○	○	○

7) Hva regner du deg selv som: (kryss av for ett eller flere alternativ)

- ☐ Norsk
- ☐ Samisk
- ☐ Kvensk/Finsk
- ☐ Annet, spesifiser her

RØYK, SNUS OG ALKOHOL

43) Røyker du?

○ Nei, aldri ○ Av og til ○ Daglig

44) Bruker du snus eller skrå?

○ Nei, aldri ○ Av og til ○ Daglig

49) Hvor ofte drikker du alkohol?

- ○ Aldri
- ○ 1 gang per måned eller sjeldnere
- ○ 2-4 ganger per måned
- ○ 2-3 ganger per uke
- ○ 4 eller flere ganger per uke

57) Driver du med idrett eller fysisk aktivitet (f.eks. skateboard, fotball, dans, løping) utenom skoletid?

○ Ja ○ Nei

Denne informasjonen vises kun i forhåndsvisningen

Følgende kriterier må være oppfylt for at spørsmålet skal vises for respondenten:

- (
  - Hvis Driver du med idrett eller fysisk aktivitet (f.eks. skateboard, fotball, dans, løping) utenom skoletid? *er lik* Ja
-)

59) Omtrent hvor mange timer per uke bruker du til sammen på idrett/fysisk aktivitet utenom skoletid?

- Ingen
- Omtrent 1/2 time
- Omtrent 1 - 1 1/2 time
- Omtrent 2 - 3 timer
- Omtrent 4 - 6 timer
- 7 timer eller mer

Utenom skoletid: Hvor mange timer per dag ser du på PC, TV, DVD og liknende?
61) Hverdager, antall timer per dag:

- Ingen
- Omtrent 1/2 time
- Omtrent 1 - 1 1/2 time
- Omtrent 2 - 3 timer
- Omtrent 4 - 6 timer
- Omtrent 7 - 9 timer
- 10 timer eller mer

62) Fridager (helg, helligdager, ferie), antall timer per dag:

- Ingen
- Omtrent 1/2 time
- Omtrent 1 - 1 1/2 time
- Omtrent 2 - 3 timer
- Omtrent 4 - 6 timer
- Omtrent 7 - 9 timer
- 10 timer eller mer

MATVANER OG KOSTHOLD

66) Hvor ofte pleier du å spise følgende i løpet av en uke?

	Hver dag	4-6 dager i uka	1-3 dager i uka	Sjelden eller aldri
Frokost	○	○	○	○
Middag	○	○	○	○

67) Hvor ofte spiser du matpakke hjemmefra på skolen?

- ○ Hver dag
- ○ 3-4 ganger per uke
- ○ 1-2 ganger per uke
- ○ Sjelden eller aldri

68) Hvor ofte spiser du vanligvis disse matvarene?

	Sjelden/ aldri	1-3 ganger per måned	1-3 ganger per uke	4-6 ganger per uke	Hver dag
Ost (alle typer)	○	○	○	○	○
Fet fisk (f.eks. laks, ørret, makrell, sild)	○	○	○	○	○
Mager fisk (f.eks. torsk, sei, hyse)	○	○	○	○	○
Pizza, hamburger eller pølser	○	○	○	○	○
Hermetisert mat (fra metallbokser)	○	○	○	○	○
Godteri (f.eks. sjokolade, drops)	○	○	○	○	○
Snacks og søtsaker (f.eks. potetgull, kake, kjeks, bolle)	○	○	○	○	○
Sukkerfri tyggegummi	○	○	○	○	○

69) Hvor ofte spiser du vanligvis

	Sjelden/ aldri	1-3 ganger per mnd	1-3 ganger per uke	4-6 ganger per uke	1-2 ganger per dag	3-4 ganger per dag	5 eller flere ganger per dag
Frukt	○	○	○	○	○	○	○
Grønnsaker	○	○	○	○	○	○	○

71) Hvor mye drikker du vanligvis av følgende?

	Sjelden/ aldri	1-6 glass per uke	1 glass per dag	2-3 glass per dag	4 glass eller mer per dag
Helmelk, kefir, yoghurt	○	○	○	○	○
Lettmelk, cultura, lettyoghurt	○	○	○	○	○
Skummet melk (sur/søt)	○	○	○	○	○
Ekstra lett melk	○	○	○	○	○
Juice	○	○	○	○	○
Saft med sukker	○	○	○	○	○
Lettsaft, kunstig søtet	○	○	○	○	○
Brus med sukker (1/2 liters flaske = 2 glass)	○	○	○	○	○
Lettbrus, kunstig søtet (1/2 liters flaske = 2 glass)	○	○	○	○	○
Vann	○	○	○	○	○

Apendix 9: Information leaflet for FF1 (in Norwegian)

PERSONVERN OG SIKKERHET

Alle medarbeidere som jobber med undersøkelsen, har taushetsplikt. Opplysningene som samles inn, vil bare bli brukt til godkjente forskningsformål, som beskrevet over.

Opplysningene og prøvene vil bli behandlet uten navn og fødselsnummer eller andre direkte gjenkjennende opplysninger. En kode knytter deg til dine opplysninger og prøver. Koden oppbevares separat ved Universitetet i Tromsø, og kun noen få autoriserte personer har tilgang. Den enkelte forsker får ikke tilgang til opplysninger som gjør det mulig å identifisere enkeltpersoner. Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres.

I noen tilfeller kan det være aktuelt å gjøre analyser av blodprøver eller genetiske analyser ved forskningsinstitusjoner i utlandet. Hvis dette gjøres, vil våre utenlandske samarbeidspartnere ikke få opplysninger som kan knytte prøvene opp mot deg som person.

Tromsøundersøkelsen gjennomfører Fit futures i samarbeid med Universitetssykehuset Nord-Norge og Nasjonalt folkehelseinstitutt. Data som samles inn på sykehuset, overføres til Universitetet i Tromsø når datainnsamlingen er avsluttet. Ingen av opplysningene som framkommer i undersøkelsen, lagres i journalsystemet på sykehuset. Databehandlingsansvarlig er Universitetet i Tromsø. Tromsøundersøkelsen administrerer utlevering av data til forskningsprosjekter. Hvem som er ansvarlig for forskningsprosjektene, finner du her http://www.tromsoundersokelsen.no. Fit futures er godkjent av Datatilsynet og Regional komité for medisinsk og helsefaglig forskningsetikk, Nord-Norge. Deltakere er forsikret gjennom Norsk Pasientskadeerstatningsordning.

FRIVILLIG DELTAKELSE

Det er frivillig å delta i studien. Du kan når som helst og uten å oppgi noen grunn trekke ditt samtykke til å delta i undersøkelsen, og dette vil ikke få noen konsekvenser for deg. Dersom du senere ønsker å trekke deg eller har spørsmål til studien, kan du kontakte Tromsøundersøkelsen, Institutt for samfunnsmedisin, Universitetet i Tromsø, 9037 Tromsø, telefon 77644816, e-post: tromsous@uit.no.

RETT TIL INNSYN OG SLETTING AV PRØVER OG OPPLYSNINGER OM DEG

Hvis du sier ja til å delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har også rett til å få korrigert eventuelle feil i de opplysningene vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet innsamlede prøver og opplysninger, med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner.

VIL DU DELTA?

Hvis du er fylt 16 år, gir du selv ditt samtykke til å delta. Du kan da signere vedlagte skjema (hvitt ark) og ta det med til undersøkelsen. Det er også mulig å undertegne skjemaet når du kommer til Forskningsposten.

Hvis du ikke er fylt 16 år, må du be dine foreldre/foresatte om lov til å delta. Da må både du og dine foreldre/foresatte signere vedlagte skjema (hvitt ark) som du tar med deg til undersøkelsen.

ANSVARLIGE FOR GJENNOMFØRING AV FIT FUTURES UNDERSØKELSEN

Fit futures ledes av en styringsgruppe, og følgende forskere er ansvarlige for gjennomføringen:

Anne-Sofie Furberg
prosjektleder, lege, Universitetssykehuset Nord-Norge
e-post: anne-sofie.furberg@unn.no, telefon 77 75 58 24

Christopher Sivert Nielsen
psykolog, Nasjonalt folkehelseinstitutt
e-post: Christopher.Sivert.Nielsen@fhi.no, telefon 21 07 82 77

Guri Grimnes
lege, Universitetssykehuset Nord-Norge og Universitetet i Tromsø
e-post: guri.grimnes@unn.no, telefon 77 66 94 83

SPØRSMÅL?

Dersom du/dere har spørsmål om undersøkelsen, kontakt Forskningsposten UNN på telefon 77 62 69 09 eller prosjektadministrator for Fit futures på telefon 930 03 925.

ENERGI

www.fitfutures.no

FAST FOOD

SOSIALT NETTVERK

FitFutures
EN DEL AV TROMSØUNDERSØKELSEN

DIN HELSE DIN FREMTID

INVITASJON TIL Å DELTA I HELSEUNDERSØKELSE BLANT UNGDOM

Apendix 9: Information leaflet cont.

Apendix 10: Consent-form for FF1 (in Norwegian)

FitFutures
EN DEL AV TROMSØUNDERSØKELSEN

VIL DU DELTA?

Samtykke til å delta i studien Fit futures

Jeg er villig til å delta i studien

_____

_____ (DITT FULLE NAVN I BLOKKBOKSTAVER)

Sted _____
Dato_ _____

_____

_____ (DIN SIGNATUR)

VIL DU DELTA OG ER UNDER 16 ÅR?

Foreldre/foresatte sitt samtykke til deltakelse i Fit futures

Jeg samtykker herved i at mitt/vårt barn kan delta i undersøkelsen

_____

_____ (BARNETS FULLE NAVN I BLOKKBOKSTAVER)

Sted _____
Dato_ _____

_____

_____
(SIGNATUR FORELDER/FORESATT 1)

_____

_____
(SIGNATUR FORELDER/FORESATT 2)