DISSERTATIONES MEDICINAE UNIVERSITATIS TARTUENSIS
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# HEALTH DAMAGING RISK BEHAVIOURS IN ADOLESCENCE

MARI JÄRVELAID

TARTU UNIVERSITY
PRESS

Department of Polyclinic and Family Medicine, University of Tartu, Estonia

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*To Peeter and my children with love.*

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# ABBREVIATIONS

BMI body mass index ($kg/m^2$)
BDI 21 item Beck Depression Inventory
CI confidence interval
OR odds ratio
RM regular menstrual cycles
IRM irregular menstrual cycles
SPSS Statistical Package for Social Science

# 1. INTRODUCTION

From 1991 to 1998, in my day-to-day practice at Tartu City Polyclinic, most of my patients were adolescents. The frequent occurrence of complaints and illnesses due to health damaging behaviours such as licit and illicit substance use, risk-taking sexual behaviour, unhealthy eating behaviour among young patients grabbed my attention. These behaviours are associated with the leading causes of mortality and morbidity, posing immediate risks to health during adolescence and increasing the likelihood of excess preventable morbidity and death in adulthood (Simantov *et al.*, 2000). Globally, if current trends continue, more than 200 million persons who are currently children and teenagers will die from tobacco-related illness (Siqueira and Brook, 2003). Hence, the factors affecting the health damaging risk behaviour among adolescents are not fully understood and there is a need for indicators of the risk rate to health for better management with teenage patients in daily practice.

Adolescents are the individuals who are between puberty and the completion of physical growth, roughly from 13 to 18 years of age (Jacobson and Wilkinson, 1994). The adolescent developmental period — the time between leaving childhood and becoming an adult — is characterised by rapid psychosocial, physical, and emotional changes. It is a time of increasing demands on the young person, the family, and the family physician. In a review published in 1989, Melville argued that teenagers frequently have a hidden agenda behind the apparently physical symptoms which they bring to the surgery (Melville, 1989). The family physician, who is privy to this process, to the unfolding of the young patient's adult identity, is faced with a challenge and an opportunity to render meaningful, lasting service for adolescents and the family. Within each adolescent, whether he or she is highly successful in negotiating this second decade of life or is markedly dysfunctional, there commonly are entire clusters of biological, social, psychological, cultural, and even specific environmental factors that interact in rather unique ways. So, the adolescent years have become the starting point for an upsurge of health-compromising behaviours that have lifelong consequences (Neinstein, 1996; Strasbourger and Brown, 1998; Järvelaid, 1998).

There has been a long tradition in research of adolescence medicine in Estonia (Madisson, 1926; Reiman, 1928; Lüüs, 1936). In the medical faculty of the University of Tartu the first academic degree as medical doctor on the topic of adolescence medicine was awarded on the 10$^{th}$ of December 1924 by dr. Hans Madisson.

Dr. H. Madisson was working as a school doctor in Tartu Girls' Gymnasium and was the author of several scientific pages on girls' reproductive health, but the topic of his doctoral thesis was the risk behaviour of boys (Järvelaid, 2001). The most recent doctoral thesis about knowledge on sexual issues, moral beliefs

and sexual experiences of Estonian schoolchildren was done by dr. Krista Papp (Papp, 1997).

The aim of the current research has been to clarify indicators relating to health damaging risk behaviours among Estonian adolescent schoolchildren.

# 2. REVIEW OF LITERATURE

## 2.1. Age specific characteristics of adolescents

Adolescence is one of the most complex transitions in the lifespan, a time of metamorphosis from childhood to adulthood. Its beginning is associated with biological, physical, behavioural, and social transformations. Adolescence is defined as a period of personal development during which a young person must establish a personal sense of individual identity and feelings of self-worth, which include an alteration of his or her body image, adaptation to more mature intellectual abilities, adjustment to society's demands for behavioural maturity, internalising a personal value system, and preparing for adult roles (Ingersoll, 1992).

It is from Hall that we receive the concept of adolescence as a period of "storm and stress". David Hamburg has written that by age 17, about one quarter of all adolescents have engaged in behaviours that are harmful to themselves and others, such as getting pregnant, using drugs, taking part in antisocial activity, and failing in school (Hamburg, 1997). An earlier age of first use increases the length of adolescent exposure and risk for alcohol and other drug abuse and dependence (Grant and Dawson, 1997; Hanna and Grant, 1999). Although the image of adolescence as intrinsically stormy and filled with stress was, and remains common, direct evidence in support of that image has not been strong. However, an image of adolescents as generally stressed, tumultuous, and anxiety-ridden could be misleading and potentially harmful, impeding a vision of adolescents as being capable of maintaining a positive health orientation (Ingersoll, 1992).

## 2.2. Main causes of morbidity and mortality in adolescence

Over the past few decades, the burden of adolescent illness has shifted from traditional causes of disease toward the "new morbidities" associated with the health-damaging behaviours such as depression, suicide, substance use (alcohol, tobacco, and drugs), sexually transmitted diseases including HIV and AIDS, and gun related homicides (Hamburg, 1997; Blum, 1987; Blum 1997; Aluoja *et al*., 2004; Narusk, 1996). E.g. in Estonia, in 1997, Estonian State Agency of Statistics registered 252 deaths among 15- to 24-year-old boys, 216 of which were caused by external factors; and 65 deaths were reported among 15-to 24-year-old girls, 42 of which were caused by external factors (Järvelaid, 2000).

There are some marked differences in mortality rate in the age group 15-to 24-year-olds between Estonia and the Nordic countries. Thus, in Estonia there

were 184 deaths among 15- to 24-year-old males and 44 deaths among girls. The same figures for Sweden were 53 and 22, for Finland 89 and 33. Deaths in accidents among 15- to 24-year-olds in Estonia is much more common than in the Nordic countries and it is the main death cause in this age group (Nielsen, 2000).

## 2.3. Healthy and risky lifestyle in adolescence

The adolescent years have become the starting point for an upsurge of health-compromising behaviours that have lifelong consequences. The interest of adolescents in their own developing bodies can be a potent force for building healthy lifestyles of enduring significance. The best chance to fulfill this promise lies in enhancing the understanding of adolescent development among health care professionals.

There is evidence that although the prevalence of risk behaviours does change with age, most risk — non-risk behavioural complexes seem to be relatively stable over time and the stability may increase with time. Stanton and colleagues followed the cigarette smoking and alcohol consumption among 9- to 15-year-olds at baseline, each increased from 14% to 23% and drug use increased from 7% to 27% during a 2-year period (Stanton *et al.*, 1997).

Early adolescence is characterised by exploratory behaviour in which the individual seeks adult-like roles and status. Such behaviour can readily become dangerous and inflict damage, such as sexually transmitted diseases, death or trauma from violence, and disabling accidents related to alcohol. In addition, long-term consequences include cancer and cardiovascular disease, which are made more likely by inadequate exercise, and heavy smoking.

While individual risk behaviours are frequently examined in isolation, there clearly is an interaction between many of these risky practices, although the nature of these relationships remains incompletely defined (Jones *et al.*, 1997). The Gateway Theory posits an escalating involvement in drugs. The more generalised 'Problem Behaviour Theory' suggests that youth who are attracted to one risk behaviour will be attracted to others (Jessor et Jessor, 1977; Donovan et Jessor, 1985; Jessor, 1991; Donovan *et al.*, 1993; Jessor *et al.*, 1995; Kandel and Yamaguchi, 1993; Miller and Plant, 1996; Minoru *et al.*, 2001; Neumark-Sztainer *et al.*, 1996; Stanton *et al.*, 1997; Stein *et al.*, 1998; Uitenbroek, 1994; Conner *et al.*, 1996; Papp, 1998).

In current study tobacco use, inebriety, illicit drugs abuse, unhealthy diet and unprotected sexual activity were considered as key lifestyles' or behavioural risk factors and they were an objective of the investigation.

## 2.4. Smoking behaviour in adolescence

Cigarette smoking is the most important source of preventable premature death worldwide. Cigarette smoking and alcohol drinking are the most widely used licit substances by adults also by teenagers in Estonia. E.g., at ages 35 to 69, almost 49% of male deaths and just fewer than 10% of female mortality are attributable to smoking. In 1995, smoking was estimated to have caused about 16% all deaths in the country (Harkin *et al.*, 1997). In 1991, 10% and in 1998, 17% of 15-year-old boys smoked daily, also the number of daily smokers among girls has increased from 2% to 8% during the 1990s (Kepler *et al*, 1999). 60% of boys and 36% of girls experienced the first use of cigarettes at a younger age than 13 years (Hibell *et al.*, 2000). Before this decade, in Estonia males smoked considerably more than female adolescents, but currently the difference between male and female adolescents is disappearing step by step (Pärna, 1997; Hibell *et al.*, 2000).

The common age to start smoking is the age between the years of 13 and 16. A large body of literature has conceptualised tobacco smoking as a gateway drug, which precedes the initiation and subsequent problematic use of other substances. The clustering of risk behaviours may serve as a social or psychological development function for the adolescent, such as affirming individuation from parents, trying to achieve adult status and seeking acceptance from peers. It seems that cigarette smoking is related to risk factors indicative of behavioural difficulties facing adolescents (Jessor et Jessor, 1977; Rantakallio, 1983; Donovan and Jessor, 1985; Rush and Callahan, 1989; Jessor 1991; McNeill, 1991; Bailey, 1992; Neighbors *et al.*, 1992; Donovan *et al.,* 1993; Jessor *et al.*, 1995; Brown *et al.,* 1996; Meijer *et al.*, 1996; Escobeno *et al.*, 1997; Jackson *et al*., 1997; Breslau *et al.*, 1998; Nelson and Wittchen, 1998; Russell, 1990).

The studies regarding adolescent smoking patterns have showed that, when teenage smokers were asked about the reasons why they smoke, two of the most common reasons involved dealing with uncomfortable feelings and enhanced moods (Carmody, 1989; Henningfield *et al.,* 1990; Dappen *et al*., 1996; Fergusson *et al.*, 1996). Among 9- to 14-year-olds, both girls and boys, contemplation of smoking is positively related to weight concerns. Contemplation of tobacco use was associated with the misperception of being overweight, unhappiness with appearance, and a tendency to change eating patterns around peers (Tomeo *et al*., 1999).

## 2.5. Alcohol consumption in adolescence

Of all substances that adolescents ingest illicitly, alcohol is by far the most significant (Strasburger and Brown, 1998). In the 2003 ESPAD survey, among 15-to 16-year-olds 95.6% of Estonian schoolchildren had been drinking alcohol and 76% of schoolchildren had experience inebriety in Estonia. At the time 13.3 % of girls and 21.5% of boys reported that they had been drunk at least three times during the last 30 days (Allaste, 2004). In 1999, it was 6% of girls and 12% of boys who reported that they had been drunk at least three times during the last 30 days. Then the reported age at time of first use of alcohol younger than 13 years was for an amount of at least one glass of wine was in 63% of boys and 59% of girls. Therewith 26% of boys and 14% of girls had been drunk at a younger age than 13 years (Hibell *et al.,* 2000).

Boys drink more than girls, but the difference in prevalence by gender is reducing year by year (Suurorg, 1999; Hibell *et al.,* 2000; Allaste, 2004). Alcohol consumption is associated with smoking and illicit drug use (Shedler and Block, 1990; Miller and Plant, 1996; Jackson *et al.,* 1997; Holly and Wittchen, 1998). Indeed, many young people in mid and late adolescence see drinking alcohol and using cannabis or ecstasy as alternative recreational activities (Graham, 1996). In Estonia, the expected personal reasons for alcohol consumption are most often, for both boys and girls, to have a lot of fun, feel relaxed and feel more friendly and outgoing (Hibell *et al.*, 2000; Allaste, 2004). Older teenagers are more likely to get involved in unsafe sex after heavy drinking (Graham, 1996).

There is a strong link between alcohol consumption, depressive feelings, and attempted suicide. Depressive feelings may lead young people to drink, but excessive regular alcohol consumption may also cause depression (Väli *et al.*, 2003). The physical effects of alcohol on adolescents are no different from those on adults. Ethanol is a central nervous system depressant, with different parts of the brain responding varyingly. In low doses, it causes decreases in higher cortical functions and impaired judgment. With increasing levels, slurred speech and ataxia occur, and at still higher levels, more than 350 mg/dl, lethargy, stupor and coma occur. Blackouts do occur in adolescent alcoholics, but acute alcoholic withdrawal symptoms and severe central nervous system effects, such as encephalopathy, are rare (Farrow et *al.*, 1987; Strasburger and Brown, 1998).

The psychological effects of alcohol are a primary source of trouble in adolescents. Adolescents with significant substance abuse problems suffer, what can be termed, a developmental arrest. Drinking becomes a problematic behaviour for adolescents when it interferes with the normal developmental tasks of adolescence (Strasburger and Brown, 1998). An early age of drinking onset is associated with alcohol-related violence as those who started drinking

before age 17 were at least three times more likely in the past year to have been in a fight after drinking (Hingson *et al.*, 2001).

## 2.6. Abuse of illicit drugs in adolescence

Illicit drug abuses cause physical, psychological, economic, legal, or social harm to the individual user or to others affected by the drug user's behaviour. Illicit drug use is rapidly spreading among Estonian teenagers (Suurorg, 1999; Allaste, 2000; Allaste, 2004). The reason for first drug use among all 15-to 16 year-olds in Estonia was, in 71% for boys and in 80% for girls, just curiosity, whereas the average in Europe is 59% (Hibell, 2000). The onset of use is most common in adolescence, between the ages of 13 and 15 years and the incidence of drug use is the highest among 18-to 25-year-old young adults. (Neinstein, 1996). The greater the frequency of one's own drug use during middle school and the higher the perceived level of drug use among one's peers, the greater the likelihood of frequent predatory violence (Ellickson and McGuigan, 2000). Morbidity caused by use of illicit drugs is due not only to their direct effects but, more importantly, to the consequences of their use. These include violence (e.g. accidents, suicides and homicides) as well as negative effects of these substances on cognitive and psychosocial development of adolescents (Strasburger and Brown, 1998).

## 2.7. Sexual behaviour in adolescence

Changes have occurred in society in the past century, which have influenced sexual behaviours. The first data about the menstrual function of Estonian women were published in a study by F. Bidder in 1893 and another by J.Miländer in 1896. Both studies were made on a sample of women giving birth to their first children in the Women's Hospital of the University of Tartu (Bidder, 1893; Madisson, 1926). Although the age of physical maturity has progressively declined over the past centuries, the age of economic independence and marriage has increased. In 1890, the interval for women between puberty and marriage was about seven years compared to twelve years in 1990. The enlarging time period of adolescent sexuality and society's inability to deal with the issue compounds the problems of teenagers' sexuality. Early sexual intercourse has been identified as a major causal factor for teenage pregnancies and abortions, as well as for the transmission and acquisition of sexually transmitted diseases including acquired immunodeficiency syndrome (Goodson *et al.*, 1997). Sexual risky behaviour of teenagers can be characterised by

abortion and birth rate before the age 19 (Järvelaid and Pastik, 2001). In Estonia in 1997, every twelfth abortion was carried out on teenagers and there are some cases of abortion among 12- to 13-year-old girls yearly (Tellmann *et al.,* 2002). In 1996, the rates of induced abortion were much higher in Estonia than in Finland (Karro, 1997; Gissler et *al.,* 2000).

Inherent in the problem of adolescent sexuality are the differing attitudes about sexuality expressed by adolescents and the community. Predominant views among adolescents are that sex is justified as physical pleasure or as a new experience, as an index of maturity, it reflects peer-group conformity, representing a challenge to parents or to society, offering an escape from pressures. The adolescent's parents or the community, on the other hand, often view sex among teenagers as a crime, a sin or a sickness. The adolescents' own reaction to their first intercourse is found to be as follows: the most common reactions among girls are being afraid, guilty, worried, embarrassed, only about one quarter reported being happy and satisfied, as much as feeling sorry and hurt, 16% felt used and 6% felt themselves raped; the most common reaction among the boys, reported by almost half, is being excited and thrilled, as many as feeling happiness, satisfaction and nobody felt used or raped (Neinstein, 1996).

However, most teens do not initiate sexual intercourse as early as most adults believe (Papp, 1998; Strasburger and Brown, 1997). About 50% of females and 75% of males are sexually active by their eighteenth birthday. Most younger teens are not sexually experienced and over 20% of adolescents do not have sexual intercourse at all during the teenage years (Neinstein, 1996).

In connection with other risk behaviours is found that adolescents who engage in other high-risk behaviours such as drinking and drug use are more likely than others to be sexually experienced and the girls who begin sexual activity at a young age are more likely to more quickly move on to another second partner (Durbin *et al.*, 1993; Richter *et al.*, 1993; Millstein and Moscicki, 1995).

## 2.8. Unwanted sexual experience in adolescence

Sexual intercourse in young adolescents in particular may not be voluntary (Järvelaid and Pastik, 2001). Data indicates that about 74% of women, who had intercourse before age fourteen and 60% of those who had sex before age fifteen, reported having had sex involuntarily (Neinstein, 1996). Childhood sexual abuse has been found to be a strong predictor for later alcohol dependence and abuse as well as for eating disorders (Edgardh and Ormstad, 2000).

## 2.9. Eating behaviour in adolescence

In healthy children, eating and thinking about food takes up little time in the day compared with activities and sleep. Many focus on food or weight as a distraction from unhappiness about matters unrelated to body weight, often family problems, which cannot be resolved by the teenager alone (Conner *et al*., 1996).

Children's hunger is associated with a general increase of all types of behavioural and emotional symptoms (Murphy *et al.*, 1998). Adolescents who use extreme weight control methods are at increased risk for a range of health-compromising behaviours, although strengths of association vary across behaviours and for different subgroups of the population. Dieting may be a part of a health-promoting lifestyle for some, a social behaviour for others, and a first step toward more disordered eating behaviours for still others (Giannini and Slaby, 1993; Egger and Swinburn, 1997; Shaw, 1998; Fainburn *et al*., 1999; Willett *et al.*, 1999; Barker *et al*, 2000; Stein and Hedger, 1997). In a national sample ofSwedish 17-year-old boys and girls, eating disorders were reported by a higher proportion of sexually abused than non-abused girls (Edgardh and Ormstad, 2000).

The findings suggest that there are fundamental differences between extreme and moderate dieters. Youths using extreme weight loss methods appear to share common factors with youths engaging in other health-compromising behaviours such as substance abuse and suicide attempts. Of particular concern are the strong associations between extreme weight control behaviours and both suicide ideation and reported suicide attempts. Especially in teenage girls, psychosomatic symptoms and suicidality are in a significant correlation with eating behaviour (Buddeberg-Fischer *et al.,* 1996, Buddeberg-Fischer *et al.,* 1999).

Among school-age girls in London, England, Patton and colleagues (1990) observed that when compared with no dieters, dieters had an eightfold increased risk of developing an eating disorder. Similarly, Marchi and Cohen (1990) found a significant association between efforts at weight reduction during adolescence and later development of bulimia. So the efforts at weight reduction may lead to inadequate nutrition or serve as a risk factor for the development of an eating disorder.

Adolescents may learn about dieting from watching peers and adults and this may be of similar importance in forming intentions to diet as is direct pressure to engage in dieting from others. Skipping breakfast is quite common in adolescence (Murphy *et al*., 1998). Among Estonian schoolchildren, there the reported prevalence of schoolchildren who regularly skip their breakfast was 13% and regularly eat three meals per day 67% of schoolchildren (Grünberg *et al*., 1997).

## 2.10. Menarche and menstrual function in early postmenarcheal years

The first menstrual period is a major milestone for females. The cluster of biopsychosocial factors as genetic influences, socio-economic conditions, general health and well-being, nutritional status and certain types of exercise are well-known to determine the age of women at menarche (Madisson, 1926; Lüüs,1936; Treloar *et al.*, 1967; Billewics *et al.,* 1981; Nakamura *et al.*, 1986; Carpenter, 1994; Malina *et al.*, 1994; Kaprio *et al.*, 1995; Graber *et al.*, 1995; Rees, 1995; Cooper *et al.*, 1996; Montero *et al.*, 1996; Chompootaweep *et al.,* 1997; Järvelaid *et al.*, 1997; Sanchez-Andres, 1997; van Hooff *et al.*, 1998; Pasquet *et al.*, 1999). The seasonal fluctuation of the onset of menarche is an impressive indicator of environmental factors and rarely discussed. Indeed, cases of coincidence between the month of menarche and the month of birth have been reported in several studies (Brundtland and Liestol, 1982; Miura *et al.*, 1987; Albright *et al.*, 1990; Boldsen 1992; Wolanski *et al.*, 1994; Gueresi, 1997; Valenzuela *et al.*, 1999), explained as an impact of ontogenetic factors (Valenzuela *et al.*, 1993), the predictive factors for seasonality in menarche are not so well researched.

It has been observed that diet, exercise and psychological stress may affect the age of onset and the progress of pubertal development as well as the regularity of adolescent menstrual cycles. The extent of recent biopsychosocial changes in Estonia is pointed to visibly by the fact that, in the 1980s, the onset of puberty in Estonian girls was at the age ten years (Silla and Teoste, 1989). Then a decade later the girls reached their puberty at 11.6 years on average (Grünberg and Thetloff, 1997; Grünberg *et al.,* 1998).

The process of reproductive maturation as well as regularity of menstrual cycles are the result of the complex relationship between the central nervous system, the hypothalamus, the pituitary and the ovary, and the outcome of that relationship is influenced by external environmental factors the same as by inner life (Carpenter, 1994; Rees, 1995; Harlow and Ephross, 1995; Symons *et al.*, 1997). The hypothalamic-pituitary-ovarian axis is functional in foetal life. It is quiescent during childhood and is reactivated at the time of puberty. In adolescents, an immature hypothalamic-pituitary-ovarian axis usually resolves within one year of menarche though it may take as long as two to five years. Indeed, 95–97% of adolescent irregular bleeding has no organic etiology. The precise relationship between the central nervous system and the hypothalamus are incompletely understood. Despite lack of that knowledge, the menstrual function is clearly a very sensitive function, easy to impair all levels. The cluster of biopsychosocial factors such as genetic influences, socio-economic conditions, general health and well-being, nutritional status and certain types of exercise are well-known to determine the age of women at menarche (Malina, 1994; Kaprio *et al.*, 1995; Rees, 1995; Pasquet *et al.*, 1999).

Frisch and McArthur first postulated, in 1974, an association between amenorrhea and reduced body fat content resulting from exercise or a restrictive diet (Frisch and McArthur, 1974). They reported that 17% of body fat is needed for the initiation of menses and that 22% of body fat is required to maintain regular menstrual cycles. Thus, according to the critical weight or body fat theory, sufficient body stature must be reached before menarche is triggered and is also necessary to maintain menstrual regularity (Montero *et al*, 1996; Chen and Brzyski, 1999). However, the theoretical and statistical bases for the initial body composition hypothesis have been criticised (Trussel, 1980).

# 3. AIMS OF THE STUDY

The aims of this thesis were to study the prevalence and biopsychosocial aspects of health damaging risk behaviours of Estonian teenage schoolchildren. These aims included the following issues:

1. To investigate the relationship of biopsychosocial factors with tobacco smoking and other risk behaviours.
2. To investigate the relationship of the specific risky sexual behaviour with other risk behaviours.
3. To investigate the relationship of unhealthy eating behaviour and the attitude to own bodyweight with other risk behaviours.
4. To study the secular trends in reproductive function in early postmenarcheal age.
5. To investigate the relationship of biopsychosocial factors with menstrual regularity in early postmenarcheal age.

# 4. SUBJECTS AND METHODS

## 4.1. General aspects of methods

This study included a questionnaire about socio-economic status, self-assessed health status and health damaging risk behaviours; the 21-item Beck Depression Inventory (Beck Depression Inventory, 1996) and anthropometric measurements of height and weight.

### 4.1.1. Questionnaires

#### 4.1.1.1. Risk behaviours

A questionnaire was developed to explore various aspects of health damaging risk behaviour and the biopsychosocial status of schoolchildren. The investigated aspects of health-damaging risk behaviours were as follows: smoking behaviour (smoking more than five cigarettes in life, age at first time of cigarette smoking, frequency of smoking and quantity of smoked cigarettes), alcohol abuse (frequency of use and inebriation), illicit drug use (how many times), eating behaviour (skipping breakfast and lunch in school, dieting to reduce body weight), sexual behaviour (multiple sexual partners).

In biopsychosocial status, the following aspects were asked: gynaecological age, month of birth, and BMI were considered as biological aspects; parents' educational level, economic status, the number of siblings, and living together with parents or not as social aspects; satisfaction with own life, interconnection with parents, enjoying going to school, getting good marks at school were considered as psychological aspects. In addition, self-assessed health status and existence of some chronic disorder, as well parents' smoking behaviour of the respondents was asked. Answers were given on a scale from *always* to *never* or the question was asked as close-ended.

A pilot study to assess the questionnaire was carried out in the school-year 1996/1997 in two urban and two rural secondary schools, and in one vocational school . The questionnaire was improved according to the results of the pilot study.

#### 4.1.1.2. Beck Depression Inventory

The Beck Depression Inventory (BDI) (Beck Depression Inventory, 1996) has been used widely during the last two decades as a valid screening tool for assessment of severity of depression among adolescents. Although the BDI is

not a diagnostic tool, its psychometric properties are similar to or better than other self-rating scales in adolescent samples (Roberts *et al.*, 1991). The Beck Depression Inventory is a specific scale for measuring depression. The BDI assesses cognitive, behavioural, affective, and somatic dimensions of depression (Bennett *et al,* 1997).

The BDI consists of 21 items, each with four response choices, in the numerical values of 0 to 3 and in the form of statements, ranked in order of severity, from which the respondent selects one that best fits the way she/he feels. Items are scored, with a maximum total of 63. A summed BDI score of 0–9 points is considered normal, 10–15 points indicates slight depression; 16–29 points indicates moderate depression, and more than 29 points signals severe depression.

### 4.1.2. Body mass index

The body mass index (BMI), as weight in kilograms divided by squared height in meters, has been tentatively recommended by the WHO for use as an indicator of individuals' body composition (Hughes *et al.*, 1997; Grünberg *et al.*, 1998). There has been found a strong correlation between the BMI and body composition components or skin-fold thickness, and BMI can be used as a screening tool for paediatric obesity. In a healthy paediatric population, BMI is a valid measure of fatness for both sexes as a safe, simple, non-invasive and reliable method, both for research and clinical work. Measurements of weight and height, even those reported by the subjects themselves, are highly accurate and do not contribute importantly to errors in assessing body mass index (Pietrobelli *et al.,* 1998, Willett *et al.,* 1999).

## 4.2. Subjects and data collection

In order to evaluate the prevalence of health damaging behaviours and to analyse the connection between investigated health damaging behaviours among adolescents, the cross-sectional school-based study was carried out in Estonian speaking schools during the school year 1997/1998 in Tartu city and in Tartu county. The schools were selected to be situated in different parts of city and county. Altogether there was participation by 1702 schoolchildren; 850 girls and 852 boys (Tab.1). The sample comprised 22% of all pupils in this age group living in the area.

The questionnaires were completed in a classroom situation during a regular class period. The height and weight of the respondents was measured by the school nurse. The anthropological measurement was made during the forenoon

in a specially equipped room at school. Measurements were taken according to the classical methods of Martin (Martin, 1928).

**Table 1.** Sample of the study by gender and by age.

| | RURAL SCHOOLS | VOCATIONAL SCHOOL | URBAN SCHOOLS |
|---|---|---|---|
| Number of respondents | 306 | 419 | 977 |
| By gender: | | | |
| boys | 155 | 303 | 398 |
| girls | 151 | 116 | 579 |
| Mean age in years by gender: | | | |
| boys | 15.7 | 17.8 | 15.7 |
| girls | 15.8 | 17.3 | 15.8 |

## 4.3. Statistical methods

Before the analysis, the decimal age for all respondents was computed by subtracting from the decimal date of filling in the questionnaire the decimal date of birth. The body mass index (BMI), as weight in kilograms divided by squared height in meters, was calculated for each respondent. The scores for the single items within the Beck Depression Inventory were added up, and a mean score was calculated for all respondents.

Differences in the proportions among the groups were tested using chi-squared test. A p-value less than 0.05 was used as the significance threshold. Logistic regression analysis was applied to study the association of explanatory variables, odds ratios (OR) with 95% confidence intervals (95% CI) were calculated. Analysis was, if needed, stratified by gender.

Logistic regression analysis was used after observing a significant correlation between two variables, to predict the relationship between the predictor variables and the independent variables. The dependent variables were smoking behaviour (1 = smokers; 0 = non-smokers), month of menarche close to month of birthday (MCB) (1 = if month of menarche was the same with the month of birth or +/– one month; 0 = others), regularly eating or skipping breakfast (1 = always eating breakfast; 0 = others). The independent variables were biopsychosocial aspects explored in the questionnaire as follows: 1) as biological aspects were considered gynaecological age, month of birth and BMI; 2) as social aspects were considered parents' educational level, economic status, the number of siblings, and living together with parents or not; 3) as psycho-emotional aspects were considered satisfaction with own life, interconnection with own parents, enjoying going to school, getting good marks at school; 4) as independent variables were considered self-assessed health

status and existence of some chronic disorder, all 21 single items and the sum score of BDI, as well parents' smoking behaviour of the respondents.

The SPSS statistical software versions 8.0 and 10.0 for the Windows statistical package was employed in all calculations.

## 4.4. Ethics

The Human Research Ethics Committee at the Medical Faculty of the University of Tartu approved this study on 13.12.1995.

# 5. RESULTS

## 5.1. General socio-economic description of respondents

The parents of respondents from urban secondary schools were more often educated at a university level ($p<0.05$). The respondents from rural secondary schools were less often a single child in the family and the number of siblings more than two was more frequent among rural respondents ($p<0.05$). The economic status of the family was assessed worse by respondents from rural schools ($p<0.05$)(Tab.2).

**Table 2.** Nationality of respondents, parents' education level, number of siblings and self-assessed economic welfare of family of respondents by school.

| | RURAL SCHOOLS % | VOCATIONAL % | URBAN % |
|---|---|---|---|
| Estonian nationality | 97.4 | 96.2 | 99.1 |
| Mother's education | | | |
| basic school | 4.1 | 5.5 | 1.6 |
| secondary school | 38.1 | 35.0 | 22.6 |
| vocational school | 36.7 | 41.3 | 27.6 |
| university | 20.4 | 18.3 | 48.2 |
| Father's education | | | |
| basic school | 6.7 | 5.1 | 3.3 |
| secondary school | 37.9 | 35.7 | 25.0 |
| vocational school | 35.8 | 39.9 | 25.1 |
| university | 19.6 | 19.2 | 46.7 |
| Number of siblings | | | |
| 0 | 4.1 | 10.8 | 11.3 |
| 1 | 34.0 | 45.3 | 48.2 |
| 2 | 33.0 | 26.2 | 28.6 |
| 3 | 14.8 | 7.1 | 6.8 |
| 4 | 7.2 | 5.4 | 2.9 |
| 5 or more | 6.8 | 5.0 | 2.2 |
| Economic status | | | |
| very good | 1.0 | 3.2 | 6.1 |
| good | 7.9 | 50.1 | 64.1 |
| medium | 43.0 | 24.6 | 18.5 |
| bad | 47.7 | 20.2 | 11.1 |
| very bad | 0.3 | 1.9 | 0.3 |

### 5.1.1. Biological characteristics

The means of age, age at menarche, height, weight, BMI and prevalence of BMI by BMI groups of respondents by rural, vocational and urban schools are shown in Tab.3. There is seen some difference in biological characteristics of respondents by the school. The respondents in vocational school differentiate from others by 1.7 years elder age. This explains that they were taller and with more body weight than others, accordingly was their BMI bigger as well ($p<0.05$) (Tab.3).

**Table 3.** The age, age at menarche, height, weight, mean body mass index (BMI) of respondents by gender and school.

| | RURAL | | VOCATIONAL | | URBAN | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| Number of respondents | 151 | 155 | 116 | 303 | 579 | 398 |
| Age in years | 15.7 | 15.8 | 17.8 | 17.3 | 15.7 | 15.8 |
| Age at menarche | 12.6 | | 13.4 | | 13.1 | |
| Height (cm) | 167.3 | 176.0 | 168.2 | 179.3 | 167.6 | 178.4 |
| Weight (kg) | 56.3 | 63.7 | 60.2 | 68.5 | 56.7 | 65.8 |
| Mean BMI ($kg/m^2$) | 20.08 | 20.51 | 21.28 | 21.28 | 20.17 | 20.64 |

**Table 4.** Prevalence (%) of the body mass index (BMI) of the respondents in five groups (<17.5; 17.5–18.9; 19.0–24.0; 24.1–27.5; > 27.5) by gender and by school.

| BMI GROUPS | RURAL % | | VOCATIONAL % | | URBAN % | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| <17.5 | 15.9 | 7.1 | 5.3 | 5.0 | 8.9 | 5.4 |
| 17.5–18.9 | 22.5 | 22.9 | 16.7 | 12.8 | 24.7 | 19.1 |
| 19.0–24.0 | 54.3 | 62.1 | 61.4 | 69.5 | 60.5 | 67.5 |
| 24.1–27.5 | 5.3 | 5.0 | 13.2 | 11.0 | 3.9 | 6.4 |
| > 27.5 | 2.0 | 2.9 | 3.5 | 1.8 | 2.0 | 1.5 |

### 5.1.2. Characteristics of psychological welfare

5.1.2.1. Psychological welfare of respondents by school and by gender

The response to the items about psychological welfare by school and by gender is presented in Tab. 5. There is seen that if the boys' response to the question "I'm in full health" was almost with the same prevalence "always or mostly", then girls in vocational school assessed their health status worse than others ($p<0.05$). The mean BDI sum score was higher among girls and the girls also were more afraid about their future ($p<0.05$).

**Table 5.** Characteristics of psychological welfare of respondents by school.

| | RURAL | | VOCATIONAL | | URBAN | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| In full health | | | | | | |
| always (%) | 8 | 19 | 9.5 | 23 | 10 | 16 |
| mostly (%) | 70 | 70 | 59 | 62 | 73 | 75 |
| Mean BDI sum score | 9.3 | 6.1 | | | 9.1 | 5.6 |
| Enjoy school (%) | 62 | 49 | 62 | 54 | 61 | 60 |
| Not afraid about own future (%) | 52 | 74 | | | 54 | 75 |
| Never suicidal ideas (%) | 74 | 82 | | | 71 | 86 |
| Satisfied with own body weight (%) | 49 | 75 | 46 | 77 | 53 | 78 |
| Missed the lessons due to illness during the school year (%) | 26 | 29 | 38 | 24 | 38 | 30 |

### 5.1.2.2. Psychological welfare of respondents in 9th and 12th grades of rural schools

The response to the questions about psychological welfare of 9th, the last grade students of basic and 12th, the last grade students of secondary school on the sample of rural schoolchildren, is presented in Tab.6. In the comparison of the two age groups there is seen that the girls in the ninth grades showed a more negative attitude to going to school and they had more suicidal thoughts than the girls in the twelfth grades. The boys in the ninth grades were more satisfied with life and with family economic status and worried less about the future ($p<0.05$).

**Table 6.** Characteristics of psychological welfare of respondents in the 9th and in the12th grades in the rural schools.

| | 9TH GRADES | | | 12TH GRADES | | |
|---|---|---|---|---|---|---|
| | total | girls | boys | total | girls | boys |
| Number of respondents | 210 | 101 | 109 | 94 | 54 | 40 |
| In full health (%) | 83 | 80 | 87 | 86 | 87 | 95 |
| Satisfied with own life (%) | 79 | 73 | 77 | 71 | 78 | 57 |
| Enjoy school (%) | 49 | 55 | 43 | 70 | 74 | 55 |
| Loneliness (%) | 6 | 10 | 2 | 10 | 15 | 5 |
| Enjoy family (%) | 56 | 57 | 56 | 68 | 65 | 71 |
| Suicidal ideas (%) | 24 | 31 | 18 | 17 | 17 | 17 |
| Satisfied with economic status of family (%) | 51 | 42 | 60 | 26 | 24 | 29 |
| Afraid about the future (%) | 31 | 44 | 20 | 50 | 56 | 43 |

## 5.2. Health damaging risk behaviours (I, III, IV)

### 5.2.1. General characteristics

In ninth grade, almost every fourth respondent was smoking cigarettes and in twelfth grade almost every third (Tab.7). The girls had smoked the first cigarette at the mean age of 13 years and the boys at the mean age of 11,5 years. Roughly half of respondents, who reported that they had smoked five cigarettes or more during their life, reported that they smoke cigarettes regularly. Only 17% of respondents reported that all their friends are non-smokers. Among smokers there was seen a higher prevalence of such heath damaging risk behaviours as inebriety and multiple sexual partners and they showed the less satisfaction with life ($p<0.05$).

**Table 7.** Smokers and nonsmokers prevalence (%) in grades 9th, 10th and 12th; smokers and nonsmokers use of drugs, inebriation, sexual experience, satisfaction and unhappiness in life (%).

| | SMOKERS % | NONSMOKERS % |
|---|---|---|
| $9^{th}$ grade | 26 | 74 |
| $10^{th}$ grade | 21 | 79 |
| $12^{th}$ grade | 32 | 68 |
| Use of drugs | 35 | 5 |
| Inebriety once in month | 66 | 19 |
| Sexually experienced | 54 | 17 |
| Multiple sex partners | 30 | 8 |
| I'm satisfied with my life | 68 | 80 |
| I'm unhappy in my life | 19 | 7 |

The highest prevalence of health protective behaviour was seen among the respondents from urban schools and the lowest among the respondents from vocational school. Risky sexual behaviour, expressed by having had multiple sexual partners, was reported one in ten by girls and one in five by boys in rural and urban schools, and with twice that was seen among the respondents from vocational school (Tab.8).

**Table 8.** Health protective and health risk behaviours prevalence by type of school and by gender (%).

| | RURAL | | | VOCATIONAL | | | URBAN | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Girls | Boys | Total | Girls | Boys | Total | Girls | Boys |
| Number of respondents | 306 | 151 | 155 | 419 | 116 | 303 | 977 | 579 | 398 |
| Seat belt use (%) | 62 | 68 | 56 | 67 | 77 | 63 | 73 | 76 | 69 |
| Non-smokers (%) | 69 | 76 | 61 | 56 | 73 | 50 | 75 | 75 | 74 |
| Never been drunk (%) | 33 | 42 | 24 | 17 | 25 | 14 | 41 | 48 | 29 |
| Non-smokers who never have been drunk (%) | 30 | 38 | 22 | 16 | 25 | 13 | 37 | 44 | 28 |
| Never used drugs (%) | 92 | 93 | 91 | 85 | 92 | 82 | 92 | 95 | 88 |
| With sexual intercourse experience (%) | 26 | 25 | 28 | 58 | 67 | 54 | 22 | 21 | 24 |
| Daily smokers (%) | 28 | 21 | 35 | 40 | 27 | 45 | 16 | 13 | 19 |
| Inebriety at least once in month (%) | 30 | 16 | 42 | 58 | 42 | 64 | 28 | 23 | 35 |
| Multiple sexual partners (%) | 16 | 10 | 22 | 36 | 22 | 43 | 14 | 9 | 21 |

### 5.2.2. Health protective and health risk behaviours among rural schoolchildren in the 9th and the 12th grades

The female respondents of the ninth grades showed more healthy behaviours, except less use of a seat belt compared to students of the twelfth grades. The female respondents with multiple sexual intercourse experience were presented only in the ninth grades. In the twelfth grades, among the boys there were many more non-smokers than in the ninth grades. The drug use and getting drunk had increased. The prevalence of respondents with sexual intercourse experience was almost two-fold in the twelfth grades compared with the ninth grades' respondents (Tab.9).

**Table 9.** Characteristics of health protective and health risk behaviours among rural schoolchildren in the 9th and the 12th grades (%).

| GRADE | 9TH | | | 12TH | | |
|---|---|---|---|---|---|---|
| | total | girls | boys | total | girls | boys |
| Number of respondents | 210 | 101 | 109 | 96 | 54 | 42 |
| Seat belt use (%) | 58 | 61 | 56 | 67 | 78 | 52 |
| Non-smokers (%) | 68 | 79 | 58 | 71 | 70 | 73 |
| Never been drunk (%) | 35 | 42 | 28 | 30 | 41 | 17 |
| Never used drugs (%) | 93 | 94 | 93 | 90 | 91 | 88 |
| Sexual intercourse experience (%) | 21 | 20 | 22 | 39 | 38 | 40 |
| Use of contraception during the last sexual intercourse (%) | 63 | 65 | 61 | 61 | 65 | 56 |
| Daily smokers (%) | 31 | 22 | 39 | 24 | 24 | 24 |
| Getting drunk at least once in month (%) | 28 | 14 | 41 | 29 | 17 | 45 |
| Multiple sexual partners (%) | 18 | 19 | 18 | 14 | 0 | 33 |

## 5.3. Biopsychosocial aspects associated with risky behaviours

### 5.3.1. Biopsychosocial aspects associated with risk behaviours among urban boys

The risk ratios for smoking behaviour associated with other risk behaviours is showed on the sample of urban schoolboys (n = 398). In the urban schools, 19% of boys were daily smokers. There were included only these items, which had significant relationships with daily smoking behaviour of boys. Daily smoking boys' fathers were smokers, their first cigarette was smoked before the age of 14 years, they skipped their breakfast, got drunk, used drugs and had multiple sexual partners more often than the non-smokers ($p<0.05$). There was not found any difference between daily smokers and non-smokers in social aspects, BDI sum score or in attitude to school and communication with parents. There was not found a statistically significant relationship with the mother's smoking behaviour, only the father's smoking behaviour was associated with an increased risk rate for daily smoking of the respondents.

**Table 10.** The risk ratios (OR; 95 % for CI; p) for the smokers (the dependent variable: non-smoker 1; smoker = 0) compared with the non-smoking respondents among the urban boys.

| ITEM: | OR | 95% CI | P |
|---|---|---|---|
| First cigarette smoked at younger age than 14 years | 3.34 | 1.77–6.32 | 0.0002 |
| Father is a smoker | 3.45 | 1.98–6.01 | 0.0000 |
| Inebriety at least once in month | 5.87 | 2.20–15.68 | 0.0000 |
| Inebriety at least once in week | 21.73 | 8.37–56.50 | 0.0000 |
| Have used drugs | 3.91 | 2.07–7.40 | 0.0000 |
| Always skipping breakfast | 3.50 | 1.07–11.48 | 0.0387 |
| Two to three sexual partners | 3.00 | 1.10–8.21 | 0.0325 |
| More than three sexual partners | 4.04 | 1.32–12.41 | 0.0147 |

### 5.3.2. Biopsychosocial aspects associated with other risk behaviours among urban girls

The risk ratios of smoking behaviour to other risk behaviours is showed on the sample of urban schoolgirls (n = 580). In the sample of girls in urban schools, 13% of respondents were daily smokers. The predictive risks of daily smoking behaviour of girls to other surveyed aspects are showed in Tab. 11. There are included only these aspects which had a significant statistical relationship with daily smoking behaviour of girls. There was not found a significant association with the father's smoking behaviour, but the mother's smoking behaviour increased the risk for daily smoking behaviour among the girls.

**Table 11.** The risks ratios (OR; 95 % for CI; p) for smokers (the dependent variable: non-smoker = 1; smoker = 0) compared with non-smoking respondents among urban girls.

| ITEM: | OR | 95% CI | P |
|---|---|---|---|
| Bad interconnection with own parents | 2.7 | 1.54–4.78 | 0.0005 |
| First cigarette smoked at younger age 14 years | 2.1 | 1.26–3.61 | 0.0050 |
| Mother is smoker | 1.9 | 1.12–3.14 | 0.0177 |
| Going to school is never enjoyable | 3.3 | 1.73–6.15 | 0.0003 |
| Getting mostly good marks in school | 0.2 | 0.11–0.50 | 0.0002 |
| Stomach-ache | 2.2 | 1.35–3.70 | 0.0019 |
| Always fatigue already in the morning | 2.9 | 1.49–5.58 | 0.0017 |
| Always skipping breakfast | 3.0 | 1.58–5.69 | 0.0008 |
| Had used diet to reduce own weight | 2.3 | 1.39–3.70 | 0.0010 |
| BDI sum score 10–19 | 2.5 | 1.49–4.30 | 0.0006 |

| ITEM: | OR | 95% CI | P |
|---|---|---|---|
| BDI sum score more than 19 | 3.1 | 1.41–6.59 | 0.0045 |
| Thoughts about suicide | 2.7 | 1.63–4.48 | 0.0001 |
| Desire to make suicide attempt | 3.8 | 1.15–12.84 | 0.0290 |
| Getting drunk at least once in month | 4.6 | 2.79–7.64 | 0.0000 |
| Had used drugs | 6.4 | 3.00–13.57 | 0.0000 |
| More than three sexual partners | 4.6 | 1.22–17.00 | 0.0238 |

### 5.3.3. Smoking behaviour of respondents of urban schools (I)

In the sample of urban schools (N = 977), smokers accounted for 24.5% of the girls and 26.5% of the boys, of which 13% of the girls and 19% of the boys were daily smokers. Not enjoying time spent with parents (OR=0.6), skipping breakfast (OR=1.3), frequent headache (OR=1.3) and stomach-ache (OR=1.4), dislike of school (OR=0.7), using illicit drugs (OR=5.0), and having multiple sexual partners (OR=2.4) associated with daily smoking. Higher BDI scores were seen among adolescent smokers, particularly for girls and among pupils whose parents were non-smokers. The girls who smoked daily showed a higher risk for suicidal thoughts (OR=2.4) compared with the non-smokers. Smoking was an indicator of risk for depression, distress and risk-taking health-damaging behaviours.

### 5.3.4. Impact of smoking on body stature of schoolchildren (II)

The height, body weight and body mass index (BMI kg/m$^2$) of 16-to 18-year-olds (326 girls and 245 boys from urban schools) was compared between the daily smokers and the nonsmokers, according to their parents' smoking behaviour. From the study were excluded the respondents whose parents, or one parent, had quit smoking or only one parent was a smoker. A pupil was defined to be a smoker if he/she smoked daily at least one cigarette.

Among female students, the mean height was the tallest among nonsmokers whose parents are nonsmokers — 1.4 cm taller than among the smokers whose parents are smokers and 1.1 cm taller than among the nonsmokers whose parents are both smokers. The female smokers whose parents are smokers had 1.4 kg less mean weight than among the nonsmokers whose parents are nonsmokers. The mean BMI was highest among nonsmokers whose parents are nonsmokers and lowest among the smokers whose parents are smokers. Among the male students such a difference in height was not observed, but the mean body weight was 2.8 kg smaller among the smokers whose parents are smokers compared to the nonsmokers whose parents are nonsmokers and 2.4 kg smaller than among the nonsmokers whose parents are both smokers. Due to the

difference in weight, the mean BMI was significantly lower among the respondents whose parents are smokers.

## 5.4. Body stature and eating behaviour

### 5.4.1. Satisfaction with body weight and eating behaviour (VIII)

Adolescents' attitudes to their own body weight, using BMI as a characteristic of body stature on the sample of urban schoolchildren (N = 824) were presented in the original publication VIII. In all schools male respondents showed significantly greater satisfaction with own body weight as three in four of boys were satisfied with own body weight compared with female students who almost in half cases were satisfied with own body weight ($p<0.05$). Nearly half of female students wished to reduce their weight whereas about one in twenty of male students had the similar wish. More than half of them, who wished themselves to weigh less, had observed a diet. The girls skipped their breakfast and never ate lunch in school more frequently than the boys ($p<0.05$).

**Table 12.** Satisfaction with own body stature and eating behaviour of the respondents by school and by gender (%).

| | RURAL | | | VOCATIONAL | | | URBAN | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Girls | Boys | Total | Girls | Boys | Total | Girls | Boys |
| Number of respondents | 312 | 160 | 152 | 381 | 102 | 279 | 977 | 579 | 398 |
| I'm satisfied with my body weight (%) | 62 | 50 | 75 | 69 | 45 | 77 | 64 | 53 | 78 |
| Wished to weigh more (%) | 12 | 4 | 20 | 13 | 1 | 18 | 8 | 2 | 15 |
| Wished to weigh less (%) | 26 | 46 | 5 | 18 | 54 | 5 | 29 | 45 | 7 |
| Observed a diet (%) | 17 | 28 | 5 | 11 | 30 | 4 | 24 | 34 | 9 |
| Always/mostly eating breakfast (%) | 84 | 79 | 89 | 71 | 65 | 74 | 85 | 83 | 87 |
| Always/mostly skipping breakfast (%) | 7.5 | 10 | 5 | 14 | 18 | 13 | 9 | 10 | 8 |
| Always/mostly eating lunch in school (%) | 27 | 28 | 27 | 51 | 34 | 58 | 35 | 28 | 45 |
| Never/seldom eating lunch in school (%) | 28 | 25 | 30 | 28 | 47 | 21 | 44 | 51 | 34 |
| Always/mostly please to eat together with family (%) | 66 | 66 | 67 | 62 | 66 | 60 | 65 | 63 | 67 |
| Never/seldom please to eat together with family (%) | 11 | 11 | 10 | 13 | 16 | 11 | 10 | 12 | 7 |

### 5.4.2. Breakfast eating and associated biopsychosocial factors among 15–17-year-old urban schoolgirls

The sample included 501 respondents, 15-to 17-year-old females in grades ninth to twelfth in Tartu City. In this sample, 293 girls (58.7%) reported always eating breakfast, 137 girls (24.0%) eating it on most mornings, 34 girls (6.8%) eating it sometimes, 42 girls (8.4%) seldom and 10 of them reported never eating breakfast.

**Table 13.** The risks rates in relationship with eating or skipping breakfast behaviour among 15- to 17- year-old girls (OR; 95% for CI; p) (1 = always eating breakfast, 0 = always skipping breakfast).

| ITEM: | OR | 95.0 % CI | P |
|---|---|---|---|
| BMI less or more than from 19 to 24 kg/m$^2$ | 1.5 | 1.03–2.20 | 0.033 |
| Bad relationship with parents | 2.5 | 1.47–4,25 | 0.001 |
| Rare communication about good news with father | 1.4 | 1.06–1.81 | 0.019 |
| Rare communication about bad news with father | 2.2 | 1.53–3.18 | 0.000 |
| Please eating all family together | 1.3 | 1.03–1.63 | 0.026 |
| Driving in car using the belt | 1.4 | 1.13–1.76 | 0.002 |
| Good school achievement | 1.6 | 1.11–2.25 | 0.001 |
| Beck Depression Inventory score | 1.1 | 1.02–1.09 | 0.001 |
| Smoker | 2.3 | 1.26–4.15 | 0.007 |
| Lifetime experience of drunkenness | 1.5 | 1.10–1.92 | 0.008 |
| Lifetime experience of sexual intercourse | 0.5 | 0.29–0.79 | 0.004 |

### 5.4.3. Breakfast skipping and associated biopsychosocial factors among adolescents (IX)

Analyses of data were presented in the original article IX. The sample included 838 schoolchildren. Regular breakfast eaters were 58.7% of girls and 70.6% of boys. Regularly breakfast eaters in age group 15- to 17-year-olds showed the smallest mean body weight and the breakfast skippers the biggest mean body weight. The breakfast skippers showed worse school achievement, less healthy behaviour and less psychological welfare.

## 5.5. Somatic complaints (I, V, IX)

There were some differences found in prevalence of somatic complaints of the respondents by school and by gender. Persistent fatigue was reported with most frequency, by one of three girls, in the rural schools and by one of four girls in the urban schools. Boys reported being fatigued, headaches and stomach pain less often than girls ($p<0.05$). Headache was reported twice as often by girls from vocational school compared to the rural girls, and least by the urban girls. The smallest difference in complaints by gender was seen in back pain, and it was with highest prevalence among pupils from the vocational school. In the urban and the vocational schools, 38% of the girls had missed school due to illness during the school year, to compare with 26% in the rural school. The boys from the urban and the rural schools showed about the same prevalence of absence from school due to illness.

**Table 14.** Somatic complaints by gender and by school (%).

| | RURAL | | | VOCATIONAL | | | URBAN | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total % | Girls % | Boys % | Total % | Girls % | Boys % | Total % | Girls % | Boys % |
| Always fatigued | 28 | 37 | 18 | 21 | 35 | 16 | 21 | 25 | 15 |
| Headaches: | | | | | | | | | |
| mostly | 10 | 14 | 5 | 11 | 28 | 5 | 6 | 8 | 4 |
| sometimes | 31 | 40 | 21 | 29 | 39 | 28 | 32 | 39 | 22 |
| Back pain: | | | | | | | | | |
| mostly | 10 | 10 | 9 | 13 | 13 | 14 | 6 | 7 | 5 |
| sometimes | 21 | 24 | 18 | 22 | 25 | 20 | 22 | 25 | 18 |
| Stomach-ache: | | | | | | | | | |
| mostly | 8 | 10 | 5 | 3 | 10 | 0.7 | 4 | 5 | 0.5 |
| sometimes | 30 | 41 | 18 | 22 | 40 | 15 | 29 | 37 | 16 |
| Missed school due to illness in this school-year | 27 | 26 | 29 | 28 | 38 | 24 | 34 | 38 | 30 |

## 5.6. Menstrual function (V, VI, VII)

### 5.6.1. Secular trend of menarche

A secular trend of menarche among Estonian females, comparing the data of present study with previous studies, was presented in the original publication VI. Compared with the earlier observations, the age of respondents in the current study at menarche showed a decline of 0.43 years during the period from 1896 to 1926, of 1.29 years from 1926 to 1971 and 0.28 years from 1971

to 1997. The comparison of data from 1896 and 1997 revealed the total secular trend of reduction of age at menarche by 2.09 years.

### 5.6.2. Seasonal distribution of menarche

Analyses of data were presented in the original publication VII. A secular trend of pronounced seasonal rhythms of menarche among Estonian females was followed, comparing the data of present study (N=580) with the study done by H. Madisson in 1926. The results demonstrated that while two females out of five had their menarche in summer months, more than one out of four had the month of menarche close to the month of birth. The study also explored the impact of such biopsychosocial factors as body structure, interconnections inside the family and school distress on the seasonal rhythms of menarche of Estonian females.

### 5.6.3. The effect of gynaecological age, body composition and social environment on menstrual regularity

Analyses of data were presented in the original publication V. The sample size was 580 girls at age 13- to 18-years. The mean age at menarche was 13.0 years (range 9-to 17-years). 17 (3%) of the girls were in premenarche. The regular menstrual cycles' (RM) group consisted of 311 (57.1%) and the irregular menstrual cycles' (IRM) group consisted of 209 girls (42.9%). The mean age in the RM group was 15.7$\pm$1.0 years and in the IRM group 15.6$\pm$1.0 years. The gynaecological age less than two years was associated with a statistically higher risk for RM (OR=1.91 (95% CI 1.33–2.72)). The prevalence of regular menstrual cycles increased linearly with gynaecological age. Irregularity of menstrual cycles was reported by 43% of respondents. The risks ratio for irregular cycles were in relationship with the body mass index lower than 17.5 kg/m² (OR = 2.06 (95% CI 1.06–4.00)), the low economic status (OR=1.77 (CI 95% 1.41–2.20)), not speaking of their joys and worries with parents (OR= 1.46 (95% CI 1.02–2.09)), negative attitude to school (OR=1.27 (95% CI 1.03–1.56)). Comparison of the answers to the Beck Depression Inventory (BDI) with the regularity of periods revealed a difference in the score (OR=1.54 (95% CI 1.21–1.97)), with a mean score of 8.3$\pm$0.4 for the respondents with regular menstrual cycles *vs*. 10.6$\pm$0.5 for the respondents with irregular menstrual cycles.

## 5.7. Sexual behaviour (III, IV)

### 5.7.1. Lifetime experience in sexual intercourse

Lifetime experience in sexual intercourse and associated health-damaging risk behaviour in adolescence were presented in the original articles III and IV. The association between early sexual intercourse experience and poor school achievement, involvement in other health damaging risk behaviours as cigarette smoking, inebriety, use of illicit drugs was seen.

### 5.7.2. Sexual intercourse experience with multiple partners

There was found a significantly higher risk ratio for respondents, who had had multiple sexual partners in their lifetime, to be involved in other health damaging risk behaviours. The boys had had more often multiple sexual partners. The highest risk for respondents with multiple partners was associated with smoking and drugs use, but also with inebriety, non-use of contraception, skipping breakfast and with experience of involuntary sexual intercourse.

**Table 15.** The risks ratios (OR; 95 % for CI; p) for the respondents with multiple sexual partners (1 = not having had multiple sexual partners; 0 = multiple sexual partners) compared with other respondents.

| ITEM: | OR | CI 95 % | P |
|---|---|---|---|
| Had smoked more than four cigarettes in lifetime | 6.2 | 2.52–15.20 | 0.0001 |
| Daily smoker | 2.3 | 1.62–3.30 | 0.0000 |
| Inebriety | 2.1 | 1.39–3.00 | 0.0003 |
| Used drugs | 5.5 | 2.86–10.44 | 0.0000 |
| Used alcohol before the first intercourse | 0.5 | 0.29–0.87 | 0.0131 |
| Non-use of contraception | 3.6 | 2.01–6.33 | 0.0000 |
| Unwanted sexual intercourse | 1.8 | 1.11–2.97 | 0.0168 |
| Number of sisters | 0.7 | 0.54–0.98 | 0.0375 |
| Skipping breakfast | 1.4 | 1.10–1.72 | 0.0053 |
| Gender is male | 2.7 | 1.45–4.91 | 0.0017 |

### 5.7.3. Sexual behaviour among schoolchildren in vocational school

The characteristics of sexual behaviour of the respondents from vocational school is showed in Tab. 16. Most of the girls had fallen in love, and every second girl and one in three of boys reported having a boy/girlfriend. Three in five had experienced sexual intercourse, which is just 10% higher prevalence than was seen among the final year students in urban secondary schools. Two from three respondents without sexual intercourse experience wished to have experience of sexual intercourse. Multiple sexual partners have had one in five of sexually active girls and almost every second among sexually active boys. Altogether 30% of girls reported that they have had at least once unwanted sexual intercourse. Contraception was used by less than half of sexually active respondents and only 2.4% of girls reported that they use double protection, condom and oral hormonal tablets. Almost every second boy and one in three girls were drunk during their first sexual intercourse, and one in three was drunk during their last intercourse. In the sample, 15% of sexually active girls and 20% of boys had used alcohol before their first and before their last sexual intercourse.

**Table 16.** Sexual experience of the respondents by gender.

| ITEM: | TOTAL % | GIRLS % | BOYS % |
|---|---|---|---|
| Has been enamoured | 85 | 93 | 82 |
| "Own boy/girl" | 40 | 48 | 36 |
| Experienced sexual intercourse | 60 | 67 | 57 |
| Virgins who wish to experience sexual intercourse | 67 | 61 | 68 |
| Number of sexual partners: | | | |
| 1 | 36 | 53 | 28 |
| 2–3 | 26 | 24 | 27 |
| > 3 | 38 | 23 | 44 |
| Forced sexual intercourse experience: | | | |
| once | 7 | 17 | 3 |
| twice or more | 6 | 13 | 3 |
| Contraception use during the last intercourse | 44 | 48 | 42 |
| Type of used contraception: | | | |
| condom | | 52.4 | |
| oral hormonal tablets | | 26.2 | |
| coitus interruptus | | 9.5 | |
| biological method | | 9.5 | |
| condom + oral hormonal tablet | | 2.4 | |
| Inebriety at their first sexual intercourse | 43 | 34 | 47.5 |
| Inebriety at their last sexual intercourse | 33 | 29.5 | 34 |

# 5. DISCUSSION

Estonian secondary schools in Tartu city and county were selected for the survey as being the location of many previous surveys (Bidder, 1893; Madisson, 1926; Lüüs, 1936) held during the last century, giving a possibility to compare previous cross-sectional surveys with the current study.

For collecting data about adolescents' health behaviour, a self-administered questionnaire was used instead of interviews because it is less time and money consuming. Self-administered class-interview has a benefit of having a representative number of respondents in this age-group for analyses. This has been the reason why a self-administered questionnaire is widely used around the world for collecting data from schoolchildren.

A questionnaire as a tool to collect self-reported data, as reliable information about adolescents' health status and health damaging behaviour, has been widely discussed in literature and considered of sufficient reliability for epidemiological studies (Johnson and Mott, 2001; Koo and Rohan, 1997). Although self-assessed health-status cannot be considered as synonymous with medical examination, the information collected using questionnaires is reliable for assessing various biopsychosocial aspects of health damaging behaviour in adolescence.

Adolescent health risk behaviours are likely to cluster or accumulate, further aggravating adverse health outcomes. Engaging in single risk behaviour may indicate an increased likelihood for engaging in other health damaging risk behaviours. Previous studies have showed that the clustering and accumulation of risk behaviours, where several patterns of behaviour occur simultaneously more often than one would expect on the basis of probability, is pronounced. Furthermore, the evidence for co-variation has been strongest for those risk-taking behaviours that are also problem behaviours, such as drug use, alcohol abuse and sexual precocity (Donovan and Jessor, 1985; Donovan *et al.*, 1993; Minoru *et al.*, 2001).

Based on the present findings, the overall prevalence estimates of health-damaging risk behaviours among Estonian schoolchildren in Tartu were generally lower than those statistics in the USA. However it was were mostly on the same level or higher than in several European countries (Hibell, 2001).

Cigarette smoking, alcohol use and multiple sexual partnerships, which are typical health risk behaviours in adolescence, were more prevalent among Estonian males, similar to reports from other cultures (Hibell, 2001; Minoru *et al.*, 2001). Suicidal ideations, unhealthy weight loss, which are considered "quietly disturbed" behaviours, were more common among females. These findings were consistent with findings of previous studies (Neumark-Sztainer *et al.,* 1996; Minoru *et al.*, 2001).

The present findings further showed that prevalence rates for most health damaging risk behaviours among vocational school students were higher than among secondary school students, but there was not seen any significant difference between rural and urban schoolchildren. Previous studies consistently have revealed higher smoking and other risk behaviours` rates for vocational school students (Minoru *et al*, 2001). To be a student of the vocational school was strongly associated with accumulation of health damaging risk behaviours. Thus, vocational school students, especially older students, may represent a high-risk group. The background of this phenomenon involves maladjustment to school life, including poor academic performance in basic school, lack of interest in classes, and difficulties in interpersonal relationships. Moreover, school dropouts are more likely to engage in a variety of health damaging risk behaviours. Donovan and colleagues (Donovan *et al*., 1993) suggested that co-variation of problem behaviours relates to an underlying common factor that reflects a tendency toward "unconventionality". Similarly, this study suggests that schoolchildren with many health damaging risk behaviours may face underlying problems related to "maladjustment to school life".

According to the results of the current study, it is possible to conclude that tobacco smoking by female teenagers is an indicator of risk for problematic use of drugs, problems in school, and conflict with parents. But there is also a very effective influence of parents' smoking behaviour on the lifestyle of their child. The influence of the fathers was more pronounced on the boys and the influence of the mothers was more pronounced on the girls.

By the end of adolescence most individuals have been emancipated from parents and other adults and have attained a psychosexual identity. Adolescent sexuality is an important developmental process and cannot be reduced merely to outcomes such as pregnancy and intercourse (Neinstein, 1996). The development of a mature level of sexuality is a prerequisite of effective adult functioning. It refers, instead, to how a person views himself/herself, as a man or woman, in our society. It refers to the ability of a person to enter into and to maintain an intimate relationship on a giving basis.

The fertile age for women is classically considered the age between 15- to 49-years, but as rule, the social maturity for motherhood is achieved only at the age of 19 years and psychological maturity at the age of 16 years. Thus, the sexual intercourse, and especially without using contraception before the age of 16 years, can be considered as risk behaviour (Neinstein, 1996; Strasurger and Brown, 1998). There are three other factors also that increase the risk to health when the sexual activity is at a too early age. Firstly, of any sexually active age cohort, teenagers have the highest rate of contracting sexually transmitted diseases. Then, early sexual activity is especially correlated with an increased risk of multiple partners and decreased discrimination in selection of those partners, accordingly receiving unprotected and unwanted sex.

In the current study it was seen that about 7% of teenagers had undergone their first sexual intercourse before the age of 15 years, and about every second at age 17 years had it during their last year in secondary school. There was seen a different level of risky sexual behaviour between girls and boys. There was reported higher sexual activity prevalence by male respondents, and the number of sexual partners was significantly higher among boys, although the girls reported more often that they had been enamoured. The prevalence rate of unwanted sexual intercourse was high among female respondents from the vocational school. Alcohol consumption before sexual intercourse was very common among the respondents from the vocational school, showing a higher rate among boys, as well as the general frequency of alcohol use was seen as higher among the male respondents.

The extremely rapid decline in body weight since 1989 to 1996 seems to be exceptional in an international context where so many countries have a secular trend toward an increasing prevalence of childhood obesity (He *et al*., 2000; Pingitore *et al*., 1997). Extremes of body weight have long been associated with menstrual cycle disturbances. Frisch and McArthur first postulated an association between amenorrhea and reduced body fat content resulting from exercise or a restrictive diet in 1974 (Frisch and McArthur, 1974). According to the critical weight or body fat theory, sufficient body stature must be reached for menarche to be triggered and also to maintain menstrual regularity. It seems that other factors expressing mostly psychosocial distress will come to dominate over sufficient body fat content, since a significant correlation between regularity of periods and emotional and psychophysical satisfaction was found. In the current study, the correlation between depressive mood, negative self-esteem, somatic symptoms and menstrual regularity was also demonstrated. This secular trend in Estonia to more frequent prevalence of irregularity of periods at early postmenarcheal age can be explained as a result of high levels of psychosocial distress added to the trend of declining average body weight (Rees, 1995).

A significantly higher prevalence of regular periods was found when girls had a better relationship with their father. This finding has led to the speculation that it reflects the better general emotional health of these families. The second most important emotional environment for teenage girls, next to their family, is school. In the current study, a greater liking for school coincided with higher prevalence of regularity of periods, in other words, better adaptation to the school environment is accompanied by regular periods at the early post-menarcheal years. The higher prevalence of somatic complaints was reported by the girls with irregular periods, which probably is the outcome of general distress and poor adaptability in everyday life. The significantly higher level of depressive symptoms, emotional as well as psychophysical, expressed by them, support this opinion.

In the early 1990s, thinness became a symbol of success for high-achieving young women and the halt in increase of height and weight was seen in all age groups and in both genders. It became extremely obvious among girls. In the current study it was characteristic that three quarters of the girls with BMI lower than 17,5 kg/m$^2$ considered themselves as having ideal body weight, without the desire to change it and every tenth desired to weigh even less. The cut-off point at 24 kg/m$^2$ of BMI was for all the female respondents to consider own bodyweight as too big. Among the boys, the cut-off point was at 27.5 kg/m$^2$ to consider own body as "over-weight". Both, the normal-weight and the over-weight girls expressed greater dissatisfaction with own body weight in comparison with the boys.

The reproductive maturation is a part of biological maturation and they are intertwined with each other and certain biological maturation is needed for start of puberty. In 1896, the onset of menarche of Estonians fell between the age of 12 and 20 years, in 1926 between the ages of 11 and 19 years (Madisson, 1926) and in 1997 between the ages of 9 and 17 years, which characterises well the secular shift in the maturation process of Estonian women. Interesting is that the interval between the youngest and the eldest at menarche has remained the same. The secular trend has been the earlier start of puberty, the reported fall in the age at menarche of Estonians is 2.5 months per decade during the last one hundred years. It has been a more slow trend towards earlier menarche than reported by the industrialised countries of Europe, the USA and Japan, with a decrease of about three or four months per decade (Rees, 1995). The decelerated trend toward earlier menarche was seen in the period of 1971 to 1997 (Silla and Teoste, 1989; Grünberg and Thetloff, 1997; Grünberg *et al.*, 1998). The halt of the fall of menarcheal age and even the increase of mean age at menarche can be explained by simultaneous fall in body mass in the Estonian population during the last decade.

In this study, the same secular trend towards the earlier menarche was seen among Estonians as is reported in the industrial countries of Europe, the USA and Japan, but by a lesser extent (Rees, 1995). It can be speculated that the secular trend of a decrease in menarcheal age of Estonians has already ended, as the essential fashion tends to favour slim women in Estonian society. During the period of the 1980s, when the Estonian population had the highest mean BMI values, there was not carried out any relevant survey to examine the menarcheal age of Estonian females.

The different seasonal variation of menarche, which is reported in literature among different cohorts of women, and the importance of the impact of socio-cultural and environmental aspects on the seasonality of menarche, is showed (Billewicz, 1981; Brundtland and Liestol, 1982; Nakamura *et al*, 1986; Albright *et al*, 1990; Boldsen, 1992; Chompootaweep, 1997). Comparing the data from the current study with the study carried out by H. Madisson (Madisson, 1926), menarche was found to take place even more noticeably on summer months.

The 40% prevalence of menarche close to the month of birth, an outcome in the current study, is similar (38.2%) with the study carried out in Poland (Antoszewska, 1992). There was seen a significant coinciding of the month at menarche with the months of the school-vacations in Estonia. Such connection was already reported previously, where the months with school-vacation periods coincided significantly with the peaks of menarche (Gueresi, 1997). So it was a hopeful finding that a menarche close to the birth month was found with higher prevalence among the respondents whose birthday was during the period of school vacation.

The most common environment with emotional impact on teenage girls, next to their family, is school. The current study showed that psychosocial distress is a factor having its affect on the month of menarche. The respondents who assessed going to school as always enjoyable had their menarche close to the month of the birth more frequently than their schoolmates who never felt that. The findings of the current study gave me the ground to hypothesise that the seasonality of menarche and menstrual function, in all its main characteristics, is very sensitive to environmental distress.

This study supported previous findings showing co-variation to be the strongest for problem behaviours such as cigarette smoking, alcohol use, use of other illicit drugs and precocious sexual intercourse; namely, a syndrome of problem behaviour (Donovan *et al.*, 1993; Donovan and Jessor, 1985).

These findings identify a high-risk target group with health-damaging life-style among adolescents for family practitioners and suggest that preventive intervention strategies should be taken into consideration to prevent highly risky and health-damaging lifestyle among adolescents.

# 6. CONCLUSIONS

1. The highest prevalence of smoking behaviour among the respondents was associated with pronounced psychological distress. Initiation of smoking in the early teens, before the age of 15, was an indicator that the adolescent may have psychosomatic distress, suicidal thoughts and depressed mood status, and may engage in such other health risk behaviours as excessive alcohol consumption, use of illicit drugs, having multiple sexual partners, skipping breakfast and dieting. The smoking behaviour of teenage schoolchildren was found to be a relevant indicator for associated risk taking behaviours.
2. The parents' smoking behaviour has a great influence on their children. More pronounced was the effect of mothers smoking on their daughters smoking behaviour, and the effect of fathers' smoking behaviour was seen among their sons.
3. The smoking behaviour of both, adolescent and their parents, had an impact on body stature of adolescent. The mean body mass index ($kg/m^2$) was the highest among nonsmokers whose parents were nonsmokers and the lowest among the smokers whose parents were smokers. Among teenage schoolchildren the mean height was the biggest among nonsmokers whose parents are nonsmokers.
4. The relation of sexual activity in early adolescence to worse academic achievement and involvement in other health risk behaviours, such as cigarette smoking, alcohol consumption and use of illicit drugs, was established. Sexually active schoolchildren, especially with multiple sexual partners, were at increased risk of engaging in multiple other health risk behaviours and in less frequent use of contraception.
5. Roughly half of schoolchildren did not initiate sexual intercourse during their secondary school period.
6. There was seen a significant increase in prevalence of menstrual irregularity in early postmenarcheal age compared with previous studies. Irregular menstrual cyclicity was associated with the smaller bodyweight and the insufficient psychosocial welfare.
7. The irregular menstrual cyclicity among adolescent females was an indicator for the general distress and poor adaptability in daily life. The irregularity of menstrual patterns in early postmenarcheal age was associated with depressive mood, negative self-esteem, somatic preoccupation and menstrual irregularity, but also with anorexia, weight loss, somatic preoccupation, feelings of loneliness, guilt, self-dislike and suicidal thoughts.

8. The difference between the age of the youngest and the oldest respondent at menarche has been the same period, nine years, during the century, but there was a shift to three years younger age at menarche.
9. During the last century, the seasonal variation of menarche has been changed. Menarche was with the highest prevalence during school vacations. There was seen an impact of such biopsychosocial factors as body structure, interconnections inside family, school distress and mother's smoking behaviour on the seasonal variation of menarche.
10. Adolescents thought about themselves as over-weight more often than, considering their body mass weight, they really are. Their reports of whether they have overweight, underweight or normal weight correlated poorly with the medical definitions of overweight, underweight and normal weight, particularly among girls. This tendency was among girls in all BMI classes. A high proportion of underweight and normal-weight girls were considering their body as over-weight.
11. Skipping breakfast in adolescence was an indicator of health damaging lifestyle and was associated with other health-compromising behaviours. Thereat regularly breakfast eaters had the smallest body weight and those, who were always skipping their breakfast, the biggest body weight.

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# SUMMARY IN ESTONIAN

## TERVISTOHUSTAV RISKIKÄITUMINE TEISMELISTEL NOORTEL

Teismelised noored on kõige tervem elanikkonna osa, madala haigestumise ja suremusega. Kaasaja kõige sagedasemad noorte haigestumise ja surma põhjused on tingitud käitumusliku, keskkonna ja sotsiaalsete etioloogiaga teguritest. Siin ei ole küll alati tegemist otsese meditsiinilise probleemiga *per se*, vaid küsimustega, mis puudutavad käitumuslikku ja kehalist transformatsiooni puberteedieas.

Teismeliseeas seisavad indiviidi ees täiskasvanuks saamise biopsühhosotsiaalsed ülesanded, mis seisnevad eneseidentiteedi ja seksuaalse identiteedi väljakujunemises, nii psühholoogilise kui sotsiaalse iseseisvuse ja sõltumatuse saavutamises koos realistliku tulevikunägemusega. Need ülesanded on tihedas vastastikuses seoses tervise ja tervisekäitumisega. Selles eluperioodis omandatud tervisekäitumine ja eluviis võetakse kaasa täiskasvanuikka ja seega on olulise mõjuga elanikkonna tervisele, tervisehäirete tekkele ja suremusele. See on ka eluperiood, kus paljud alustavad tubaka suitsetamise, alkoholi, illegaalsete uimastite tarvitamise, tervistohustava seksuaaleluga ja söömiskäitumisega jms, mida saab lugeda tervist ohustavaks riskikäitumisteks.

Probleemse käitumise teooria postuleerib, et teismeline, kes harrastab üht tervistohustavatest riskidest, on kõrge riskiga ka teiste käitumisriskide harrastamisele.

### Uurimistöö eesmärk

Käesoleva töö ülesandeks oli uurida eesti teismeliste noorte tervistohustavat riskikäitumist, selle esinemissagedust ja seotud biopsühhosotsiaalseid faktoreid. Uurimise aspektid olid järgnevad.

1. Suitsetamise ja teiste tervistohustavate riskikäitumiste seotus biopsühhosotsiaalsete faktoritega teismeliseeas.
2. Seksuaalkäitumise seotus tervistohustava riskikäitumisega teismeliseeas.
3. Söömiskäitumise ja oma kehakaaluga rahulolu seotus riskikäitumisega teismeliseeas.
4. Uurida kuivõrd sekulaartrendina on varajases postmenarheaaleas muutunud reproduktiivfunktsiooni regulaarsus, menarche vanus ja sessoonsus.
5. Biopsühhosotsiaalsete faktorite seotust tütarlaste menstruaalfunktsiooniga.

## Uurimismetoodika

Tartu linnas ja maakonnas eestikeelse õppega neljas linna- ja kahes maakoolis ning ühes kutsekeskkoolis üheksandates kuni kaheteistkümnendates klassides õppijad täitsid 72 küsimusest koosneva ankeedi ja Becki Depressiooni Küsimustiku tavalise klassitunni ajal. Uuringus osalejate kehakaalu ja kehapikkuse mõõtis kooliõde. Koolid, kus uuring läbi viidi, olid valitud juhuslikult. Uuringus osales kokku 1702 õpilast, 850 tütarlast ja 852 poissi.

## Uurimistöö peamised tulemused

Käesoleva tööga tehti kindlaks teismeliste noorte tervistohustava riskikäitumise sagedus, riskikäitumise indikaatorid ja erinevate riskikäitumiste seotus biopsühhosotsiaalsete faktoritega. Antud uurimuse tulemused kinnitavad suitsetamise kui riskikäitumise olulist seotust teiste riskikäitumistega nagu seda on alkoholist purju joomine, narkootikumide proovimine, dieedipidamine kaalu langetamiseks ja varajane seksuaalelu, samuti leiti seotus erinevate biopsühhosotsiaalsete faktoritega nagu teismelise kehakaal, tütarlaste menstruaalfunktsioon, suhe kooli ja vanematega, vanemate suitsetamiskäitumine, hinnang oma tervisele, alanenud meeleolu.

Õpilastest, kes olid enam kui viis sigaretti suitsetanud, pidasid end siiski mittesuitsetajateks. Iga päev suitsetajate võrdlemisel mittesuitsetajatega ilmnes, et õpilaste suitsetamise riskifaktoriteks olid vanemate suitsetamine, vanematega vähene suhtlemine, kooliskäimise vähene meeldimine ja väiksem edu õpingutes, hommikusöögi mittesöömine, sage kõhu- ja peavalu esinemine. Samuti esines suitsetajate hulgas oluliselt enam alkoholi ja illegaalsete uimastite tarbimist ning palju seksuaalpartnereid. Beck Depressiooni Küsimustiku vastuste analüüsis selgus, et suitsetajatel oli kõrgem depressioonirisk ja esines rohkem suitsiidimõtteid.

Uuringus võrreldi 16–18-aastaste suitsetajate ja mittesuitsetajate kehapikkust, kehakaalu ja kehamassiindeksit, arvesse oli seejuures võetud ka vanemate suitsetamine või mittesuitsetamine. Mittesuitsetajad, kelle vanemad ei suitseta ega ole ka kunagi suitsetanud olid kõrgeima kehamassiindeksiga ja need, kes ise suitsetasid ja ka vanemad suitsetavad, olid madalaima kehamassiindeksiga.

Noortele on seksuaalsuhte tähendus erinev täiskasvanute omast. Nii on noortele seksuaalelu alustamisel oluline uudishimu, seksuaalsuhe kui küpsuse tunnus ja eakaaslaste tunnustus. Seksuaalelu varajane alustamine on tervist ohustav käitumine sugulisel teel ülekantavate haiguste nakkuse ja soovimatu rasestumise riski tõttu. Ka paljude seksuaalpartnerite omamine on riskikäitumist iseloomustava elustiili osa. Nii maakonna kui linna koolides oli uuritavate seksuaalvahekorra kogemus seotud halvema õpieduga koolis, kutsekooli

õpilastel sellist erinevust ei esinenud. Sage oli tahtevastase seksuaalvahekorra esinemissagedus seksuaalkogemusega õpilaste hulgas. Uuringus selgus, et suitsetavatest tütarlastest oli viimase vahekorra ajal kontratseptsiooni kasutanud 33% versus 50% mittesuitsetajatest, positel vastavalt 27% versus 52%. Käesoleva uuringu alusel on võimalik järeldada, et teismelistest kasutavad vähem kontratseptsiooni need, kes käituvad riskantselt ka teistes situatsioonides, suitsetavad, joovad end purju ja proovivad illegaalseid uimasteid.

Seksuaalsuhte kogemus oli üheksandate klasside õpilastest linnakoolides 6% ja maakoolides 21% õpilastest. Linnakoolides oli lõpuklassides neli või enam partnerit olnud 9% tüdrukutest ja 21% poistest, maakoolides 33% poistest, kuid mitte tüdrukutel. Kaheksateistaastastest uuritavatest oli linnakoolides seksuaalsuhte kogemus 50%, poistest 43%; maakoolides 25% tüdrukutest ja 45% poistest; kutsekoolis 73% tüdrukutest ja 63% poistest. Suurem osa poistest, kel polnud küsitluse ajal seksuaalsuhte kogemust olnud, soovis seda saada.

Viimasel aastakümnel on jälgitav oluline kehakaalu langus, seda eriti teismeliste tütarlaste hulgas. See tendents on oluline mõjutegur menarheaalvanuse tõusuks viimase aastakümne jooksul. Lisaks menarheaalvanuse tõusule selgus, et varases menarhejärgses perioodis esineb oluliselt sagedamini väljakujunemata regulaarsusega menstruaaltsüklit kui seda on leitud varasemates uuringutes 20. sajandi alguses ja teises pooles. Uuringus 43% tütarlastest olid menstruatsioonid ebaregulaarselt. Ebaregulaarsus oli seotud kehamassiindeksiga alla 17.5 kg/m$^2$, perekonna halva majandusliku seisuga, vanematega vähese suhtlemisega, kooliskäimisse negatiivse suhtumisega. Ebaregulaarse nenstruaalfunktsiooniga tütarlastel oli Becki Depressiooni Küsimustiku kogusumma oluliselt kõrgem kui regulaarse menstruaalfunktsiooniga uuritavatel.

Viimase sajandi jooksul on eesti tütarlastel menarche nihkunud keskmiselt kaks aastat varasemasse vanusesse. See on sarnane arenenud riikides kirjeldatud trendiga, kuid väiksema ulatusega. Jälgitav oli muutus menarhe sessoonsuses, kuivõrd käesolevas uuringus langes tütarlastel menarhe oluliselt sagedamini kuudele, mil on koolivaheajad. Samuti saab antud uuringu tulemuste põhjal järeldada, et menarhe sessoonsuses on oluliselt määravad teised biopsühhosotsiaalsed tegurid nagu kehakaal, eluga rahulolu, suhe vanematega ja kooliga, ema suitsetamine ja edukus õpingutes.

Teismeliste rahulolu oma kehakaaluga, kasutades uuritavate kehamassiindeksi alusel klassidesse jagamist, näitas, et suur osa normaalse kehakaaluga tütarlastest pidas end ülekaaluliseks, seejuures kehamassiindeks 24 kg/m$^2$ oli lõikepunktiks, üle mille kõik tütarlapsed hindasid end ülekaaluliseks. Tütarlastest kolm neljast ja poistest iga teine, kelle kehamassiindeks oli 17.5 kg/m$^2$ või vähem, pidasid end normkaaluliseks. Iga kümnes tütarlaps, kel oli kehamassiindeks 17.5 kg/m$^2$ või vähem, soovis endale veelgi väiksemat kehakaalu.

Hommikusööki söövad poised sagedamini kui tütarlapsed, vastavalt 77% poistest ja 59% tütarlastest söövad alati hommikuti enne kooliminekut. Selgus, et hommikusööki mittesööjatel oli suurem kehakaal kui hommikusöögi sööjatel.

Hommikusöögi mittesööjatel oli Becki Depressiooni Küsimustiku kogusumma oluliselt kõrgem kui sööjatel, nad olid koolis vähemedukad ja suitsetasid sagedamini. Hommikusööki mittesööjad tütarlapsed tarvitasid sagedamini alkoholi, suitsetasid, neil olid halvemad suhted vanematega, hommikusööki mittesööjad poised aga olid sagedamini sööjatest proovinud illegaalseid uimasteid.

## JÄRELDUSED

1. Teismelise riskikäitumise väljendajana on suitsetamine oluline riskikäitumisele viitav indikaator, mida tuleks arvestada perearsti igapäevapraktikas nii teismeliste patsientidega tehtavas preventiivses töös, tervisekontrollis kui ravis. Nii oli suitsetamine oluliselt enam levinud nende õpilaste hulgas, kel esines väljendunud psühholoogiline rahulolematus, enesetapumõtted ja kurvameelsus, samuti neil, kes tarvitasid alkoholi ja olid sageli purjus, olid proovinud illegaalseid uimasteid, kel oli olnud palju seksuaalpartnereid ja kes regulaarselt loobusid hommikusöögist ning kasutasid dieeti kehakaalu langetamiseks.
2. Vanemate suitsetamiskäitumisel on suur mõju laste suitsetamise alustamisele, seejuures tuli esile tütarlaste suitsetamiskäitumise seotus ema suitsetamiskäitumisega ja poistel seotus isade suitsetamiskäitumisega.
3. Nii teismelise kui tema vanema suitsetamisel on mõju teismelise kehalisele arengule. Nii oli keskmine kehamassiindeks kõrgeim mittesuitsetajatel ja madalaim suitsetajatel. Kehapikkus oli seejuures suurim mittesuitsetajatel.
4. Seksuaalsuhte kogemus uuritavatel oli seotud halvema edasijõudmisega koolis ja tervistohustava riskikäitumisega nagu suitsetamine, alkoholi tarbimine, illegaalsete uimastite proovimine. Suurema seksuaalpartnerite arvuga õpilased olid kõrgema riskiga kaitsmata seksuaalvahekorra ja teiste tervistohustavate riskikäitumiste, nagu suitsetamine, alkoholi ja illegaalsete uimastite tarbimine, suhtes.
5. Ligikaudu pooltel õpilastest ei ole seksuaalsuhte kogemust õpingute ajal gümnaasiumis.
6. Käesolevas uuringus esines tütarlastel oluliselt sagedamini ebaregulaarset menstruaalfunktsiooni võrreldes varasemate uuringute tulemustega. Ebaregulaarsete menstruatsioonitsüklitega uuritavatel oli väiksem kehakaal.
7. Ebaregulaarselt esinevad menstruatsioonitsüklid olid seotud üldise rahulolematusega ja halvema kohanemisega igapäevaelus, alanenud meeleoluga, negatiivse enesehinnanguga, kehaliste kaebustega, samuti aga anoreksia, kaalulanguse, üksindustunde, süütunde, enesele mittemeeldimise ja enesetapumõtetega.

8. Noorim ja vanim vanus menarche ajal oli sama pikk ajaperiood kui varasemates uuringutes. Menarhe vanus oli aga kolme aasta võrra nooremas vanuses.
9. Viimase sajandi jooksul on lisaks noorenenud keskmisele menarheaalvanusele muutunud menarhe sessoonsus. Menarhe leidis aset oluliselt sagedamini kuudel, mil on koolivaheajad. Menarhe sessoonsuses olid oluliselt määravad ka teised biopsühhosotsiaalsed tegurid nagu kehakaal, suhe vanematega, edukus õpingutes ja ema suitstamiskäitumine.
10. Teismelised arvavad end olevat ülekaalulised oluliselt sagedamini kui nad seda tegelikult on. Nende poolt antud hinnang oma kehakaalule korreleerub halvasti medistiinilises mõistes alakaalulisuse, normaalse ja ülekaalulisuse mõistetega, seda eriti tütarlaste hulgas. Selline tendents esines kõikides kehamassi klassides. Oluline osa alakaalulisi ja normaalkaalulisi tütarlapsi pidasid end ülekaaluliseks.
11. Hommikusöögi mittesöömine oli tervist kahjustava eluviisi indikaatoriks, olles seotud teiste tervist kahjustavate käitumistega. Seejuures hommikusöögi sööjatel oli väiksem keskmine kehakaal kui neil, kes ei söönud hommikuti.

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# PUBLICATIONS

Mari Järvelaid.
Adolescent tobacco smoking and associated psychosocial health risk factors. Scandinavian Journal of Primary Health Care. 2004; 22: 50–53.

Mari Järvelaid.
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Mari Järvelaid.
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Mari Järvelaid.
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Mari Järvelaid.
Breakfast skipping and associated biopsychosocial factors among adolescents. Papers on Anthropology 2003; 12: 78–85.

# CURRICULUM VITAE

## MARI JÄRVELAID


Citizenship: Estonia
Born: September 25, 1956 in Tartu, Estonia
Married, 3 children
Address: Gonsiori 34–4, Tallinn 10128
Phone/fax: + 372 600 91 66


### Education

| | |
|---|---|
| 1963–1974 | Tartu Secondary School No. 2 |
| 1976–1981 | University of Tartu, Faculty of Physical Education |
| 1985–1990 | University of Tartu, Faculty of Medicine |
| 1990–1991 | Internship in Tartu City Polyclinic |
| 1995–2001 | Postgraduate student at the Department of Polyclinic and Family Medicine, University of Tartu |

### Special courses

| | |
|---|---|
| 1996 | Training in reproductive health for physicians, Sweden |
| 1997 | Training in problem based teaching for family practitioners, University of Maastricht |
| 1998 | Advanced course in family medicine, University of Zagreb |
| 1998 | Training in family medicine, Collage of Family Practitioners of Ireland |
| 2001 | Advanced course on drug addiction, University of Ljubljana |
| 2002 | Care, support and treatment for HIV-positive patients, UNAIDS, Kiev |

### Professional employment

| | |
|---|---|
| 1974–1976 | Sport Committee, instructor |
| 1981–1985 | Sport Club of University of Tartu, coach |
| 1991–1998 | Tartu City Polyclinic, general practitioner |
| 2001–2004 | Ministry of Social Affairs, Department of Public Health, chief specialist |
| 2004 | Health Protection Service of Tallinn, chief specialist |

### Scientific work

Research fields: public health, health policy, health in adolescence, including risk-taking health damaging behaviours and reproductive health.
23 scientific publications, 16 presentations at international conferences.

# *CURRICULUM VITAE*

## MARI JÄRVELAID


Kodakondsus: Eesti
Sünniaeg ja koht: 25. septembril 1956 Tartus
Perekonnaseis: abielus, 3 last
Aadress: Gonsiori 34–4, Tallinn 10128
Tel/fax: 600 91 66


### Haridus

1963–1974 Tartu 2. Keskkool
1976–1981 Tartu Ülikooli kehakultuuriteaduskond
1985–1990 Tartu Ülikooli arstiteaduskond
1990–1991 Internatuur Tartu Linna Polikliinikus
1995–2001 Doktorantuur Tartu Ülikooli arstiteaduskonnas

### Erialane enesetäiendus

1996 Rroduktiivtervishoiu alane täienduskursus, SIDA Rootsi
1997 Peremeditsiinialane täiendus, Maastrichti Ülikool
1998 Peremeditsiinialane täiendus, Zagrebi Ülikool
1998 Peremeditsiinialane täiendus, Iirimaa Perearstide Kolledz
2001 Täienduskursus uimastisõltuvusest, Ljubljana Ülikool
2002 Täienduskursus hooldusest, toest ja ravist HIV/AIDS patsientidele, ÜRO HIV/AIDS Programm, Kiiev

### Ametikäik

1974–1976 ENSV Spordikomitee instruktor
1981–1985 Tartu Ülikooli Spordiklubi treener
1991–1998 Tartu Linna Polikliinik, arst
2001–2004 Sotsiaalministeeriumi rahvatervise osakonna peaspetsialist
2004 Tallinna Tervisekaitsetalituse juhtivspetsialist

### Teadustöö kirjeldus

Peamiseks uurimisvaldkonnaks on rahvatervise, tervisepoliitika ja noorte tervisega seotud probleemid, sealhulgas tervist ohustav riskikäitumisen ja reproduktiivtervis.
23 teaduspublikatsiooni, 16 ettekannet rahvusvahelistel konverentsidel.

# DISSERTATIONES MEDICINAE UNIVERSITATIS TARTUENSIS

1. **Heidi-Ingrid Maaroos.** The natural course of gastric ulcer in connection with chronic gastritis and *Helicobacter pylori*. Tartu, 1991.
2. **Mihkel Zilmer.** Na-pump in normal and tumorous brain tissues: Structural functional a. tumorigenesis aspects. Tartu, 1991.
3. **Eero Vasar.** Role of cholecystokinin receptors in the regulation of behaviour and in the action of haloperidol and diazepam. Tartu, 1992.
4. **Tiina Talvik.** Hypoxic-ischaemic brain damage in neonates (clinical, biochemical and brain computed tomographical investigation). Tartu, 1992.
5. **Ants Peetsalu.** Vagotomy in duodenal ulcer disease: A study of gastric acidity, serum pepsinogen I, gastric mucosal histology and *Helicobacter pylori*. Tartu, 1992.
6. **Marika Mikelsaar.** Evaluation of the gastrointestinal microbial ecosystem in health and disease. Tartu, 1992.
7. **Hele Everaus.** Immuno-hormonal interactions in chronic lymphocytic leukaemia and multiple myeloma. Tartu, 1993.
8. **Ruth Mikelsaar.** Etiological factors of diseases in genetically consulted children and newborn screening: dissertation for the commencement of the degree of doctor of medical sciences. Tartu, 1993.
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