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SMOKING AND HEALTH IN ADOLESCENCE

The Nord-Trøndelag Health Study, 1995-97

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List of papers

I Holmen TL, Barrett-Connor E, Holmen J, Bjermer L. Health problems in teenage daily smokers versus nonsmokers, Norway, 1995-97: The Nord-Trøndelag Health Study. Am J Epidemiol 2000;151:148-55.

II Holmen TL, Barrett-Connor E, Clausen J, Langhammer A, Holmen J, Bjermer L. Gender differences in the impact of adolescent smoking on lung function and respiratory symptoms. The Nord-Trøndelag Health Study, Norway, 1995-97. (Submitted)

III Holmen TL, Barrett-Connor E, Clausen J, Holmen J, Bjermer L. Physical activity and sports in smoking versus non smoking adolescents; associations with lung function. The Nord-Trøndelag Health Study, Norway, 1995-97. Accepted for publication in Eur Respir J.

IV Holmen TL, Barrett-Connor E, Holmen J, Bjermer L. Adolescent occasional smokers, a target group for smoking cessation? The Nord-Trøndelag Health Study, Norway, 1995-97. Prev Med 2000;31:682-90.

Abbreviations and definitions

ATS	American Thoracic Society
ERS	European Respiratory Society
ISAAC	International Study of Asthma and Allergies in Childhood
FVC	Forced vital capacity
FEV1	Forced expiratory volume in one second
FEF50	Mid forced expiratory flow
FEV1/FVC	Percent forced expiratory volume in one second in relation to the forced vital capacity
FET	Forced expiratory time
ATP	Ambient temperature pressure
BTPS	Body temperature pressure saturated
CI	Confidence interval
OR	Odds ratio
PACK YEARS	The number of years with daily smoking multiplied by the number of cigarettes smoked daily divided by twenty.
HUNT	The Nord-Trøndelag Health Study (Helseundersøkelsen i Nord-Trøndelag)
young-hunt	The youth part of HUNT

Summary

Background and aims

The onset of cigarette smoking begins primarily in adolescence, and prevalence of smoking among adolescents has been increasing during the last ten years. The prevalence of adolescent smoking increases with age and is more common or at least as common in girls as in boys in most western countries.

Until recently the intensive investigation on health effects of smoking has been mostly conducted among adults. In adolescence the long-term health consequences have been reviewed, but current health problems are probably more important to adolescents and may be more motivating for smoking prevention and cessation. Increased morbidity among adolescent smokers has been reported, but specific current health problems and medication use have received little attention. More attention has been given to associations between smoking and respiratory symptoms and lung function, but very few have focused on possible gender differences in adolescents.

Control of smoking is a primary health goal. An underlying premise for promotion of physical activity in adolescence is that it may lead to a healthy lifestyle persisting through adulthood. Encouraging participation in sports has been recommended as smoking prevention and as part of smoking cessation programs. Smoking habits within different types of sports has received less attention, and whether physical activity has an impact on lung function is debated.

Adolescent smokers are often unsuccessful in quitting and difficult to recruit and retain in smoking cessation programs. Occasional smoking may be the strongest risk factor for daily smoking, but occasional smokers are found to quit smoking more often than daily smokers. Thus, occasional smokers could be an important target group for smoking cessation who could be discouraged from moving into daily smoking status.

The first aim of this thesis was to study associations between smoking and current health status by examining associations between daily smoking and subjective health problems

(Paper I), and gender specific effects on respiratory symptoms and lung function (Paper II). The associations between physical activity and lung function in never smokers and daily smokers were also assessed (Paper III). The second aim was to study factors that might be useful in smoking prevention and cessation by examining the associations between smoking habits and exercise and different types of sports (Paper III), and differences between occasional and daily smokers (Paper IV).

Material and method

The ***young-hunt*** study is the youth part of the large Nord-Trøndelag Health Study (HUNT II), conducted in Nord-Trøndelag County, Norway, from 1995-97. Adolescents in Nord-Trøndelag, 13-19 years of age (9917 individuals), were invited to this cross-sectional study, the participation rate was 92%. The ***young-hunt*** study was conducted in schools. Information on smoking habits, health problems, physical activity and individual and environmental factors was obtained from a self-administered questionnaire. Within a month after completing the questionnaire, the students underwent a clinical examination including measuring of spirometry and body size measures. Spirometry was performed by specially trained nurses in accord with American Thoracic Society (ATS) standards. The acceptability of spirometry results was assessed both during the testing and during the data analysis.

The study population presented in this thesis consists of adolescents, aged 13 –18. Youth who participated in the questionnaire were included in Papers I and IV, and youth, without asthma, who participated both in the questionnaire and the spirometry were included in Papers II and III.

Results and conclusions

Of the adolescents who answered the questionnaire, 55% of boys and 57% of girls had tried smoking, at least one cigarette. In the age group 13-15 years, 5.9% of boys and 9.3% of girls reported occasional smoking while 6.4% of boys and 5.7% of girls reported daily smoking. In the older age group, 16-18 years, 10.8% of boys and 12.8% of girls reported

occasional smoking and 14.1% of boys and 18.4% of girls reported daily smoking. Mean age of smoking initiation was 13.9 years in both boys and girls. In average, boys smoked more cigarettes daily (9.8 cigarettes) than girls (7.9 cigarettes) ($p<0.001$).

Compared to boys and girls who had never smoked, daily smoking in both sexes and all age groups was associated with significantly poorer perceived health, respiratory symptoms, headache, neck and shoulder pain, stomachache, nausea, frequent heart beats, nervousness/restlessness and sleep problems. Daily smokers used more medications and health services. Whether or not the association is causal, daily smoking identifies a group of adolescents with health problems, for whom preventive strategies should also imply medical and social support.

Smokers had a higher prevalence of respiratory symptoms than never smokers. Symptoms increased with smoke burden. Compared to boys, girls reported more respiratory symptoms and greater increase in symptoms with comparable smoke burdens. A dose-response relation between smoking and reduced levels of lung function was found in girls only. Both boys and girls with light smoke burden had higher lung capacity (FVC) than never smokers. Girls were found to be more vulnerable to the effect of smoking on respiratory symptoms and lung function than boys.

Frequency of physical exercise was inversely associated with smoking, but participants in some types of sports were more likely to be daily smokers, especially in girls. Both daily smokers (53%) and occasional smokers (43%) were more likely to have quit sport than never smokers (26%). In never smokers, a positive dose response was found between physical exercise and better lung function (FVC and FEV1, adjusted for age and height); no similar significant association was observed in daily smokers.

Compared to daily smokers, occasional smokers participated in higher academic courses, were more engaged in organized activities and sports, had been less drunk and had better family role models. Occasional smokers quit smoking more often than daily smokers.

1 Introduction

Anything that primitive man was unable to explain was held to be of divine origin, so also the fire. As he learned to kindle it, he watched the curling tongues of flame and the dense clouds of smoke soar upwards and conceived the idea of worshipping the sun with offerings of holy fire and holy smoke. In time, the priests found the smoke from the sacrifice injurious to their breathing and endeavored to lessen the harmful effects of the acrid fumes by burning sweet herbs and odoriferous gums. In Central America, the tobacco plant was used. The priests came to inhale the smoke and soon realized the pleasing narcotic effects of tobacco. Thus it is believed that tobacco originated as a plant of healing and ceremony among the Mayans and Aztecs of Central America [1].

When introduced to Europe by the Spanish and Portuguese explorers, its reputation as a cure for every ill spread rapidly. It was first "smoked" in the modern sense in England, but was in the beginning violently opposed in all parts of the world by Kings, Pope, Emperor, Tzar and Sultan. In spite of this the smoking habit triumphed, and the attitudes changed in the 18th century when tobacco was accepted as an effortless way for governments to raise money through taxation.

In the beginning of the 20th Century smoking cigarettes was considered vulgar and ill bred in Norway, especially among women. But, through the first half of the Century mass production, intensive marketing and lack of health information made smoking a symbol of progress and freedom, resulting in an explosive increase in cigarette smoking. Around 1950 three out of four adult men in Norway smoked [2].

Health effects of cigarette smoking have been the focus of intensive investigation since the 1950s. Causal linkage between smoking and serious health consequences has been extensively documented [3,4]. With comprehensive information and Governmental users protection, there has been a marked decline in smoking prevalence in men during the last 20 years, and smoking in women has never reached the large proportion once seen in men [2]. Smoking is still considered to be the chief preventable cause of premature disease and death in the Developed Countries,

and in the world today one person dies every eight second as a consequence of smoking (World congress on Lung Health 2000). In Norway about 1/3 of the population are presently smokers, and the prevalence of smoking is increasing in adolescence [5].

Preventing smoking among young people is likely to affect both duration and intensity of total tobacco use, potentially reducing health consequences significantly with large impact on public health.

2 Background

2.1 Cigarette smoking in adolescence

2.1.1 Prevalence

During the first half of the 20th century, people became regular smokers at progressively younger ages, so that by the 1990s, the vast majority of smokers appeared to have started smoking before the age of 20 [2,6,7]. In most western countries smoking prevalence among adolescents declined sharply in the 1970s, but the decline slowed during the 1980s and turned to a new increase in the late1990s [5,6,8-10].

The National Council of Tobacco and Health has regularly collected information on the prevalence of smoking in Norway [5]. The latest data for the age group 13-15 years (students attending junior high schools) are from 1995 when, in the country as a whole, 8.0% boys and 9.4% girls reported daily smoking, and 15.1% and 19.7% respectively reported occasional smoking [11]. The prevalence differed between counties, and was lowest in the county of Nord-Trøndelag (6.9% boys and 4.9% girls reported daily smoking. Data on occasional smoking from each county has not been published). In 1995, 22.6% of boys and 20.8% of girls in the age group 16-19 years, reported daily smoking [5]. This had increased to 23.8% boys and 26.3% girls in 1999. The latter data are collected yearly by interview from a sample of only 350 persons, and cannot be broken down by county (Rita Lindback The National Council of Tobacco and Health, personal communication). Compared to the data from the National Council of Tobacco and Health, the prevalence of smoking in the ***young-hunt*** study was somewhat lower than the national mean, but was consistent with the prevalence reported for daily smokers, 13-15 years, from Nord-Trøndelag county (Table 1, Paper IV) . The prevalence of adolescent smokers differs between different countries, cultures and races [6,12-17].The prevalence of smoking in Norwegian adolescents is in consistency with other comparable countries.

Large and increasing numbers of adolescent cigarette smokers, and early initiation enhances the importance of early intervention in smoking prevention.

2.1.2 Predictors of smoking

Young people appear to progress through a sequence of stages from receptivity to dependency of tobacco. This process runs from attitudes and beliefs about tobacco, trying, experimenting with, and regular use, to being addicted [18]. Both environmental and individual factors influence this progress. Susceptibility to smoking, attitude, family role models, peer influence, self-esteem, advertising, depression, and anxiety are all said to play important roles in initiation of childhood and adolescent smoking [6,13,19-25]. Attitude towards cigarettes and smoking role models, in combination with poor adjustment in school and access to cigarettes, appear to make early initiators more likely to continue smoking [6,26,27].

Previous research has suggested that early initiation predicts longer duration, heavier daily consumption, and greater chances of nicotine dependence [6,28-30]. Smoking is clearly a long-term addiction for many adolescents who start smoking [6,31].

2.1.3 Intermittent smokers

During recent years occasional smoking has been found to increase as frequently or more frequently than daily smoking in young people [5,32]. More occasional smokers are seen among people with higher education [5,32-34]. Students at the University of Oslo expressed, during interview, that occasional smoking was associated with the ability to take control, a desired quality, whereas daily smoking was considered negative (Per Schioldborg, personal communication). Although occasional smoking may be the strongest risk factor for later daily smoking [29,35], intermittent smoking can be stable [33,34], and light, nondependent cigarette smokers ("chippers") have been described in adults [36-38]. Their motive for smoking may differ from that of daily smokers [36,37,39], but little attention has been paid to possible characteristics of occasional smoking in adolescents.

2.1.4 Gender differences

Smoking increases by age in both sexes and is more common or at least as common in girls as in boys in most western countries [5,6,8,10,13,40]. The age of smoking initiation has been reported to be equal in boys and girls [2,6], but, among daily smokers, boys report smoking a higher number of cigarettes per day [5,6,8,10]. A review article on gender differences in adolescent smoking reported both similarities (peer influences and parent modes) and differences (smoking girls being more socially skilled and more concerned about body weight) [41]. Different concern about body weight has also been reported in Norwegian adolescents [42]. Studies have evaluated changes in gender roles and smoking and suggested that smoking may have different meaning for boys and girls [43]. Others have concluded that the complex combinations of risk factors and processes leading to smoking are fundamentally different in boys and girls [6]. More frequent smoking among girls and other possible gender differences may suggest that prevention programs should be specially targeted.

2.2 Health problems in adolescence

Adolescence is a period with few serious health problems. Most young people perceive their health as being good [10,13]. A Nordic study from 1984 found that 9 % of adolescents, 13-18 years, had a long-term illness or malfunction [44], but long-term illness is not necessarily consistent with less good perceived health [45]. Adolescence is characterized by rapid physical growth, marked psychological development and changes in personal relations. Many positive factors such as feeling happy, being well integrated socially, and having a positive attitude towards school are found to be associated with feeling healthy [13].

2.2.1 Subjective health problems

Subjective health problems such as headache, muscle pain, back ache and stomachache have been given less attention in adolescence than health risk behaviors such as smoking, drug abuse, alcohol intake and injuries. Studies on subjective health have most often

included young adolescents together with children, and older adolescents together with adults. Reported pains are found to be frequent [46-48]. Monthly pain has been described by 78% of young people on Iceland (11-16 years) and in 54% in the Netherlands (0-18 years) [47,48]. The most common types of pain were headache, limb pain and abdominal pain. Reported subjective health problems vary, however, between countries. In the WHO cross-national survey from 1993-94, Norwegian 11-15 years olds reported less headache, stomachache and back pain compared to many other countries [13]. Repeated cross-sectional studies indicate that subjective health problems in 15 year olds have increased in Norway during the period 1983-97 [10]. Whether this is a real increase or due to different classification remains uncertain. Although only 10% perceived their health as poor, nearly 50% of the students in the ***young-hunt*** study reported subjective health problems and the prevalence of problems increased with age (Appendix 6, tab 2.1).

Subjective health problems can be of organic origin, but are also found to be associated with psychological stress, and seem to be associated with depression [13,46,49]. Problems are reported to be stable in the same persons during adolescence [46]. Thus, already in adolescence there seems to be a group of teenagers who consider their health to be less good year after year.

Gender differences

Girls are found to report subjective health problems more often than boys in the ***young-hunt*** study (Appendix 6, tab 2.1), as well as in many other studies and in most European countries [10,13,46,47,50,51]. The reasons are not known, but expressing health problems might be more acceptable for girls than boys in the western culture [50]. If subjective health problems are induced by psychological stress, adolescent girls may be exposed to more stress than boys or boys may express stress in other ways. A marked increase in reported subjective health problems and less good perceived health have been reported between the age of 12 and 15 in previous studies [46,51], also seen in the ***young-hunt*** study (Appendix 6, fig 2.1). Early puberty and hormonal changes might pose a larger strain on girls. Also girls' greater expectations about looks and appearance due to public pressure might be influential.

2.2.2 Respiratory health problems

Respiratory symptoms and bronchial asthma

Bronchial obstruction or bronchial asthma is one of the most common chronic diseases in children and adolescents in the developed countries. Severity varies from mild intermittent symptoms to life threatening attacks. There is no golden standard for defining bronchial asthma, and this is a problem in epidemiological studies when comparing time trends and prevalence between countries [52,53]. Whether or not the prevalence of asthma is increasing has been debated for such reasons [54-58]. Both defining asthma by assessing symptoms from questionnaires or measuring bronchial hyperractivity can introduce misclassifications. The main question defining asthma symptoms are wheezing and whistling in the chest. The term wheeze is difficult to translate in many languages and may be used as a term for a variety of noises and sensations. Population based studies have found that not all school children who report wheeze have asthma [59,60]. The question of ever having asthma has been found to be sensitive for the diagnose of asthma in adults [61].

The International Study of Asthma and Allergies in Children (ISAAC) was initiated to standardize methodology in the research of bronchial asthma and allergies among children [62]. A self-reported questionnaire was designed for 6-7 year olds and 13-14 year olds. No standardized questionnaire has been made especially for older adolescents. Using the ISAAC questionnaire, comparing different countries in different regions of the world, the prevalence differs greatly between different countries [63]. The prevalence of wheeze the last 12 months ranged from 4.1-32.1% and was particularly high in the English speaking countries and Latin America. The 12-month prevalence of wheeze in Sweden was 12.9%. Norway was not included in the study since no study of the 13-14 years olds using the ISAAC questionnaire had been conducted at the time, but data from ***young-hunt,*** using the ISAAC questionnaire (Appendix 6, tab 2.2), are consistent with those of comparable countries.

Lung function

During the last three decades lung function tests have evolved from tools for physiologic studies to clinical tools widely used in assessing respiratory status. They have also become a part of routine health examinations in respiratory, occupational and sports medicine, and

are used in public health screening. Lung function tests give quantified measures of lung function, and provide direct assessments of airflow limitations. The most widely used lung function test is flow-volume spirometry. To maximize the value of spirometry both for clinical work and epidemiology, both American and European standardizations have been made [64-68]. The standards of the American Thoracic Society (ATS) are commonly referred to in international epidemiological studies including flow-volume spirometry. Measures used in this thesis are:

- Forced Vital Capacity (FVC): maximal volume of air exhaled with maximally forced effort from a position of maximal inspiration. FVC is expressed in liters and reflects lung capacity.
- Forced Expiratory Volume in one second (FEV1): volume of exhaled air in the first second during the performance of FVC. FEV1 is expressed in liters, can be used as a measure of airflow limitation, and may reflect airway caliber.
- Forced Expiratory Flow during the middle half of FVC (FEF50 or FEF25-75). Expressed in liters per second. Reduced values are considered an expression of airflow limitation in the small airways.
- FEV1/FVC: The percentage of air expired in one second of the total expiration. Reduced values reflect airway limitation.

Both within individual (e.g body and head position and effort) and between individual variations (e.g aging, sex, size, race and past and present health) may affect these measures [69]. Lung capacity increases with lung growth and development during childhood, and rises even more steeply with the growth spurt in adolescence [69-71]. It shows an age related decline in adulthood.

Whether or not physical activity has an impact on lung function in adolescents and young adults remain uncertain. Some studies report a positive association between physical activity and physical fitness and forced vital capacity (FVC) and forced expiratory volume (FEV1) in young adults and adults [72-75], while others do not [76]. If a positive association reflects a selection of people with larger lung function into physical activity or physical activity increases lung function is unclear. An impact of training on lung function in young

swimmers has been suggested [77,78], but other studies have found no effect of physical activity on lung growth [79,80].

Gender differences

Gender difference in respiratory symptoms may reflect differences in perception, reporting and interpretation of symptoms by the individual or professionals, but may also have a biological basis [81]. Bronchial asthma is found to be more frequent among boys in childhood. This difference is wiped out through adolescence, and in adulthood more females than males are reported to have asthma [63,82]. Both biological, social and cultural explanations have been discussed as reasons for this, including hormonal factors and greater denial of asthma symptoms in boys [82].

Sex differences are found in lung physiology. Female lungs are smaller than male lungs, and remain so throughout the life span [82]. In adolescence, the age related increase in FVC ceases in girls as somatic growth ceases. Girls usually attain their maximal values of lung capacity at about 16 to 18 years of age [70,82,83]. In boys vital capacity continues to increase after growth in height has ceased, and may not be maximal until the age of 20-25, probably due to continued maturation in boys with increase in muscle mass [69,70,82,84]. The configuration of girls' and women's lungs is a results of proportional growth of airways in relation to parenchyma, while in boys and men the growth of airways lags behind that of the parenchyma. This dimensional advantage in females makes the emptying rate of the lungs higher in females than in males, reflected in larger expiratory flows and larger FEV1 to FVC ratios in girls than in boys of the same age and stature [82]. Differences in impact of environmental factors on lung function remain uncertain.

2.3 Smoking and health problems

The health effects of cigarette smoking have been the subject of intensive investigation since the 1950s, and cigarette smoking has been linked to a wide range of health outcomes [4]. Until recently, this research was mostly focused on adverse effects in adults. In adolescents, the long-term health consequences, those that emerge into adulthood, have been the subject of review. Current health problems, evident among young smokers, have

been investigated to a lesser extent. Many young people may have little fear of future disease. Current health problems are probably of greater interest, and might be more important in motivating adolescents not to start or to quit smoking.

2.3.1 Subjective health problems

Increased morbidity among smoking adolescents has been suggested by studies reporting more absence from school, poorer perceived health, and more frequent contact with health services [6,85-88]. Risk taking behavior, psychosocial problems and depression have also been associated with cigarette smoking in adolescents [6,89-92]. Studies that have addressed subjective health problems in teenagers, other than respiratory symptoms, most often group symptoms into nonspecific categories such as "psychosomatic" or "general illness" [6,85,86,88]. Focusing on different symptoms may be more useful in smoking prevention. The positive associations between smoking and drug abuse and alcohol intake seem well established [6,90], but the use of medication by teenage smokers has received little attention.

2.3.2 Respiratory symptoms and lung function

Smoking is associated with increased respiratory morbidity in adults [3], and many studies have linked smoking and respiratory symptoms in children and adolescents [6,17,93-95]. Smoking has been associated with increased frequency of wheezing and dyspnoe, as well as cough and phlegm.

Different studies have shown an increased risk of bronchial asthma in children exposed to passive smoking [96,97], and own smoking has been related to higher risk of asthma in adolescence [98]. People with asthma are especially encouraged not to start or to stop smoking. Previous studies have found, however, that former asthma could be a risk factor for smoking initiation in youth [99], and that adults with asthma had the same smoking habits as non-asthmatic [100]. They did not feel that smoking was an increased risk to them. In the

young-hunt study smoking in those who reported ever asthma was as frequent as for the total population (Appendix 6, tab 2.3)

Numerous cross-sectional studies of adults have shown lower levels of lung function in cigarette smokers, and longitudinal studies indicate that smoking speeds age-related decline in lung function in a dose related manner [3,71,101]. Also cross-sectional and longitudinal studies among children and adolescents show that smoking adversely affects lung function, indicated through reduced flow rates and slowed growth [6,93,95,101-103]. It has been suggested that the presence of wheeze in smokers is associated with higher risk of reduced levels of lung function [104].

The mechanism by which smoking affects the lung is not entirely known. Studies have found a close link between smoking and inflammatory mediators in the small airways, and also suggest that smoking may cause an inflammatory process in the central airways and lung parenchyma [105]. This is in agreement with increased respiratory symptoms and changes in lung function associated with affection of the small airways in smokers. The characteristics of the inflammatory process have been reported to differ between smokers who develop chronic airflow limitation and those who do not [106].

Gender differences

Smoking may affect male and female lungs differently [81,82]. Higher rates of wheeze and hyperresponsivness in smoking females compared to males have been described and attributed, in part, to smaller airway caliber in females [82,93,107]. Also, because of smaller lung volume, a relatively higher dose of tobacco may be deposited in women than in men despite equal smoke burden. Hormones may alter response in females [82], suggested because tracheal epithelium response to cigarette smoke has been shown to be related to the estrous cycle [108,109]. In adults, some studies suggest that smoking has greater impact on lung function in men [110-114], while others report a more adverse effects in women [115-117]. This contradiction may reflect gender differences in smoking prevalence between populations [118].

Only a few have focused on gender differences in studies of smoking and respiratory symptoms and lung function in adolescence. In one paper by Gold et al. [93] it was found that cigarette smoking was associated with mild airway obstruction and slowed growth of lung function in both sexes, but suggested that girls may be more vulnerable than boys to the effect of smoking on growth of lung function.

2.3.3 Physical fitness

Physical fitness is an important predictor of morbidity and mortality in different diseases in adulthood [119,120]. An underlying premise for promotion of physical activity in youth is that it may persist through out adulthood, lead to a healthy lifestyle and thereby reduce the risk of behaviors that may be detrimental to health [121]. Several cross-sectional studies have reported that physically active adolescents and adolescents who participate in sports are less likely to be regular smokers [6,122-124]. Encouraging participation in sports has been widely recommended as smoking prevention, or as part of smoking cessation programs [6,124,125]. Little attention has been paid to possible different smoking habits among participants of different types of sports.

2.3.4 Nicotine addiction

Nicotine addiction is not only the most common form of drug addiction, but also the one that causes most death and diseases [6]. Most human research on nicotine addiction has been conducted on adults, but the basic biological processes that underlie this dependency appear to be similar in adolescents [6].

Studies have found nicotine to be as addictive as heroin, cocaine, and alcohol [126,127]. The modern cigarette is a highly efficient drug delivery system, delivering nicotine in high concentrations rapidly into the brain [127,128]. This situation optimizes the likelihood of self-administration. Nicotine acts on cholinergic receptors that show diversity in structure, function, and distribution in the nervous system, mediating the multiple actions of nicotine described in smokers.

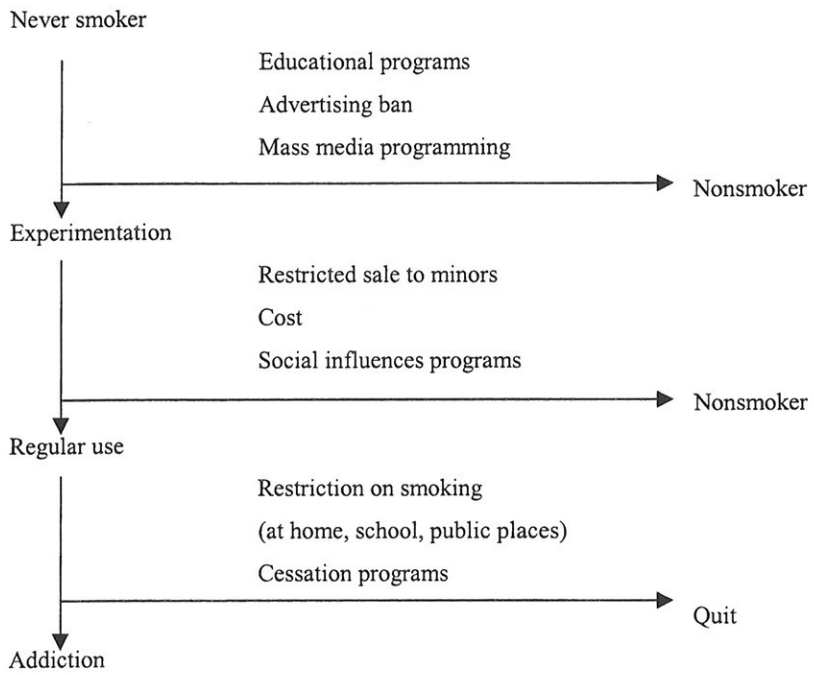
Two medical disorders that relate to nicotine addiction have been identified: nicotine dependence and nicotine withdrawal. Results from different studies indicate that one to three out of five adolescent smokers are dependent on nicotine [29]. Some groups of adolescents, as daily smokers, heavy smokers, and students in vocational schools, are found to have a higher risk of dependence [29]. A large majority of adolescent smokers report withdrawal symptoms during attempts to quit or reduce their smoking [29].

Gender differences in dependence and withdrawal have been examined only in a few studies and with mixed results [29]. Differences related to dependence have seldom been found and have not been consistent. However, girls have been found to have lower cotinine levels and report smoking fewer cigarettes per day than boys even though no difference in nicotine dependence prevalence rate was found [129]. It may be that nicotine dependent women require fewer cigarettes than nicotine dependent men because of sex differences in metabolism of nicotine or differences in body weight. Findings related to withdrawal are more consistent, with girls smokers experiencing more appetite increase and more weight gain than boys [29]. More stress has also been reported by girls after quitting, but at the same time girls have reported more positive effects of quitting [29].

2.4 Smoking prevention and smoking cessation strategies

Since the first publications on the impact of smoking on health, efforts to control smoking have been a primary public health goal. Efforts to control tobacco use among young people depend on stage of smoking initiation (Fig 2.1).

Figure 2.1. Efforts to prevent tobacco use among young people by stage of initiation



Adopted from U.S. Department of Health and Human Services (1991)

Smoking prevention has been recognized as a primary strategy for controlling smoking in the population. Advertising ban for cigarettes and counter advertising, educational efforts including school programs and mass media programs, increased cost of tobacco, tobacco restriction in public places, sales restriction for minors and social influences programs are all mass prevention strategies. The effectiveness of mass strategies is difficult to evaluate. Cochrane reviews of published papers show some evidence of effectiveness of mass media interventions and community interventions for preventing smoking in young people [130,131]. Increased prices also seem to reduce cigarette smoking in youth [2,6]. Tobacco advertising was banned in Norway in 1975. It is believed that the ban was effective because data from the National Council of Tobacco and Health showed that a more rapid decrease in adolescent smoking started from that same year, while the price on tobacco was stable in the period from 1975-81 [2]. However, the development of school educational programs was

also initiated during this period, and many studies have shown marked effect of such programs [6,132,133]. Although both school educational programs, and community based tobacco control programs have been found effective, the long-term effects (more than 5 years) are questioned [134,135]. Therefore follow-up programs seem important.

Once adolescents graduate to a given smoking status, return to earlier stages is uncommon [136]. Adolescent smokers frequently try to quit, but are usually unsuccessful, despite an expressed desire to quit and repeated cutback attempts [137]. They are difficult to recruit and retain in cessation programs and are not responsive to these programs [6]. Also smoking cessation treatment for adolescents has been disappointing due to low participation and quit rates [138]. Success in smoking cessation programs might require identification of appropriate target groups. Early intervention, before addiction, is also important.

3 Objectives

1. To study associations between smoking in adolescence and current health status by examining:

   - associations between daily smoking and current health problems, use of medication, and use of health services (Paper I).

   - gender specific effects of smoking and smoke burden on respiratory symptoms and lung function (Paper II).

   - the association between physical activity and participation in different sports and lung function in never smokers and daily smokers (Paper III).

2. To study factors that might be useful to smoking prevention and cessation programs in adolescence by examining:

   - the association between smoking habits and participation in different types of sports (Paper III).

   - individual and environmental differences between occasional and daily smokers (Paper IV).

4 Material and methods

4.1 The *young-hunt* study

4.1.1 Background

The ***young-hunt*** study is part of the Nord-Trøndelag Health Study, HUNT.

HUNT I

The first health survey in Nord-Trøndelag (HUNT I), Norway, was conducted in 1984-86. All the county's inhabitants 20 years and older were invited, 75,000 people (88%) participated. The study was a collaboration between the National Institute of Public Health (Folkehelsa), the National Health Screening Service (SHUS), the University of Oslo, administrated by the Community Medicine Research Unit, Folkehelsa, Verdal, and focused on hypertension, diabetes, pulmonal diseases, and quality of life.

HUNT II

In 1995-97 the second health survey of Nord-Trøndelag (HUNT II) was carried out. Few large health studied had been carried out with adolescents so this time all inhabitants 13 years and older, 102 800 people, were invited, (73% of all participated). Main collaboraters in the study were the National Institute of Public Health (Folkehelsa), the National Health Screening Service (SHUS), the Norwegian University of Science and Technology, Trondheim (NTNU) and Nord-Trøndelag County Council, with the administration at the Community Medicine Research Unit, Folkehelsa, Verdal. Data were collected by self-reported questionnaires, physical examinations and blood samples (adult population). HUNT II was more extensive than HUNT I, and different national and international research centers are involved in more than 80 different research projects using these databases.

The youth part of HUNT II, defined as inhabitants aged 13-19 years, is called the ***young-hunt*** study. It was organized differently from the adult part and had its own administration. ***Young-hunt*** is a cross-sectional study of a total adolescent population.

4.1.2 Planning

Working groups

The first working group was established in 1992 with representatives from the National Institute of Public Health (Folkehelsa), Oslo and Verdal and the University of Oslo. This group started the discussion and planning of including adolescents in HUNT II. From 1994, this group was replaced by a local group in Nord-Trøndelag composed of representatives from the Nord-Trøndelag County Education Authorities, both teachers' and school chiefs' organizations, the Nord-Trøndelag Teaching College, the Nord-Trøndelag County Medical Authorities, Innherred Hospital, Levanger and Folkehelsa, Verdal. Plans were also discussed with the Norwegian Pediatric Organization, the Community Medicine Research Unit's Research Advisory Board and other university research groups.

Information and consents of county and school authorities

Written information about the study together with an approval from the Nord-Trøndelag County Education Authorities, and the Medical Authorities, was sent to the County Chief Manager, the Chief Managers and School Chiefs in all the County's communities and Principals of all the schools. All approved the study and 100% wanted participation for their community or school. Also the Child Health Care unit in every community received information.

4.1.3 Administration

The National Institute of Public Health, Community Medicine Research Unit, Verdal, was responsible for the planning, conducting and administration of the ***young-hunt study*** with Turid Lingaas Holmen as project leader. As part of the HUNT studies, ***young-hunt*** reported to the HUNT Steering Committee and the Community Medicine Research Unit's Research Advisory Board.

Collaborators in different projects within the study included the National Institute of Public Health, Oslo (mental health and quality of life), Nord-Trøndelag Teaching College (physical activity and reading disorders), the Norwegian University of Science and Technology,

Trondheim (NTNU) (headache and asthma) and Innherred Hospital, Levanger (eating disorders).

The ***young-hunt*** study had its own budget and was funded by grants and support from the Norwegian Ministry of Social and Health Affairs, the Norwegian Research Council, Nord-Trøndelag County Council, the Norwegian University of Science and Technology, Trondheim (NTNU), the National Institute of Public Health, the Norwegian Women's Public Health Association, and ASTRA ZENECA AS.

4.1.4 Field work

The study was carried out in schools. Specially trained nurses visited all junior high and high schools in the county (65 schools) from September 1995 to June 1997. Two teams, each with two nurses, worked simultaneously, one in the northern and one in the southern part of the county.

Information routines

The principal of each school received written information about the study, consented to school participation, and appointed a contact person for the school. Representatives from the ***young-hunt*** study visited all high schools and the larger junior high schools to inform teachers. In addition, all teachers responsible for classes during the questionnaire administration received written instructions (Appendix 5).

Written information about the study was distributed to all students and parents well ahead of the study start (Appendix 3).

Courses for teachers and school health caretakers

Each six months, two courses, one in the north and one in the south, were held for teachers and school health caretakers in the communities participating in the study during that time. Topics were related to the study and included asthma and allergy, indoor climate, psychosocial problems, eating disorders, violence and addiction. Important were discussions about collaboration between schools and school health care.

4.1.5 Data collection

The data collection included a questionnaire, a physical examination, and an interview.

Questionnaire

A self-administered questionnaire (Appendix 1) was completed during one school hour, in a setting with no opportunity to view answers of the other students. The questionnaire was without name or registration number, only identifiable by a bar code of the 11-digit personal number (personnummer) by which all Norwegians are registered at birth. Each student put their completed questionnaire in a blank envelope and sealed it. Field workers collected the envelopes.

The questionnaire included topics on home environment, somatic and mental health, use of health services, stages of puberty, quality of life, physical activity, diet and eating habits and use of alcohol, tobacco and drugs. Youth in high schools (aged 16-19) answered one page of extra questions not presented for the younger age group. The ***young-hunt*** project leader, in collaboration with persons responsible for the substudies, constructed the questionnaire. Most questions had been previously used in national or international studies. Some questions were made for this study. A pilot study, testing the questionnaire, was carried out in Sør-Trøndelag county, including two classes of eight grade (14-15 years) in junior high schools and the second year (17-18 years) of high school.

Physical examination

Within a month after completing the questionnaire, all participants had a physical examination performed by the trained project nurses. The nurses visited every school, bringing the equipment. Height, sitting height, weight, hip/waist ratio, blood pressure and lung function were measured. All measurements had standardized (written) procedures. Tape measures and weights were adjusted against standards. All students received written test results of blood pressure and lung function measures explaining the meaning of the test. If necessary, they were advised to contact the school health care or a doctor.

Interview

In connection with all examinations, the nurses conducted two structured interviews, one on headache and one on allergy and respiratory symptoms, including triggers, medication, pet keeping and smoking habits. The questions had written procedures on interpretations.

4.1.6 Quality controls

All field workers were specially trained in examination and interview techniques before entering the study. Meetings with all the field workers were held every month in the study period. Examination techniques, possible interpretations of questions in the interviews, practices and experiences were discussed. The nurses regularly listened to each other during examinations comparing techniques and interpretations. The project leader and research technician also visited the teams during work and had regular telephone contact.

Weekly, monthly and 6 months working plans were written. Routines were checked and discussed weekly. Quality control routines were followed during data punching and results checked regularly.

4.1.7 Ethics

Each adolescent signed a written consent to participate in the study (Appendix 4). The consent contained information on the study and use of data, the same information as distributed to the adolescents ahead of the study to be discussed with parents. Parents of students younger than 16 years also gave their written consent (Appendix 4). The Regional Committee for Ethics in Medical Research and the Norwegian Data Inspectorate approved the study.

4.1.8 Participation

The target group for the ***young-hunt*** study was all inhabitants in Nord-Trøndelag county aged 13 to 19 during the study years. As the study followed the school year instead of the calendar year, two sources were used for invitations:

- The list of students in the age group registered in schools (klasselister) obtained from each school; "*Youth registered in school*".
- The list of adolescents in the age group not registered in any school, obtained from the "the follow-up service" (Oppfølgningsetaten) of the County Education Authorities; "*Youth not registered in school*".

Since adolescents usually graduate from high school the calendar year they become 19, about half of the 19 year olds had left school and were not invited. Some 12 years old (126 adolescents) who were in junior high schools and also a few who had turned 20 in high schools before the study started at their school, participated (40 adolescents). Totally 9,917 adolescents were registered as invited to the study, and 9,131 (92.1%) participated (Table 4.1).

Table 4.1. Adolescents who were invited and who participated in the ***young-hunt*** study.

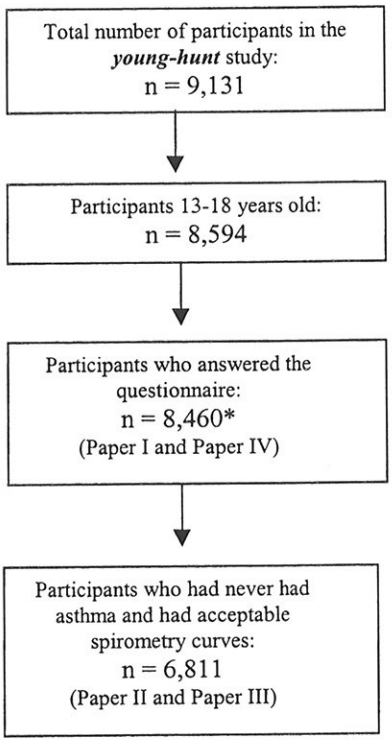
Schools	Number invited	Total participation; participants with questionnaire and/or examination		Participants with questionnaire		Participants with both questionnaire and examination	
	n	n	(%)	n	(%)	n	(%)
Junior high	5,004	4,784	(95.6)	4,743	(94.8)	4,598	(91.9)
Senior high	4,913	4,313	(87.8)	4,207	(85.6)	3,810	(77.5)
"Not in school"	285	34	(12.0)	34	(12.0)	31	(10.9)
Total	9,917	9,131	(92.1)	8,984	(90.6)	8,439	(85.1)

4.2 Material used in Papers I-IV (fig. 4.1)

The study population presented in this thesis consists of adolescents, aged 13 –18 years, who attended school. We chose to exclude the 19 year olds because about half of the 19 year olds had already graduated from school and were not invited. Those aged 12 and 20 who had participated were also excluded (se also chapter 6.1.2.1).

Adolescents who participated in the questionnaire were included in Papers I and IV. The number of participants in these two papers differs. Questionnaires from 420 adolescents were added after another quality check. This was after Paper I had been accepted for publication. The results were not changed when the analyses in Paper I were repeated including all adolescents. Participants both in the questionnaire and with spirometry were included in Papers II and III.

Figure 4.1. The study populations used in the different papers in the thesis.



* Only 8,040 were included in Paper I (see chp. 4.2).

4.3 Variables used in Papers I-IV

The variables used in Paper I-IV, with one exception (collected from the interview on asthma and allergy), are collected from the questionnaire and the lung function testing. Definitions, groupings of variables dichotomization of questions with more than two answering alternatives and the question from the interview are shown in Appendix 2 and in each Paper.

4.3.1 Smoking habits (Appendix 1, q 40-44)

The question about having tried smoking (q 41) was from the "WHO cross-national survey of health behavior in school aged children" [139], previously used in Norway. The questions used on smoking habits (q 42) were modified from the questions used in the a study of Norwegian teenagers "Ung i Norge" and in "UNGdata", NOVA, (www.isaf.no/ungdata/). The questions on age of smoking initiation and duration of smoking are the same as in the adult HUNT study. Definitions are shown in Appendix 2.

4.3.2 Lung function

Spirometry was performed by specially trained nurses, in accordance with American Thoracic Society (ATS) standards [64], using computerized pneumotachographs (Jaeger Masterscope, software version 4.15, Jaeger Inc, Wurtzberg, Germany). Pneumotachographs were calibrated twice daily with one-liter syringe. In addition, they were calibrated if changes were made (e.g. changes of filter with excessive salvation). The nurses also performed a biologic control assessing their own lung function each day. The participants were seated and extension or flexion of the neck was avoided. Nose-clip was used. Altitude, barometer pressure, temperature and relative humidity were registered every morning. Temperature was also registered in the afternoon. For the results, the software carried out automatic conversion from ambient temperature pressure (ATP) to body temperature pressure saturated (BTPS). The software satisfied the ATS equipment recommendations.

The test maneuver should be performed with maximal effort to assure best values of FEV1 and FEF50, and last until all the air is emptied to assure maximal value of FVC. Acceptability of flow volume curves was based on the recommendation of ATS from 1987 [64]. A minimum of three acceptable maneuvers was performed. If maneuvers were not satisfactory a maximum of the five was done. The flow-volume curve with the highest sum of FVC and FEV1 was saved. Computerized error messages were shown during testing if one or more of the following ATS recommendations were not met:

- Duration of expiration should be 6 seconds or more (expiration time)
- The difference between the FVC and FEV1 in the two best tests should be less than 5% or 100 ml (reproducibility)
- The back extrapolated volume should be less than 5% or 100 ml (start of test)
- An obvious plateau of at least 2 seconds at the end of test.

The field workers were specially trained in performance of spirometry and in assessing acceptability of curves. The acceptability of spirometry results was assessed both during the testing and during the data analysis, and included review of the computerized ATS error codes reported from the Masterscopes, and visual inspection of volume/time and flow/volume graphics. The computer provided feedback to the technicians on acceptability by providing the ATS error codes. In addition to the ATS error codes, they were instructed to inspect the flow-volume curves to ensure that the tested youth produced the highest possible peak flow, without cough, leakage of air or early termination. In adolescents who were unable to sustain expirations for 6 seconds or more before triggering automated cessation of collection of spirometry data, achieving end-of-test acceptability was confirmed either from the computerized error code regarding flow plateaus or from visual inspection of spirometry displays during testing. In addition to inspecting the curves, effort was also considered during analyses using PEF/FEF50 equal or higher than 1.25 as an acceptable effort (Clausen J, personal communication).

One person (the project leader), who had nearly 20 years experience with lung function testing, instructed all. Instructions were repeated regularly during the study, and curves were viewed by the project leader and discussed with the field workers.

Forced vital capacity (FVC), forced expiratory volume in one second (FEV_1), mid forced expiratory flow (FEF_{50}) and FEV1 percent in relation to FVC (FEV1/FVC) were registered. FVC was defined as the largest of either forced expiratory or forced inspiratory vital capacity from technically acceptable curves. The reported FEV1 was the largest value from technically acceptable curves.

4.3.3 Physical activity (Appendix 1, q 50, 53-56)

Physical activity was assessed by frequency of exercise using a question from the "WHO cross-national survey of health behavior in school aged children" (q50) [139]. Frequency of exercise was divided into three levels (Appendix 2).

The questions about different types of sports and participation in organized activities and competitions (q 53-56) had not previously been used in other studies. Different sports were divided into five groups: "Individual high endurance sports"," "Individual low endurance sports", "Swimming", "Bodybuilding and fight sports" and "Team sports" (Appendix 2).

4.3.4 Health problems, medication and health services (Appendix 1, q 10-12, 14,15,19-21,28,29,34,36-39,63,66, 93-98)

The questions about perceived health and disabilities (q10, 11) have previously been used in adult HUNT . Subjective health problems (q12), allergy (q34, 36) sleeping problems (q63), medication (q37) and use of health services (q93-98) are similar to questions used in other studies, but especially designed for the ***young-hunt*** study. The more frequent health problems were dichotomized differently from the less frequent problems (Appendix 2). Questions of respiratory symptoms were standardized questions from the ISAAC questionnaire, translated according to the ISAAC protocol [62]. The term wheeze can not be directly translated to Norwegian, therefore terms most frequently used by youth with bronchial obstruction when describing their symptoms were used [140].

Acute bronchitis were defined as "Yes" to the question "Do you have a cold with cough or do you have bronchitis today" from the interview during the clinical examination.

Except for allergy and respiratory disease, the number of students who reported any chronic disease was small (q 38 and 39). Diabetes, epilepsy, heart disease, rheumatism, bowel disease, cancer, kidney disease, and skeletal disease were therefore combined into one variable called "chronic disease".

4.3.5 Social factors (Appendix 1, q 2,3,67,68,71,84,87)

These questions were partly adopted from the "Ung i Norge" study (NOVA) and partly designed for the ***young-hunt*** study. Divorced parents, mother/father/sibling's smoking and seen parents drunk were considered as "*environmental factors*", while education, perceived health, out with friends, homework, watching TV, organized activity and sports, physical exercise and drunkenness were considered as "*individual factors*" (Appendix 2).

4.4 Statistical methods

Independent Samples t-tests were used for comparisons between boys and girls regarding initiation age of smoking, number of cigarettes smoked, years of daily smoking and numbers of pack years.

Chi-square and Odds Ratio (OR) were used to study significance and strength of associations between smoking habits and health variables (Paper I) and social factors (Paper IV). Fisher's exact test was used when one cell had an expected frequency of less than five. Because of multiple comparisons, significance was set at $p < 0.01$, but 95% Confidence Intervals (CI) were shown in the tables. The analyses were stratified according to age and sex.

Logistic regression was performed to estimate independent importance of social factors (Paper IV), and effects of smoking habits on respiratory symptoms (Paper II) and sports (Paper III). Odds Ratio with 95% confidence intervals were calculated from the regression models. Significance of sex differences in associations between smoking habits and respiratory symptoms (Paper II) was tested adding sex and smoking interaction to the model.

Linear regression models were used to compare lung function and smoking habits and physical activity, with FVC, FEV1, FEF50 and FEV1/FVC as dependent variables in separate models (Papers II and III). Age, height, weight, passive smoking, rhinitis, current

bronchitis and physical exercise (Paper II and comparing types of sports in Paper III) were adjusted for. All models were sex specific. Daily smokers and never smokers were analyzed separately in Paper III.

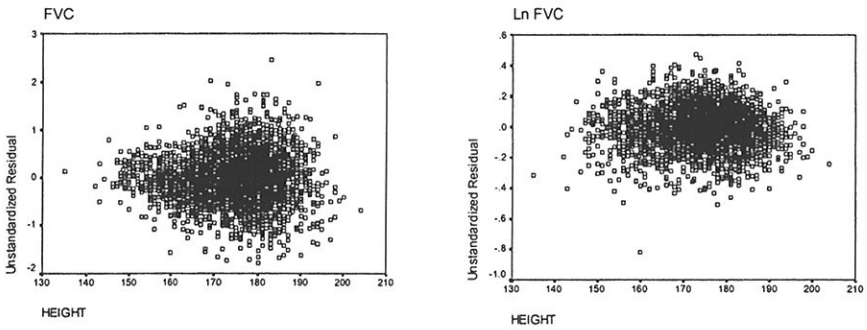
Model assumptions was tested in each model by histogram (frequencies against regression standardized residuals), P-P plots for regression (expected cumulative probability against observed cumulative probability) and scatter plots for regression (unstandardized residuals against the different variables). The assumptions tested were linearity (mean of dependant variable (Y) is a linear function of X), normality (normal distribution of Y for each predictor variable X) and homoscedasticity (variability of Y, as assessed by variance or standard error is the same for all Xs). Variables tested in the models were age, height and weight. The assumption of homoscedasticity was not met for height (fig 4.1). Logarithmic (ln) transformation of lung function (Y) was used to fit model assumptions. Age was not strictly linearly correlated to FEV1 in boys, but age squared did not improve the model. Height was linearly correlated to the logarithmic (ln) transformation of FVC, FEV1 and FEF50 at all ages.

Analyses of variance were used for comparisons between mean values of lung function measures of different smoking burdens and different levels of physical activity with age, height, weight, passive smoking, rhinitis, current bronchitis and physical activity as covariates. Boys and girls were analyzed separately, and in Paper III daily smokers and never smokers were also tested separately.

Estimates with confidence intervals for smoking effects and effects of physical activity on lung function were expressed as percent differences, calculated from the logarithmic scale, with never smokers as reference in Paper II, and those who exercised one day a week or less as reference in Paper III. Since the value of the betas was less than 0.1 the percentage was derived using the actual betas multiplied by 100. With values of beta closer to one, the correct formula would have been $e^{beta} - 1$ [141,142].

SPSS Base 8.0 for Windows (SPSS Inc. Illinois, US) was used for all analyses.

Figure 4.1 Testing the assumption of homoscedasticity; scatter plots for regression of FVC and height in boys before (left) and after (right) ln transformation in the linear regression models used in Papers II and III.



5 Review of Paper I-IV

5.1 Paper I

Health Problems in Teenage Daily Smokers Versus Nonsmokers, Norway, 1995-97 .

The Nord-Trøndelag Health Study

Turid Lingaas Holmen, Elizabeth Barrett-Connor, Jostein Holmen, Leif Bjermer

Am J Epidemiol 2000; 151:148-155

Background and aims: Increased morbidity among smoking teenagers has been reported, but specific current health problems and medication use other than narcotics have received less attention. The aim of this study was to examine the association between subsequent health problems and daily smoking in teenagers.

Methode: 90% of all teenagers attending junior high or high schools participated in a cross- sectional study, conducted in Nord-Trøndelag County, Norway, 1995-97, including 8,040 students, 13-18 years. Information on smoking habits, health problems, medication use, and use of health services was obtained in schools by self-administered questionnaire and by interview.

Results: Fifty-five percent of boys and 57% of girls had tried smoking, and 9% and 11%, respectively, reported current daily smoking. Compared to boys and girls who had never smoked, daily smoking in both sexes and all age groups was associated with significantly poorer perceived health, respiratory symptoms, headache, neck and shoulder pain, stomachache, nausea, frequent heart beats, nervousness/restlessness and sleep problems. Daily smokers used more medications and health services.

Conclusions: Daily smoking by adolescents is already associated with specific health problems. Whether or not the association is causal, daily smoking identifies a group of adolescents with health problems, for whom preventive strategies should also imply medical and social support.

5.2 Paper II

Gender differences in the impact of adolescent smoking on lung function and respiratory symptoms. *The Nord-Trøndelag Health Study, Norway, 1995-97*

Turid Lingaas Holmen, Elizabeth Barrett-Connor, Jack Clausen, Arnulf Langhammer, Jostein Holmen, Leif Bjermer (Submitted)

Background and aims: Smoking may increase respiratory symptoms and adversely affect lung function in adolescents. Girls take up smoking at least as frequently as boys. If girls are more vulnerable to impact of smoking, morbidity and mortality related to smoking could increase. Sex specific impact of smoking needs evaluation.

Method: All students in junior high and high schools in Nord-Trøndelag County, Norway, 1995-97, were invited to a cross-sectional study. Information on smoking habits and respiratory symptoms was obtained by self- administered questionnaire. Spirometry was performed by specially trained nurses in accord with ATS standards.

Results: 8,305 students (83%) completed both questionnaire and spirometry. Among the 6,811 students aged 13-18 years (50.3% girls), with no history of asthma, 2,993 (44%) reported never smoking, 665 (9.8%) reported occasional smoking and 677 (9.9%) reported daily smoking; mean initiation age: 13.9 years. Smoking was more common in girls, but boys smoked more daily cigarettes and reported more pack years of smoking. In all smoking categories, including occasional smokers, smokers reported a higher prevalence of respiratory symptoms than non-smokers. Symptoms increased with smoke burden. Compared to boys, girls reported more respiratory symptoms and greater increase in symptoms with comparable smoke burdens. A dose-response relation between smoking and reduced levels of lung function was found in girls only. Both boys and girls with light smoke burden had higher lung capacity (FVC) than never smokers.

Conclusion: Girls were more vulnerable than boys to the impact of smoking on both respiratory symptoms and lung function.

5.3 Paper III

Physical activity, sports and lung function in smoking versus non-smoking adolescents. *The Nord-Trøndelag Health Study, Norway, 1995-97*

Turid Lingaas Holmen, Elizabeth Barrett-Connor, Jack Clausen, Jostein Holmen, Leif Bjermer

(Accepted for publication in Eur Respir J)

Background and aims: Sport participation has been encouraged in smoking cessation programs. We studied the association between smoking habits and physical activity, particularly participation in different types of sports and lung function.

Method: All students, 13-19 years, in Nord-Trøndelag County, Norway, 1995-97, were invited to a cross-sectional study. Information on smoking habits and physical activity was obtained by self- administered questionnaire. Spirometry was performed in accord with ATS standards.

Results: 8,305 (83%) completed both questionnaire and spirometry. 6,811 (49.7% boys), aged 13-18, without asthma were included in this paper. Of these, 2,993 (44%) reported never smoking, and 1,342 (19.7%) reported current smoking (9.8% daily). Overall, frequency of physical exercise was inversely associated with smoking, but students who participated or had participated in individual low endurance sports, swimming, bodybuilding, or fighting sports were significantly more likely to be daily smokers than those who did not participate in these sports. Both daily smokers (53%) and occasional smokers (43%) were more likely to have quit sports than never smokers (26%). In never smokers, a positive dose response was found between physical exercise and better lung function (FVC and FEV1) in both boys and girls; no similar significant dose response relation was seen among daily smokers.

Conclusions: These data suggest that smoking habits in different types of sports should be considered when promoting physical activity as smoking prevention, and sports organizations should include smoking prevention programs. Adolescents with better lung function may self-select into sports; this possibility needs to be studied in a longitudinal design.

5.4 Paper IV

Adolescent occasional smokers, a target group for smoking cessation?

The Nord-Trøndelag Health Study, Norway, 1995-97

Turid Lingaas Holmen, Elizabeth Barrett-Connor, Jostein Holmen, Leif Bjermer.

Prev Med 2000:31:682-690.

Background and aims: Adolescent smokers are often unsuccessful in quitting and difficult to retain in cessation programs. In health promotion, focusing on the right target groups is essential. The aim of this study was to examine if adolescent occasional smokers differ from daily smokers, and if possible differences could be useful for targeted smoking cessation programs.

Methods: 91% of all teenagers attending junior high or high schools participated in a cross-sectional study, conducted in Nord-Trøndelag County, Norway, 1995-97, including 8,460 students 13-18 years old. Information on smoking habits, education, after school activities and parental status was obtained by self-administrated questionnaires.

Results: 54% of boys and 57% of girls had tried at least one cigarette. Of these, 36% of boys and 41 % of girls were current smokers, half of whom reported occasional smoking. Students who had quit smoking had more often been occasional than daily smokers. Compared to daily smokers, occasional smokers participated in higher academic courses, were more engaged in organized activities and sports, had been less drunk and had better family role models.

Conclusion: These findings support potential utility of focusing on occasional smokers as a special target group in smoking cessation programs, and suggest that smoking cessation programs for occasional smokers may need a different focus than programs for daily smokers.

6 General discussion

6.1 Methodological considerations

In an epidemiological study accuracy in estimation is an overall goal. To achieve this the study should be designed and conducted with the aim of reducing random and systematic errors [143]. Precision in measurement and estimation correspond to reduction of random errors, while validity of a study corresponds to lack of systematic errors. Validity is usually divided into two parts: internal validity and external validity.

6.1.1 Precision

One major problem in applying results drawn from a sample to the total population is that the play of chance may always affect the results observed because of random variations between samples [143]. Whether or not there is a sampling error when a total population is studied is argued. According to professor Rothman [143] it should be standard practice to treat all epidemiological studies, also cohort studies, as having sampling errors. Other sources such as the measurements of key variables also contribute to the overall inaccuracy. Precision can be increased by increasing the size of a study or by improving the design to increase efficiency. The degree to which chance or random errors may account for the results can be evaluated by tests of statistical significance.

The ***young-hunt*** study was designed to include the total teenage population in Nord-Trøndelag County. The response rate was high, and the sample size quite large for this age group, indicating precise estimates. However, the events of some of the key variables were not common, and this reduced the statistical power. This was so for daily smokers in the younger age groups and for the higher levels of pack years in all age groups. Rare events also applied to some health problems, to medication used and to participation in some type of sports. This would tend to diminish the significance of associations giving a type II error. Significance found in spite of this indicates strong associations. Lack of power is reflected in broad confidence intervals for these variables in Papers I-IV. A type II error cannot be excluded when

no significant association was found between the highest levels of smoke burden and reduced lung function in boys (Paper II), and when no significant association was found between lung function and frequency of physical activity in smokers (Paper III). This is discussed in the papers.

6.1.2 Internal validity

Internal validity is defined as the degree to which the results of an observation are representative for the particular group of people being studied [144]. Three general types of biases can reduce internal validity: selection bias, information bias and confunding [143].

6.1.2.1 Selection of subjects and study participation (selection bias):

The target group of the ***young-hunt*** study was all inhabitants in the county aged 13 –19 years. As described in chapter 4.1.8, two sources were used for invitations, defining two separate groups: "Youth registered in schools" and "Youth <u>not</u> registered in schools".

Since the 19 year olds who had graduated from school were not invited, the total attendance rate of the 19 year olds were low. It might not be expected that those who had already graduated from school would yield a systematic bias, but we excluded the 19 years olds in the papers because they were few. The 12 year olds and 20 year olds who were registered in the study were also excluded because they were not the target group of the study and because they were few.

<u>"Youth registered in school"</u>

Youth not participating were mostly not in school on the day of the study, did not get consent to participate from their parents (less than 1% in the age group 13-15) or did not want to participate. Some were unable to participate because of disabilities. The exact number of such disabled students was not registered, but the number was low. The high response rate indicates that the study cohort represents the population fairly well, and that no serious selection bias is present. However, it is possible that students absent from school generally might have had

more health problems than responders. If in addition, they were more frequently never smokers, this could weaken the association between daily smokers and current health problems reported in Paper I. However, compared to responders, non-responders are more likely smokers [107,145-147]. Associations could also be reduced if there were more healthy daily smokers (Paper I) or more physical active daily smokers (Paper III) among non-responders, but this seems unlikely. More smokers in the non-responder group would tend to strengthen the associations.

"Youth registered as not in school"

Since no one was registered as not in school in the age group attending junior high schools (13-16 years), this problem only applied to the age group 16-19 years.

Only adolescents in 13 of the county's 24 municipals (285 youths) were invited from this group because the lack of resources. The response rate was very low, 12% (tab 4.1). 7% replied that they were attending other schools or were not living in the county, and another 7% replied that they did not want to participate. The lists obtained from the school authorities were also lacking information, for example, it was uncertain how many occupational trainees who were registered. The internal validity cannot be expected to be satisfactory within this group in the ***young-hunt*** study. As less education is known to be associated with more smoking and other health related factors [6], also discussed in Paper I, non-responders from the group of youth not in school could be expected to strengthen the associations found in all the papers.

6.1.2.2 Self reported information (Information bias)

All self-reported information may be influenced by the veracity of the responders.

Smoking habits

Risk taking health behaviors, such as smoking habits, can be especially vulnerable to truthful reporting in adolescence. It is at the same time considered non-acceptable among most guardians, but may in many peer environments be considered as "cool", an admirable habit. The questions about smoking habits that were used have not been validated.

However, some features in the study design foster truthful reporting. Confidentiality was stressed and no names were attached to the questionnaire. Smoking habits were not the focus of the study and were included with a variety of other items. Self-reported smoking habits have been found to be reliable in young adults in Norway, and also others suggest accurate reporting by adolescent daily smokers and non-smokers [136,148].

In the ***young-hunt*** study the participants were also interviewed about smoking habits (Appendix 2). The questions were not identical, but answers were compared to the answers given in the questionnaire (Table 6.1). Non-smoking students registered as smokers or students with a higher smoking level from the questionnaire to the interview may reflect the time difference between the two settings. Only seven of those who reported that they never had tried smoking in the questionnaire were registered as smokers in the interview (none as daily smokers). The agreement between the answers in the questionnaire and the interview was also good for daily smokers, 98% of daily smokers in the interview also reported smoking in the questionnaire. The agreement was not good for occasional smokers. About half of those who reported occasional smoking in the questionnaire said they were non-smokers in the interview. This might be due to different interpretation by the students and the project nurses of occasional smoking, but was more likely an under reporting of occasional smoking in the interview. Under reporting may be due to differences in questions or reluctance to report smoking in the interview. Also other studies have shown that occasional smokers might be misclassified as non-smokers, while self-reported daily smoking and non-smoking are reliably reported [136].

Considering this information, the data on smoking habits used in Papers I-IV are from the questionnaire.

Table 6.1. Comparisons between smoking habits reported in the questionnaire and in the interview among adolescents, 13-18 years, in the ***young-hunt*** study.

Smoking habits in the questionnaire	Smoking habits in the interview: Non smokers		Occasional smokers		Daily smokers		Total	
Never tried smoking, not one cigarette	3,447	(99.8 %)	7	(0.2 %)			3,454	(100.0 %)
Tried smoking, but were non smokers	2,075	(98.7 %)	25	(1.2 %)	2	(0.1 %)	2,102	(100.0 %)
Previous smokers	441	(84.6 %)	61	(11.7 %)	19	(3.6 %)	521	(100.0 %)
Occasional smokers	393	(51.8 %)	314	(41.4 %)	52	(6.9 %)	759	(100.0 %)
Daily smokers	45	(5.6 %)	109	(13.6 %)	650	(80.8 %)	804	(100.0 %)
Total	6,401	(83.8 %)	516	(6.8 %)	723	(9.5 %)	7,640	(100.0 %)

Smoking data were missing for 253 students.

Health problems and physical activity

Health outcomes cannot be expected to be equivalent with diagnosed illness, but the students' subjective feelings of health problems may be just as relevant. Information bias related to smokers reporting more health problems because they know smoking is harmful cannot be excluded. However, questions on health problems were answered before questions on smoking, reducing the possibility of differential misclassification. Validity is supported by the consistency in the reporting of health problems, medication use and use of health services. These questions were also placed in different sections of the questionnaire.

It cannot be excluded that students participating in some sports reported less smoking because they felt that smoking was not accepted by sportsmen, or wrongly reported smoking because smoking was considered to be "cool" by participants in that sport. Questions on sport activities were also placed after, and far from, the questions on smoking.

Implications for the results in Papers I-IV

Paper I: Since daily smokers reported more school absence and more health problems compared to never smokers, any misclassifications of smokers would have tended to reduce smoking-symptom associations (bias towards the null value). Smokers who wrongly reported health problems would strengthen the associations, but the study design and consistency in reporting make this less likely.

Paper II : Any misclassification of smokers and smoke burden would tend to reduce associations between smoking and lung function. However, the gender differences could be affected if misclassifications of daily versus never smokers were higher in boys than in girls. Since boys were heavier smokers than girls, consistent with other studies in different countries [6,8,11,13], this would imply that never smoking boys to a larger extend wrongly reported daily smoking and daily smoking boys more often reported an excessive amount of smoking. Although we cannot exclude this, it seem unlikely as never smokers are seldom found to report daily smoking in any sex, and an under reporting of amount of cigarettes is more likely than over reporting [136,148].

The associations would be strengthened if youth with reduced lung function for other reasons wrongly reported smoking. This is not likely, and is also contradicted by the finding that smokers with low smoke burden had larger lung capacity than never smokers

Paper III: Misclassification of smokers would tend to reduce associations with physical activity. The associations could be exaggerated if smokers wrongly reported less physical activity. Consistency with other studies makes this seem unlikely. It is also unlikely that never smokers wrongly reported smoking associated with some sports.

Paper IV: Only never smokers wrongly reporting occasional smoking could be expected to increase differences between occasional and daily smokers. Comparing the questionnaire and the interview in the ***young-hunt*** study, and findings from other studies make this unlikely [136,148].

The consistency of prevalence and gender differences with results from other studies of adolescent smoking also support the validity of the present results [5,6,13,93].

6.1.2.3 Lung function (Information bias)

Spirometry is an effort-dependent maneuver with many possibilities of influencing internal validity. It requires careful subject instruction, understanding, coordination and cooperation. This in turn makes the interaction between technician and the person tested crucial for a good result. Other within individual variations are body position, head position and circadian rhythms [69]. Standardized procedures, checking of the equipment, carefully training of project nurses and quality control were practiced in the ***young-hunt*** study to minimize differences between participants and between project nurses. Spirometry was conducted during school hours making influence of circadian rhythms less important.

Acceptability of spirometry measures

Flow-volume curves of all students with FVC higher or equal to 150% of predicted, and FEV1 higher or equal to 140% or less or equal to 70% were inspected, and not acceptable curves (n= 56) were excluded.

Most adolescents were unable to sustain expirations for 6 seconds or more before triggering automated cessation of collection of spirometry data. The mean expiratory time registered was 3.7 seconds in boys and 3.4 seconds in girls. It is well accepted that youth empty their lungs faster than adults [64,68,149]. Compared to predicted values for adolescence programmed in the computers (prediction equations by Zapletal et al. [65]), mean FVC was 102.3% in boys and 104.7% in girls. This supports sufficient expiration time.

Studies in adults have reported that up to one forth of the subjects studied do not meet the ATS 87 recommendations [150]. This is consistent with failures to meet the recommendations (other than expiration time of 6 seconds) in the ***young-hunt*** study. It is acknowledged in the ATS recommendations that they are difficult to meet, especially in children and adolescents, and it is not advised to exclude subjects not meeting the expiration time and reproducibility criteria, or subjects with sub maximal efforts (Clausen J, personal communication) [64,68,149,151]. The recommendations on lung function testing from the European Respiratory Society and the American Thoracic Society are now in the process of being reviewed [152].

Implication for the results (Papers II and III)

Since light smokers and physically active youth were found to have better lung capacity than never smokers and the physically less active youth, a systematic error would occur if smokers and physical active youths were more able to produce acceptable curves. Daily smokers had a higher average forced expiratory time (FET) than those who had never tried smoking (3.3 vs 3.1, p=0.01 in boys and 3.3 vs 2.7, p <0.001 in girls). If this was due to daily smokers being able to empty their lungs better than never smokers, it might have accounted for the larger values of FVC. However, longer expiration time is also associated with bronchial obstruction of the smaller airways [69]. As smokers reported more respiratory symptoms, more unrecognized bronchial obstruction could be a plausible reason for longer expiration time. After adjustment for FET, FVC in occasional smoking girls was barely no longer significantly higher compared to never smokers (p=0.07), other results reported in the Papers were not changed. No significant difference was found between mean expiratory time in physical active youth compared to those who were less physical active.

All students with curves accepted during testing were included in the analyses, regardless of error codes registered in the Jaeger Masterscope. However, the analyses in Paper II and III were also done after excluding students with different error codes and low effort (PEF/FEF50 <1.25). This did not materially change the results.

6.1.2.4 Confounding factors

Confounding occurs when the effects of risk factors have not been separated and it is therefore incorrectly concluded that the effect is due to one rather than the other variable. A confounder must be a risk factor for the outcome, and also associated with the exposure, but should not be an intermediate step in the causal path between exposure and outcome [143].

Several methods are available to control confounding, either through study design or analysis of results. Confounding factors were considered in the statistical analyses in the papers included in this thesis. When multivariate models were used, variables included in the models were previously described risk factors for smoking, respiratory symptoms and lung function [6,153,154]. Boys and girls were analyzed separately. Adolescents with known asthma were excluded from the analysis.

Socioeconomic status may be negatively associated with cigarette smoking, physical activity and health [6,121,155-158]. Questions about economic and educational status of the parents were not included in the ***young-hunt*** study, and could not be adjusted for in the analyses. Other studies including socioeconomic status have found an independent association between smoking and health problems and physical activity [86,93,94]. Smoking habits and lung function are associated with race [6,14,15,69]. Number of students of other races than Caucasian registered in the study was so few (3 blacks and 13 Asian) that this could not influence the results.

6.1.3 External validation

External validity or generalizability is the extent to which the results of a study apply to people not in it. Determining the validity of a generalization is ultimately a matter of informed judgment [143].

The large number of participants and high participation rate supports a high external validity of the study population of 13-18 years old in the county. Nord-Trøndelag has a sex and age distribution similar to Norway as a whole. The same is true for geography, industry, sources of income and economy. The county lacks large cities and the levels of average education and income are also somewhat lower than the average of the country. This may affect prevalence of smoking. Prevalence of smoking in Nord-Trøndelag, both in adults and adolescents, has been found to be somewhat lower than the national mean [5]. The lower values for occasional smoking seen in the ***young-hunt*** study compared to those from the National Council of Tobacco and Health [11] may also be due to differences in the phrasing of the questions [5]. It is unlikely that the associations would be effected by higher prevalence of smoking. The results

are judged also to have international generalizability to people of similar race and culture. Consistency with findings in previous studies supports both nationally and internationally generalizability [6,10,13,93].

6.2 Importance of results and implications

Smoking and health

Paper I is one of few papers that have reported associations between daily smoking and multiple current somatic and psychosocial health problems, and the use of medication in adolescents. As discussed in the paper, causality cannot be assumed from this cross-sectional study. Smoking itself may cause some symptoms [3,6,88,94], but other symptoms could be the result of stressful life situations that may lead to smoking [6,49,86,89,91]. If smoking is the cause of presented health problems, the young age and short duration of daily smoking (mean 1.6 years) call for concern.

That adolescent girls may be more vulnerable than boys to the effects of the same smoke burden on lung function has not been previously published (Paper II). The greater increase in symptoms per level of smoke burden in girls, also found in adults [107], confirms that females are more susceptible to changes in bronchial reactivity due to smoking. If girls now smoke more or at least as frequent as boys do, morbidity and mortality of cigarette smoking will increase in the years to come.

The dose response increase in respiratory symptoms seen in both boys and girls (Paper II) indicates that smoking has an early impact on respiratory function also in boys and that symptoms precede changes in lung function. This supports the importance of being aware of health problems in young smokers, also lung function, especially in daily smoking girls.

The larger lung capacity found in light smokers compared to never smokers (Paper II) has also been reported by others [93,159,160], but not given much attention. These findings are important to account for when examining effects of smoking on lung function in adolescents, and may be one reason for contradictory result reported in different studies [6].

Why young light smokers might have larger lung capacity than non-smokers is not known. Longitudinal studies have indicated that it is those with a larger lung capacity who take up smoking [93,160]. They suggest that those with larger lung capacity do not feel the same discomfort when they try smoking for the first time. Discomfort does not seem to explain the difference in the ***young-hunt*** study because smokers were compared to those who had never tried smoking. Another reason may well be that adolescents who take up smoking are more developed than never smokers, and that stage of puberty affects lung function in addition to age and height. These questions need more attention.

Whether physical exercise actually leads to a better lung capacity is debated [72-75,77-80]. Studies focusing on this in a total population of youth with different levels of activities have been lacking, as well as studies comparing the effects on physical activity in smoking and non-smoking adolescents. Causality can not be confirmed, but, as discussed in Paper III, findings suggest a selection of youth with larger lung capacity into sports activities.

Smoking prevention and cessation

Information about short-term health effects (Paper I) is probably as important to adolescents as long-term effects, and cold be beneficial in smoking prevention programs. To the extent that smoking is started by more stressed or depressed adolescents, more education and information alone will not prevent smoking. Preventive strategies should also offer medical and social support to these youths.

Frequency of physical activity was inversely related to current smoking consistent with other studies (Paper III) [6,13,122-125]. This, together with the finding that a much higher percent of smokers than never smokers quit sports, support the importance of promoting physical activity in smoking cessation and prevention. However, differences in smoking habits in different types of sports have previously received little attention, but must be taken into consideration. Different smoking habits also enhances the importance of smoking prevention within sports organizations.

Preventing the transition from occasional smoking to daily smoking would have a large personal and public health potential. Nicotine dependence of heavier smokers have been

reported previously in adolescence [6,29,36], but other possible differences between occasional and daily smokers have not been well documented. It is expected that many of the occasional smokers in the ***young-hunt*** study will become daily smokers (Paper IV), but the observed differences between occasional and daily smokers may indicate that the adult pattern of intermittent smokers [33,34] may start at an early age. Whether transitional or not, adolescent occasional smokers differs from daily smokers. Occasional smokers seem more likely to be in the contemplative stage needed to stop. A more academic approach in smoking cessation could be tried, and motivations other than health effects may be more important since their perceived health risk may be smaller than for daily smokers.

The early average age of smoking initiation strongly indicates that early intervention is necessary. Gender differences suggests that early intervention is especially important in girls.

7 Future research

The ***young-hunt*** study covers a series of topics that will give an important contribution to the understanding of somatic and mental health and lifestyle in adolescence. At present, six different additional projects are working with data from ***young-hunt*** including mental health and quality of life, eating disorders, headache, asthma and allergy, reading and writing disorders and life style. Validation of the questions used in the ***young-hunt*** study is needed, and this is being planned.

A longitudinal study gives possibilities to explore new and unanswered questions derived from the cross-sectional study. Presently, a four-year follow-up study of the ***young-hunt*** study, ***young-hunt 2000/01,*** is being conducted. Students (about 3500) who were in junior high schools (13-16 years) during the ***young-hunt*** study in 1995-97 are invited. These students are attending high schools (16-19 years) during the new study period from spring 2000 to spring 2001. The follow-up study has the same administration and the same procedures as in 1995-97, including questionnaire and clinical examinations (except for measuring blood pressure). This study is also a new cross-sectional study for the age group 16-19 years giving the possibility to study time trends. Youth not in school will get a closer monitoring. The adolescents who participated in the ***young-hunt*** study in 1995-97 will also be followed as adults in the planned HUNT III study. Adolescents, 13-19 years, will be included in HUNT III giving further possibilities to study time trends.

In addition to the longitudinal studies, data from the 1995-97 ***young-hunt*** study are in the process of being merged with data from the adult HUNT I and II to yield an unique opportunity to study genetic and social associations.

Findings from the ***young-hunt*** study, reported in this thesis, raises important questions. Gender differences have received little attention in adolescence and should be further studied:

- Why do adolescent smokers report more health problems than non-smokers? Are their health problems a result of smoking or are more youths with psychological stress or with poor health likely to start smoking? Are there gender differences?

- What role do respiratory symptoms and lung function play for the onset of smoking in adolescence? Are there gender differences in the development of respiratory symptoms and growth of lung function in adolescent non-smokers compared to smokers?

- What is the effect of physical activity on lung growth? Do differences apply to smokers and nonsmokers, and to gender?

- Is there a "window of opportunity", beneficial to smoking cessation, in transition from non-smokers to regular smokers in adolescence? Can occasional smoking in adolescence be stable? How is the time trend in prevalence and incidence of smoking initiation at different ages? Are there gender differences in factors of importance to smoking initiation?

8 Conclusions

1. Associations between smoking and current health status in adolescence:

    - Compared to never smoking, daily smoking was associated with poorer perceived health and more respiratory symptoms, headache, neck and shoulder pain, stomachache, nausea, frequent heart beats, nervousness/restlessness and sleep problems in both boys and girls.

    - Girls were more vulnerable to the impact of cigarette smoking on both respiratory symptoms and lung function than boys.

    - In never smokers, there was a positive dose response association between physical exercise and better lung function (FVC and FEV1) in both boys and girls; no similar significant dose response relation was seen among daily smokers.

2. Effects of social factors and lifestyle that might be useful to smoking cessation and prevention in adolescents:

    - Frequency of physical activity was negatively associated with smoking in both boys and girls, but some types of sports were associated with more daily smokers, especially in girls. Both daily smokers and occasional smokers were more likely to have quit sports than never smokers.

    - Compared to daily smokers, occasional smokers were at higher academic levels in school, were more engaged in organized activities and sports, had been drunk less often and had better family role models with regard to smoking. Occasional smokers had quit smoking more often than daily smokers.

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Paper I
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Paper II

Gender differences in the impact of adolescent smoking on lung function and respiratory symptoms.

The Nord-Trøndelag Health Study, Norway, 1995-97

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Abstract

Background: Girls take up smoking at least as frequently as boys. If girls are more vulnerable to the impact of smoking, morbidity and mortality related to smoking could increase. The sex spesific impact of adolescent smoking needs evaluation.

Method: All students in junior high and high schools in Nord-Trøndelag County, Norway, 1995-97, were invited to participate in a cross-sectional study. Information on smoking habits and respiratory symptoms was obtained by self-administered questionnaires. Spirometry was performed by specially trained nurses in accord with ATS standards.

Results: 8,305 students (83%) completed both questionnaire and spirometry. Among 6,811 students aged 13 to 18 years (50.3% girls) with no history of asthma, 2,993 (43.9%) reported never smoking, 665 (9.8%) reported occasional smoking and 667 (9.9%) reported daily smoking (mean initiation age: 13.9 years). Smoking was more common in girls (33.4% vs. 28.4%), but boys smoked more daily cigarettes and reported more pack years of smoking. In all smoking categories, including occasional smokers, smokers reported a higher prevalence of respiratory symptoms than nonsmokers; symptoms increased with smoke burden. Girls reported more symptoms compared to boys with comparable smoke burden. A dose-response relation between smoking and reduced levels of lung function was found in girls only.

Conclusions: Girls were more vulnerable than boys to the impact of smoking on both respiratory symptoms and lung function.

Key words: Adolescents, cigarette smoking, gender difference, lung function, respiratory symptoms, epidemiology

Cross-sectional studies of adults show lower levels of lung function in cigarette smokers compared to never smokers [1]. Longitudinal studies indicate that smoking speeds age-related decline in lung function and has dose-related effects [1-3]. Cross-sectional and longitudinal studies among children and adolescents also show that smoking adversely affects lung function [2,4-8]. Respiratory symptoms are reported to be increased in smokers [4-9], and presence of wheeze in smokers may lead to a higher risk for low levels of lung function [10].

Studies of gender differences in adults show inconsistent results; several studies suggest that smoking has greater impact on lung function in men [11-15], whereas others report a more adverse effect in women [16-19]. This difference may reflect gender differences in smoking habits in the populations [18] or smoking may affect male and female lungs differently [20]. Higher rates of wheeze and hyperresponsiveness in smoking women compared to men have been attributed, partly, to smaller airway caliber and smaller lung volume in women [5,21], with a disproportionately high dose of tobacco deposited in women than in men. Also, hormones may alter response in women [20]. Tracheal epithelial response to cigarette smoke has been related to the estrous cycle [22,23].

The prevalence of adolescent smoking has been increasing. In many countries, girls smoke more frequently or at least as frequently as boys [24-26]. In one of the few studies that focused on gender differences in respiratory symptoms and lung function in smoking adolescents, Gold and colleagues [5] found cigarette smoking to be associated with mild airway obstruction and slowed growth of lung function in both sexes, but suggested that girls may be more vulnerable than boys to smoking's effect on growth of lung function. If girls are more vulnerable to effects of smoking, this would have major health implications.

The aim of this study was to examine gender specific effects of smoking and smoke burden on respiratory symptoms and lung function in an adolescent population.

MATERIAL AND METHODS

From August 1995 to June 1997, a large health survey, the Nord-Trøndelag Health Study (HUNT), was conducted in Nord-Trøndelag County, Norway. All students in junior high schools (aged 13-16 years) and high schools (aged 16-19 years) in the county were invited to the youth part of the study, YOUNG-HUNT. A self-administered questionnaire was completed during one school hour, in a setting with no opportunity to look at each other's papers. The questionnaire had no name or registration number, and was identifiable only by a bar code of the 11-digit personal number with which all Norwegians are registered at birth. Each student put the completed questionnaire in a blank envelope and sealed it. Project nurses collected the envelopes.

Questions and dichotomization used in this report are shown in the Appendix. Questions on respiratory symptoms were those used in the International Study of Asthma and Allergy in Childhood (ISAAC) [27]. Current smokers were defined as those who answered "yes" to ever having tried smoking at least one cigarette and in addition answered "yes, I smoke daily" or "yes, I smoke occasionally, but not daily" to the question: "Do you smoke now?" (Appendix). Smokers were compared to those who answered "no" to ever having tried smoking. "Pack years" was defined as number of years of daily smoking multiplied by number of cigarettes smoked daily divided by twenty, and grouped as follows: "Never smokers": those who had never tried smoking; "Light smokers": pack years greater than zero, but less than one; "Medium smokers": one pack year or greater, but less than two; "Heavy smokers": two pack years or greater. Thirty self-reported daily smokers who did not report years of smoking were excluded. Smoke burden refers to occasional smoking and pack years. Passive smoking was defined as exposure to smoking at home by parents or siblings.

A clinical examination that included spirometry and height and weight and was performed within a month after completion of the questionnaire. Spirometry was performed by specially trained nurses, in accord with American Thoracic Society (ATS) standards [28], using computerized pneumotachographs (Jaeger Masterscope, software version 4.15, Jaeger Inc, Wurtzberg, Germany). The acceptability of spirometry results was assessed both during the testing and during the data analysis, and included review of the computerized ATS error codes reported from the Masterscopes as well as visual inspection of volume/time and flow/volume graphics. Achieving end-of-test acceptability was confirmed either from the computerized ATS error code regarding flow plateaus or from visual inspection of spirometry displays during testing.

Forced vital capacity (FVC), forced expiratory volume in one second (FEV1), mid forced expiratory flow (FEF50) and FEV1 percent in relation to the maximal FVC (FEV1%FVC) were registered. FVC was defined as the largest of either forced expiratory or forced inspiratory vital capacity from technically acceptable curves. The reported FEV1 was the largest value from technically acceptable curves. Standing height without shoes was measured using standardized meter measures.

Ethics

Each student signed a written consent to participate in the study. Parents of students who were less than 16 years of age also gave written consent. The Regional Medicine Ethical Research Committee and the Norwegian Data Inspectorate Board approved the study.

Statistics

Students who reported ever having had asthma were excluded from these analyses. Girls and boys were analyzed separately. Significance of gender differences was tested adding sex and smoking interaction to the models. Comparisons between age at onset of smoking and mean pack years were made using Independent Sample t-tests. For symptoms, comparisons were performed using logistic regression adjusted for age, exposure to passive smoking and smoking groups.

Lung function was analyzed using linear regression models with FVC, FEV1, FEF50 and FEV1%FVC as dependent variables. Because of hetrocedasity, logarithmic (ln) transformation of lung function (Y) was used to fit model assumptions. Separate models were made for daily smoking, occasional smoking, and different groups of pack years, adjusted for age, standing height, weight, passive smoking, physical activity, rhinitis and acute bronchitis with cough. Estimates and 95% confidence intervals are expressed as percent differences, calculated from the logarithmic scale, with those who had never tried smoking as reference.

SPSS Base 8.0 for Windows (SPSS Inc. Illinois, US) was used for all analyses.

RESULTS

Ninety-two percent of all students (aged 13-19 years) answered the questionnaire, and 8,305 (83%) also completed spirometry with acceptable expiratory flow volume curves. Included in these analyses were 6,811 students aged 13 to 18 years (50.3% girls) who reported never having had asthma (Table 1). Of this number 2,993 (43.9%) reported never having tried smoking, 665 (9.8%) reported occasional smoking, and 677 (9.9%) reported daily smoking (Table 2). Both daily and occasional smoking increased with age

($p < 0.001$). Mean age of smoking initiation was 13.9 years in both boys and girls for daily smokers, but was significantly later in occasional smokers, 14.3 years for boys ($p=0.002$) and 14.4 years for girls ($p<0.001$). Among daily smokers, mean years of daily smoking were 2.3 years in boys and 2.5 years in girls. On average, boys smoked more cigarettes daily (9.8 cigarettes) than girls (7.9 cigarettes) ($p<0.001$). There was no significant difference between overall mean pack years for boys (0.24) compared to girls (0.21) ($p=0.21$), but in the heavy smoking group (two pack years or more), boys had higher mean pack years (3.4) than girls (2.7) ($p=0.001$).

Symptoms. Compared to never smokers, more smokers reported recent (past 12 months) wheeze or dry cough at night in the absence of respiratory infection (Table 3). Symptoms increased with smoke burden. Among smokers with compatible smoke burden and among never smokers, girls reported more respiratory symptoms than boys (Fig 1). The finding of the greater increase in symptoms with increasing smoke burden in girls than in boys was confirmed by a significant sex-pack years interaction ($p<0.001$) in the logistic regression model.

Lung function: Occasional smokers had significantly better FVC than those who had never tried smoking (Fig. 2); this was true in both boys ($p<0.001$, mean difference 180 ml) and girls ($p= 0.04$, mean difference 62 ml). In similar comparisons only boys had significantly larger FEV1 ($p= 0.002$, mean difference 105 ml); no significant differences were found for FEF50 or FEV1%FVC in either boys or girls.

In daily smokers, a dose-response was found between smoking and levels of FEV1, FEF50 and FEV1%FVC in girls, but not in boys (Fig. 2). Compared to never smokers, FEV1 and FEF50 levels in girls were significantly lower only in heavy smokers (two packyears or more) (mean difference 145 ml, $p=0.01$ and mean difference 399 ml, $p=0.002$, respectively), whereas levels of FEV1%FVC were significantly lower for both

medium smokers (pack years one or more, but less than two) and heavy smokers (p=0.03 and p=0.001). The largest reduction, found in heavy smokers, was 3.8%. Both daily smoking boys and girls had higher FVC than never smokers, but boys had higher FVC with a higher smoke burden than girls. For girls this was significant only in light smokers (mean difference 120 ml, p=0.002), whereas in boys significantly higher levels of FVC were found in medium smokers (mean difference 213 ml, p=0.003) (Fig. 2). FVC decreased with increasing smoke burden in girls, but did not become significantly different from never smokers or from light smokers.

Although smoking adolescents were more likely than nonsmokers to have smoking family members, this source of passive smoking did not explain the gender differences (data not shown). Results were also not materially changed when analyses were repeated including the students with known asthma (data not shown). The effect of smoking on respiratory symptoms or lung function parameters did not differ in the 467 girls who used contraceptives compared to the girls who did not (data not shown).

DISCUSSION

In this large study of adolescents, with high participation rates and carefully supervised spirometry testing, girls were more vulnerable than boys to the effects of the same cigarette smoke burden on lung function and respiratory symptoms. To our knowledge, such gender differences in adolescent lung function (FEV1, FEF50 and FEV1/FVC) have not been published previously. A study by Gold et al [5], implied that girls might be more vulnerable than boys to the effect of smoking on growth of lung function, but reported no other gender difference.

Increasing wheeze and cough with increasing smoke burden is in agreement with other studies [4,5,9]. Rates of wheeze and cough were higher for girls than for boys in each level of smoking, concordant with the findings of Gold et al [5]. In the present study, girls who never smoked also reported more wheeze and cough than boys who had never smoked, but girls also reported more frequent symptoms with regard to multiple other health problems, suggesting that girls perceive symptoms differently than boys or report them more readily [20]. Nevertheless, the greater increase in symptoms per level of smoke burden in girls compared to boys, suggest that girls really are more susceptible to changes in bronchial reactivity with smoking. In girls only, a dose – response relation was found between smoking and levels of FEF50 and FEV1%FVC, parameters typically associated with obstructive airway disease [5,29] in agreement with the greater increase in symptoms with increasing smoke burden in girls. The dose-response increase in symptoms seen in boys indicates that smoking has an early impact on respiratory function in boys too, and that symptoms precede changes in lung function, illustrating the potential importance of focusing on current health problems in young smokers when encouraging smoking cessation [30].

The observation of increased symptoms in both sexes, whereas physiological consequences measured as changes in lung function are seen in girls only, is consistent with a gender difference secondary to the lower airway caliber in girls compared to boys.

Gold et al. [5] also found reduced FEF25-75 and FEV1/FVC with the highest level of smoke burden in boys. This was not found in the present study, using the same measure of smoke burden (number of cigarettes per day, with 15 or more as highest level), and the same lung function parameters. The number of both boys and girls with the highest smoke burden (two pack years or more), was smaller in the present study than the number in the study of Gold et al. It is unlikely that a type II error in the present study explain the significant differences found in girls only, in that boys had the highest smoke burden.

It has been postulated that effect of smoking on respiratory symptoms or lung function is modulated by hormonal factors [20,22,23]. Only 13% of girls in the present study were using oral contraceptives, and no different effect of smoking on respiratory symptoms and lung function were observed in users compared to nonusers.

Lung capacity (FVC) was greater in light smokers compared to never- smokers, concordant with previous cross-sectional and longitudinal studies of young people [5,31,32]. This suggest selection bias of adolescent smokers equivalent to "the healthy smokers effect", described in adult populations [18,19]. This bias may explain the different impact of smoking on lung function seen in different cross sectional studies of young people [4]. It is not known whether such selection bias applies differently to boys and girls, but it is unlikely that gender differences in pulmonary function in heavy smokers in explained by healthy smoker bias.

A correlation between smoking and the incidence of asthma and bronchial hyperreactivity has been reported, implying that girls, compared to boys, have an increased risk of bronchial hyperreactivity and of developing asthma if they smoke [21,33]. To study the impact of smoking on respiratory symptoms and lung function we excluded students reporting known asthma, the majority of whom reported having asthma before they started smoking. Including students with known asthma in the analyses did not change the results.

All students with curves accepted after assessment of flow/volume curves were included in these analyzes, including students not meeting the 1987 ATS criteria judged by the ATS error code message from the Jaeger Masterscope. It is not recommended to exclude data because both expiration for 6 seconds and the reproducibility criteria have been shown to be difficult to meet in young people and people with small lung volumes [28,34,35]. Excluding any group not achieving these recommendations might exclude smokers. Bronchial hyperreactivity in both boys and girls, and cigarette smoking in young girls especially, are important risk factors for not achieving ATS recommendations [36]. Nevertheless, analyses that were also done

excluding students with different ATS error codes registered did not significantly change the results (data not shown).

Self-reported smoking habits and respiratory symptoms were potentially subject to biased reporting. However, anonymous study was designed to foster truthful reporting and self-reported smoking habits have been found to be reliable in young Norwegian men and women [37]. Pack years was chosen as measure of smoke burden for daily smokers because both duration (years with smoking) and intensity (number of cigarettes) of smoke exposure are expected to affect lung function. Pack years could be biased by age when smoking began, but debut age did not affect lung function when substituted for pack years in regression model (data not shown).

These data support the thesis that girls are more susceptible to the effects of smoking than boys. Because girls now smoke more or at least as frequently as boys, the possibility that they are more vulnerable to the effects of smoking, suggests an increasing female burden of morbidity and mortality due to cigarette smoking. This plus the early average age of smoking initiation confirms the importance of early intervention for smoking prevention, especially for young girls.

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TABLE 1 Age and sex distribution of students, aged 13-18 years, who reported never having asthma, had acceptable flow-volume curves, and participated both in the questionnaire and the lung function test in the Young-Hunt study.

	BOYS		GIRLS		TOTAL	
Years	n	(%)	n	(%)	n	(%)
13	553	(16.3)	552	(16.1)	1105	(16.2)
14	646	(19.1)	663	(19.3)	1309	(19.2)
15	639	(18.9)	671	(19.6)	1310	(19.2)
16	569	(16.8)	569	(16.6)	1138	(16.7)
17	544	(16.1)	507	(14.8)	1051	(15.4)
18	432	(12.8)	465	(13.6)	897	(13.2)
TOTAL	3383	(49.7)*	3427	(50.3)*	6811	(100.0)

* Percent of all.

TABLE 2 Smoking status in adolescents, 13-18 years, participating in the YOUNG-HUNT study with both self-reported questionnaire and spirometry with acceptable curves. Adolescents who ever had asthma were excluded.

	AGE 13-15 YEARS		AGE 16-18 YEARS		
	Boys n (%)	Girls n (%)	Boys n (%)	Girls n (%)	TOTAL n (%)
Never tried smoking, not even (	979 (53.3)	964 (51.1)	543 (35.1)	507 (32.9)	2993 (43.9)
Tried smoking, but reported to	438 (23.9)	459 (24.3)	490 (31.7)	439 (28.5)	1827 (26.8)
Previous smokers	109 (5.9)	131 (6.9)	90 (5.8)	107 (6.9)	437 (6.4)
Occasional smokers	114 (6.2)	182 (9.7)	168 (10.9)	201 (13.0)	665 (9.8)
Daily smokers	113 (6.1)	100 (5.3)	207 (13.4)	257 (16.7)	677 (9.9)
Missing data	84 (4.6)	50 (2.7)	48 (3.1)	30 (1.9)	212 (3.1)
TOTAL	1838 (100.0)	1886 (100.0)	1546 (100.0)	1541 (100.0)	6811 (100.0)

TABLE 3 Odds of wheeze or night cough in the last 12 months by smoke burden in adolescents included in the lung function study, adjusted for age and passive smoking and compared to those who had never tried smoking.

	Never tried smoking	Occasional smokers			Daily smokers								
					Pack years >0<1			Pack years ≥1<2			Pack years ≥2		
	n (%)*	n (%)*	OR (CI)	p	n (%)*	OR (CI)	p	n (%)*	OR (CI)	p	n (%)*	OR (CI)	p
BOYS:													
Wheeze	182 (13.4)	48 (19.4)	1.5 (1.0-2.1)	0.03	44 (35.5)	3.3 (2.2-5.1)	<0.001	31 (49.2)	5.8 (3.4-10.0)	<0.001	35 (49.3)	5.7 (3.4-9.6)	<0.001
Cough	185 (12.4)	72 (25.9)	2.3 (1.6-3.1)	<0.001	46 (35.4)	3.5 (2.3-5.2)	<0.001	40 (52.6)	5.5 (3.4-9.1)	<0.001	32 (40.5)	3.9 (2.4-6.6)	<0.001
GIRLS:													
Wheeze	235 (18.5)	111 (35.2)	2.2 (1.7-2.9)	<0.001	92 (56.4)	5.0 (3.5-7.2)	<0.001	49 (57.0)	4.8 (3.0-7.8)	<0.001	38 (70.4)	8.5 (4.5-16.1)	<0.001
Cough	250 (17.5)	119 (31.6)	2.0 (1.6-2.6)	<0.001	101 (54.6)	5.2 (3.7-7.2)	<0.001	51 (51.0)	5.2 (3.7-7.3)	<0.001	40 (71.4)	10.2 (5.5-19.1)	<0.001

* Percent of total number of boys and girls in the smoke burden group

Compared to wheeze, 25 more boys and 24 more girls answered the cough question.

Odds ratio (OR), Confidence interval (CI)

APPENDIX . Questions and alternative answers used in the study.

Questions	**Possible Answers**					
Have you ever tried smoking (at least one cigarette)?	Yes	No				
If yes, do you smoke?	Yes, I smoke __ cigarettes daily	Yes, I smoke occasionally, but not daily	No, previously I smoked daily	No, previously I smoked occasionally	No, I don't smoke	
How old were you when you started smoking?	___Age					
How many years all together have you been smoking daily?	___Number of years					
Does anyone in your home smoke?[1]	No	Yes, mother	Yes, father	Yes, siblings		
During the last 12 months, have you had problems with sneezing and/or a clogged or runny nose when you do NOT have a cold or the flu?	Yes	No				
During the last 12 months; have you had wheeze or heavy breathing?	Yes	No				
During the last 12 months; have you had dry cough at night without having a cold or the flu?	Yes	No				
Do you have a cold with cough or bronchitis today?	Yes	No				
Outside school hrs.: How many days a week do you play sports, or exercise to the point where you breathe heavily and/or sweat?	Every day	4-6 d	2-3 d	1d	every 14d	Every month	Less/never

[1] The answer is dichotomized into: no one smokes (no) and someone smokes (mother and/or father and/or siblings smoke)

Figure 1 Wheeze last 12 months and cough at night (without having a respiratory infection) last 12 months in adolescents by smoke burden compared to those who had never tried smoking. Those who reported ever to have had asthma are excluded.

Gender difference in impact of smoking

Figure 1

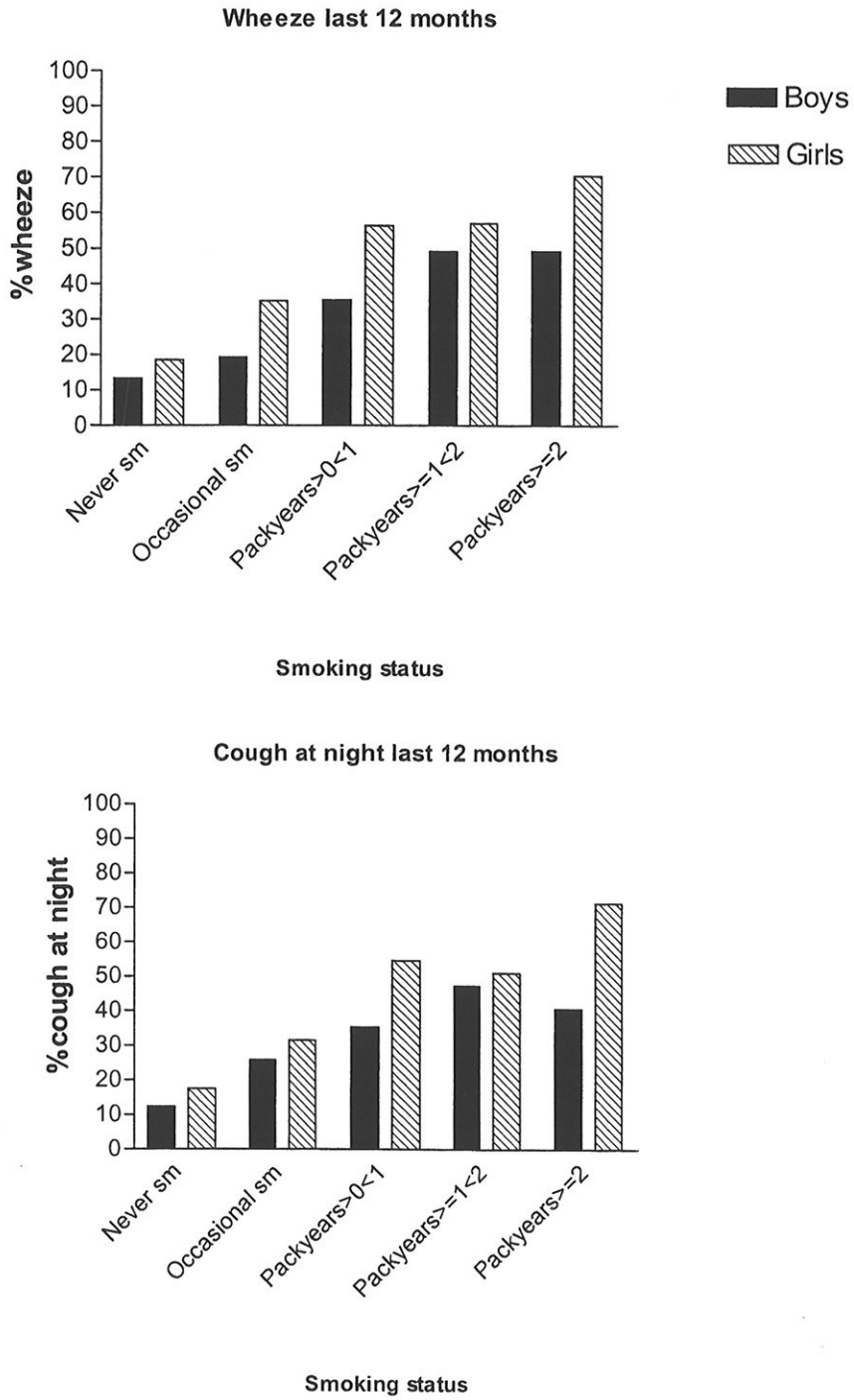
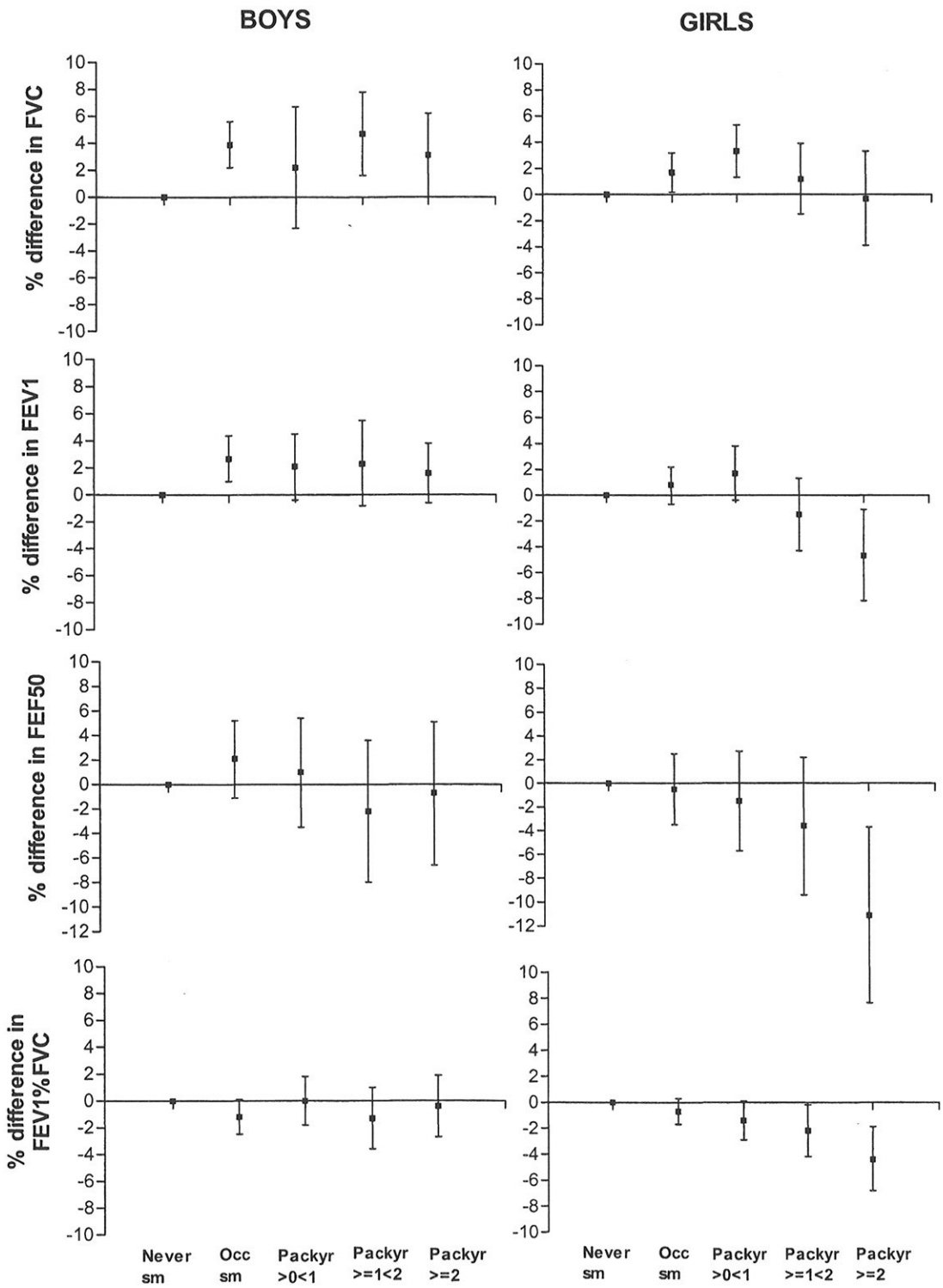


Figure 2. Sex-specific effects of smoking on lung function in adolescents, 13-18 years; boys: n=2124 and girls n=2211. Percent differences and 95% confidence intervals for differences were calculated on a logarithmic scale using those who had never tried smoking as reference, and adjusting for age, height, weight, passive smoking at home, exercise, rhinitis and acute bronchitis with cough.

Gender difference in impact of smoking

Figure 2



Paper III

Physical activity, sports, and lung function in smoking verses non-smoking adolescents.

The Nord-Trøndelag Health Study, Norway, 1995-97.

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Key words: Adolescents, smoking, physical activity, sports, lung function

Abstract

We studied the association between adolescent smoking habits and physical activity, particularly participation in different types of sports, and lung function.

All students aged 13-19 years in Nord-Trøndelag County, Norway, 1995-97, were invited to a cross-sectional study. Information on smoking habits and physical activity was obtained by self- administered questionnaire. Spirometry was performed in accord with ATS standards.

Of the 6,811 students (aged 13-18, without asthma,) included, 2,993 (44%) reported never smoking, and 1,342 (20%) reported current smoking (10% daily). Frequency of physical exercise was inversely associated with smoking, but participants in some types of sports were more likely to be daily smokers than non-participants. Both daily (53%) and occasional smokers (43%) were more likely to have quit sports than never smokers (26%). In never smokers, a positive dose response was found between physical exercise and better lung function (FVC and FEV1, adjusted for age and height); no similar significant association was observed in daily smokers.

These data suggest that smoking habits in different types of sports should be considered when promoting physical activity as smoking prevention, and sports organizations should include smoking prevention programs. Adolescents with better lung function may self-select into sports; this possibility needs to be studied in a longitudinal design.

Low physical activity is associated with increased morbidity and mortality in adulthood (1,2). An underlying premise for promotion of physical activity in youth is that it may persist through adulthood and may also reduce the risk for initiating unhealthy habits such as smoking (3).

Several cross-sectional studies have reported that physically active adolescents and those who participate in sports are less likely to be regular smokers (4-7) compared to sedentary youths. Encouraging participation in sports has been widely recommended for smoking cessation programs (4,8,9). Aaron et al (8) found female adolescents less likely to initiate smoking if they were more physically active or fit, but male adolescents showed a trend (not significant) toward more active individuals being more likely to initiate cigarette use. Smoking habits among participants of different types of sports have received little attention.

Some studies report a positive association between physical activity and physical fitness and lung capacity (10-13), while others do not (14). Whether physical activity increases lung function remains uncertain. Adult smoking sportsmen exhibit some degree of lung function impairment compared to non- smoking sportsmen, but still have better lung function than smokers who are not sportsmen (15). Young swimmers have been found to have better lung function than sedentary youth, as have participants of other sport activities (10,16,17). An impact of training on lung growth in young swimmers has been suggested (16,17), but other studies have found no effect of physical activity on lung growth (18,19). Smoking in youth has been found to increase respiratory symptoms and decrease rate of lung growth (4,20-22).

In this paper we report the cross-sectional association between smoking habit and physical activity, participation in different types of sports, and lung function in adolescents.

MATERIAL AND METHODS

From August 1995 to June 1997 a large health survey, the Nord-Trøndelag Health Study (HUNT), was conducted in Nord-Trøndelag County, Norway. All students in Junior High Schools (13-16 years) and High Schools (16-19 years) in the county were invited to the youth part of the study, YOUNG-HUNT. A self-administered questionnaire was completed during one school hour, in a setting with no opportunity to look at each other's papers. The questionnaire did not include the participants' names, the subjects were linked to the questionnaire by a bar code of the 11-digit personal number with which all Norwegians are registered at birth. Each student put their completed questionnaire in a blank envelope and sealed it. Project nurses collected the envelopes.

Questions used in this presentation are shown in Appendix. Physical activity were assessed using frequency of exercise from the question: " Outside of school, how many days a week do you perform sports or exercise until you get short of breath and /or sweaty". Activity was divided into three groups: "exercising 4 days a week or more", "exercising 2 to 3 days a week" and "exercising 1 day a week or less". Different kinds of sports were divided into the following five groups: "*Individual high endurance sports*" including cross country skiing, cycling and running; "*Individual low endurance sports*" including slalom skiing, horseback riding and gymnastics; "*Swimming*"; "*Body building and fight sports*" including body building, weightlifting, boxing, wrestling, Judo,
Taekwondo and similar sports; and "*Team sports*" including football/soccer, handball, basketball and volley ball.

Current smokers were defined as those who answered "yes" to ever having tried smoking (at least one cigarette) and in addition answered "yes, I smoke daily" (daily

smokers) or "yes, I smoke occasionally, but not daily" (occasional smokers) to the question: "Do you smoke now?" Smokers were compared to those who answered "no" to ever having tried smoking one cigarette (never smokers). Passive smoking was defined as exposure to smoking at home by mothers, fathers or siblings.

Within a month after completing the questionnaire, the students underwent a clinical examination, performed in schools, including measuring of spirometry, and body size measures. Spirometry was performed by specially trained nurses, in accord with American Thoracic Society (ATS) standards (23), using computerized pneumotachograph (Jaeger Masterscope, software version 4.15, Jaeger Inc, Wurtzberg, Germany). The acceptability of spirometry results was assessed both during the testing and during the data analysis, and included review of the computerized ATS error codes reported from the Masterscopes, and visual inspection of volume/time and flow/volume graphics. Many subjects were unable to sustain expirations for 6 seconds or more before triggering automated cessation of collection of spirometry data. Achieving end-of-test acceptability was confirmed either from the computerized error code regarding flow plateaus or visual inspection of spirometry displays during testing.

Forced vital capacity (FVC), forced expiratory volume in one second (FEV1), mid forced expiratory flow (FEF_{50}) and FEV1 percent in relation to the maximal FVC (FEV1%FVC) were registered. FVC was defined as whichever was largest of either forced expiratory or forced inspiratory vital capacity from technically acceptable curves.

The reported FEV1 was the largest value from technically acceptable curves. Standing height was registered without shoes with standardized meter measures.

Students reporting a history of asthma were excluded from these analyses.

Ethics

Each student signed a written consent to participate in the study. Parents of students less than 16 years also gave their written consent. The study was approved by the Regional Medicine Ethical Research Committee and the Norwegian Data Inspectorate Board.

Statistics

Comparisons of age at onset of smoking and leaving active sports were made by Independent Sample t-tests, and comparisons of categorical variables by chi square. Comparisons between daily smokers and those who had never tried smoking were performed using logistic regression with age, exposure to passive smoking and physical activity in the model. Amount of exercise (days per week with exercise) were adjusted for when comparing different types of sport activities. Separate models were used for girls and boys and for different types of sports.

Analyses of lung function were done by linear regression models with FVC, FEV1, FEV1%FVC and FEF50 as dependent variables. Because of hetrocedasity, logarithmic (ln) transformation of lung function (Y) was used to fit model assumptions. Separate models were made for daily smokers and for those who had never tried smoking, adjusted for age, standing height, weight, passive smoking, physical activity, rhinitis and acute bronchitis with cough in both boys and girls. Estimates and confidence intervals are expressed as percent differences from the logarithmic scale, with those who reported lowest level of exercise (one day a week or less) as reference. Comparisons of height within each level of

physical exercise were also done at all ages (13-18) using one way analysis of variance. Girls and boys were analyzed separately. 95% confidence intervals (CI) are shown. SPSS Base 8.0 for Windows (SPSS Inc. Illinois, US) was used for all analyses.

RESULTS

Eighty-three percent (8,305) completed both questionnaire and spirometry. Included in these analyses were 6811 students without asthma, aged 13-18, 50% boys.

Smoking: As shown in Table 1, 2,993 students (45.0% of boys and 42.9% of girls) had never tried smoking and 1342 students (17.8% of boys and 21.6% of girls) reported current smoking, 9.9% daily (Table 1). Daily smoking increased with age ($p < 0.001$), and was marginally more common in girls ($p=0.09$). In daily smokers, mean age when smoking began was 13.9 years in both boys and girls. Overall, 52.2% boys and 52.8% girls reported being exposed to passive smoking at home.

Physical activity: Most students (68%) said they exercised at least 2 days a week outside school hours (Table 2). Boys exercised more than girls ($p<0.001$), and participated more in sports competition ($p<0.001$). Compared to the younger age group (13-15 years), both boys and girls in the older age group (16-18 years) exercised less ($p<0.001$) and joined in less sports competition ($p<0.001$). Compared to girls, more boys participated or had participated in individual endurance sport ($p<0.001$) and bodybuilding and fight sports ($p<0.001$), while girls participated more in individual low endurance sport ($p<0.001$) (Table 2). Overall, 31.4% boys and 34.4% girls reported having participated in sports previously but not currently.

Physical activity, sports and smoking: Current smoking was more prevalent in students with lower levels of physical exercise (Fig. 1). It was more common in body building and fighting sports, swimming, and individual low endurance sports compared

to team sport and individual high endurance sport, especially in girls (Table 3). More daily smokers (51.6 of boys, 60.7 of girls) and occasional smokers (42.7% of boys, 38.9% of girls) had dropped out of active sports compared to never smokers (25.7% boys, 26.8% girls), $p<0.001$. Mean age for quitting sports was similar in daily smokers (boys 14.8, girls 14.5) and never smokers (boys 14.5, girls 13.9). About 35% had started smoking before they quit sports; another 30% started smoking and quit sports in the same year.

Daily smokers reported less physical activity and less participation in sport competitions than never smokers (Table 4). Both boys and girls currently participating in team sport and sport competitions (regardless of what type of sport) were less likely to be daily smokers than those who did not. In boys, daily smoking was positively associated with both current and previous participation in bodybuilding and fight sports and with present participation in swimming. Girls who had previously participated in these types of sports and low endurance sports were more often daily smokers than girls who had not participated. Few daily smoking girls were participating in bodybuilding/ fight sports and swimming, however (Table 3).

Lung function and physical activity. A significant difference in mean height by exercise status was seen only between the highest and lowest level of exercise at age 13 (mean difference 2.2 cm, $p=0.01$). To be certain that different height at different levels of exercise did not explain different lung capacity, age and height were adjusted for in the regression analyses of lung function.

In never smoking boys and girls there was a step-wise increase in levels of FVC and FEV1 with increasing frequency of exercise (Fig 2). There was a clinically and statistically significant mean difference between the highest and lowest level of exercise for FVC was: boys 195 ml, $p<0.001$, girls 122 ml, $p<0.001$ and for FEV1: boys 154 ml,

p<0.001, girls 119 ml, p<0.001. The same dose response relationship was observed in daily smokers, but this trend was not statistically significant (fig. 2). Daily smoking boys with medium level of exercise had significantly larger FEV1 compared to the lowest level of exercise. No significant associations were found between FEF50 and FEV1%FVC and frequency of exercise in never smokers or daily smokers.

Both never smoking boys and girls who participated in sports competitions (regardless of type of sport) had larger FVC, FEV1 and FEF50 compared to those who did not participate (adjusted for frequency of exercise). Mean differences in boys: FVC 95 ml, p=0.01, FEV1 113ml, p<0.001, FEF50 155ml, p=0.03, and in girls: FVC 65ml, p=0.04, FEV1 70ml, p=0.01, FEF50 156ml, p=0.02. No such differences were found in daily smokers.

Lung function and different types of sports. Never smoking boys and girls who presently participated in team sport had marginally higher FEF50 (mean difference: boys 174ml, p=0.05, girls 151ml, p=0.06) than those who did not. Girls participating in team sports also had larger FEV1 (mean difference 80ml, p=0.03) compared to non-participating girls. Daily smoking boys who presently participated in low endurance sport had significantly lower FEV1 (p=0.05) and FEF50 (p=0.04) than non-participating boys. No other differences were found for other types of sports in never smokers or daily smokers.

Never smoking boys and girls who remained active in sports had better lung capacity compared to those who were no longer active. Mean difference in boys: FVC: 135ml, p<0.001, FEV1: 125ml, p<0.001, and in girls FVC: 69ml, p=0.01, FEV1: 63ml, p=0.01. No such difference was seen in daily smokers.

DISCUSSION

In this study of a large general population of adolescents, with high participation rate and carefully supervised spirometry testing, higher levels of physical exercise were associated with less daily smoking overall, but daily smoking was more frequent in students who participated or had previously participated in some types of sports, most notably, individual low endurance sports, body building, fighting sports and swimming. Larger lung capacity (FVC and FEV1) independent of age and height was found in never smokers with higher levels of physical exercise, no similar significant association was observed in daily smokers.

The inverse association between physical activity and current smoking is consistent with other studies (4,5,7,8). This observation, along with the finding that a much larger percent of smokers than never smokers had quit sports, suggests a role for promoting physical activity in smoking prevention. However, some types of sports were associated with more smoking, even after adjusting for the frequency of exercise. Daily smoking was more often associated with individual sports either demanding less endurance, or associated with less frequent participation in competitions. It is not clear whether these differences by type of sport are because smoking is perceived as less likely to impair performance or reflect peer influence, which plays an important part in adolescent smoking (4,24,25).

Difference in smoking habits among different types of sport has previously received little attention. If confirmed elsewhere, it suggests that type of sport should be considered when sports are recommended for smoking prevention or cessation. The importance of focusing on smoking prevention within sport organizations (26) is further supported by the observation that the age of smoking initiation either preceded or coincided with the age of quitting sports.

Whether physical exercise actually leads to better lung capacity cannot be determined in a cross-sectional study. In a prospective study, very young female competitive swimmers were found to increase their vital capacity and total lung capacity during a year of training (17), suggesting that the larger lung volumes in swimmers may be due to impact of training on lung growth. No impact of training on lung growth has been found in older swimmers or other youth (18,19). Being good in sports may depend on a better lung capacity, representing a self-selection of adolescents who both join and continue with sports. Self-selection is a plausible explanation why never smoking students who had discontinued sports had a lower lung capacity compared to never smokers who were still active.

In this (21) and other studies (20,22,27), daily smokers with a light smoke burden were found to have a larger lung capacity (FVC) than non-smokers. If daily smokers already with good lung function self select into physical activity, this would tend to diminish the observed "effects" of exercise. This possibility is supported by the finding that, among less active students, daily smokers had larger FVCs than never smokers, while no significant difference in lung capacity was found between daily and never smokers who were more physically active. Few daily smokers exercised at high levels, however, and it cannot be excluded that the absent significant association reflects only the small number of daily smoking athletes.

In this student population, the frequency of physical exercise, not the type of sport, was associated with better lung capacity; this has been reported in some studies of athletes, particularly in swimmers (10,12,16,17). In the present study, swimmers did not have better lung capacity than non-swimmers, but there were few swimmers and none competed at a high level. The independent association between participation in

sports competition and larger lung function also suggests that intensity of physical activity may be associated with larger lung function.

In spite of the computerised ATS error code warnings during testing, and careful assessment of the quality of the flow/volume curves by the nurses, a number of students did not meet the 1987 ATS criteria as judged by the ATS error code messages from the Jaeger Masterscope. As meeting the ATS criteria in adolescents have been reported to be difficult (23,28-30), and excluding any group not achieving ATS recommendation might exclude smokers, all students are included in the analysis. However, there were no significant differences in associations when all analysis of lung function values and physical exercise were performed with or without students who did not meet the different Jaeger Masterscope ATS error codes. To study the association between physical activity and lung function in daily smokers and never smokers, we excluded students who reported a history of asthma. Larger values of FEF50 and FEV1 in never smoking participants in team sport may reflect less airway dysfunction (not diagnosed as asthma) in students participating in these sports.

In this study, smoking habits were self-reported, and potentially subject to biased reporting. Some features of the study design, including confidentiality and smoking not being the study focus, were intended to foster truthful reporting. The consistency with other studies of adolescent smoking in terms of prevalence, age at initiation, and gender differences support the validity and generalizability of these results (4,31,32). The long dark winters of northern Norway may impact exercise preferences in youth, but do not appear to have impacted smoking patterns.

CONCLUSION

Higher frequencies of physical exercise were associated with less daily smoking, but daily smoking was more common in youth performing body building sport, fighting sports

and swimming than in other sports. Smokers quit sports participation more often than never smokers. Adjusted for age and height, a significant dose-reponse relation between larger lung capacity (FVC and FEV1) and levels of physical exercise was found in never smokers, but not in daily smokers. These data provide indirect support for promotion of physical activity as smoking prevention, and suggest that sport organizations should include smoking prevention programs. Initiation of sport programs before the average age of smoking initiation (age 13 in this study) could potentially yield long-term benefits in pulmonary function. A selection of adolescents with better lung function into sports is also suggested by these data, but causality will need to be studied prospectively.

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TABLE 1 Smoking status in adolescents, 13-18 years, participating in the YOUNG-HUNT study with both self-reported questionnaire and spirometry.
Adolescents who reported ever having asthma were excluded.

	Boys n (%)	Girls n (%)	TOTAL n (%)
Never tried smoking, not even one cigarette	1522 (45.0)	1471 (42.9)	2993 (43.9)
Tried smoking, but reported to be non smokers	929 (27.5)	898 (26.2)	1827 (26.8)
Previous smokers	199 (5.9)	238 (6.9)	437 (6.4)
Occasional smokers	282 (8.3)	383 (11.2)	665 (9.8)
Daily smokers	320 (9.5)	357 (10.4)	677 (9.9)
Missing data*	132 (3.9)	80 (2.3)	212 (3.1)
TOTAL	3384 (100.0)	3427 (100.0)	6811 (100.0)

* Students who did not answer the questions on smoking.

TABLE 2 Physical activity and present and previously participation in different sports in adolescents, 13-18 years, attending both questionnaire and spirometry in the YOUNG-HUNT study. Adolescents who reported ever having asthma were excluded. n= 6811

	AGE 13-15 YEARS		AGE 16-18 YEARS		
	Boys n (%)	Girls n (%)	Boys n (%)	Girls n (%)	TOTAL n (%)
Exercise until sweaty >=4 days a week (outside school)	610 (33.2)	424 (22.5)	501 (32.4)	325 (21.1)	1860 (27.3)
Exercise until sweaty 2-3 days a week (outside school)	765 (41.6)	895 (47.5)	509 (32.9)	601 (39.0)	2770 (40.7)
Exercise until sweaty <=1 day a week (outside school)	444 (24.2)	552 (29.3)	530 (34.3)	611 (39.6)	2137 (31.4)
Join in sports competitions	979 (53.3)	934 (49.5)	634 (41.0)	481 (31.2)	3028 (44.5)
Participate or previously participated in sports:					
Individual high endurance sports (cross-country skiing, cycling, running)	583 (31.7)	451 (23.9)	496 (32.1)	355 (23.0)	1885 (27.7)
Individual low endurance sports (slalom, ski jumping, horseback riding, gymnastics)	340 (18.5)	717 (38.0)	209 (13.5)	584 (37.9)	1850 (27.2)
Bodybuilding and fight sports (bodybuilding, weight lifting, wrestling, judo, karate and similar fight sports)	243 (13.2)	75 (4.0)	271 (17.5)	123 (8.0)	712 (10.5)
Swimming	178 (9.7)	188 (10.0)	136 (8.8)	148 (9.6)	650 (9.5)
Team sports (football/soccer, handball, basket ball, volley ball)	1327 (72.2)	1354 (71.8)	1113 (72.0)	1083 (70.3)	4877 (71.6)

25 boys and 19 girls did not answer the question of days with exercise pr week.

TABLE 3 Present participation in different sports in never-, occasional- and daily- smoking adolescents, 13-18 years, attending both questionnaire and spirometry in the YOUNG-HUNT study. Adolescents who reported ever having asthma were excluded. n= 6811 students

	BOYS				GIRLS			
Type of sport	Never smokers n (%)	Occasional smokers n (%)	Daily smokers n (%)	Total n (%)	Never smokers n (%)	Occasional smokers n (%)	Daily smokers n (%)	Total n (%)
Individual high endurance sports (cross-country skiing, cycling, running)	392 (84.1)	44 (9.4)	30 (6.4)	466 (100)	252 (78.8)	50 (15.6)	18 (5.6)	320 (100)
Individual low endurance sports (slalom, ski jumping, horseback riding, gymnastics)	173 (80.8)	21 (9.8)	20 (9.3)	214 (100)	332 (70.6)	98 (20.9)	40 (8.5)	470 (100)
Bodybuilding and fight sports (bodybuilding, weight lifting, wrestling, judo, karate and similar fight sports)	117 (62.9)	37 (19.9)	32 (17.2)	186 (100)	39 (60.9)	17 (26.6)	8 (12.5)	64 (100)
Swimming	86 (73.5)	15 (12.8)	16 (13.7)	117 (100)	74 (71.2)	22 (21.2)	8 (7.7)	104 (100)
Team sports (football/soccer, handball, basket ball, volley ball)	758 (80.6)	114 (12.1)	68 (7.2)	940 (100)	704 (77.7)	146 (16.1)	56 (6.2)	906 (100)

TABLE 4 Frequency of exercise and participation in different types of sports in never smoking compared to daily smoking adolescents attending both questionnaire and spirometry in the YOUNG-HUNT study.
Regression models are adjusted for age, passive smoking at home and frequency of exercise (competition and sports)
Exercise 2-3 days and 4 days or more a week are compared to exercise one day a week or less.
Odds Ratio (OR), 95% Confidence Intervals (CI), statistical significans (p).
Adolescents who reported ever having asthma were excluded. n= 6811 students.

	BOYS				GIRLS			
Exercise and sports:	OR (CI)	p	OR (CI)	p	OR (CI)	p	OR (CI)	p
Exercise until breathless/sweaty 2-3 days a week	0.4 (0.3-0.5)	<0.001			0.4 (0.3-0.5)	<0.001		
Exercise until breathless/sweaty 4 days a week or more	0.2 (0.1-0.3)	<0.001			0.3 (0.3-0.5)	<0.001		
Join in sports competitions	0.4 (0.3-0.8)	0.003			0.4 (0.2-0.7)	0.001		
	Presently participating		Formerly participating		Presently participating		Formerly participating	
Individual high endurance sports (cross-country skiing, cycling, running)	0.7 (0.4-1.1)	0.159	1.3 (0.8-2.0)	0.318	0.7 (0.4-1.3)	0.325	0.8 (0.5-1.3)	0.468
Individual low endurance sports (slalom, ski jumping, horseback riding, gymnastics)	1.3 (0.7-2.2)	0.404	1.4 (0.8-2.6)	0.199	1.6 (1.0-2.6)	0.065	2.0 (1.4-3.0)	<0.001
Bodybuilding and fight sports (bodybuilding, weight lifting, wrestling, judo, karate and similar fight sports)	3.0 (1.8-4.9)	<0.001	3.2 (1.9-5.3)	<0.001	1.4 (0.6-3.4)	0.412	3.8 (1.8-8.1)	<0.001
Swimming	1.9 (0.9-3.6)	0.038	0.7 (0.4-1.8)	0.694	1.2 (0.5-2.8)	0.625	3.0 (1.7-5.0)	<0.001
Team sports (football/scoccer, handball, basket ball, volley ball)	0.5 (0.3-0.8)	0.003	1.7 (0.9-3.2)	0.132	0.5 (0.3-0.9)	0.013	0.9 (0.6-1.5)	0.725

APPENDIX . Questions and alternative answers used in this presentation from the YOUNG-HUNT study.

Questions	Possible Answers				
Have you ever tried smoking (at least one cigarette)?	Yes	No			
If yes, do you smoke?	Yes, I smoke __ cigarettes daily	Yes, I smoke occasionally, but not daily	No, previously I smoked daily	No, previously I smoked occasionally	No, I don't smoke
How old were you when you started smoking?	___Age				
How many years all together have you been smoking daily?	___Number of years				
Does anyone in your home smoke?[1]	No	Yes, mother	Yes, father	Yes, siblings	
Not during the average school day: How many days a week do you play sports or exercise to the point where you breath heavily and/or sweat?	Every day	4-6 days a week	2-3 days a week	1 day a week	
	At least once pr 14 days	At least once a month	Less than once a month	Never	
Are you actively involved in sports?	Yes	No, but I used to participate		No	
How old were you when you stopped participating?	___Age				
Which sport(s) do/did you participate in?	Skiing (cross country)	Skiing (slalom/ski jump)	Soccer/football	Horse riding	Handball/basket/ volleyball
	Fight sports /boxing	Body building	Weight lifting	Cycling	Track/field/orientation
	Swimming	Gymnastics			
Do you participate in competitive sports?	Yes	No, but I used to participate		No	

Figure 1 Frequency of exercise until sweaty or breathless outside school and smoking habits in adolescents, 13-18 years, attending both questionnaire and spirometry in the YOUNG-HUNT study. Students who reported ever having asthma were excluded. N=6811 students. *Never sm:* never smokers; *Occ sm:* occasional smokers; *Daily sm:* daily smokers.

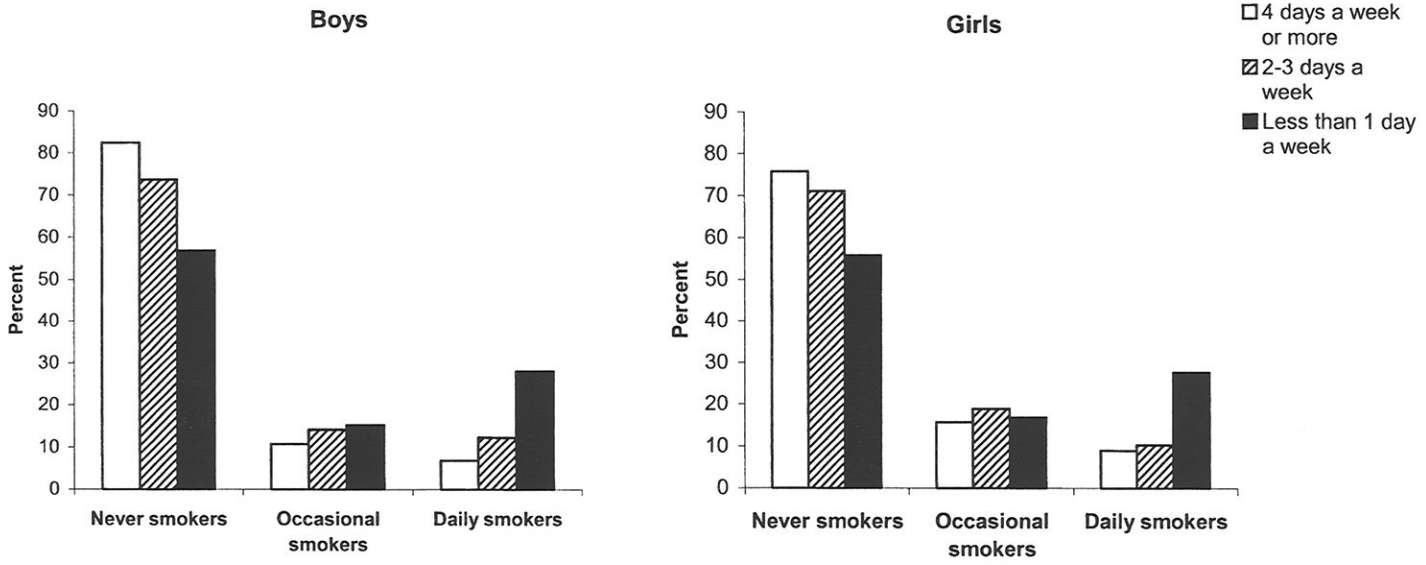
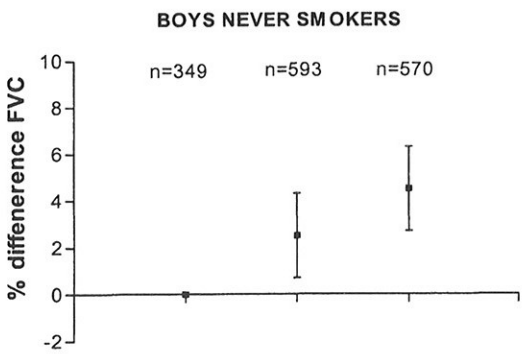
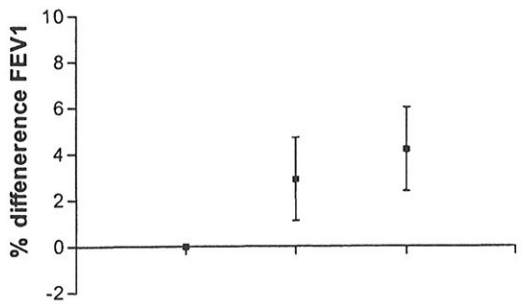
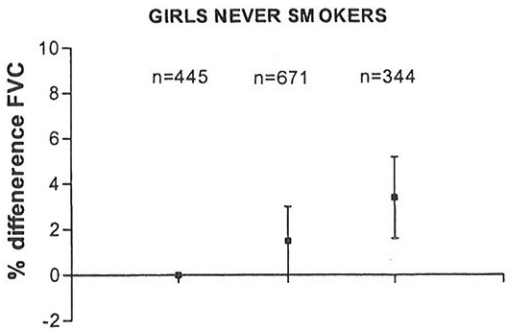
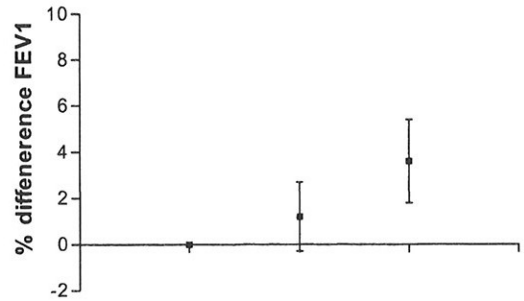


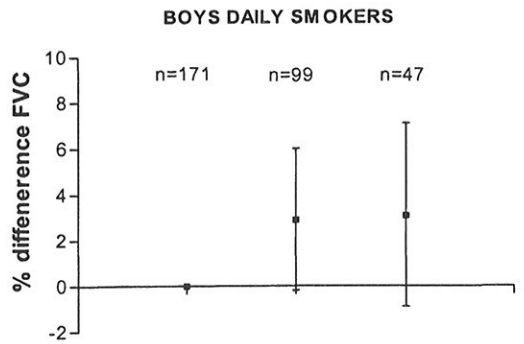
Figure 2 Effects of physical exercise on lung function in never smoking and daily smoking adolescents, 13-18 years, attending both questionnaire and spirometry in the YOUNG-HUNT study. Students who reported ever having asthma were excluded. Percent differences and 95% confidence intervals for differences were calculated on a logarithmic scale using those who had the lowest level of exercise (one day a week or less) as reference, and adjusting for age, height, weight, passive smoking at home, rhinitis and acute bronchitis with cough.

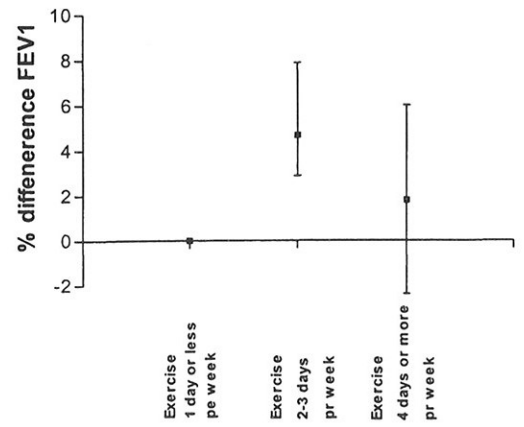

BOYS NEVER SMOKERS
n=349
n=593
n=570
% diffenerence FVC
10
8
6
4
2
0
-2

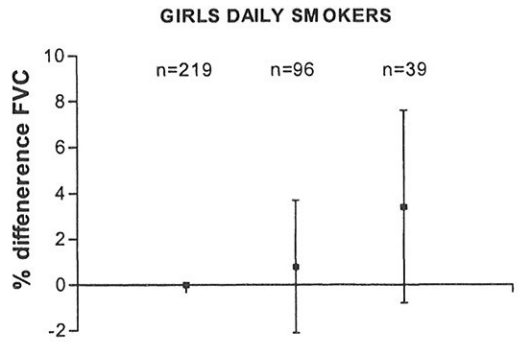

% diffenerence FEV1
10
8
6
4
2
0
-2

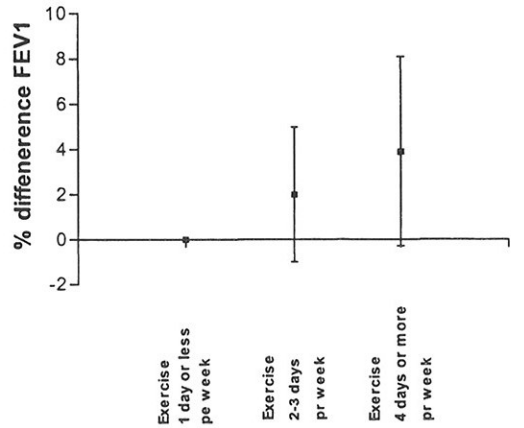

GIRLS NEVER SMOKERS
n=445
n=671
n=344
% diffenerence FVC
10
8
6
4
2
0
-2


% diffenerence FEV1
10
8
6
4
2
0
-2


BOYS DAILY SMOKERS
n=171
n=99
n=47
% diffenerence FVC
10
8
6
4
2
0
-2


% diffenerence FEV1
10
8
6
4
2
0
-2
Exercise 1 day or less pe week
Exercise 2-3 days pr week
Exercise 4 days or more pr week


GIRLS DAILY SMOKERS
n=219
n=96
n=39
% diffenerence FVC
10
8
6
4
2
0
-2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Paper IV

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Adolescent Occasional Smokers, a Target Group for Smoking Cessation? The Nord–Trøndelag Health Study, Norway, 1995–1997[1]

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Background. **Adolescent smokers are often unsuccessful in quitting and difficult to retain in cessation programs. In health promotion, focusing on the right target groups is essential.**

Aim. **The aim was to examine if adolescent occasional smokers differ from daily smokers, and if possible differences could be useful for targeted smoking cessation programs.**

Methods. **Ninety-one percent of all teenagers attending junior high or high schools participated in a cross-sectional study, conducted in Nord-Trøndelag County, Norway, 1995–1997, including 8,460 students 13–18 years old. Information on smoking habits, education, after school activities, and parents was obtained by self-administered questionnaires.**

Results. **Fifty-four percent of boys and 57% of girls had tried at least one cigarette. Of these, 36% of boys and 41% of girls were current smokers, half of whom reported occasional smoking. Students who had quit smoking had more often been occasional than daily smokers. Compared to daily smokers, occasional smokers participated in higher academic courses, were more engaged in organized activities and sports, had been drunk less often, and had better family role models.**

Conclusion. **Differences support potential utility of focusing on occasional smokers as a special target group in smoking cessation programs.**

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Key Words: **smoking; adolescence; target groups; social differences; occasional smoking; smoking cessation.**

INTRODUCTION

Despite prevention efforts, the prevalence of smoking in adolescence has been increasing [*1–3*]; programs to help adolescents quit smoking are needed. Young people appear to progress through a sequence of stages from receptivity to dependence on tobacco [*4*]. Both environmental and individual factors influence this progress. Susceptibility to smoking, family role models, peer influence, self-esteem, advertising, depression, and anxiety are all said to play an important role in initiation of childhood and adolescent smoking [*1,5–12*]. Attitude toward cigarettes and smoking role models, in combination with poor adjustment in school and access to cigarettes, appear to make early initiators more likely to continue smoking [*1,13,14*] Smokers have been shown to be less physically active and to have more health problems than nonsmokers [*1,15,16*]. Previous research has suggested that early initiation predicts longer duration, heavier daily consumption, and greater chances of nicotine dependence [*1,17,18*]. Smoking will be a long-term addiction for many adolescents who start smoking [*1,19*].

Once teenagers graduate to a given smoking status, return to earlier stages is uncommon [*20*]. Studies have shown that adolescent smokers frequently try to quit, but are usually unsuccessful, often have withdrawal reactions, are difficult to recruit and retain in cessation programs, and are not responsive to these programs [*1*]. Daily smoking in adolescence seems to be resistant to change despite an expressed desire and repeated

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cutback attempts [*21*]; occasional smokers have been shown to quit smoking more often [*22*]. Thus, occasional smokers could be an important target group for smoking cessation who could be discouraged from moving into daily smoking status. Success in smoking prevention or cessation programs requires identification of appropriate target groups.

Nicotine dependence of heavier smokers is recognized [*1,21,23,24*], but other possible differences between current occasional versus heavy smokers are not well documented. The aim of this study was to examine possible individual and environmental differences between adolescent occasional smokers and daily smokers, and to identify possible differences that could be useful for smoking cessation programs.

METHODS

In the 2-year period from August 1995 to June 1997 a large health survey, the Nord-Trøndelag Health Study (HUNT), was conducted in Nord-Trøndelag County, Norway. The county has 127,000 inhabitants and consists of rural and industrial areas with small social differences. Except for lacking a large city, it is a fairly representative cohort of the Norwegian population.

All students in junior high schools (13–16 years) and high schools (16–19 years) in the county were invited to the youth part of the study, YOUNG-HUNT. Ninety-one percent completed a self-administered questionnaire during one school hour, using the same settings as an examination, with no opportunity to look at each other's papers. No name or registration number was written on the questionnaire, which was identifiable only by a bar code of the 11-digit personal number with which all Norwegians are registered at birth. Each student put their completed questionnaire in an envelope without identification and sealed it. Project nurses collected the envelopes.

Relevant questions are shown in the appendix. Questions with more than two answering alternatives were dichotomized as shown in the appendix. Daily and occasional smokers listed age of smoking debut. Occasional smokers (current, but not daily smokers) are defined as those who answered "yes" to the question "Have you ever tried smoking?" and "Yes, I smoke occasionally, but not daily" to the question "Do you smoke now?" (Appendix). Daily smokers are defined as those who answered "yes" to the question "Have you ever tried smoking?" and on the question" Do you smoke now" marked the alternative "Yes, I smoke (number) cigarettes daily" and provided the number of cigarettes (Appendix). Those who listed the number of cigarettes smoked daily without marking the question were also included. Current smokers are defined as those who answered "yes" to either daily or occasional smoking. In this study, current occasional smokers were compared to current daily smokers.

Ethics

Each student signed a written consent to participate in the study and the parents of the students under 16 also gave their written consent. The study was approved by the Regional Medicine Ethical Committee and the Norwegian Data Inspectorate Board.

Statistics

Pearson chi-square and odds ratios (OR) analyses were used to compare occasional smokers with daily smokers. Because of multiple comparisons, significance was set at $P < 0.01$; 95% confidence intervals (CI) are shown. Logistic regression, with occasional versus daily smokers as the dependent variable, was performed to estimate the independent importance of each factor. Separate models were made for environmental factors, including parents divorced, mother/father/sibling's smoking, and seen parents drunk, and for individual factors, including education, perceived health, out with friends, homework, watching TV, organized activities,

TABLE 1

Smoking Status in Boys and Girls Attending the YOUNG–HUNT Study

	Age 13–15 years		Age 16–18 years		
	Male *n* (%)	Female *n* (%)	Male *n* (%)	Female *n* (%)	Total *n* (%)
Never tried smoking, not even one cigarette	1188 (53.0)	1127 (49.8)	693 (34.5)	631 (32.4)	3639 (43.0)
Tried smoking, but were never smokers	524 (23.4)	561 (24.8)	613 (30.5)	521 (26.8)	2219 (26.2)
Previous smokers	143 (6.4)	164 (7.2)	117 (5.8)	140 (7.2)	564 (6.7)
Occasional smokers	132 (5.9)	210 (9.3)	217 (10.8)	249 (12.2)	808 (9.6)
Daily smokers	144 (6.4)	130 (5.7)	282 (14.1)	358 (18.4)	931 (10.8)
Missing data[a]	111 (5.0)	73 (3.2)	85 (4.2)	47 (2.4)	316 (3.7)
Total	2242 (100.00)	2265 (100.0)	2007 (100.0)	1946 (100.0)	8460 (100.0)

[a] 135 boys and 94 girls did not answer the question "Did you ever try smoking?" and 61 boys and 26 girls who had tried smoking did not answer the question "Do you smoke now?"

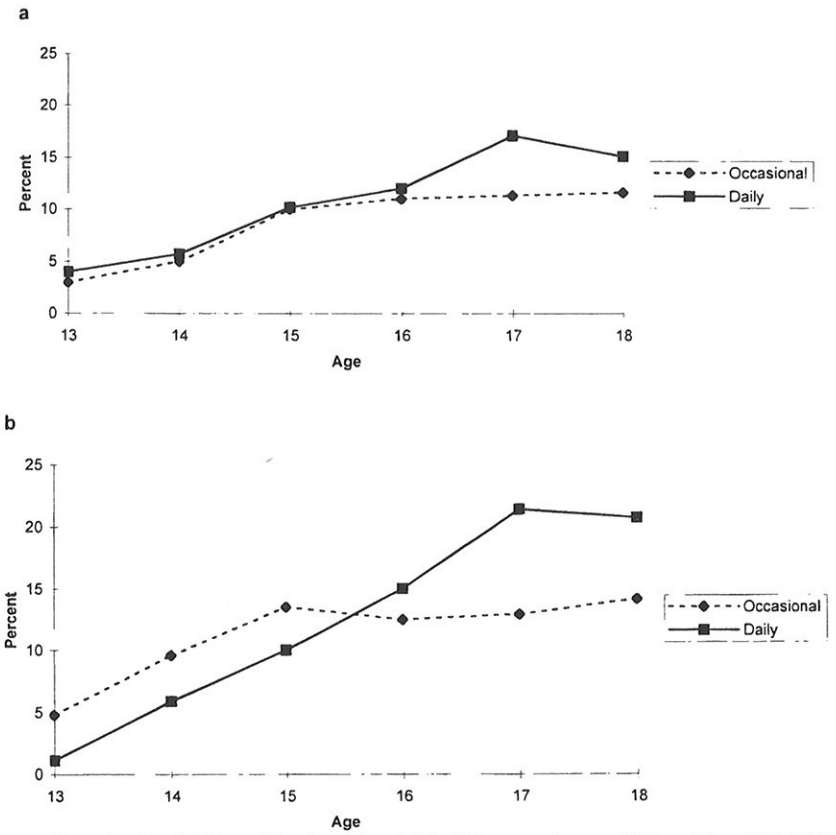

FIG. 1. Percentage of occasional and daily smoking boys (a) and girls (b) by age. *n* boys = 4053; *n* girls = 4091 (316 did not answer the smoking question).

organized sport, frequency of exercise, and drunkenness. Sex-specific analyses were stratified by age (13–15 and 16–18 years). Comparisons between debut ages were made using independent sample *t* tests. SPSS was used for all analyses.

RESULTS

Ninety-one percent of all students, 13–19 years, in the county (4,741 students in junior high school and 4,209 students in high school) participated in the study. All participants who were aged 13–18 years (8,460) were included in these analyses (Table 1).

More than half of all students (54.3% boys and 57.3% girls) had tried at least one cigarette. Current smoking was reported by 37.5% of these (n = 1,722), 34.7% of boys and 40.2% of girls. About half of current smokers reported that they were occasional smokers (Table 1). Both occasional and daily smoking were generally more common among girls than boys and increased with age in both sexes. However, fewer 18-year-olds than 17-year-olds reported daily smoking. Up to the age between 15 and 16, occasional and daily smoking were equally common in boys while occasional smoking was more common in girls (Fig. 1). After age 16, daily smoking was more common than occasional smoking in both boys and girls. Mean age of smoking onset was similar in boys and girls and slightly lower for daily smokers (13.9 years) than occasional smokers (14.4 years) ($P < 0.001$).

Of those who had tried smoking, 12.1% (564 students) reported that they had smoked previously, but had quit smoking. Most quitters, 72%, said they had been previous occasional smokers. Among previous daily smokers less than age 16, significantly more boys (63.0%) than girls (37.0%) had quit smoking (P = 0.001); no such difference was found in the older age group.

The following analyses compare occasional smokers with daily smokers, among those who were current smokers at the time they completed the questionnaire.

TABLE 2A

Odds of Being Occasional vs Daily Smoker by Environmental Factors for Adolescents Aged 13–15 Years[a]

	Boys				Girls			
	Occasional *n* (%)[b]	Daily *n* (%)[c]	OR (CI)	*P*	Occasional *n* (%)[b]	Daily *n* (%)[c]	OR (CI)	*P*
Parents not divorced	94 (71.8)	103 (69.6)	1.1 (0.7–1.9)	0.692	165 (78.6)	83 (63.8)	2.1 (1.3–3.4)	0.003
Never saw parents drunk	32 (25.2)	27 (19.3)	1.4 (0.8–2.5)	0.245	58 (28.9)	32 (25.6)	1.2 (0.7–2.0)	0.523
Mother does not smoke	81 (61.8)	70 (47.3)	1.8 (1.1–2.9)	0.015	116 (55.2)	43 (33.1)	2.5 (1.6–3.9)	<0.001
Father does not smoke	52 (39.7)	58 (39.2)	1.0 (0.6–1.7)	0.931	71 (33.8)	56 (43.1)	0.7 (0.4–1.1)	0.086
Siblings do not smoke	105 (80.2)	112 (75.7)	1.3 (0.7–2.3)	0.369	180 (85.7)	97 (74.6)	2.0 (1.2–3.6)	0.010

Note. Because missing data were excluded, the number of subjects varied for each factor.
[a] Odds ratio (OR), 95% confidence interval (CI).
[b] % of occasional smokers, aged 13–15; boys $n = 131$, girls $n = 210$.
[c] % of daily smokers, aged 13–15; boys $n = 148$, girls $n = 130$.

Environmental Factors (Tables 2A and 2B)

In the age group 13–15 years, occasional smoking girls were less likely to have divorced parents, and smoking mothers or siblings than daily smoking girls. These differences were not seen in boys. The father's smoking status was unrelated to smoking habit in boys or girls. In the older ages (16–18 years), however, significant differences between occasional and daily smokers of both sexes were found for all factors studied with one exception: fathers' smoking was more common in occasional smoking boys; no difference was found in girls.

Sixty-five percent of all students reported that they had seen their parents drunk. Compared to daily smokers, not seeing their parents drunk was more common only in the oldest occasional smoking girls.

In the regression model including environmental factors, comparing occasional and daily smokers, mothers of occasional smokers being less likely to smoke was the most influential factor in the younger boys ($P = 0.04$). Occasional smokers not having divorced parents or mothers and siblings that smoked were independent significant factors among the younger girls ($P = 0.04$, $P = 0.001$, and $P = 0.03$) and among both boys ($P = 0.03$, $P = 0.007$, and $P = 0.005$) and girls ($P = 0.006$, $P = 0.001$, and $P = 0.03$) 16 years and older.

Individual Factors (Tables 3A and 3B)

Occasional smoking girls of both age groups, and the oldest boys participated in more organized after school activities, more organized sports, more sport competitions, and harder exercise than daily smokers. In the younger age group, the occasional smoking boys and girls reported less social life without friends, and more often did at least 1 h of homework during the 7 days prior to answering the questionnaire compared to the daily smokers. No difference in social life with friends was found in the older age group. The oldest occasional smoking boys, but not girls, did more homework than daily smokers. No difference between smoking pattern and time spent watching television was found in the younger age group or the older boys. The older occasional smoking girls watched TV more often compared to daily smoking girls. Very few current smokers (9 aged 13–15 and 6 aged 16–18) had never tried to drink alcohol. In both age groups and sexes, occasional

TABLE 2B

Odds of Being Occasional vs Daily Smoker by Environmental Factors for Adolescents Aged 16–18 Years[a]

	Boys				Girls			
	Occasional *n* (%)[b]	Daily *n* (%)[c]	OR (CI)	*P*	Occasional *n* (%)[b]	Daily *n* (%)[c]	OR (CI)	*P*
Parents not divorced	179 (82.5)	205 (72.7)	1.8 (1.1–2.7)	0.010	199 (80.2)	247 (68.1)	1.9 (1.3–2.8)	0.001
Never saw parents drunk	43 (20.4)	53 (19.1)	1.1 (0.7–1.7)	0.732	55 (22.2)	49 (13.7)	1.8 (1.2–2.7)	0.007
Mother does not smoke	148 (68.2)	144 (51.1)	2.1 (1.4–3.0)	<0.001	157 (63.3)	166 (46.0)	2.0 (1.5–2.8)	<0.001
Father does not smoke	67 (30.9)	125 (44.3)	0.6 (0.4–0.8)	0.002	77 (31.0)	137 (38.0)	0.7 (0.5–1.0)	0.080
Siblings do not smoke	200 (92.2)	229 (81.2)	2.7 (1.5–4.9)	<0.001	223 (89.9)	290 (80.3)	2.2 (1.3–3.6)	0.001

Note. Because missing data were excluded, the number of subjects varied for each factor.
[a] Odds ratio (OR), 95% confidence interval (CI).
[b] % of occasional smokers, aged 16–18; boys $n = 217$, girls $n = 248$.
[c] % of daily smokers, aged 16–18; boys $n = 282$, girls $n = 361$.

TABLE 3A

Odds of Being an Occasional Smoker vs Daily Smoker by Individual Factors for Adolescents Aged 13–15 Years[a]

	Boys				Girls			
	Occasional *n* (%)[b]	Daily *n* (%)[c]	OR (CI)	*P*	Occasional *n* (%)[b]	Daily *n* (%)[c]	OR (CI)	*P*
Out with friends < 2 times a week	28 (21.5)	9 (6.3)	4.1 (1.9–9.1)	<0.001	46 (22.3)	14 (10.9)	2.3 (1.2–4.5)	0.008
Did homework > 1 h > 2 times a week	49 (37.7)	34 (23.8)	1.9 (1.2–3.3)	0.013	92 (44.7)	35 (27.6)	2.1 (1.3–3.4)	0.002
Watched TV < 4 times a week	40 (31.5)	57 (40.4)	0.7 (0.4–1.1)	0.129	72 (36.2)	51 (40.8)	0.8 (0.5–1.3)	0.404
Never been drunk	31 (24.8)	13 (9.4)	3.2 (1.6–6.4)	0.001	38 (18.9)	4 (3.1)	7.2 (2.5–20.8)	<0.001
Been drunk less than 10 times	103 (82.4)	79 (57.2)	3.5 (1.9–6.2)	<0.001	171 (85.1)	66 (51.6)	5.4 (3.2–9.0)	<0.001
Participate in organized activities	91 (69.5)	81 (56.6)	1.7 (1.1–2.9)	0.028	136 (65.7)	63 (49.6)	2.0 (1.2–3.1)	0.004
Participate in organized sports	74 (56.5)	62 (42.2)	1.8 (1.1–2.9)	0.017	111 (53.1)	45 (34.9)	2.1 (1.4–3.3)	0.001
Participate in sport competitions	60 (53.6)	50 (42.7)	1.6 (0.9–2.6)	0.101	89 (47.1)	33 (29.5)	2.1 (1.3–3.5)	0.003
Hard exercise ≥2 days a week	94 (71.8)	83 (57.6)	1.9 (1.1–3.1)	0.015	140 (67.3)	63 (50.0)	2.1 (1.3–3.2)	0.002
Plan for academic course in high school	35 (40.7)	21 (28.8)	1.7 (0.9–3.3)	0.117	97 (70.3)	25 (38.5)	3.8 (2.0–7.0)	<0.001
Perceived good health	109 (83.2)	107 (73.3)	1.8 (1.0–3.3)	0.047	178 (86.0)	72 (56.7)	4.7 (2.8–7.9)	<0.001

Note. Because missing data were excluded, the number of subjects varied for each factor.
[a] Odds ratio (OR), 95% confidence interval (CI).
[b] % of occasional smokers, aged 13–15; boys $n = 131$, girls $n = 210$.
[c] % of daily smokers, aged 13–15; boys $n = 148$, girls $n = 130$.

smokers had been drunk less frequently than daily smokers.

In the age group 13–15 years, occasional smoking girls planned to enter higher academic courses in high school more often than daily smokers. In the older age group attending high school, both occasional smoking boys and girls participated in higher academic courses compared to daily smokers. Except for the youngest boys, occasional smokers reported having better health than daily smokers.

In multivariate analyses including the individual factors, occasional smokers being less often drunk ($P = 0.004$) and less often out with friends ($P = 0.03$) were independent significant factors in boys, while choosing higher academic courses in high school ($P = 0.002$), better perceived health ($P = 0.006$), and being less often drunk ($P = 0.004$) were influential in girls for the age group 13–15 years. In occasional smoking boys 16 years and older, higher academic courses ($P < 0.001$), more participation in organized activities ($P = 0.02$), more physical activity ($P = 0.02$), less drunkenness ($P = 0.02$), and more homework ($P = 0.04$) were independently influential. Compared to boys, doing more homework was not significant for the older girls, and occasional smokers participating more in organized sports ($P = 0.004$) was more influential than participation in organized activities in general.

TABLE 3B

Odds of Being an Occasional Smoker vs Daily Smoker by Individual Factors for Adolescents Aged 16–18 Years[a]

	Boys				Girls			
	Occasional *n* (%)[b]	Daily *n* (%)[c]	OR (CI)	*P*	Occasional *n* (%)[b]	Daily *n* (%)[c]	OR (CI)	*P*
Out with friends < 2 times a week	49 (22.8)	45 (16.1)	1.5 (1.0–2.4)	0.061	44 (17.7)	85 (23.5)	0.7 (0.5–1.1)	0.085
Did homework > 1 h > 2 times a week	70 (32.9)	55 (19.6)	2.0 (1.3–3.0)	0.001	113 (45.6)	136 (37.9)	1.4 (1.0–1.9)	0.059
Watched TV < 4 times a week	76 (35.7)	110 (39.7)	0.8 (0.6–1.2)	0.362	76 (31.3)	145 (41.2)	0.7 (0.5–0.9)	0.014
Never been drunk	5 (2.4)	5 (1.8)	1.3 (0.4–4.7)	0.650	4 (1.6)	2 (0.6)	2.9 (0.5–16.1)	0.196
Been drunk less than 10 times	50 (24.0)	29 (10.5)	2.7 (1.6–4.4)	<0.001	73 (29.4)	66 (18.4)	1.9 (1.3–2.7)	0.001
Participate in organized activities	153 (71.2)	133 (47.3)	2.8 (1.9–4.0)	<0.001	161 (65.4)	170 (47.5)	2.1 (1.5–2.9)	<0.001
Participate in organized sports	82 (38.0)	71 (25.4)	1.8 (1.2–2.6)	0.003	104 (42.1)	71 (19.7)	3.0 (2.1–4.3)	<0.001
Participate in sport competitions	69 (37.5)	50 (21.5)	2.2 (1.4–3.4)	<0.001	72 (34.6)	43 (14.4)	3.2 (2.1–4.9)	<0.001
Hard exercise ≥2 days a week	136 (63.0)	118 (41.8)	2.4 (1.6–3.4)	<0.001	153 (61.9)	136 (37.8)	2.7 (1.9–3.7)	<0.001
Academic course in high school	122 (58.9)	93 (35.1)	2.7 (1.8–3.9)	<0.001	169 (74.1)	180 (52.8)	2.6 (1.8–3.7)	<0.001
Perceived good health	188 (87.0)	220 (78.6)	1.8 (1.1–3.0)	0.014	207 (85.5)	265 (74.2)	2.1 (1.3–3.2)	0.001

Note. Because missing data were excluded, the number of subjects varied for each factor.
[a] Odds ratio (OR), 95% confidence interval (CI).
[b] % of occasional smokers, aged 16–18; boys $n = 131$, girls $n = 210$.
[c] % of daily smokers, aged 16–18; boys $n = 148$, girls $n = 130$.

DISCUSSION

This study confirms other studies showing cigarette smoking in youth increases with age, and is more common in girls [*1,25*]. Smoking prevalence was consistent with earlier studies from comparable countries [*25*], but somewhat lower than reported in recent studies of smoking trends [*2,3*]. Data from the National Council on Tobacco and Health, Norway [*3*], indicate that adolescent smoking prevalence in Nord-Trøndelag county is below the national average. Selective nonresponse by smokers cannot be excluded, although the participation rate in the present study was high (91%). The smoking history was self-reported and may be influenced by the veracity of the students. Some features of the study design foster truthful reporting. Confidentiality was stressed and no names were attached to the questionnaire. Smoking habits were not the focus of the study and were included with a variety of other items on somatic and mental health, quality of life and school features. In Norway, self-reported smoking habits have been found to be reliable in young adults [*26*]. In the present study, only nonsmokers wrongly reporting occasional smoking could be expected to increase differences between occasional and daily smokers, but it is not likely that nonsmokers would wrongly report occasional smoking. Other studies have shown the opposite, occasional smokers misclassified as nonsmokers [*20*].

Smoking Pattern

Studies have reported that occasional smoking is more common than daily smoking among 8th-graders, while daily smoking is more common among 12th-graders [*2*]. The present study showed that occasional smoking seemed to stabilize around age 15–16, while daily smoking was still increasing and became the dominant smoking pattern in both older boys and girls. This is in agreement with other reports that most adult daily smokers had smoked daily by age 18 [*1*], and emphasizes the importance of intervention at an early age.

One reason for the change in smoking pattern at age 16 might be the change of social environment from junior high to high school, as in Norway it is usual to start high school the year students turn 16. However, we found no difference between 16-year-old students attending junior high and 16-year-old students attending high school in regard to occasional and daily smokers (data not shown). The explanation could rather be that the attitude toward smoking changes with age or that the oldest students in junior high are more likely to socialize with older friends. Slightly fewer daily smokers in the 18-year-olds, compared to the 17-year-olds, might be a form of selection bias because 18-year-old students were more likely to be in academic classes. More quitters had been occasional smokers than daily smokers previous to quitting, consistent with cessation patterns reported elsewhere [*22*].

Individual and Environmental Factors

Logistic regression models confirmed the findings in the univariate models. Factors no longer significant when entered together in the multivariate models may be explained by intercorrelation. Since factors, although not significant in a regression model, may be important to smoking cessation, they are shown and discussed according to the univariate models.

Participation in organized activities and sports was more common in occasional smokers than daily smokers, compatible with other studies indicating that more nonsmokers than smokers participate in physical activity [*1,15*]. Whether this reflects selection of non-daily smokers into these activities or participation itself reduces smoking cannot be determined in a cross-sectional study. Encouraging participation in organized activities or organizing such activities could be tested as a method to prevent nonsmokers or occasional smokers from transitioning into daily smokers.

Occasional smokers doing more homework is consistent with their reporting more academic courses in school. The lack of difference for the oldest girls is unexplained, but girls may do more homework in general than boys. More time spent at home than out with friends among occasional smokers in the younger age group is concordant with the importance of parental monitoring in smoking progression of early initiators [*13*], or with peer pressure when young adolescents are unsupervised outside the home.

The close relationship between smoking and use of alcohol is well known [*1*]. Almost all youth in this study had tried alcohol, and most had been drunk. Nevertheless, the lower frequency of reported drunkenness by occasional smokers in both age groups and sexes suggests that the drinking pattern of occasional smokers is different from that of daily smokers.

Several studies have found that smoking initiation is associated with parental role models, disrupted families, low academic achievement, and limited educational plans [*1*]. In the present study occasional smokers differed from daily smokers in the same way. This is compatible with other studies showing that occasional smoking adults have higher education than daily smokers [*27,28*], and suggesting that a good quality social background and parental support are likely to lead smokers to quit or reduce smoking [*1,29*].

Smoking Transition

This study differs from previous studies in focusing on adolescent smokers and comparing those who are occasional smokers with daily smokers. It is expected that some of the adolescent occasional smokers who

are still experimenting will eventually become daily smokers [*30*]. However, stabile occasional smokers and smokers who show no sign of nicotine dependence ("tobacco chippers") have been described in adults [*23,27,28*]. Prospective studies will be necessary to distinguish possibly different groups of occasional smokers.

Significantly lower debut age for both male and female daily smokers compared to occasional smokers indicates that many occasional smokers will become daily smokers. This may explain why no difference was found in social factors between occasional smokers and daily smokers in the younger boys. The gender difference in the younger age group may indicate that girls' early smoking is more influenced by social factors than boys'. The finding that more boys than girls quit daily smoking at a young age is compatible with this thesis. Girls' smoking pattern may also stabilize at an earlier age than boys'. Although the age trend supports the thesis that many occasional smokers will become daily smokers before adulthood, the observed differences between daily and occasional smokers in the present study may indicate that the adult pattern of occasional smoking [*27,28*] can also start at an early age. Studies involving twins have been interpreted to support a genetic component to daily addictive smoking [*31*].

Whether transitional or not, occasional adolescent smokers differed from daily smokers. This should be accounted for in cessation programs, and could make occasional adolescent smokers a special target group for several reasons. Occasional smoking is the strongest predictor for later daily smoking [*30*]. Preventing this transition would have a large personal and public health potential. Occasional smokers seem more likely to be in the contemplative stage needed to stop smoking with stronger support at home, better role models, and organized activities. This is in agreement with more occasional than daily smokers quitting smoking. Also, cessation programs for occasional smokers might be focused differently from daily smokers. For example, a more academic approach could be tried, and motivations other than health effects may be even more important in occasional smokers since they may perceive their health risk to be smaller than daily smokers. The gender difference seen in the younger age group indicates that an intervention in girls should start earlier than in boys, and the possible greater influence of social factors in young girls should be addressed. Support for stresses such as adjusting to parents' divorce might be helpful.

CONCLUSION

In this population-based study, approximately half of adolescents had tried smoking, and half of current smokers were occasional smokers. Occasional smokers were found to be in higher academic courses, to be more engaged in organized activities and sports, to have been less frequently drunk, and to have better family role models compared to daily smokers. Quitters were more likely to have been occasional than daily smokers. These findings suggest the potential utility of focusing on occasional smokers as a special target group in smoking cessation programs, and suggest that smoking cessation programs for occasional smokers may need a different focus than programs for daily smokers.

APPENDIX

Questions and Alternative Answers Used in the Study

Question	Possible answer				
Have you ever tried smoking (at least one cigarette)?	Yes	No			
If yes, do you smoke?	Yes, I smoke _ cig. daily	Yes, I smoke occa. but not daily	No, previously I smoked daily	No, previously I smoked occa.	No, I don't smoke
Does anyone in your home smoke?	No	Yes, mother	Yes, father	Yes, siblings	
What study courses do you take? (for high school students)	Academic	Nonacademic			
What study courses do you plan to take in high school? (for junior high school students)	Academic	Nonacademic			
Are your parents divorced or have they been separated for more than a year? 1	No	Yes, divorced/ separated		Yes, but moved together again	
Have you ever had so much alcohol that you have been drunk? 2	No, never	Yes, once	Yes, 2–3 times	Yes, 4–10 times	Yes, > 10 times
Have you ever seen your parents drunk? 3	Never	A few times	Yearly	Every month	Every week
How many organized activities do you participate in? (as music, sport, scouts etc.) 4	None	One	Two or more		

APPENDIX—*Continued*

Question	Possible answer					
Do you participate in active (organized) sports? 5	Yes	No, I have quit		No		
Do you participate in sports competitions? 5	Yes	No, I have quit		No		
How many days a week (outside school hours) do you exercise until sweaty or breathless? 6	Every day	4–6 d	2–3 d	One d	Every 14 d	Every month
Think of the last 7 days, about how many times did you do any of the below listed:						
Were out with friends more than two hours at a time? 7	None	One time		2–3 times	≥4 times	
Did homework for more than one hour? 7	None	One time		2–3 times	≥4 times	
Watched TV or video? 7	None	One time		2–3 times	≥4 times	
How is your health right now? 8	Very good	Good		Not good	Bad	

Questions with more than two possible answering alternatives were dichotomized into:
1 Yes, "divorced-separated" and "No." Students with parents that had moved together again were excluded.
2 "Never" and "Once/2–3/4–10/> 10" or "Never/once/2–3/4–10 times" and "> 10 times."
3 "Never" and "A few times/yearly/every month/every week."
4 "None" and "One/two or more."
5 "Yes" and "No/no, quit."
6 "Every day/4–6/2–3/ days" and "One day/every 14 days/every month/less–never."
7 "None/one" and "2–3/≥4 times."
8 "Very good/good" and "not good/bad."

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Appendices

Appendix 1: Questionnaire for junior high (13-16 years) and high school (16-19 years) in Norwegian and English

Appendix 2: Definitions, groupings and dichotomization of variables used in Papers I-IV

Questions from the interview used in this thesis

Appendix 3: Written information to participants and parents

Appendix 4: Written consents from adolescents and parents

Appendix 5: Instructions to teachers

Appendix 6: Tables and figures

Appendix 1

Questionnaires for junior high (13-16 years) and high school (16-19 years) in Norwegian

Pages 2 to 22 in the two versions were identical. Therefore only the front and back pages and pages 1 and 22 in the high school questionnaire are reprinted

Questionnaire for high school (16-19 years) in English

FOLKEHELSA
Statens Institutt for Folkehelse
Samfunnsmedisinsk
forskningssenter,
Verdal

ung-hunt

Helseundersøkelsen i Nord-Trøndelag

Nå er det *din tur* til å delta i den store helseundersøkelsen i Nord-Trøndelag (***hunt***)!

Vi håper du har lest igjennom informasjonen du fikk med hjem om ung-hunt og bestemt deg for å være med!

Les nå først gjennom samtykkeerklæringen som ligger i spørreskjemaet. Sjekk at det er ditt navn som står der! Kryss av for om du vil delta eller ikke, og undertegn. Lever denne lappen til læreren. Alle lappene legges i en konvolutt som klistres igjen.

Navnet ditt skal IKKE være med på spørreskjemaet!

Fyll så ut spørreskjemaet. Sett et kryss i rutene ☒ du synes passer for deg. Svar så godt du kan! Spørsmål du ikke ønsker å svare på, kan du hoppe over. Når du er ferdig, legger du spørreskjemaet i den konvolutten du har fått, klistrer igjen og leverer konvolutten til læreren. Lever også spørreskjemaet selv om du ikke ble helt ferdig.

Alle svarene dine blir behandlet med taushetsplikt!

Ingen på skolen får se svarene dine.

Hvis du ønsker å snakke med noen om undersøkelsen, kan du ta kontakt med ***ung-hunt***-sykepleieren på skolen din eller ringe Folkehelsa i Verdal (se baksiden).

Lykke til og tusen takk!

Dato for utfylling av skjema: ___ /___ 19___

1. **Er du gutt eller jente ?** *Gutt* ☐ *Jente* ☐

2. **Hvilken klasse går du i ?**
7. klasse .... ☐
8. klasse .... ☐
9. klasse .... ☐

3. **Hvilke planer for videre utdanning har du ?**
(Sett ett eller flere kryss)

* *Ingen* ..... ☐
* *Videregående allmennfag* ..... ☐
* *Videregående yrkesfag* ..... ☐
* *Høgskole eller universitet mindre enn 4 år* ..... ☐
* *Høgskole eller universitet i 4 år eller mer* ..... ☐
* *Annen yrkesutdanning* ..... ☐
* *Vet ikke* ..... ☐

OM DER DU BOR

4. **Hvilken type bolig (hus) bor du i ?** (Sett bare ett kryss)

* *Enebolig/villa* ..... ☐
* *Blokk/terasseleilighet* ..... ☐
* *Gardsbruk* ..... ☐
* *Rekkehus/2-4 mannsbolig* ..... ☐
* *Annen bolig* ..... ☐

5. **Hvem bor du sammen med nå ?** (Her kan du sette ett eller flere kryss)

* *Mor* ..... ☐
* *Far* ..... ☐
* *1-2 søsken* ..... ☐
* *3 eller flere søsken* ..... ☐
* *Mors nye mann eller samboer* ... ☐
* *Fars nye kone eller samboer* ..... ☐
* *Alene/på hybel* ..... ☐
* *Fosterforeldre* ..... ☐
* *Andre* ..... ☐

6. **Er det heldekkende tepper (teppegulv) hjemme hos deg:**
- i stua ? *Ja* ☐ *Nei* ☐
- på soverommet ditt ? *Ja* ☐ *Nei* ☐

7. **Er det katt i boligen (hjemme hos deg) ?** *Ja* ☐ *Nei* ☐

8. **Er det hund i boligen (hjemme hos deg) ?** *Ja* ☐ *Nei* ☐

9. **Er det andre pelskledde dyr i boligen (hjemme hos deg)?** *Ja* ☐ *Nei* ☐

OM HELSA DI

10. Hvordan er helsa di nå ? (Sett ett kryss for det som passer for deg)

* *Dårlig* ..... ☐		* *God* ..... ☐	
* *Ikke helt god* ..... ☐		* *Svært god* ..... ☐	

11. Er du funksjonshemmet på noen av disse måtene ?
(Sett ett kryss på hver linje)

	Nei	Litt	Middels	Mye
* *Er bevegelseshemmet*	☐	☐	☐	☐
* *Har nedsatt syn*	☐	☐	☐	☐
* *Har nedsatt hørsel*	☐	☐	☐	☐
* *Hemmet pga. kroppslig sykdom*	☐	☐	☐	☐
* *Hemmet pga. psykiske plager*	☐	☐	☐	☐

12. Har du hatt noen av disse plagene i løpet av de siste 12 månedene ?
(Sett ett kryss på hver linje)

	Aldri	Sjelden	Av og til	Ofte
A *Hodepine (uten kjent medisinsk årsak)*	☐	☐	☐	☐
B *Nakke og skuldersmerter*	☐	☐	☐	☐
C *Ledd og muskelsmerter*	☐	☐	☐	☐
D *Magesmerter (uten kjent medisinsk årsak)*	☐	☐	☐	☐
E *Kvalme*	☐	☐	☐	☐
F *Treg mage*	☐	☐	☐	☐
G *Diare, magesyke*	☐	☐	☐	☐
H *Hjertebank*	☐	☐	☐	☐
I *Bronkitt eller lungebetennelse*	☐	☐	☐	☐
J *Ørebetennelse*	☐	☐	☐	☐
K *Bihulebetennelse*	☐	☐	☐	☐

13. Hvis du har svart «aldri» på <u>alle</u> plagene nevnt ovenfor: Har du hatt noen av disse plagene <u>ofte</u> tidligere (dvs. før de siste 12 månedene) **?**

Ja ☐ *Nei* ☐

Hvis ja: **Hvilke plager (se ovenfor) var det ?** (Skriv navn eller bokstavene ovenfor som passer)

OM LUFTVEISPLAGER

14. **Har du noen gang hatt tung pust eller piping/surkling/tetthet i brystet ?**
Ja ☐ *Nei* ☐

HVIS DU HAR SVART «NEI»: GÅ TIL SPØRSMÅL **19**

15. **Har du hatt tung pust eller piping/surkling/tetthet i brystet i løpet av de siste 12 månedene ?** *Ja* ☐ *Nei* ☐

HVIS DU HAR SVART «NEI»: GÅ TIL SPØRSMÅL **19**

16. **Hvor mange anfall med tung pust eller piping/surkling/tetthet i brystet har du hatt i løpet av de siste 12 månedene ?**

Ingen ☐ *1 til 3* ☐ *4 til 12* ☐ *Mer enn 12* ☐

17. **Hvor ofte i gjennomsnitt har søvnen din blitt forstyrret p.g.a. tung pust eller piping/surkling/tetthet i brystet de siste 12 månedene?**

Aldri våknet ☐ *Mindre enn en natt pr. uke* ☐ *En eller flere netter pr. uke* ☐

18. **Har piping/surkling/tetthet i brystet eller tung pust vært så alvorlig de siste 12 månedene at du har hatt problemer med å snakke, slik at du bare har kunnet si ett eller to ord mellom hver pust ?**

Ja ☐ *Nei* ☐

****

19. **Har du noen gang hatt astma ?** *Ja* ☐ *Nei* ☐

Hvis ja:
Har lege sagt du har hatt astma ? *Ja* ☐ *Nei* ☐

20. **Har du i løpet av de siste 12 månedene hatt tung pust eller piping/surkling/tetthet i brystet under eller etter fysisk trening, aktiv lek eller mosjonering ?**

Ja ☐ *Nei* ☐

21. **Har du i løpet av de siste 12 månedene hatt tørr hoste om natten uten å være forkjølet eller ha annen luftveisinfeksjon ?**

Ja ☐ *Nei* ☐

OM UTSLETT

22. **Har du noen gang hatt kløende utslett som har kommet og gått i minst 6 måneder ?** *Ja* ☐ *Nei* ☐

HVIS DU HAR SVART «NEI»: GÅ TIL SPØRSMÅL **27**

23. **Har du noen gang hatt dette kløende utslettet i løpet av de siste 12 månedene ?** *Ja* ☐ *Nei* ☐

HVIS DU HAR SVART «NEI»: GÅ TIL SPØRSMÅL **27**

24. **Har dette kløende utslettet noen gang sittet på noen av de følgende stedene: albuebøyene** (på innsiden), **bak knærne, foran på anklene, under baken eller rundt hals, ører eller øyne ?**

Ja ☐ *Nei* ☐

25. **Har dette utslettet vært helt borte noen gang i løpet av de siste 12 månedene ?** *Ja* ☐ *Nei* ☐

26. **I løpet av de siste 12 månedene, hvor ofte i gjennomsnitt har du blitt holdt våken om natten på grunn av dette kløende utslettet ?**

* *Ingen ganger de siste 12 månedene* ..... ☐
* *Mindre enn en natt per uke* ..... ☐
* *En eller flere netter per uke* ..... ☐

****

27. **Har du noen gang hatt eksem ?** *Ja* ☐ *Nei* ☐

OM NESEPLAGER

Alle spørsmålene er om problemer som oppstår når du IKKE er forkjølet eller har influensa.

28. Har du noen gang hatt problemer med nysing eller tett eller rennende nese når du IKKE har vært forkjølet eller har hatt influensa ?

Ja ☐ *Nei* ☐

HVIS DU HAR SVART «NEI»: GÅ TIL SPØRSMÅL **33**

29. I løpet av de siste 12 månedene, har du da hatt problemer med nysing, rennende eller tett nese uten å ha vært forkjølet eller å ha hatt influensa?

Ja ☐ *Nei* ☐

HVIS DU HAR SVART «NEI»: GÅ TIL SPØRSMÅL **33**

30. I løpet av de siste 12 månedene, har disse neseproblemene vært ledsaget av kløende, rennende øyne ? *Ja* ☐ *Nei* ☐

31. I hvilke av de siste 12 månedene har du hatt neseproblemene ?
(Sett ett kryss for hver måned som passer)

* *Januar* .... ☐	* *Mai* ..... ☐	* *September* ..... ☐
* *Februar* .... ☐	* *Juni* ..... ☐	* *Oktober* ..... ☐
* *Mars* ..... ☐	* *Juli* ..... ☐	* *November* ..... ☐
* *April* ..... ☐	* *August* ..... ☐	* *Desember* ..... ☐

32. I løpet av de siste 12 månedene, hvor mye har disse neseproblemene virket inn på din daglige aktivitet ?

Ikke i det hele tatt ☐ *Litt* ☐ *Mye* ☐ *Veldig mye* ☐

****

33. Har du noen gang hatt høysnue eller neseallergi ? *Ja* ☐ *Nei* ☐

OM ALLERGI

34. Er du allergisk ? *Ja* ☐ *Nei* ☐ *Vet ikke* ☐

HVIS DU HAR SVART «NEI»: GÅ TIL SPØRSMÅL **37**

35. Hva kjenner du selv at du er allergisk for ? Kryss av for hva slags plager du har for hver ting. (Sett ett eller flere kryss for hver linje)

	Ingen plager	Nese-plager	Øye-plager	Eksem-plager	Mage-plager	Astma/ puste-plager	Annet
* *Hund*	☐	☐	☐	☐	☐	☐	☐
* *Katt*	☐	☐	☐	☐	☐	☐	☐
* *Andre dyr* .	☐	☐	☐	☐	☐	☐	☐
* *Gress/trær*	☐	☐	☐	☐	☐	☐	☐
* *Husstøv* ...	☐	☐	☐	☐	☐	☐	☐
* *Mat*	☐	☐	☐	☐	☐	☐	☐
* *Røyk*	☐	☐	☐	☐	☐	☐	☐
* *Annet*	☐	☐	☐	☐	☐	☐	☐

36. Har du tatt allergitest hos lege (blodprøve, hudtest) **?**

Ja ☐ *Nei* ☐

OM MEDISINER

37. Bruker du noen av disse medisinene eller kosttilskuddene ?
Tenk på hva du bruker medisinene for. (Sett ett kryss for hver linje)

	Aldri	Av og til	Nesten daglig
* *Smertestillende medisin*	☐	☐	☐
* *Migrenemedisin*	☐	☐	☐
* *Sovemedisin*	☐	☐	☐
* *Nervemedisin*	☐	☐	☐
* *Beroligende medisin*	☐	☐	☐
* *Astmamedisin*	☐	☐	☐
* *Allergimedisin*	☐	☐	☐
* *Eksemsalve*	☐	☐	☐
* *Avføringstabletter*	☐	☐	☐
* *Jerntabletter*	☐	☐	☐
* *Vitamintilskudd*	☐	☐	☐
* *Tran*	☐	☐	☐
* *Homøopatmedisin, naturmedisin*	☐	☐	☐
* *Annet*	☐	☐	☐

*Hvis annet, hva*_____

OM ANDRE SYKDOMMER

38. Har lege sagt at du har:

	Ja	Nei
* *Epilepsi*	☐	☐
* *Diabetes (sukkersyke)*	☐	☐
* *Migrene*	☐	☐

39. Har du noen andre sykdommer som har vart over 3 måneder ? *Ja* ☐ *Nei* ☐

*Hvilke(n) ?*_____

OM TOBAKK

40. Røyker noen hjemme hos deg ? (Sett ett eller flere kryss)

* *Nei, ingen* ☐
* *Ja, mor ...* ☐
* *Ja, far .....* ☐
* *Ja, søsken .....* ☐
* *Ja, andre .....* ☐

41. Har du prøvd å røyke ? (minst en sigarett) *Ja* ☐ *Nei* ☐

HVIS DU HAR SVART «NEI»: GÅ TIL SPØRSMÅL **45**

42. Røyker du selv ?
(Sett ett kryss og oppgi evt. antall sigaretter. En pakke tobakk er ca. 50 sigaretter)

- ☐ *Ja, jeg røyker ca _____ sigaretter daglig*
- ☐ *Ja, jeg røyker av og til, men ikke daglig*
- ☐ *Nei, ikke nå, men tidligere røykte jeg av og til*
- ☐ *Nei, ikke nå lenger, men tidligere røykte jeg ca _____ sigaretter daglig*
- ☐ *Nei, jeg røyker ikke*

HVIS DU HAR SVART «NEI, JEG RØYKER IKKE»: GÅ TIL SPØRSMÅL **45**

43. Hvor gammel var du da du begynte å røyke ? _____*år*

44. Hvor mange år tilsammen har du røykt daglig ? _____*år*

45. **Blir du noen gang sjenert av røyklukt :**

	Aldri	Av og til	Ofte
- på skolen ?	☐	☐	☐
- hjemme ?	☐	☐	☐

46. **Bruker du eller har du brukt snus, skrå eller lignende ?**

Nei, aldri ☐ *Ja, men jeg har sluttet* ☐ *Ja, av og til* ☐ *Ja, hver dag* ☐

HVIS DU HAR SVART «NEI, ALDRI»:GÅ TIL SPØRSMÅL **50**

47. **Hvor gammel var du da du begynte med snus/skrå ?** _____*år*

48. **Hvor mange år til sammen har du brukt snus/skrå ?** _____*år*

49. **Hvor mange esker/poser snus/skrå bruker/brukte du i uka ?** _____*antall*

OM IDRETT OG MOSJON

50. Utenom skoletida: **Hvor mange dager i uka driver du idrett, eller mosjonerer du så mye at du blir andpusten og/eller svett?**
(Sett bare ett kryss)

* *Hver dag*	☐	* *Ikke hver uke, men minst en dag hver 14.dag* .	☐
* *4-6 dager i uka* ..	☐	* *Ikke hver 14.dag, men minst en dag i måneden* .	☐ .
* *2-3 dager i uka* ...	☐	* *Sjeldnere enn en dag i måneden*	☐
* *1 dag uka*	☐	* *Aldri*	☐

51. Utenom skoletida: **Til sammen hvor mange timer i uka driver du idrett eller mosjonerer du så mye at du blir andpusten og/eller svett?**
(Sett bare ett kryss)

* *Ingen*	☐	* *Omtrent 2-3 timer*	☐
* *Omtrent ½ time* ..	☐	* *Omtrent 4-6 timer*	☐
* *Omtrent 1 time* ...	☐	* *7 timer eller mer*	☐

52. **Bruker du astma-medisin før mosjon, trening eller idrettskonkurranser?**
Ja ☐ *Nei* ☐

53. Driver du aktiv idrett ?

Ja ☐ *Nei, men jeg drev med aktiv idrett før* ☐ *Nei* ☐

HVIS DU HAR SVART «NEI» (aldri drevet aktiv idrett): GÅ TIL SPØRSMÅL **59**

54. Hvis du har sluttet: **Hvor gammel var du da du sluttet med aktiv idrett ?** __*år*

55. Hvilke(n) idrett(er) er/var du med i ? (Sett ett eller flere kryss)

A Ski (langrenn, skiskyting) ..... ☐
B Ski (slalåm, hopp) ..... ☐

C Fotball ..... ☐

D Riding ..... ☐
E Skøyter, ishockey ..... ☐

F Håndball, basket, volleyball ..... ☐
G Kampidrett, boksing ..... ☐

H Bodybuilding ..... ☐
I Sykling ..... ☐

J Styrkeløft/vektløfting ..... ☐

K Friidrett/løp/orientering . ☐
L Svømming ..... ☐

M Gymnastikk/turn ..... ☐
N Annet, ... ☐
Hva ? _____

56. Deltar du i idrettskonkurranser, kamper ? (Sett ett kryss)

Ja ☐ *Nei, men jeg deltok før* ☐ *Nei* ☐

HVIS DU HAR SVART «NEI» (aldri deltatt i konkurranser, kamper): GÅ TIL SPØRSMÅL **59**

57. På hvilket nivå deltok/deltar du i idrettskonkurranser ? (Angi høyeste nivå)

* *Lokalt nivå* (klubbmesterskap, serier etc.) ..... ☐
* *Kretsnivå* ..... ☐

* *Nasjonalt nivå* (landsstevne, Norgesmesterskap) ..... ☐

58. I hvilke(n) idrett(er) er/var dette ? (Skriv inntil 3 idretter du er/ var mest med på)

Jeg er/har vært mest aktiv i.....og har hold på med dette i .....år

Jeg er/har vært nest mest aktiv i .....og har holdt på med dette i .....år

Jeg er/har vært 3. mest aktiv i .....og har holdt på med dette i.....år

HVORDAN DU HAR DET

59. Når du tenker på hvordan du har det for tida, er du stort sett fornøyd eller er du stort sett misfornøyd ? (Sett bare ett kryss)

* *Svært fornøyd* ..... ☐
* *Meget fornøyd* ..... ☐
* *Ganske fornøyd* ..... ☐
* *Både og* ..... ☐
* *Nokså misfornøyd* ..... ☐
* *Meget misfornøyd* ..... ☐
* *Svært misfornøyd* ..... ☐

60. Føler du deg stort sett sterk og opplagt eller trøtt og sliten ? (Sett bare ett kryss)

* *Meget sterk og opplagt* . ☐
* *Sterk og opplagt* ..... ☐
* *Ganske sterk og opplagt.* ☐
* *Både og* ..... ☐
* *Ganske trøtt og sliten* ... ☐
* *Trøtt og sliten* ..... ☐
* *Svært trøtt og sliten* ..... ☐

61. Er du vanligvis glad eller nedstemt (trist) ? (Sett bare ett kryss)

* *Svært nedstemt* (trist) .... ☐
* *Nedstemt* (trist) ..... ☐
* *Nokså nedstemt* (trist) .. ☐
* *Både og* ..... ☐
* *Nokså glad* ..... ☐
* *Glad* ..... ☐
* *Svært glad* ..... ☐

62. Hva slags oppfatning har du av deg selv ? Kryss av for hver av setningene under ettersom du er enig eller uenig i at de passer for deg. (Ett kryss for hver linje)

	Svært enig	Enig	Uenig	Svært uenig
* *Jeg har en positiv holdning til meg selv*	☐	☐	☐	☐
* *Jeg føler meg virkelig ubrukelig til tider*	☐	☐	☐	☐
* *Jeg føler at jeg ikke har mye å være stolt av* ...	☐	☐	☐	☐
* *Jeg føler at jeg er en verdifull person, i hvert fall på lik linje med andre*	☐	☐	☐	☐

63. Har du i løpet at den siste måneden:

	Nesten hver natt	Ofte	Av og til	Aldri
* *hatt vanskelig for å sovne inn ?*	☐	☐	☐	☐
* *våknet for tidlig og ikke sovnet igjen ?.*	☐	☐	☐	☐

64. Spørsmålene nedenfor dreier seg om hvordan du vanligvis opptrer, føler og handler. Kryss av det som passer best, enten Ja eller Nei for hver linje.

	Ja	Nei
* *Er du forholdsvis livlig ?*	☐	☐
* *Ville du bli oppskaket av å se et barn eller dyr lide ?*	☐	☐
* *Liker du å treffe nye mennesker ?*	☐	☐
* *Blir dine følelser lett såret ?*	☐	☐
* *Hender det ofte at du «går trøtt»?*	☐	☐
* *Liker du å spille andre et puss som av og til kan såre dem ?* .	☐	☐
* *Er du ofte bekymret ?*	☐	☐
* *Er gode manérer og renslighet viktig for deg ?*	☐	☐
* *Bekymrer du deg for at fryktelige ting kan skje ?*	☐	☐
* *Tar du vanligvis selv det første skrittet for å få nye venner?* .	☐	☐
* *Er du for det meste stille når du er sammen med andre ?*	☐	☐
* *Liker du å komme til avtaler i god tid ?*	☐	☐
* *Har du ofte følt deg trøtt og giddeslaus uten grunn ?*	☐	☐
* *Er det mange mennesker som forsøker å unngå deg ?*	☐	☐
* *Klarer du å holde fart i et selskap ?*	☐	☐
* *Bekymrer du deg for lenge etter en pinlig opplevelse ?*	☐	☐
* *Liker du å ha masse liv og røre rundt deg ?*	☐	☐
* *Forteller folk deg en masse løgner ?*	☐	☐

65. Nedenfor er en liste over noen problemer eller plager. Har du vært plaget av noe av dette <u>de siste 14 dagene</u> ? (Sett ett kryss for hver linje)

	Ikke plaget	Litt plaget	Ganske plaget	Veldig plaget
* *Vært stadig redd og engstelig*	☐	☐	☐	☐
* *Følt deg anspent eller urolig*	☐	☐	☐	☐
* *Følt håpløshet når du tenker på framtida*	☐	☐	☐	☐
* *Følt deg nedfor eller trist*	☐	☐	☐	☐
* *Bekymret deg for mye om forskjellige ting*	☐	☐	☐	☐

66. Har du i løpet av <u>den siste måneden</u> vært plaget av nervøsitet (irritabel, urolig, anspent eller rastløs) ?

Nesten hele tida ☐ *Ofte* ☐ *Av og til* ☐ *Aldri* ☐

OM FRITIDA

67. Tenk tilbake på den siste uka, altså de 7 siste dagene. Hvis du gjorde noe som står på lista nedenfor, omtrent hvor mange ganger gjorde du det ? (Sett ett kryss for hvert punkt med stjerne)

	Ingen gang	En gang	To eller tre ganger	Fire eller flere
* *Besøkte noen du kjente*	☐	☐	☐	☐
* *Fikk besøk*	☐	☐	☐	☐
* *Leste en bok du likte*	☐	☐	☐	☐
* *Hørte på musikk eller spilte et instrument lengre enn et kvarter av gangen*	☐	☐	☐	☐
* *Var ute mer enn 2 timer av gangen med kamerater eller venninner*	☐	☐	☐	☐
* *Var på møte eller trening i en forening eller et lag*	☐	☐	☐	☐
* *Drev med en annen hobby*	☐	☐	☐	☐
* *Så på TV eller video*	☐	☐	☐	☐
* *Gjorde lekser eller hjemmearbeid lengre enn en time*	☐	☐	☐	☐

68. Hvor mange lag eller foreninger er du med i ? (f.eks. idrettslag, speiderforening, musikk-korps el.)

Ingen ☐ *En* ☐ *To eller flere* ☐

OM VENNER

69. Har du hatt noen som du har regnet som din beste venn gjennom mesteparten av skoletiden ? *Ja* ☐ *Nei* ☐

70. Hender det at du føler deg ensom ? (Sett ett kryss)

* *Svært ofte* ..... ☐
* *Ofte* ..... ☐
* *Av og til* ..... ☐
* *Sjelden* ..... ☐
* *Svært sjelden eller aldri* ..... ☐

71. Er dine foreldre separert eller skilt, eller har de noen gang flyttet fra hverandre for mer enn ett år ? (Sett ett kryss og evt. alderen din)

* *Nei* ..... ☐

* *Ja, de flyttet fra hverandre eller ble separert da jeg var_____år, men flyttet senere sammen igjen* ..... ☐

* *Ja, de ble skilt eller flyttet fra hverandre for godt da jeg var_____år* ..... ☐

72. Hvis du har søsken, hvor godt forhold føler du at du har til søsteren eller broren din ? Hvis du har flere søsken, tenk på den du har det beste forholdet til. (Sett ett kryss)

* *Mye dårligere enn vanlig* ..... ☐
* *Dårligere enn vanlig* ..... ☐
* *Som vanlig* ..... ☐
* *Bedre enn vanlig* ..... ☐
* *Mye bedre enn vanlig* .... ☐

* *Har ikke søsken* ..... ☐

73. Omtrent hvor mange nære venner har du ? Regn med de du kan snakke fortrolig med og som kan gi deg god hjelp når du trenger det. Regn ikke med de du bor sammen med, men regn med andre slektninger. (Sett ett kryss)

* *Ingen* ..... ☐
* *En* ..... ☐
* *2 eller flere* ..... ☐
* *4 eller flere* ..... ☐

74. Har du fast kjæreste ? *Ja* ☐ *Nei* ☐

75. Føler du at du har mange nok venner ? *Ja* ☐ *Nei* ☐

OM SKOLEN

76. Hender noe av dette deg på skolen, eller har det hendt før? (Sett ett kryss for hvert punkt med stjerne)

	Aldri	En gang i blant	Ofte	Svært ofte
* *Har vanskelig for å konsentrere deg i timen*	☐	☐	☐	☐
* *Synes gym eller formingstimene er morsomme*	☐	☐	☐	☐
* *Synes andre timer er morsomme*	☐	☐	☐	☐
* *Krangler med læreren*	☐	☐	☐	☐
* *Gleder deg til å gå skolen*	☐	☐	☐	☐
* *Skulker*	☐	☐	☐	☐
* *Forstår når lærerne underviser* ..	☐	☐	☐	☐
* *Har det morsomt i friminuttene* ..	☐	☐	☐	☐
* *Er fornøyd med resultatene på prøver*	☐	☐	☐	☐
* *Kommer i slåsskamp*	☐	☐	☐	☐
* *Blir mobbet av andre elever*	☐	☐	☐	☐
* *Får skjenn av læreren*	☐	☐	☐	☐
* *Klarer ikke å være rolig i timene* .	☐	☐	☐	☐
* *Kjeder deg, eller mistrives*	☐	☐	☐	☐

OM KOSTHOLD OG SPISEVANER

77. Hvor ofte spiser du til vanlig disse måltidene? (Sett ett kryss for hver linje)

	Hver dag	4-6 dg i uka	1-3 dg i uka	Sjeldnere eller aldri
* *Frokost*	☐	☐	☐	☐
* *Formiddagsmat/ nistepakke*	☐	☐	☐	☐
* *Varm middag*	☐	☐	☐	☐

78. Prøver du å slanke deg ?

Nei, vekten min er passe ☐ *Nei, men jeg trenger å slanke meg* ☐ *Ja* ☐

79. Hvor ofte hender det at du ikke spiser matpakken selv om du har den med ? (Sett ett kryss)

* *Hver skoledag* ..... ☐
* *4-6 dager i uka* ..... ☐
* *1-3 dager i uka* ..... ☐
* *Sjeldnere eller aldri* ..... ☐
* *Har aldri med matpakke* .. ☐

80. Hvor ofte drikker du eller spiser du noe av dette ?
(Sett ett kryss for hver linje)

	Mer enn 1 gang pr. dag	En gang pr. dag	Hver uke, men ikke hver dag	Sjeldnere	Aldri
* *Cola, brus eller andre leskedrikker*	☐	☐	☐	☐	☐
* *Lettmelk/skummet melk*	☐	☐	☐	☐	☐
* *Helmelk*	☐	☐	☐	☐	☐
* *Kaffe*	☐	☐	☐	☐	☐
* *Potetgull o.l*	☐	☐	☐	☐	☐
* *Sukkertøy, sjokolade, andre søtsaker*	☐	☐	☐	☐	☐
* *Pommes frites, hamburger, pølser*.....	☐	☐	☐	☐	☐
* *Grovt brød/knekkebrød*	☐	☐	☐	☐	☐
* *Meierismør*	☐	☐	☐	☐	☐
* *Margarin*	☐	☐	☐	☐	☐
* *Frukt*	☐	☐	☐	☐	☐
* *Grønnsaker*	☐	☐	☐	☐	☐

81. Vil du si om deg selv at du er: (Sett ett kryss)

* *Svært tykk* ..... ☐
* *Litt tykk* ..... ☐
* *Omtrent som andre* ..... ☐
* *Heller tynn* ..... ☐
* *Svært tynn* ..... ☐

82. Nedenfor er en liste over ting som gjelder spisevaner. Kryss av for hva som passer deg. (Sett ett kryss for hvert punkt med stjerne)

	Aldri	Sjelden	Ofte	Alltid
* *Når jeg først har begynt å spise, kan det være vanskelig å stoppe*	☐	☐	☐	☐
* *Jeg bruker for mye tid til å tenke på mat*	☐	☐	☐	☐
* *Jeg føler at maten kontrollerer livet mitt*	☐	☐	☐	☐
* *Når jeg spiser, skjærer jeg maten opp i små biter*	☐	☐	☐	☐
* *Jeg bruker lengre tid enn andre på et måltid*	☐	☐	☐	☐
* *Eldre mennesker synes at jeg er for tynn*	☐	☐	☐	☐
* *Jeg føler at andre presser meg til å spise*	☐	☐	☐	☐

OM ALKOHOL

83. Har du noen gang prøvd å drikke alkohol ? (Dvs. alkoholholdig øl, vin , brennevin eller hjemmebrent)

Ja ☐ *Nei* ☐ *Vet ikke* ☐

HVIS DU HAR SVART «NEI», GÅ TIL SPØRSMÅL **87**

84. Har du noen gang drukket så mye alkohol at du har vært beruset (full) ? (Sett ett kryss)

* *Nei, aldri* ..... ☐
* *Ja, en gang* ..... ☐
* *Ja, 2-3 ganger* ... ☐
* *Ja, 4-10 ganger* ..... ☐
* *Ja, mer enn 10 ganger* ..... ☐

85. Omtrent hvor mye øl, vin eller brennevin drikker du vanligvis i løpet av <u>to uker</u> ? Regn ikke med alkoholfritt øl. Sett **0** hvis du **ikke drikker**.

Øl _____ *antall ½ flasker* *Brennevin* _____ *antall glass(ca ½ dl)*

Vin _____ *antall glass (ca 1 dl)* *Hjemmebrent* _____ *antall glass(ca ½ dl)*

86. På hvilke ukedager drikker du som oftest alkoholholdige drikker?
(Sett ett eller flere kryss)

* *Drikker ikke* ..... ☐
* *Fredager* . ☐
* *Lørdager* . ☐
* *Andre dager i uken* ..... ☐

****

87. Har du noen gang sett at noen av dine foreldre har vært beruset?
(Sett ett kryss)

* *Aldri* ..... ☐
* *Noen få ganger* .. ☐
* *Noen ganger i året* ..... ☐
* *Noen ganger i måneden* ..... ☐
* *Noen ganger i uka* ..... ☐

LESE- OG SKRIVEVANSKER

88. Hvor ofte føler du at din lese- og skriveferdighet er utilstrekkelig for de oppgavene du skal gjøre på skolen og /eller i fritiden?

	Aldri	Nesten aldri	Noen ganger	Ofte	Alltid
* *Lesing*	☐	☐	☐	☐	☐
* *Skriving*	☐	☐	☐	☐	☐

89. Har du hatt spesielle lese- eller skriveproblemer <u>de siste 12 månedene</u> ?

	Store problemer	Noen problemer	Ingen problemer
* *Lesing*	☐	☐	☐
* *Skriving*	☐	☐	☐

90. Får du hjelp for lese- eller skriveproblemer nå? *Ja* ☐ *Nei* ☐

91. Har du hatt lese- eller skriveproblemer tidligere, men ikke <u>de siste 12 månedene</u> ? *Ja* ☐ *Nei* ☐

Hvis ja, ***fikk du hjelp den gangen?*** *Ja* ☐ *Nei* ☐

92. Har du noen form for talevansker? *Ja* ☐ *Nei* ☐

Hvis ja: **hvilke:**

* *Stamming* ..... ☐
* *Uttalevansker* ..... ☐
* *Stemmevansker* ..... ☐
* *Vansker med å uttrykke meg* .... ☐

OM HELSETJENESTEN

93. Har du i løpet av de siste 12 månedene vært hos: (Ett kryss på hver linje)

	Ja	Nei
* *Allmennpraktiserende lege* (lege utenom sykehus)	☐	☐
* *Lege på sykehus* (uten at du var innlagt)	☐	☐
* *Psykolog*	☐	☐
* *Fysioterapeut*	☐	☐
* *Kiropraktor*	☐	☐
* *Homøopat*	☐	☐
* *Annen behandler (*naturmedisiner,fotsoneterapeut, håndspålegger, «healer», «synsk», e.l.)	☐	☐

94. Har du noen gang vært innlagt på sykehus (utenom da du ble født)**?**

Nei, aldri ☐ *Ja, en gang* ☐ *Ja, mer enn en gang* ☐

*Hvis ja:***Har du vært innlagt på sykehus i løpet av de siste 12 månedene?**

Ja ☐ *Nei* ☐

95. Hvor ofte har du vært hos skolehelsetjenesten de siste 12 månedene?

Ingen ganger ☐ *1 -3 ganger* ☐ *Mer enn 3 ganger* ☐

96. Har du selv noen gang tatt kontakt med skolehelsetjenesten?

Ja ☐ *Nei* ☐

97. Ønsker du deg mer kontakt med skolehelsetjenesten enn det du har hatt?

Ja ☐ *Nei* ☐

98. Hvor ofte har du vært borte fra skolen p.g.a. sykdom de siste 12 månedene ?

Mindre enn en uke ☐ *1-2 uker* ☐ *Mer enn 2 uker* ☐

OM UTVIKLING

Du er nå i en alder da kroppen din kan ha begynt å forandre seg og bli mer og mer lik kroppen til en voksen. Her er det noen spørsmål om kroppslige forandringer som skjer med ungdommer i din alder.

99. Når man er tenåring, er det perioder da man vokser raskt. Har du merket at kroppen din har vokst fort (blitt høyere) ? (Sett ett kryss)

* *Nei, den har ikke begynt å vokse* ..... ☐
* *Ja, den har såvidt begynt å vokse raskt* ..... ☐
* *Ja, den har helt tydelig begynt å vokse* ..... ☐
* *Ja, det virker som om jeg er ferdig med å vokse raskt* ..... ☐

100. Og hva med hår på kroppen (under armene og i skrittet) ? Vil du si at håret på kroppen din har: (Sett ett kryss)

* *Ikke begynt å vokse enda* ..... ☐
* *Såvidt begynt å vokse* ..... ☐
* *Helt tydelig begynt å vokse* ..... ☐
* *Det virker som om håret på kroppen er utvokst* ..... ☐

101. Når du ser på deg selv nå, mener du at du er/var tidligere eller senere fysisk moden enn andre på din alder ? (Sett ett kryss)

* *Mye tidligere* ..... ☐
* *Noe tidligere* ..... ☐
* *Lite grann tidligere* ..... ☐
* *Akkurat som andre* ..... ☐
* *Lite grann senere* ..... ☐
* *Noe senere* ..... ☐
* *Mye senere* ..... ☐

SPØRSMÅL BARE FOR JENTER

102. Har du begynt å få bryster? (Sett ett kryss)

* *Nei, har ikke begynt ennå* ☐
* *Ja, har såvidt begynt* ..... ☐
* *Ja, har helt tydelig begynt* ..... ☐
* *Det virker som om brystene er fullt utviklet* ☐

103. Har du fått menstruasjon («mensen»)? *Ja* ☐ *Nei* ☐

HVIS DU HAR SVART «NEI»: GÅ TIL SPØRSMÅL **106**

104. Hvor gammel var du da du fikk din første menstruasjon?

Jeg var .....år og .....måneder.

105. Har du noen gang etter en blødning vært blødningsfri i flere måneder (uten å ha vært gravid)? (Sett ett kryss)

* *Ja, 2-5 mnd* ..... ☐
* *Ja, 6-12 mnd* ..... ☐
* *Ja, mer enn 1 år* ..... ☐
* *Nei, aldri* ..... ☐

****

106. Har du noen gang fått behandling av lege for:

	Ja	Nei
* *Underlivsbetennelse (eggstokkbetennelse, eggleder betennelse)?*	☐	☐
* *Utflod*	☐	☐
* *Menstruasjonssmerter*	☐	☐

107. Har du noen gang brukt p-piller eller minipiller? *Ja* ☐ *Nei* ☐

HVIS DU HAR SVART «NEI»: GÅ TIL SISTE SIDE

108. Hvor gammel var du første gang du brukte p-piller? _____år

109. Hvor lenge har du brukt p-piller i alt? _____år

110. Bruker du p-piller nå? *Ja* ☐ *Nei* ☐

SPØRSMÅL BARE FOR GUTTER

112. Har du begynt å komme i stemmeskiftet? (Sett ett kryss)

* *Nei, har ikke begynt ennå* ..... ☐
* *Ja, har såvidt begynt* ..... ☐
* *Ja, har helt tydelig begynt* ..... ☐
* *Det virker som om stemmeskiftet er ferdig* ..... ☐

113. Har du begynt å få bart eller skjegg? (Sett ett kryss)

* *Nei, har ikke begynt ennå* ..... ☐
* *Ja, har såvidt begynt* ..... ☐
* *Ja, har helt tydelig begynt* ..... ☐
* *Ja, har fått en god del skjeggvekst* ..... ☐

114. Har du vært behandlet hos lege for: (Sett ett kryss for hver linje).

	Ja	Nei
* *Trang forhud*	☐	☐
* *Utflod* fra *urinrøret*	☐	☐
* *Betennelse i forhuden eller pungen* (testiklene)	☐	☐

KOMMENTARER

Hvis du har tid kan du gjerne skrive litt om det du synes er viktig, men som det ikke er spurt etter i spørreskjemaet. Hvordan synes du det er å være ung i dag ? Er det noe du mener kan bli bedre når det gjelder helse og trivsel for dere som er unge ?

Vennlig hilsen

FOLKEHELSA
Statens Institutt for Folkehelse
Samfunnsmedisinsk forskningssenter, Verdal

Turid Lingaas Holmen
overlege, prosjektleder
Folkehelsa, Verdal
Tlf. 74 07 71 44

Kjell Terje Gundersen
høgskoledosent,
prosjektansvarlig ved
Høgskolen i Nord-Trøndelag
Levanger

VIDEREGÅENDE SKOLE

FOLKEHELSA
Statens Institutt for Folkehelse
Samfunnsmedisinsk
forskningssenter,
Verdal

ung-hunt

Helseundersøkelsen i Nord-Trøndelag

Nå er det *din tur* til å delta i den store helseundersøkelsen i Nord-Trøndelag (***hunt***)!

Vi håper du har lest igjennom informasjonen du fikk med hjem om ung-hunt og bestemt deg for å være med!

Les nå først gjennom samtykkeerklæringen som ligger i spørreskjemaet. Sjekk at det er ditt navn som står der! Kryss av for om du vil delta eller ikke, og undertegn. Lever denne lappen til læreren. Alle lappene legges i en konvolutt som klistres igjen.

Navnet ditt skal IKKE være med på spørreskjemaet!

Fyll så ut spørreskjemaet. Sett et kryss i rutene ☒ du synes passer for deg. Svar så godt du kan! Spørsmål du ikke ønsker å svare på, kan du hoppe over. Når du er ferdig, legger du spørreskjemaet i den konvolutten du har fått, klistrer igjen og leverer konvolutten til læreren. Lever også spørreskjemaet selv om du ikke ble helt ferdig.

Alle svarene dine blir behandlet med taushetsplikt!

Ingen på skolen får se svarene dine.

Hvis du ønsker å snakke med noen om undersøkelsen, kan du ta kontakt med ***ung-hunt***-sykepleieren på skolen din eller ringe Folkehelsa i Verdal (se baksiden).

Lykke til og tusen takk!

Dato for utfylling av skjema: ____/ ___19 ___

1. Er du gutt eller jente ? *Gutt* ☐ *Jente* ☐

2. Hvilken klasse går du i ?

	Allmennfaglig	Yrkesfaglig
* *1. videregående*	☐	☐
* *2. videregående*	☐	☐
* *3. videregående*	☐	☐
* *Folkehøgskole*	☐	

3. Hvilke planer for videre utdanning har du ? (Sett ett eller flere kryss)

* *Ingen* ..... ☐
* *Høgskole eller universitet mindre enn 4 år* ..... ☐
* *Høgskole eller universitet i 4 år eller mer* ..... ☐
* *Annen yrkesutdanning* ..... ☐
* *Vet ikke* ..... ☐

OM DER DU BOR

4. Hvilken type bolig (hus) bor du i ? (Sett bare ett kryss)

* *Enebolig/villa* ..... ☐
* *Blokk/terasseleilighet* ..... ☐
* *Gardsbruk* ..... ☐
* *Rekkehus/2-4 mannsbolig* ..... ☐
* *Annen bolig* ..... ☐

5. Hvem bor du sammen med nå ? (Her kan du sette ett eller flere kryss)

* *Mor* ..... ☐
* *Far* ..... ☐
* *1-2 søsken* ..... ☐
* *3 eller flere søsken* ..... ☐
* *Mors nye mann eller samboer* ... ☐
* *Fars nye kone eller samboer* ... ☐
* *Ektefelle/samboer/venner* ..... ☐
* *Alene/på hybel* ..... ☐
* *Fosterforeldre* ..... ☐
* *Andre* ..... ☐

6. Er det heldekkende tepper (teppegulv) hjemme hos deg:

- i stua ?	*Ja* ☐	*Nei* ☐
- på soverommet ditt ?	*Ja* ☐	*Nei* ☐

7. Er det katt i boligen (hjemme hos deg) ? *Ja* ☐ *Nei* ☐

8. Er det hund i boligen (hjemme hos deg) ? *Ja* ☐ *Nei* ☐

9. Er det andre pelskledde dyr i boligen (hjemme hos deg)? *Ja* ☐ *Nei* ☐

FOR ELEVER I VIDEREGÅENDE SKOLE

Disse spørsmålene står bare i spørreskjemaet for dere som går i videregående skole.

115. **Har du i løpet av det siste året ofte følt at du har presset deg, eller stadig drevet deg selv framover ?**

Ja ☐ *Nei* ☐ *Vet ikke* ☐

116. **Føler du deg under tidspress, også når det gjelder daglige gjøremål ?**

* *Alltid, eller nesten alltid* ..... ☐
* *Noen ganger* ..... ☐
* *Aldri* ..... ☐

117. **Har du hatt tanker om å ta ditt eget liv ?** *Ja* ☐ *Nei* ☐

118. **Har du noen gang prøvd hasj, marihuana eller lign. ?** *Ja* ☐ *Nei* ☐

119. **Har du noen gang brukt anabole steroider eller andre dopingmidler ?** *Ja* ☐ *Nei* ☐

120. Hvis ja, **hvor gammel var du første gang ?** _____år

121. **Har du noen gang hatt samleie ?** *Ja* ☐ *Nei* ☐

122. **For JENTER: Har du noen gang vært gravid uten at du ønsket det ?**

Ja ☐ *Nei* ☐

123. **For GUTTER: Har en jente noen gang blitt gravid med deg uten at det var meningen ?**

Ja ☐ *Nei* ☐ *Vet ikke* ☐

For BÅDE gutter og jenter:

Hvis ja:

124. **Hvor gammel var du da dette skjedde ?** _____år

125. **Ble det utført abort ?** *Ja* ☐ *Nei* ☐ *Vet ikke* ☐

KOMMENTARER

Hvis du har tid, kan du gjerne skrive litt om det du synes er viktig, men som det ikke er spurt etter i spørreskjemaet. Hvordan synes du det er å være ung i dag? Er det noe du mener kan bli bedre når det gjelder helse og trivsel for dere som er unge?

Vennlig hilsen

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YOUNG-HUNT

The Nord-Trøndelag Health Study

Date: ___ / ___ 19___

1. Are you male or female? Male Female

2. What grade are you in? Academic Vocational

- 2nd year high school
- 3rd year high school
- 4th year high school
- People's High School, Senior Primary School

3. Do you plan to continue your studies? (Check one or more boxes)

No	College or university for 4 years or more
College or university, less than 4 years	Vocational school
	Don`t know

ABOUT WHERE YOU LIVE

4. What type of housing do you live in? (Check only one box)

House	Farm
Apartment	Row house
	Another type

5. Who do you live with at this time? (Check one or more boxes)

Mother	Father`s new wife or partner
Father	Spouse/partner (boyfriend or girlfriend)/friends
1-2 siblings	Alone/in a rented room
3 or more siblings	Foster parents
Mother`s new husband or partner	Other

6. Is there wall to wall carpeting where you live: Yes No

- In the living room?
- In your bedroom?

7. Is there a cat where you live (in your home)? Yes No

8. Is there a dog where you live (in your home)? Yes No

9. Are there other animals with fur where you live (in your home)? Yes No

ABOUT YOUR HEALTH

10. How is your overall health at this time? (Check the box that best describes your health)

Poor	Good
Not very good	Very good

11. Are you disabled in any of these ways? (Check one box on each line) No Little Somewhat Very

Restricted movement
Impaired vision
Impaired hearing
Restricted due to physical disease
Restricted due to mental illness

12. Have you had any of these ailments in the past 12 months? Never Seldom Sometimes Often
(Check one box on each line)

A Headache (without known medical cause)
B Neck or shoulder pain
C Joint or muscle pain
D Stomach pain (without known medical cause)
E Nausea
F Constipation
G Diarrhea, upset stomach
H Palpitations
I Bronchitis or pneumonia
J Ear infection
K Sinus infection

13. If you have answered "never" to <u>all</u> the above listed ailments: Have you had any of these ailments <u>often</u> earlier (meaning before the last 12 months)? Yes No

If yes: **Which ailment (see above) was it?** (Write the name of the ailment or letter from above)

ABOUT RESPIRATORY PROBLEMS

14. Have you <u>ever</u> had wheezing or whistling in the chest at any time in the past? Yes No

If you answered "NO", please skip to question 19

15. Have you had wheezing or whistling in the chest in <u>the last 12 months</u>? Yes No

If you answered "NO", please skip to question 19

16. How many attacks of wheezing have you had in <u>the last 12 months</u>?
None 1 to 3 4 to 12 More than 12

17. In <u>the last 12 months</u>, how often, on average, has your sleep been disturbed due to wheezing?
Never woken with wheezing Less than one night per week One or more nights per week

18. In <u>the last 12 months</u>, has wheezing ever been severe enough to limit your speech to only one or two words at a time between breaths? Yes No

****

19. Have you ever had asthma? Yes No

20. In <u>the last 12 months</u>, has your chest sounded wheezy during exercise? Yes No

21. In <u>the last 12 months</u>, have you had a dry cough at night, apart from a cough associated with a cold or chest infection? Yes No

ABOUT RASH

22. Have you <u>ever</u> had an itchy rash that has lasted at least 6 months? Yes No

If you have answered "NO", go to question 27

23. Have you had this rash during the last 12 months? Yes No

If you have answered "NO", go to question 27

24. Was the rash ever on any of the following places: elbow (on the crease side), **behind the knee, front of the ankles, under the buttocks or around the neck, ears or eyes?** Yes No

25. Has the rash ever been completely gone during the past 12 months? Yes No

26. During the last 12 months, how often on the average have you been kept awake at night due to this rash?
Not at all in the last 12 months
Less than 1 night a week
1 or more nights a week

****

27. Have you ever had eczema? Yes No

ABOUT NASAL PROBLEMS

All these questions concern problems that occur when you do NOT have a cold or the flu.

28. Have you ever had problems with sneezing and/or a clogged or runny nose when you do NOT have a cold or the flu?
Yes No

If you have answered "NO", go to question 33

29. During the last 12 months, have you had problems with sneezing and/or a clogged or runny nose when you do NOT have a cold or the flu? Yes No

If you have answered "NO", go to question 33

30. During the last 12 months, have these nasal problems been accompanied by itchy, watery eyes?
Yes No

31. In which of the last 12 months have you had nasal problems?
(Check the box for every month that you have had problems)

January	May	September
February	June	October
March	July	November
April	August	December

32. During the last 12 months, how much have these nasal problems interfered with your daily activity?
Not at all A little Much Very much

****

33. Have you ever had hay fever or nasal allergies? Yes No

ABOUT ALLERGIES

34. Do you have any allergies? Yes No I don't know

If you have answered "NO", go to question 37

35. What do you think you are allergic to? Check the boxes for how you are affected by each item listed in the left column. (Check one or more box for each line.)

	No	Nose	Eyes	Eczema	Stomach reaction	Asthma/breathing	Other
Dogs							
Cats							
Other animals							
Grass/trees							
Dust							
Food							
Smoke							
Other							

36. Has your doctor given you any allergy tests (blood tests, skin tests)? Yes No

ABOUT MEDICINE

37. Do you use any of these medicines or supplements? Think about what you use these for.

(Check a box on every line.)	Never	Sometimes	Almost daily
Pain relievers			
Migraine medicine			
Sleeping medicine			
Nerve medicine			
Relaxants			
Asthma medicine			
Allergy medicine			
Eczema cream			
Laxatives			
Iron supplements			
Vitamins			
Cod liver oil			
Homeopathic medicine, natural healing aids			
Other			

List "other" here: _____

ABOUT OTHER ILLNESSES

38. Has a doctor diagnosed you with: Yes No

Epilepsy
Diabetes
Migraines

39. Have you had an illness that has lasted longer than 3 months? Yes No

If "yes": What type(s)? _____

ABOUT TOBACCO

40. Does anyone you live with smoke at home? (Check one or more boxes)

No, nobody
Yes, my mother
Yes, my father
Yes, a sibling
Yes, other

41. Have you tried smoking? (at least one cigarette) Yes No

If you have answered "NO", go to question 45

42. Do you smoke? (Check a box and write in the number of cigarettes. A package of loose tobacco equals aprox. 50 cigarettes.)
Yes, I smoke about ____ cigarettes daily.
Yes, I smoke sometimes, but not daily.
No, not anymore, but previously I smoked once in a while.
No, not anymore, but previously I smoked about ____ cigarettes daily.
No, I don`t smoke.

If you have answered "NO, I DON'T SMOKE", go to questioin 45

43. How old were you when you began smoking? _____ years old

44. How many years total have you smoked daily? _____ years

****

45. Does the smell of smoke bother you: Never Sometimes Often
- At school?
- At home?

46. Do you use or have you used snuff, chewing tobacco or similar products?
No, never Yes, but I have quit Yes, sometimes Yes, everyday

If you have answered "NO, NEVER", go to question 50

47. How old were you when you began using snuff/chewing tobacco? _____ years old

48. How many years total have you used snuff/chewing tobacco? _____ years

49. How many boxes/bags of snuff/chewing tobacco do you use in a week? _____ (number)

ABOUT SPORTS AND EXERCISE

50. Not during the average school day: **How many days a week do you play sports, or exercise to the point where you breathe heavily and/or sweat?** (Check only one box)

Everyday	Not every week, but at least once every two weeks
4-6 days a week	Not every 14th day, but at least once a month
2-3 days a week	Less than once a month
1 day a week	Never

51. Not during the average school day: **How many hours a week do you play sports, or exercise to the point where you breathe heavily and/or sweat?** (Check only one box)

None	About 2-3 hours
About ½ hour	About 4-6 hours
About 1 hour	7 or more hours

52. Do you use asthma medication before you exercise, train or compete in sports? Yes No

53. Are you actively involved in sports?
Yes No, but I was earlier No

If you have answered "NO" (never have been actively involved in sports), go to question 59

54. If you no longer participate in sports: **How old were you when you stopped?** _____ years old

55. Which sport(s) do/did you participate in? (Check one or more boxes)

A Skiing (cross country, biathlon)
B Skiing (downhill, slalom, ski jump)
C Soccer/football
D Horse riding
E Skating, ice hockey
F Handball, basketball, volleyball
G Asian fighting sports, boxing
H Body building
I Cycling
J Weight lifting
K Track and field/orientation
L Swimming
M Gymnastics
N Other: What?_____

56. Do you participate in competitive sports? (Check one box)

Yes | No, but I used to participate | No

If you have answered "NO" (never partisipated in competitive sports), go to question 59

57. At what level do/did you participate in competitive sports? (Give highest level)

Local level (championships, series, etc.) | Regional or state level | National level

58. In which sports are/were you active in?

(In order of participation level, list 3 sports you are/were active in.)

I am/have been most active in _____ and have/had participated for _____ years.
I am/have also been active in _____ and have/had participated for _____ years.
I am/have also been active in _____ and have/had participated for _____ years.

YOUR GENERAL WELLBEING

59. When you think about how things are generally going for you, are you basically satisfied or dissatisfied?

(Check only one box)

Completely satisfied
Very satisfied
Quite satisfied
So-so
Rather dissatisfied
Very dissatisfied
Totally dissatisfied

60. In general, do you feel strong and good humored or tired and worn out? (Check only one box)

Very strong and good humored
Strong and good humored
Quite strong and good humored
So-so
Quite tired and worn out
Tired and worn out
Extremely tired and worn out

61. Are you generally happy or sad? (Check only one box)

Feel very down (sad)
Feel down (sad)
Feel rather down (sad)
So-so
Rather happy
Happy
Very happy

62. How do you picture yourself? Check a box for each sentence below indicating whether you agree or disagree in how it relates to you. (Check one box for each line)

	Completely agree	Agree	Disagree	Completely disagree
I have a positive attitude toward myself.				
I feel rather useless at times.				

I feel that I don`t have much to be proud of.
I feel that I`m a valuable person, at least equal to other people.

63. During the last month have you: Almost every night Often Sometimes Never
Had difficulty falling asleep ?
Woken up too early and not been able to sleep again ?

64. The questions below regard how you behave, feel and deal with things (act).
Check the answer that best describes you, either Yes or No for each line. Yes No
Are you a relatively lively person?
Would you be affected by seeing a child or animal suffer?
Do you like to meet new people?
Are your feelings easily hurt?
Do you often run out of energy?
Do you like to tease people even though it may hurt them?
Are you often worried?
Are good manners and cleanliness important to you?
Do you worry that terrible things could happen?
Do you regularly take the first step in making friends?
Are you mostly quiet when you are around others?
Do you like to be on time for appointments?
Do you often feel tired and unmotivated for no reason?
Do many people try to avoid you?
In the company of others, can you keep a party going?
Are you bothered by an embarrassing experience long after it happens?
Do you like to have a lot of things going on around you?
Do people tell you a lot of lies?

65. Below is a list of some problems. Have you been bothered by any of these in <u>the last 14 days</u>?
(Check one box for each line) Not bothered A little bothered Quite bothered Very bothered
Been consistently afraid and anxious
Felt tense or uneasy
Felt hopelessness when you think of the future
Felt dejected or sad
Worry too much about various things

66. During <u>the last month</u> have you been bothered by nervousness (irritability, uneasiness, tenseness or restlessness)?
Almost always Often Sometimes Never

ABOUT YOUR LEISURE TIME

67. Think back over the last week, <u>the last 7 days</u>. If you did any of the things listed below, about how many times did you do it. (Check one box for every point)
Not once Once 2 or 3 times 4 times or more
Visited someone you know
Received a visit
Read a book you liked
Listened to music or played an instrument longer than 15 minutes
Were out for more than 2 hours (in a row) with friends
Were at a meeting or training with a club or team
Were active in a hobby
Watched television or a video
Did homework longer than 1 hour

68. How many teams or clubs are you a part of? (for example: sports team, girl or boy scouts, band, etc.) None One 2 or more

ABOUT FRIENDS

69. Do you have someone that you have considered your best friend through most of school? Yes No

70. Do you sometimes feel lonely? (Check one box)

Very often
Often
Sometimes
Rarely
Very rarely or never

71. Are your parents separated or divorced, or have they lived separately for more than a year? (Check a box and write in your age where necessary)

No
Yes, they lived separately or were separated when I was _____ years old, but they later moved back together again.
Yes, they were divorced or moved away from each other when I was ____ years old.

72. If you have siblings, how good a relationship do you feel you have with your sister or brother? If you have several siblings, think about the one you have the best relationship to. (Check one box)

Much worse than normal
Worse than normal
Average
I do not have siblings
Better than normal
Much better than normal

73. About how many close friends do you have? Include those you can speak to confidentially and those that help you when you need it. Do not include those people you live with, but include other relatives. (Check one box)

None
One
2 or more
4 or more

74. Do you have a steady boy-/girlfriend? Yes No

75. Do you feel that you have enough friends ? Yes No

ABOUT SCHOOL

76. Do any of the below items happen to you at school, or have happened before? (Check one box for each line)

	Never	Sometimes	Often	Very often
Have difficulties concentrating during class				
Think that gym or art is fun				
Think other classes are fun				
Argue with the teacher				
Look forward to going to school				
Skip school				
Understand what is being taught				
Have fun during recess/break time				
Satisfied with your test results				
Have fistfights				
Teased/harassed by other students				
Reprimanded by the teacher				

Can`t manage to be calm during class
Become bored or dissatisfied

ABOUT MEALS AND EATING HABITS

77. How often do you eat at these mealtimes? (Check one box for each line)

	Everyday	4-6 days a week	1-3 days a week	Seldom or never
Breakfast				
Lunch				
Dinner				

78. Are you trying to lose weight?

No, I'm comfortable with my weight
No, but I need to lose weight
Yes

79. How often does it occur that you <u>don`t</u> eat your lunch even though you brought one with you? (Check one box)

Every school day
1-3 days a week
4-6 days a week
Seldom or never
I never bring a lunch with me

80. How often do you drink or eat the things listed below? (Check a box for each line)

	More than once a day	Once a day	Every week but not everyday	Seldom	Never
Cola, soda or other soft drinks					
Light milk/skim milk					
Whole milk					
Coffee					
Potato chips and such					
Candy, chocolate and other sweets					
French fries, hamburgers or hot dogs					
Whole grain bread/rye crisps					
Butter					
Margarine					
Fruit					
Vegetables					

81. Do you consider yourself: (Check one box)

Very large
Thin
A little chubby
Very thin
About the same as others

82. Below are listed things that concern your eating habits.
Check the boxes according to how they apply to you.

(Check one box for each sentence)	Never	Seldom	Often	Always
When I first begin eating it can be difficult to stop.				
I use a lot of time thinking about food.				
I feel that food controls my life.				
When I eat I cut my food up in small pieces.				
I use more time than others to finish a meal.				
Older people think I'm too thin.				
I feel that others pressure me to eat.				

ABOUT ALCOHOL

83. Have you ever tried drinking alcohol? (Meaning alcoholic beer, wine, hard liquor or moonshine)

Yes No I don't know

If you have answered "NO", go to question 87

84. Have you ever drank so much alcohol that you felt intoxicated (drunk)? (Check one box)

No, never
Yes, once
Yes, 2-3 times
Yes, 4-10 times
Yes, more than 10 times

85. About how much beer, wine or hard liquor do you usually drink during <u>two weeks</u>? Don't count beer free for alcohol. Mark 0 if you **don't drink alcohol.**

Beer ____ number of 1/2 bottles
Hard alcohol, liquors ____ number of glasses (approx. 1/2 dl)
Wine ____ number of glasses (approx. 1 dl)
Moonshine ____ number of glasses (approx. 1/2 dl)

86. On which day during the week do you most often drink alcohol? (Check one or more boxes)

I don`t drink
Fridays
Saturdays
Weekdays

****

87. Have you ever seen either of your parents intoxicated? (Check one box)

Never
A few times
A few times during the year
A few times a month
A few times a week

READING AND WRITING DIFFICULTIES

88. How often do you feel that your reading or writing skills are inefficient for the tasks you do at school and/or in your spare time?

	Never	Seldom	Sometimes	Often	Always
Reading					
Writing					

89. Have you had any particular reading or writing problems <u>in the last 12 months</u>?

	A lot of problems	Some problems	No problems
Reading			
Writing			

90. Do you receive help for any reading or writing problems at this time? Yes No

91. Have you had reading or writing problems earlier, but not <u>within the last 12 months</u>? Yes No

If yes, **did you receive help at that time?** Yes No

92. Do you have any speaking difficulties? Yes No

If yes, **which one(s):**
Stuttering
Pronunciation difficulties
Problems with my voice
Difficulties expressing myself

ABOUT HEALTH SERVICES

93. During <u>the last 12 months</u> have you been to: (Check a box for every line) Yes No

General practitioner (a doctor outside the hospital)
Doctor at the hospital (not having been admitted)
Psychologist
Physical therapist
Chiropractor

Homeopath
Other treatment (natural medicine, foot reflexology, healer, psychic, etc.)

94. Have you ever been admitted to the hospital (not including when you were born)?
No, never Yes, once Yes, more than once
If yes: **Have you been admitted to the hospital during the last 12 months?** Yes No

95. How often have you been to the school health center during the last 12 months?
Not at all 1-3 times More than 3 times

96. Have you ever on your own accord contacted the school health center? Yes No

97. Would you like to have more contact with the school health center than you have had?
Yes No

98. How often have you been absent from school due to illness during the last 12 months?
Less than 1 week 1-2 weeks More than 2 weeks

ABOUT DEVELOPMENT

You are now at the age when your body has begun to change and become more like an adults body. Below are some questions about physical changes that occur in young people around your age.

99. During the teenage years there are periods where one grows quickly (a growing spurt). Have you noticed that your body has grown quickly (you`ve become taller)? (Check one box)
No, I have not had any growing spurts
Yes, I have barely begun a growing spurt
Yes, it is quite clear that I have had a growing spurt
Yes, it seems as though I`m finished with growing spurts

100. Concerning hair on your body (under your arms and your crotch/groin)? Would you say that the hair on your body has: (Check one box)
Not begun to grow yet
Barely begun to grow
Quite clearly begun to grow
It seems as though my body hair has grown in

101. When you look at yourself, do you think that you physically matured earlier or later than others your own age?
(Check one box)

Much earlier	A little bit later
Somewhat earlier	Somewhat later
A little bit earlier	Much later
The same as others	

QUESTIONS FOR GIRLS ONLY

102. Have you begun to develop breasts? (Check one box)

No, haven`t begun yet	Yes, have quite clearly begun
Yes, have barely begun	It seems as though my breasts are fully developed

103. Have you begun menstruating (gotten your period)? Yes No

If you have answered "NO", go to question 106

104. How old were you when you first began menstruating?
I was ____ years and ____ months old.

105. Have you ever missed (not gotten) your period for several months after a regular period (without being pregnant)?
(Check one box)
Yes, for 2-5 months
Yes, for 6-12 months
Yes, for more than a year
No, never

106. Have you ever been treated by a doctor for:	Yes	No
Inflammation/infection of the reproductive system (ovarian, fallopian tubes)		
Discharge		
Pain with menstruation		

107. Have you ever used birth control pills or the mini pill?	Yes	No

If you have answered "NO", go to the last page

108. How old were you when you first began to use birth control pills? ____ years old

109. How long in total did you use birth control pills? ____ years

110. Do you use birth control pills now?	Yes	No

QUESTIONS FOR BOYS ONLY

112. Has your voice begun to change? (Check one box)
No, hasn`t begun yet
Yes, has just barely begun
Yes, has clearly begun
It seems as though my voice has finished changing

113. Have you begun to get a mustache or beard? (Check one box)
No, hasn`t begun yet
Yes, has just barely begun
Yes, has clearly begun
Yes, I have quite a lot of facial hair

114. Have you been treated by a doctor for: (Check a box for every line)
Tight foreskin
Discharge from the penis (urethra)
Inflammation in the foreskin or scrotum (testicles)

FOR STUDENTS IN HIGH SCHOOL

These questions are directed to high school students only.

115. During the last year have you often felt that you were pressuring yourself or were constantly pushing yourself to continue?
Yes No I don`t know

116. Do you feel pressed for time even in regards to daily tasks?
Always, or almost always
Sometimes
Never

117. Have you ever had thoughts about taking your own life? Yes No

118. Have you ever tried hash, marijuana or related drugs? Yes No

119. Have you ever used steroids or other drugs to build muscles and/or enhance physical endurance?

Yes No

120. If yes, **how old were you the first time?** ____ years old

121. Have you ever had sexual intercourse? Yes No

122. For GIRLS: Have you ever been pregnant when you didn`t want to be? Yes No

123. For BOYS: Have you ever gotten a girl pregnant without intending to?

Yes No I don`t know

For BOTH boys and girls:

If yes:

124. How old were you when this happened? ____ years old

125. Was the result an abortion? Yes No I don`t know

Appendix 2

Definitions, groupings and dichotomization of variables used in Papers I-IV

Questions from the interview used in this thesis

Definitions, groupings and dichotomization of variables used in Papers I-IV

Smoking habits

Occasional smokers are defined as those who answered "yes" to the question "Have you ever tried smoking (at least one cigarette)?" (q 41) and "yes, I smoke occasionally, but not daily" to the question "Do you smoke yourself?" (q 42).

Daily smokers are defined as those who answered "yes" to the question "have you ever tried smoking (at least one cigarette)?" (q 41) and to the question" Do you smoke yourself" (q 42) marked the alternative "Yes, I smoke_(number)_ cigarettes daily" and listed the amount of cigarettes. Those who listed the number of cigarettes smoked daily without marking the question were also included.

Current smokers are defined as those who answered "yes" to either daily or occasional smoking.

Pack years was defined as the number of years with daily smoking multiplied by the number of cigarettes smoked daily divided by twenty. It was grouped as follows: "Never smokers": those who had never tried smoking; "Light smokers": pack years greater than zero, but less than one; "Medium smokers": pack years one or greater, but less than two; "Heavy smokers": pack years two or greater.

Smoke burden refers to occasional smoking and pack years.

Passive smoking was defined as exposure to smoking at home by mothers and/ or fathers and/ or siblings.

Physical activity

Physical activity was assessed using frequency of exercise (q 50) divided into three groups: "exercising 4 days a week or more", "exercising 2 to 3 days a week" and "exercising 1 day a week or less".

Participation in competitions and active sports (q53, 56) were dichotomized in to "Yes" and No/no quit".

Types of sports (q55) were divided into: "*Individual high endurance sports*" including cross country skiing, cycling and running; *"Individual low endurance sports*" including slalom, horseback riding and gymnastics; *"Swimming"*; *"Bodybuilding and fight sports"* including body building, weightlifting, boxing, judo, taekwondo and similar fight sports; and *"Team sports"* including football/soccer, handball, basketball and volley ball.

Health problems

Questions with more than two alternative answers were dichotomized as follows:

Perceived health (q 10): "Bad/not good" and "Good/very good".

Disabled (q 11): "Much/some/little" and "No".

Health problems (q 12): The more frequent ones (ABCDE) were dichotomized into "Sometimes/often" and "Never/seldom" and the less frequent ones (FGHIJK) into "Sometimes/often/seldom" and "Never."

Medication (q 37): "Almost daily/sometimes" and "Never".

Sleeping problems and nervousness (q 63, 66): "Most of the time/often" and "Sometimes/never".

School absence (q 98): "One week or more" and "Less than one week".

Hospitalization and school health service (q 94, 95): " "Once or more" and "Never".

Having allergy was defined as answering "yes" to both questions: "Are you allergic?" (q 34) and "Have you been allergy tested (skin or blood test) by a physician?" (q 36).

Current wheeze was defined as answering "yes" to both questions: "Have you ever been wheezing?" (q 14) and "Have you been wheezing during the last 12 months?" (q 15).

Current rhinitis was defined as answering "yes" to both questions: "Have you ever had problems with sneezing and/or a clogged or runny nose when you do NOT have a cold?" (q 28) and "During the last 12 months, have you had problems with sneezing and/or a clogged or runny nose when you do NOT have a cold?" (q 29).

Acute bronchitis was defined as answering "yes" to the following question in the interview: "Do you have a cold with cough or do you have bronchitis today?"

Social factors

Questions with more than two alternative answers were dichotomized as follows:

Out with friends more than two hours at the time, did homework for more than one hour, watched TV or video (q 67): ""None/one" and ""2-3/4 times or more".

Organized activity (68): "None" and "One/ two or more".

Parents divorced (q 71): "Yes, divorced or separated" and "No". Students with parents who had moved together again were excluded.

Been drunken (q 84): "Never" and "Once/2-3/4-10/more than 10 times" or "Never/once/2-3/4-10 times" and "More than 10 times".

Seen parents drunk (q 87): "Never" and " a few times/yearly/every month/ every week".

Questions from the interview used in this thesis

Er du forkjølet med hoste eller har du bronkitt i dag? Ja Nei

Do you have a cold with cough or do you have bronchitis today?

Røyker du selv? Ja Nei

Do you smoke?

Hvis ja, røyker du hver dag? Ja Nei

If yes, du you smoke every day?

Daily smokers were defined as those who answered "yes" to both questions: "Do you smoke?" and "If yes, du you smoke every day?"

Occasional smokers were defined as those who answered "yes" to the question: "Do you smoke?", but no to the question: "If yes, du you smoke every day?"

Appendix 3

Written information to participants and parents

FOLKEHELSA
Samfunnsmedisinsk
forskningssenter, Verdal

ung-hunt
Helseundersøkelsen i Nord-Trøndelag

Til ungdom og foresatte

I alle kommunene i Nord-Trøndelag pågår det i perioden 1995-1997 en stor helseundersøkelse, HUNT, hvor alle innbyggerne over 13 år blir invitert til å delta. Ungdommer mellom 13 og 19 år blir invitert til å delta i *ungdomsdelen* av HUNT, ***ung-hunt***.

Hvorfor bør ungdommene være med i helseundersøkelsen?

Ungdomsgruppen faller ofte mellom barn og voksne, og mange kommuner i Norge har ikke godt nok helsetilbud til ungdommene. Mange har ikke skolehelsetjeneste i videregående skole. Når det skapes et miljø omkring forebyggende helsearbeid i fylket er det viktig at også ungdommene tas med i dette. Målet for helseundersøkelsen er:

* å finne ut hvordan helsa til ungdommene er
* å finne ut hva som er årsakene til sykdom, og hva som gir god helse
* å bedre helsetjenesten og det forebyggende helsearbeid for ungdom

For å kunne forebygge sykdom og gi et bedre helsetilbud til alle er det også viktig å finne ut hvordan ungdommene selv mener de har det.

Hvordan skal helseundersøkelsen gjennomføres?

Helseundersøkelsen foregår på skolen i skoletiden og inneholder følgende:

* Ungdommene blir tilbudt en *klinisk undersøkelse*.

Det blir målt blodtrykk, høyde og vekt, og gjort en lungefunksjonsundersøkelse (pusteprøve). Det blir ikke tatt blodprøver av ungdommene og ingen av undersøkelsene er smertefulle. Alle får skriftlig svar på undersøkelsene og beskjed om hva man bør gjøre dersom prøvene ikke er tilfredsstillende. Dersom man ønsker det vil også lege få prøvesvarene. Elevene tas ut av klassen som ved en skolehelseundersøkelse. Undersøkelsen utføres av en prosjektsykepleier og en assistent.

* Ungdommene blir bedt om å fylle ut et *spørreskjema*.

Dette gjøres i en skoletime. Spørreskjema vil inneholde spørsmål om sykdom og helse, kosthold, idrett, rus og hvordan de selv synes de har det. Spørreskjema inneholder ikke navn, men personnummer i *strekkode* som bare kan leses av en datamaskin. Det legges i en konvolutt som klistres igjen av eleven selv før det samles inn.

I tilslutning til undersøkelsen vil det bli tilbudt kurs til lærere og til skolehelsetjenesten om emner som omhandles i spørreskjema. I samarbeid med Høgskolen i Nord-Trøndelag (avd. for helsefag og avd. for lærerutdanning) planlegges det et opplegg for helseinformasjon og helsefremmende arbeid i skolen.

Alle opplysninger blir behandlet med taushetsplikt!

I tillegg til at de unge selv får svarene på den kliniske undersøkelsen, vil dataene bli brukt til medisinsk forskning, eventuelt ved å sammenholde opplysningene med opplysninger fra andre helseregistre. Dette vil i tilfelle skje i samråd med Datatilsynet og Regional komite for medisinsk forskningsetikk, helseregion IV. Forskerne vil få datafiler som er anonymiserte, og det vil ikke bli offentliggjort opplysninger som kan føres tilbake til en bestemt elev. Ingen på skolen har anledning til å se svarene på spørreskjemaene.

Det er mulighet for at noen unge vil få tilbud om videre undersøkelser på et senere tidspunkt. Dette vil være unge med sykdom og plager, men også noen friske. Det er mulig til en hver tid å trekke seg fra undersøkelsen og også be om at data blir slettet.

Regional komite for medisinsk forskningsetikk, helseregion IV, tilrår undersøkelsen og Datatilsynet har også godkjent undersøkelsen.

Undersøkelsen er selvfølgelig frivillig, men vi håper at alle ønsker å delta.
De som ikke ønsker å delta i undersøkelsen vil få vanlig skolearbeid mens denne pågår.

På skolen blir alle unge på nytt informert om undersøkelsen og bedt om å undertegne et skriftlig samtykke samtidig som spørreskjemaet utfylles. For ungdom i alderen 13-16 år ønsker vi også foresattes tillatelse til at de unge skal delta i undersøkelsen.

Ved spørsmål, ta gjerne kontakt med Folkehelsa, Verdal!

Vennlig hilsen

Turid Lingaas Holmen

Kjell Terje Gundersen

Turid Lingaas Holmen
barnelege, prosjektleder
Folkehelsa, Verdal **tlf. 74 07 71 44**

Kjell Terje Gundersen
høgskoledosent, prosjektansvarlig
ved Høgskolen i Nord-Trøndelag (HiNT)

Bak undersøkelsen står: Statens Institutt for Folkehelse (Folkehelsa), Universitetet i Trondheim, Norges forskningsråd, Statens helseundersøkelser (SHUS), Fylkeslegen, Fylkesskolesjefen, Statens Utdanningskontor, Norske Kvinners Sanitetsforening (Nord-Trøndelag krets) og Høgskolen i Nord-Trøndelag(HiNT). Undersøkelsen ledes av Samfunnsmedisinsk forskningssenter (Folkehelsa), Verdal.

Appendix 4

Written consents from adolescents and parents

FOLKEHELSA
Statens Institutt for Folkehelse
Samfunnsmedisinsk
forskningssenter, Verdal

ung-hunt
Helseundersøkelsen i Nord-Trøndelag

Hei!

Sammen med alle ungdommene i alderen 13- 19 år i hele Nord-Trøndelag (ca. 13 000) blir du nå invitert til å være med i ungdomsdelen av helseundersøkelsen i Nord-Trøndelag, HUNT.

Hensikten med undersøkelsen er å få vite mer om hvordan helsa er hos dere som er unge og hvordan dere selv synes dere har det. Dette er viktig for å kunne forebygge sykdom og gi et bedre helsetilbud til alle unge.

Du blir nå bedt om å fylle ut dette spørreskjemaet i denne skoletimen. Siden vil du bli undersøkt som ved en vanlig skolehelsetjeneste. En sykepleier og en assistent undersøker blodtrykk, spirometri (pusteprøve), høyde og vekt. Ingen av undersøkelsene er smertefulle. Du får svar på hvordan prøvene dine er. Hvis du ønsker at en lege også skal få svar på prøvene så kryss av på svarlappen nedenfor.

Alle svarene dine blir behandlet med taushetsplikt!

I tillegg til de svarene du selv får på undersøkelsen, vil dataene bli brukt til medisinsk forskning, eventuelt ved å sammenholde opplysningene med opplysninger fra andre helseregistre. Dette vil i tilfelle skje i samråd med Datatilsynet og Regional komite for medisinsk forskningsetikk, helseregion IV. Forskerne vil få datafiler som er anonymiserte (uten navn og personnummer). Det vil ikke bli offentliggjort opplysninger om akkurat hva du har svart. Ingen på skolen får se svarene på spørreskjemaet ditt.

Du kan få tilbud om videre undersøkelser på et senere tidspunkt. Dette vil være hvis du har en sykdom eller plager, men også noen friske får et slikt tilbud. Du kan trekke deg fra undersøkelsen når som helst og også be om at dine data blir slettet.

Regional komite for medisinsk forskningsetikk, helseregion IV, tilrår undersøkelsen og Datatilsynet har også godkjent undersøkelsen.

Undersøkelsen er selvsagt frivillig, men vi håper at også du vil være med!
Hvis du ikke vil være med får du skolearbeid av læreren din som du kan gjøre isteden.

Hvis du vil være med i undersøkelsen skriver du navnet ditt på svarslippen. Kontroller at det er ditt navn som står der fra før. Navnet ditt skal ikke stå på spørreskjemaet. Lappene blir samlet inn, og skal ikke legges sammen med spørreskjemaet.

SVAR----------

☐ **JA,** jeg vil være med i ***ung-hunt***

☐ **NEI,** jeg vil ikke være med

☐ Provesvar kan sendes lege.....
legens navn

....
Dato Underskrift

FOLKEHELSA

Samfunnsmedisinsk
forskningssenter, Verdal

ung-hunt
Helseundersøkelsen i Nord-Trøndelag

Til ungdom og foresatte

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Ungdomsgruppen faller ofte mellom barn og voksne, og mange kommuner i Norge har ikke godt nok helsetilbud til ungdommene. Mange har ikke skolehelsetjeneste i videregående skole. Når det skapes et miljø omkring forebyggende helsearbeid i fylket er det viktig at også ungdommene tas med i dette. Målet for helseundersøkelsen er:

* å finne ut hvordan helsa til ungdommene er
* å finne ut hva som er årsakene til sykdom, og hva som gir god helse
* å bedre helsetjenesten og det forebyggende helsearbeid for ungdom

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Hvordan skal helseundersøkelsen gjennomføres?

Helseundersøkelsen foregår på skolen i skoletiden og inneholder følgende:

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I tilslutning til undersøkelsen vil det bli tilbudt kurs til lærere og til skolehelsetjenesten om emner som omhandles i spørreskjema. I samarbeid med Høgskolen i Nord-Trøndelag (avd. for helsefag og avd. for lærerutdanning) planlegges det et opplegg for helseinformasjon og helsefremmende arbeid i skolen.

Alle opplysninger blir behandlet med taushetsplikt!

I tillegg til at de unge selv får svarene på den kliniske undersøkelsen, vil dataene bli brukt til medisinsk forskning, eventuelt ved å sammenholde opplysningene med opplysninger fra andre helseregistre. Dette vil i tilfelle skje i samråd med Datatilsynet og Regional komite for medisinsk forskningsetikk, helseregion IV. Forskerne vil få datafiler som er anonymiserte, og det vil ikke bli offentliggjort opplysninger som kan føres tilbake til en bestemt elev. Ingen på skolen har anledning til å se svarene på spørreskjemaene.

Det er mulighet for at noen unge vil få tilbud om videre undersøkelser på et senere tidspunkt. Dette vil være unge med sykdom og plager, men også noen friske. Det er mulig til en hver tid å trekke seg fra undersøkelsen og også be om at data blir slettet.

Regional komite for medisinsk forskningsetikk, helseregion IV, tilrår undersøkelsen og Datatilsynet har også godkjent undersøkelsen.

Undersøkelsen er selvfølgelig frivillig, men vi håper at alle ønsker å delta.
De som ikke ønsker å delta i undersøkelsen vil få vanlig skolearbeid mens denne pågår.

På skolen blir alle unge på nytt informert om undersøkelsen og bedt om å undertegne et skriftlig samtykke samtidig som spørreskjemaet utfylles. For ungdom i alderen 13-16 år ønsker vi også foresattes tillatelse til at de unge skal delta i undersøkelsen.

Ved spørsmål, ta gjerne kontakt med Folkehelsa, Verdal!

Vennlig hilsen

Turid Lingaas Holmen

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ung-hunt
Helseundersøkelsen i Nord-Trøndelag

FOLKEHELSA
Samfunnsmedisinsk forskningssenter, Verdal

VI BER OM AT SVARSLIPPEN NEDENFOR FYLLES UT AV FORESATTE OG LEVERES TIL SKOLEN

Barnets navn.....Kommune.....

Skole.....Klasse.....

☐ **Ja**, jeg gir tillatelse til at mitt barn kan delta i ***ung-hunt,*** ungdomsdelen av Helseundersøkelsen i Nord-Trøndelag.

☐ **Nei**, jeg gir ikke tillatelse til at mitt barn kan delta i ***ung-hunt***.

☐ Hvis prøvesvarene ikke er tilfredstillende ønsker jeg at de skal sendes til lege.

Navnet på legen:.....

Hvis den unge ikke har noen fast lege sendes svaret til kommunelege I

☐ Jeg ønsker ikke at prøvesvarene skal sendes til lege

.....
Dato

.....
Foresattes underskrift

Appendix 5

Instructions to teachers

ung-hunt
Helseundersøkelsen i Nord-Trøndelag

Informasjon til lærere i ungdomsskolen

Hver klasse har fått utdelt konvolutter som inneholder spørreskjema og samtykkeerklæring for hver enkelt elev. Etter avtale med rektor skal elevene på 7., 8. og 9. klassetrinn ved din skole fylle ut vedlagte spørreskjema i løpet av samme skoletime.

Før utfylling av spørreskjema:

Spørreskjemaet har en strekkode. Det må **ikke skrives** navn på spørreskjema (konfidensiell behandling)! Skjema **må ikke** byttes mellom elever! Strekkoden må ikke rives av eller klusses på!

Samtykkeerklæringen ligger inne i spørreskjema (gult ark). Den er påklistret elevens navn og fødselsdato. Elevene må kontrollere om de har fått rett samtykkeerklæring. **Alle elever som har fått konvolutt skriver navnet sitt på samtykkeerklæringen og krysser av for ja eller nei.** Læreren samler inn samtykkeerklæringene (hele arket) og legger dem i vedlagte konvolutt.

Ved utfylling av spørreskjema:

Disse retningslinjene er viktige ved utfyllingen av spørreskjema:

1. **Utfyllingen skjer som ved en prøve eller eksamen.** *(Elevene sitter ved hver sin pult. De kan ikke gå mellom pultene eller snakke med hverandre.)*

2. **Elevene kan ikke forlate klasserommet før timen er ferdig.** *(Dersom en elev må forlate klasserommet, legges spørreskjemaet i konvolutten midlertidig. Elever som blir ferdige tidlig, får andre oppgaver resten av timen.)*

3. **Elever som ikke ønsker å være med på undersøkelsen, er tilstede, men får andre oppgaver.**

4. **Læreren skal ikke tolke spørsmålene for eleven.** *(Dersom elever ikke klarer eller ikke ønsker å svare på spørsmål, kan de hoppe over disse.)*

5. **Lesesvake elever kan samles spesielt (eks.vis i «lesestudio») slik at læreren kan lese spørsmålene høyt for elevene.** *(Læreren må ikke sitte/stå så nært elevene at svarene kan ses!)*

6. **Spørreskjemaet leveres inn selv om eleven ikke blir helt ferdig.** *(NB! Det er svært viktig at elever som ikke blir ferdige får benytte lengre tid til utfyllingen, eks.vis. friminutt, utvidet skoletime ol.)*

7. **Eleven legger selv spørreskjemaet inn i vedlagte konvolutt. Navnet på limstrimmelen fjernes og konvolutten klistres igjen.**

8. **Læreren samler inn konvoluttene. Konvolutten med samtykkeerklæringene og spørreskjemakonvoluttene leveres klassevis til skolens administrasjon.**

ung-hunt
Helseundersøkelsen i Nord-Trøndelag

Informasjon til lærere i videregående skole

Hver klasse har fått utdelt konvolutter som inneholder spørreskjema og samtykkeerklæring for hver enkelt elev. Etter avtale med rektor skal elevene ved din skole fylle ut vedlagte spørreskjema i løpet av samme skoletime.

Før utfylling av spørreskjema:

Spørreskjemaet har en strekkode. Det må **ikke skrives** navn på spørreskjema (konfidensiell behandling)! Skjema **må ikke** byttes mellom elever!

Samtykkeerklæringen ligger inne i spørreskjema (gult ark). Den er påklistret elevens navn og fødselsdato. Elevene må kontrollere om de har fått rett samtykkeerklæring. **Alle elever skal skrive navnet sitt på samtykkeerklæringen og krysse av for ja eller nei.** Læreren samler inn samtykkeerklæringene (hele arket) og legger dem i vedlagte konvolutt.

Ved utfylling av spørreskjema:

Disse retningslinjene er viktige ved utfyllingen av spørreskjema:

1. **Utfyllingen skjer som ved en prøve eller eksamen.** *(Elevene sitter ved hver sin pult. De kan ikke gå mellom pultene eller snakke med hverandre.)*

2. **Elevene kan ikke forlate klasserommet før timen er ferdig.** *(Dersom en elev må forlate klasserommet, legges spørreskjemaet i konvolutten midlertidig. Elever som blir ferdige tidlig, får andre oppgaver resten av timen.)*

3. **Elever som ikke ønsker å være med på undersøkelsen, er tilstede, men får andre oppgaver.**

4. **Læreren skal ikke tolke spørsmålene for eleven.** *(Dersom elever ikke klarer eller ikke ønsker å svare på spørsmål, kan de hoppe over disse.)*

5. **Lesesvake elever kan samles spesielt (eks.vis i «lesestudio») slik at læreren kan lese spørsmålene høyt for elevene.** *(Læreren må ikke sitte/stå så nært elevene at svarene kan ses!)*

6. **Spørreskjemaet leveres inn selv om eleven ikke blir helt ferdig.** *(NB! Det er svært viktig at elever som ikke blir ferdige får benytte lengre tid til utfyllingen, eks.vis. friminutt, utvidet skoletime ol.)*

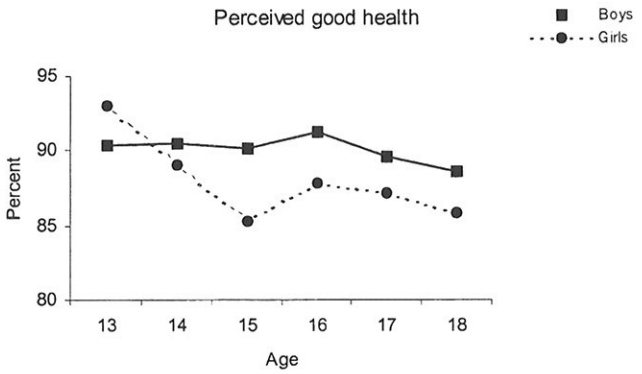
7. **Eleven legger selv spørreskjemaet inn i vedlagte konvolutt. Navnet på limstrimmelen fjernes og konvolutten klistres igjen.**

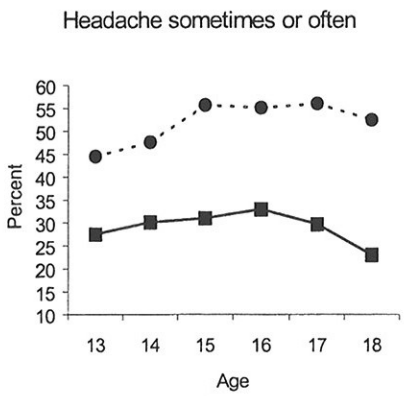
8. **Læreren samler inn konvoluttene. Konvolutten med samtykkeerklæringene og spørreskjemakonvoluttene leveres klassevis til skolens administrasjon.**

Appendix 6

Tables and figures

Figure 2.1. Perceived health, headache and neck and shoulder pains among adolescents, 13-18 yeears, who answered the questionnaire in the ***young-hunt*** study. Boys: n=4,249, girls: n=4,211.





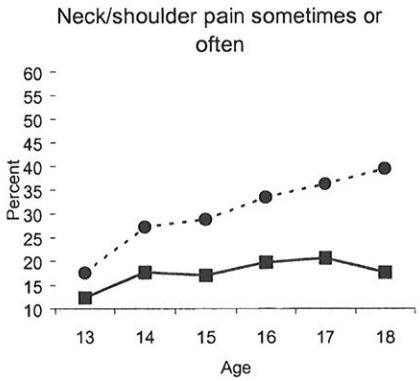


Table 2.1. Subjective health problems and disability in adolescents, 13-18 years, who answered the questionnaire in the ***young-hunt*** study. Total numbers of participants: 13-15 years: boys n=2,242, girls n=2,265, 16-18 years: boys n=2,007, girls n=1,946.

	Age 13-15 years						Age 16-18 years					
	Boys			Girls			Boys			Girls		
Health problems	n	%	CI	n	%	CI	n	%	CI	n	%	CI
General												
Self-reported poor health [1]	212	9.6	8.4-10.8	248	11.1	9.8-12.4	199	10.1	8.8-11.4	248	13.0	11.5-14.5
Absent from school more than 1 week	462	22.5	20.7-24.3	530	25.1	23.3-27.0	392	20.4	18.6-22.2	499	26.6	24.6-28.6
Overall pain	1,057	47.1	45.0-49.2	1,503	66.4	64.5-68.4	956	47.6	45.4-49.8	1,393	71.6	69.6-73.6
Head/muscles												
Headache [1]	648	29.7	27.8-31.6	1,100	49.5	47.4-51.6	564	28.9	26.9-30.9	1,039	54.6	52.4-56.8
Neck and shoulder pain [1]	344	15.9	14.4-17.4	548	25.0	23.2-26.8	380	19.6	17.8-21.4	681	36.3	34.1-38.5
Muscle and joint pain [1]	343	15.9	14.4-17.4	387	17.8	16.2-19.4	286	14.9	13.3-16.5	348	19.0	17.2-20.8
Gastrointestinal												
Stomachache [1]	279	12.9	11.5-14.3	600	27.4	25.5-29.3	258	13.4	11.9-14.9	538	28.7	26.7-30.8
Constipation [2]	514	23.9	22.1-25.7	708	32.6	30.6-34.6	584	30.5	28.4-32.6	870	47.0	44.7-49.3
Diarrhea [2]	568	26.3	24.4-28.2	729	33.3	31.3-35.3	625	32.4	30.3-34.5	767	41.2	39.0-43.4
Nausea [2]	243	11.2	9.9-12.5	415	18.9	17.3-20.5	145	7.5	6.3-8.7	354	19.0	17.2-20.8
Psychhological												
Nervous/restless [3]	124	5.7	4.7-6.7	181	8.1	7.0-9.2	139	7.1	6.0-8.2	245	12.7	11.2-14.2
Sleep problems [3]	179	8.2	7.1-9.4	268	12.2	10.8-13.6	231	11.8	10.4-13.2	324	17.0	15.3-18.7
Frequent heartbeats [2]	315	14.7	13.2-16.2	479	22.3	20.5-24.1	360	18.8	17.1-20.6	496	26.9	24.9-28.9
Disablements												
Disabled from motion restriction [4]	43	2.2	1.6-2.8	40	2.0	1.4-2.6	42	2.3	1.6-3.0	37	2.3	1.6-3.0
Disabled from hearing loss [4]	163	8.1	6.9-9.3	180	9.1	7.8-10.4	185	10.1	8.7-11.5	147	8.9	7.5-10.3
Disabled from physical disease [4]	123	6.1	5.1-7.1	127	6.5	5.4-7.6	97	5.3	4.3-6.3	184	11.1	9.6-12.6
Disabled from psychological disease	71	3.6	2.8-4.4	96	4.9	3.9-5.9	67	3.7	2.8-4.6	120	7.3	6.0-8.6

[1] Often/sometimes during the **last 12 months**
[2] Often/sometimes/seldom during the **last 12 months**
[3] Most of the time/often during the **last month**
[4] Much/some/little
Because missing data were excluded, the percentage of subjects with each health problem varied (88-100 %).

Table 2.2. Respiratory symptoms and asthma in adolescents, 13-18 years, who answered the questionnaire in the ***young-hunt*** study. Total numbers of participants: 13-15 years: boys n=2,242, girls n=2,265, 16-18 years: boys n=2,007, girls n=1,946.

	Age 13-15 years						Age 16-18 years					
	Boys			Girls			Boys			Girls		
Respiratory symptoms	n	%	CI	n	%	CI	n	%	CI	n	%	CI
Bronchitis/pneumonia [1]	241	11.2	7.2-15.2	279	12.8	8.9-16.7	216	11.2	7.0-15.4	234	12.6	8.4-16.9
Sinusitis [1]	166	7.7	3.6-11.8	220	10.1	6.1-14.1	191	9.9	5.7-14.1	257	13.8	9.6-18.0
Ear ache [1]	337	15.6	11.7-19.5	347	15.8	12.0-19.6	207	10.8	6.6-15.0	231	12.4	8.2-16.7
Ever asthma	289	13.1	9.2-17.0	267	12.0	8.1-15.9	258	13.1	9.0-17.2	266	13.9	9.7-18.1
Doctor diagnosed asthma	268	94.7 *	92.0-97.4	235	91.4 *	87.8-95.0	224	88.5 *	84.3-92.7	241	92.0 *	88.6-95.4
Current asthma (symptoms last 12 months)	164	7.3	3.3-11.3	198	8,7	4.8-12.6	156	7.8	3.6-12.0	201	10.3	6.1-14.5
Wheeze last 12 months	443	20.1	16.4-23.8	630	28.5	25.0-32.0	444	22.7	18.8-26.6	638	33.6	29.9-37.3
Cough at night last 12 months	366	16.8	13.0-20.6	540	24.7	21.1-28.3	429	22.2	18.3-26.1	587	31.1	27.4-34.8
Wheeze on exercise last 12 months	675	30.8	27.3-34.3	1,012	45.9	42.8-49.0	675	34.7	31.1-38.3	928	49.2	46.0-52.4

[1] Often/sometimes/seldom during the **last 12 months**

* % of those who ever had asthma

Because missing data were excluded, the percentage of subjects with each health problem varied (88-100 %).

Table 2.3. Smoking habits in adolescents, 13-18 years, who answered the questionnaire in the ***young-hunt*** study and who reported to have or have had asthma. n=1,080.

	Age 13-15 years				Age 16-18 years					
	Boys		Girls		Boys		Girls		Total	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Never tried smoking, not even one cigarette	152	(52.6)	119	(44.6)	92	(35.7)	89	(33.5)	452	(41.9)
Tried smoking, but were not smokers	67	(23.2)	79	(29.6)	73	(28.3)	58	(21.8)	277	(25.6)
Previous smokers	27	(9.3)	21	(7.9)	17	(6.6)	22	(8.3)	87	(8.1)
Occasional smokers	14	(4.8)	21	(7.9)	27	(10.5)	32	(12.0)	94	(8.7)
Daily smokers	19	(6.6)	19	(7.1)	39	(15.1)	60	(22.6)	137	(12.7)
Missing	10	(3.5)	8	(3.0)	10	(3.9)	5	(1.9)	33	(3.1)
Total	289	(100.0)	267	(100.0)	258	(100.0)	266	(100.0)	1,080	(100.0)

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