



**„Study on young people's lifestyles and  
sedentariness and the role of sport in the context  
of education and as a means of restoring the  
balance”**

**- Final report -**

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## Definitions

- Young people:** The term „young people“ refers to school-aged boys and girls. Because of the different national education systems the range of school ages varies across Europe but mainly refers to children and adolescents from 5 to 19 years.
- Health:** Health is viewed as a resource for everyday living, not just the absence of disease. Young people's health is considered as a positive concept encompassing physical, social and emotional well being (WHO, 2000).
- Lifestyle:** Lifestyle is a complex concept or term. It includes the entirety of norms and values as well as patterns of physical, social, and mental behaviour of an individual, varying with age, gender and cultural background. Its main function is the personal development, expression, and preservation of competence, performance and identity.
- Sedentariness:** Sedentariness is a concept or term which refers to a physically inactive lifestyle. It is embedded in social and mental behaviour patterns and caused by current developments in the work and leisure sectors of our societies.
- Physical activity:** Physical activity is a complex set of behaviours that encompass any bodily movement produced by skeletal muscles that results in energy expenditure.

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**Physical fitness:** Physical fitness is an umbrella term which captures both the variety of components which are assessed as motor and/or health related fitness and the different motor abilities (e.g. endurance, speed, strength, power, flexibility, coordination) which need to be maintained or developed by physical activity and exercise.

**Sport:** Sport in its broad sense is a highly diversified social phenomenon, encompassing various forms of physical activity from high-level competition through school, club or community organised programmes to spontaneous and informal physical activity in accordance with the individual's attitudes and interests.

# Part I

## 1 Terminology, methodology and concept of the study

This study, commissioned by the EU, aims to analyse young people's lifestyles and sedentariness and the role of physical activity and sport in the context of education and as a means of restoring the balance. It was decided to conduct this study as a complex literature review and, so far as possible, to extend it to all the member states of the EU, including those newly acceded on May 1<sup>st</sup> 2004. As a further prerequisite it was decided to formulate a design for the review which takes a trans-disciplinary approach into consideration and analyses young people's lifestyles and the development of sedentariness from various perspectives: for individuals and the physical development of their bodies, their social and mental patterns of behaviour (which are generally to some extent influenced by the different cultural settings in which they live) and finally, with reference to certain societal and environmental factors and determinants that cause or accompany the development of sedentary lifestyles.

This concept makes it by no means easy to formulate unequivocal definitions of the terms "young people" and "lifestyle" without any relativizations or supplementary explanations, because each expression possesses common interdisciplinary and intercultural facets as well as technically and interculturally mandated differences, depending on the individual's scientific discipline, scientific viewpoint and socio-cultural background and flavoured by any of Europe's idiosyncratic national characteristics. The same applies to the ages that are considered to delimit the period during which individuals are seen as "young people".

In this study we understand the term “young people” to mean boys and girls (children, adolescents and young adults) during that period of their life when, after their initial years spent largely within the confines of their parents’ home, they join with others of a similar age (their peers) to visit social institutions: kindergartens, pre-schools, schools, sports clubs, youth clubs, and all types of public and private sports and leisure facilities. This period naturally also includes meetings with peers outside such institutions for movement, play, sport and other activities, at the numerous informal meeting places that children and young people organise for themselves during their free time.

The term “lifestyle” is similarly broadly diverse and multiform. Quite specific features of the individual are brought to the fore depending on the specific scientific viewpoint (e.g. biology, physiology, sociology, education, etc.), from their genetic code by way of their motor development to their psycho-social attitudes and their active or sedentary physical activities; in each case the chosen feature is viewed as fundamental and decisive in explaining the individual’s intricately structured personal patterns of behaviour.

In accordance with the design for this study, we shall however assume that the formation and structure of lifestyles cannot be adequately explained by any scientific discipline and that the lifestyle process can be entirely attributed neither to internal maturation nor to external impulses. Growing up means taking into account the internal and external realities. This process, between the individual’s internal and external nature, can be described as an **interaction**, by means of which a dialectic pattern of continual **assimilation** and **accommodation** produces a typical lifestyle.

This **whole of a lifestyle** includes at least four areas of development or competence, which we can term its **cognitive**, **social**, **emotional**, and **physical** dimensions. Young people developing their lifestyles act and react **as individuals**



in **different contexts**, which markedly affect their social life. These different contexts can be distinguished on **four levels**.

The first level is **the individual** himself or herself, including his or her whole body of functions and dysfunctions, multiple psycho-social attitudes and behaviour patterns and the processes of growing up from childhood to adolescence and from adolescence to adulthood.

At the second level are the **people** who interact directly with children and young people or adolescents (e.g. parents, teachers, trainers, peers, etc.).

At the third level are the **institutions** and **social agencies** to which young people contribute, or at which they merely spend time, and where facets of their lifestyles develop (e.g. schools, sport clubs, groups, etc.).

At a fourth level are **cultural, normative factors** and **socio-political structures** (e.g. society's values and standards, infrastructure features affecting mobility or sedentariness and the environment at large including public health systems, traffic and transportation systems, etc.), which not only influence the other three levels to a varying degree but also directly affect the individual processes through which young people develop their lifestyles.

## **2 Different sources and structure of the study**

Because sedentariness is not only linked with physical inactivity in the context of physical activity and sports, it is necessary to take into consideration various aspects which belong to the whole cluster of sedentariness: other leisure activities, e.g. media consumption such as watching TV, playing with electronic games or the PC; certain eating habits which make children and adolescents overweight and obese; substance abuse, etc. There are also some health-related risk factors for young people, such as CHD and CVD, which have all too plainly become epidemic in many EU countries in recent years and which are also connected with sedentary behaviour patterns.

Taking into account the concept of our study, the increasing appearance of sedentary lifestyles must be reviewed for young people on all four of the previously mentioned levels: how the whole body is affected physically, psychosocially and mentally by an active or inactive lifestyle, including other different patterns of leisure and nutrition; whether and to what extent the people (parents, teachers, coaches and peers) in the various social settings and institutions (family, school, sport and social club, groups) are supportive of inactivity and sedentariness; how great is the effect of cultural and societal norms, their regulations and shifts; and to what extent has society and the environment influenced or, via various factors and determinants, even caused the problem of sedentariness.

In order to cover this whole cluster of sedentariness we established a research consortium of experts representing academic disciplines in the areas of biomedicine (human biology, physiology, epidemiology), social science (sociology, psychology), education and curriculum studies for physical education, and sport sciences (dealing with physical fitness, motor development, physical activity and sports for children and young people).

The task for this research consortium was to review, within their individual academic disciplines, published research material dealing with the different elements and aspects of young people's physical activity and sedentary leisure behaviour. For these literature reviews it was also necessary to cover all the cultural regions of the EU, in particular to include many national sources from (e.g.) central and eastern Europe which are still very often published only in their national languages (for example the Slavonic languages).

Each member of the research consortium has written a national or regional review in English about published material on the topic of the project in his or her native language (e.g. Dutch/Flemish/French, Swedish/Finnish, Lithuanian/Latvian, Czech/Slovak, Portuguese/Spanish, German/Austrian/Swiss). To cover as

much published material as possible from newly acceding EU member states we extended further collaboration to sub-partners of the research consortium at leading national universities, who each wrote state-of-the-art reports for their countries (Poland, Slovakia, Hungary, Slovenia) on the topic of young people's lifestyles and sedentariness.

The sources for these reviews are nationally and internationally published books and articles in leading journals of the various academic disciplines, internet and bibliographic research using a number of keywords relevant to the project, relevant international databases such as "Sport Discus", "Spolit" etc., as well as research reviews of comparable EU and international studies on physical education, children's health and youth sport studies, nutrition surveys, transport and environment protection reports, including documentation of some national and international statistics offices and departments.

In addition, as valuable sources of applied research about young people as customers in the leisure market, we have included papers and presentations given at the EU conference for the project (held in June 2004 in Essen, see [www.eucopelis.info](http://www.eucopelis.info)) by experts from leading companies in the media, food & beverage, and electronic devices industries.

However, for some aspects, European findings are still very rare, e.g. on the environmental correlates of sedentary lifestyles, family and school-based nutrition and physical activity intervention studies to prevent sedentary lifestyles, etc., while results are available from north American studies and projects. In such cases the authors have also included relevant US findings, i.e. where comparable problems have already been encountered in some European countries and, with the typical American-European "time lag", are already similarly affecting current trends of sedentary behaviour in young Europeans (cf. U.S. Department of Health and Human Services, 1996, 2000).

Our data and findings were put into context with respect to demographic, socio-economic and public health indicators and their variations over time and space, so as to better understand the specificities of the populations of young people in the various geographical and cultural contexts across Europe.

This report therefore falls into three parts:

In part I (chapters 1 to 3) we briefly introduce the purposes, concept, range and methodology of the study and give sources for the review and references on the populations.

In part II (chapters 4 to 7) we describe the situation of young people in Europe with reference to their current state of health, their current levels of fitness, motor ability and physical activity; we analyse prevalence data for overweight and obesity and monitor secular trends. We also report on the range of active and sedentary lifestyles of young people in their different settings, listing matters of concern, the benefits of physical activity and sports, dietary habits, urban development and barriers which, as factors and determinants, affect activity and inactivity. The situation of today's young generation is viewed from complex physical, psychological, behavioural, social-cultural and macro-economic perspectives.

In part III (chapters 8 to 10) we summarise the major findings of part II and analyse the role of physical activity and sport in the context of education in restoring the balance. We consider constraints and findings for some successful educational interventions at different points inside and outside the school system aimed at restoring active lifestyles. Attention must be paid to intervention and prevention strategies with a specific emphasis on the role of physical activity and sport in the context of education and as a means of restoring the physical,

emotional and social balance of young people. Finally, we discuss a set of recommendations intended to promote physical activities and a healthy lifestyle within the different settings in which young people live, and suggest how policy making can support them on national and European levels.

### **3        The reference population and its demographic and socio-economic picture**

Over the past decades the population in most European countries has undergone profound transformation that has affected the entire structure and organisation of the society. Whereas this process of transformation started in most western and central European countries in the late 1950s, and with a time-lag of about 25 years in southern European countries such as Spain, Portugal and Greece, the transition in the east European countries and the Baltic states started after the fall of the Iron Curtain in the early 1990s; since then the transformation has been very fast and intense and has affected dramatically those countries, which had previously seen little of the modernisation process.

Keeping in mind the different historical development and its consequences on the population in the various EU countries the following general remarks concerning the demographic structure of the population and its socio-economic profile in the EU member states can be made:

The population growth has slowed down in the course of the last decades. In many countries it has stopped. While the population's life expectancy has jumped, birth rates have decreased, the average number of children per woman reaching 1.2-1.5. In many European countries for the first time in history the young generation – classically the largest share of the general population – has become a minority.

Tab. 3.1. *National demographic characteristics (Currie, Hurrelmann, Settertobulte, Smith & Todd, 2000)*

Country	Population		Unem- ployment rates (%)	Average size of families <sup>1</sup>	Average age at marriage (years)	
	Total (number)	11- to 16-year olds (%)			Man	Women
Austria	8 072 200	7.1	7.1	2.5	28.9	26.6
Belgium (Flemish)	5 912 400	7.0	5.3	2.5	31.0	29.0
Czech Rep.	10 299 125	7.8	5.4	2.8	27.7	
Denmark	5 294 900	6.0	7.9	2.2	35.3	32.7
Greenland	55 000	9.4	8.0	2.8	-	-
Estonia	1 462 100	8.9	10.0	2.3	26.3	24.1
Finland	5 147 000	(12.5) <sup>2</sup>	12.7	2.9	33.3	30.7
France	58 604 000	8.0	12.5	2.6	29.0	26.9
Germany	82 012 000	5.4	13.1	-	33.4	30.6
Greece	10 475 900	8.0	10.3	3.0	31.8	27.4
Hungary	10 174 400	10.4	8.7	2.9	29.7	
Ireland	3 680 600	(8,9) <sup>3</sup>	8.5	-	27.0	25.0
Latvia	2 479 900	8.9	7.0	2.4	25.7	23.6
Lithuania	3 707 200	9.0	5.9	-	27.1	25.2
Norway	4 392 700	(12.0) <sup>2</sup>	4.1	2.1	33.4	30.4
Poland	38 880 000	8.5	10.3	3.2	-	-
Portugal	9 955 400	-	3.9/6.2 <sup>4</sup>	-	-	-
Slovakia	5 387 600	9.5	12.9	2.7	27.2	24.3
Sweden	6 847 600	6.9	8.0	2.1	32.2	29.6
Switzerland	7 096 500	6.9	5.2	3.1	-	-
United Kingdom						
England	47 900 000	7.2	6.0	2.4	26.5	
Northern Ireland	1 675 000	9.2	8.5	2.7	29.2	
Scotland	5 122 500	7.6	8.7	2.4	26.7	
Wales	2 921 100	6.5	11.3	2.5	28.3	28.6
<sup>1</sup> People in household; <sup>2</sup> Aged 10-19; <sup>3</sup> Aged 10-14; <sup>4</sup> Man/Woman						

Today the numbers for teenagers between 11 and 16 years for example have clashed down in almost each EU country between 5 % and 10 % of the national population. However, if school children under the age of 10 are included the percentage will become higher.

Side by side with this demographic development in the age structure a modernisation process with a shift to urbanisation has taken place. A transition from a society the largest part of which was employed in the agricultural or industrial

sector, to a post-industrial society can be observed in many central, western, northern and southern countries. Whereas at present the agricultural sector contributes to the Gross National Product by a relative small share, a considerable share comes from the industry sector and the largest share from the services. Due to different historical and political developments considerable west-east differences remain.

It is obvious that these changes in our European societies have a strong impact not only on the situation of adult people, but also on the every day life of the young generation, their health and fitness status, their eating habits, their lifestyles and especially their behaviour patterns with respect to physical activity and sport involvement.

Today we find an ambivalent picture for young people in many EU countries, as some previous national and European physical activity and youth sport studies already revealed (cf. De Knop, Engström, Skirstad & Weiss, 1996): on the one hand there is an increase in daily and weekly moderate and vigorous physical activity and sport for children and young people, which is related to a certain higher socio-economic status and level of education; on the other hand, however, there is also an marked decrease in daily and weekly physical activity for young people, which is linked with lower socio-economic status and level of education. Quantitatively we can say that the more active group is still small compared to former times, but the more sedentary group is growing more and more. In some new EU countries, for instance, up to 30 % of boys and 50 % of girls in certain age groups are reported not to engage in any physical activities or sport.

At present, and particularly in this growing sedentary sample group of young people, an epidemic of chronic diseases is rapidly increasing, initially in the US and, since the 1990s, in many European countries as well. Today it is already estimated to account for almost 50 % of the global burden of disease.

Of particular concern in this context are overweight and obesity in children and adolescents. Overweight and obesity are particularly worrying because they are not only increasing at a very high rate, but also appearing earlier in life and increasingly affecting all European countries and all social layers.

Obesity and overweight are frequently associated with the shift to modern lifestyles, in which diet and physical inactivity play a major role. The importance of an active and healthy lifestyle has been recognised for quite a long time, but the relationship between disease, dietary intake and energy expenditure are not as clear-cut as one would expect.

Particularly in the case of overweight and obesity among children and adolescents, modern research tends to articulate a new platform going beyond the simple energy intake/expenditure balance and encompassing a wide concept of the human organism's subtle and complex relationship with its social and material environment (cf. Bouchard, 2000).

In this complex network of factors underlying the homeostasis of health and disorder during the lifespan, additional attention is paid to the role of physical activity and sport, not only as a measure to keep an even energy balance but also as a fundamental source of emotional stimulation and social interaction as young people pass through their teenage years (cf. Biddle, Fox & Boutcher, 2000).

In order to combat this emerging epidemic, which affects not only the individual development of young people in Europe but also the development of our societies, their economies and their health care systems, we have to tackle it throughout Europe as a complex task, to restore the balance by means of interventions in different points of young people's living environments and at the various levels that are able to exert an influence on young people's sedentary lifestyles.



## Part II

### 4 Young people's lifestyles

Reflecting Europe's cultural and national diversity we find different statutory regulations, in some cases extremely diverse cultural and social institutions and national idiosyncrasies in the various educational, social and sporting systems of countries within the European community. Suppose we consider youngsters' period of compulsory school attendance to be their time as "young people": in Germany, compulsory school attendance begins at age six and ends after ten years at age 16, but other education systems within Europe – in France, for example, or the Netherlands – would qualify them as "young people" from as early as three or four until the age of 18; we might even include the whole of their period of tertiary education (university course), lasting well into their 20<sup>th</sup> year or even beyond.

The different age-bands that can be considered to define "young people" are reflected in the various studies whose results are introduced and analysed in this PART II. There are studies that compare only young people between ages 15 and 24; others concentrate on age groups from six to nine; some consider only the years around adolescence, when an age group's rate of participation in sporting activities – broken down according to sport and European country – reaches its highest value (between ages 11 to 12 and 14 to 15) while simultaneously already exhibiting a recognisable downward trend.

Different individual related lifestyles arise depending on the course of the geographical, cultural and socio-economical backgrounds in Europe, and these differences also produce differing physical active and sedentary lifestyles, into

which various forms of movement, play and sport and other physical activity are more or less integrated. Each of the various elements – family background, gender, age, education and upbringing, social class, inclusion, and forms of participation in physical activities and sport, leisure behaviour patterns etc. – independently plays an important but always distinct role for the individual development and structure of a lifestyle.

In this respect young people exhibit a whole range of very different lifestyles, and these also vary between the various cultural areas within Europe (north, south, east, and west) because these communities also incorporate different traditions and constraints for these various lifestyle elements, and only in their entirety do they fashion a particular lifestyle. Here too, the whole of a lifestyle is more than the sum of its parts.

In **PART II** of our report, the following chapters 4 and 5 will exhaustively discuss the **physical dimension of young people's lifestyles** in order to illustrate and compare the problems and different manifestations of an inactive, sedentary lifestyle across Europe. The subsequent chapter 6 will then investigate those factors and determinants that influence the institutional, cultural, socio-political in in particular environmental context of a sedentary lifestyle for children and young people.

#### **4.1 Physical activity and sport participation**

National government agencies and ministries in each of the countries of the European Union support studies and surveys of children and young people. Such surveys generally focus on three principal topics: school attendance and education, state of health and symptoms of illness, and leisure activities and consumer behaviour. A number of international studies on these three main topics, comparing the situation across a number of European countries, have also been published over the last few years by global organisations (such as OECD and WHO), and in recent years the EU Commission has published results on the same topics for numerous European Union countries, for instance, for EYES 2004 a study dealing with participation in sport in the EU, and more recently one dealing with media consumption in selected EU countries (TV).

Only occasionally, and often only incidentally, do these national and international studies investigate the frequency and intensity of young people's and social engagement as part of an active and health-promoting lifestyle. Many EU countries still do not carry out regular representative studies on young people's sport participation and physical performance. Systematic data assessment on young people's sporting practices in all their facets and with all their impact on the physical, cognitive, emotional and social domain of development remains the exception, even in Europe's "great sporting countries". Such studies are generally initiatives, financially supported by foundations or private institutions (cf. Schmidt, Hartmann-Tews & Brettschneider, 2003).

In a study of physical fitness and sporting lifestyles carried out and published by ICSSPE (cf. Telama et al., 2002) with over 6000 12- and 15-year-old participants from six European countries (Belgium, Germany, Estonia, Finland, Czech Republic and Hungary), "recreational sport" was placed in sixth position and participation in "organised competitive sport" in ninth position in the list of leisure activities. Sedentary activities such as "listening to music" and "watching TV or videos" were the two dominant leisure activities both in EU member states (BEL, GER, FIN) and the accession countries (CZE, EST, HUN). The type of sport participation revealed considerable differences between the countries:

whereas (e.g.) Czech youngsters placed “recreational sport” high on their list of most frequent leisure activities, their participation in “organised competitive sport” finished in 17<sup>th</sup> place. In contrast, Germany’s young people placed “organised competitive sport” in position six, well above average in the study, while “recreational sports” finished in tenth place, well below the Czech result and the European average.

These examples show that the requirements and opportunities for young people to participate in sports differ widely between the various EU countries. There are already far more parallels between old and new EU countries when it comes to sedentary activities. It is all the more important that individual EU countries apply uniform objective criteria when recording the different types of sport (organised and informal) in which young people participate. Only in this way can researches begin to compare the bandwidth of young people’s (curricular and extracurricular) sporting activities, including the major forms of physical activity and sport and the time allocated to them.

The latest of the six multinational World Health Organisation surveys that have been carried out so far provides the participants with a definition of physical activity as

“any activity that increases your heart rate and makes you get out of breath some of the time. Physical activity can be done in sports, school activities, playing with friends or walking to school. Some examples of physical activity are running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, soccer, basketball, football and surfing” (Currie et al., 2004, p. 91).

It shows that all physical activities of at least moderate intensity, carried out at school and/or in free-time are included. Competitive sports organised by clubs are as well integrated into this umbrella concept as school physical education, health-focused physical exercise and informal sporting activities.

Political transformations in the Eastern part of Europe as well as social and cultural changes all over Europe have created new leisure patterns and have also paved the way for a cultural redefinition of sport. Internal differentiation has ex-

tended boundaries from institutionalised sports to informal physical activity and on the level of activities and from competition and achievement maximisation to a wide range of configurations including fun and enjoyment, social contact, adventure, body sensation, health and relaxation on the level of motives. Especially for young people sport does no longer represent the sum of institutionalised and codified sports as organised by sport federations. What counts for children and youth is their subjective interpretation of what sport means to them (cf. Frömel et al., 2004; Jurak et al., 2003; Kardelis & Stakyte, 2003).

The WHO definition of physical activity in its broad sense does not only show the difficulty in differentiating between the various forms of activity. It also makes clear that young people's physical activity is extremely difficult to assess and interpret. An impressive number of methods assessing physical activity can be identified, but the validity, reliability and objectivity of many of these methods have not been established with young people. Among the more objective estimates of physical activity heart rate monitoring and accelerometry are to be found, but although these techniques have allowed valuable insights into young people's physical activity patterns sample sizes are too small to be representative of the population.

The most widely used method of assessment of physical activity all over Europe is the self-report method which includes retrospective questionnaires, interview-administered recall, activity diaries and mail surveys. An impressive number of these studies provide representative data, but especially data referring to children need to be interpreted cautiously for several reasons. Considerable demands are placed on the child's cognitive abilities to recall specific events of the past. In addition children are less time-conscious than adults and tend to engage in physical activities at sporadic times and intensities rather than consistent bouts. The recall of mode, intensity, frequency and duration of bouts of physical activity by children is therefore problematic.

In the following we therefore differentiate between physical activity and sport as assessed by objective measures and physical activity and sport participation as measured by subjective measures.

#### **4.1.1 Objective measures of physical activity**

##### ***Physical activity as assessed by heart rate monitoring***

Heart rate monitoring provides an objective estimate of physical activity. The underlying assumption is that children who spend longer periods of time with elevated heart rates are generally more active than those whose heart rate remains in the lower ranges. Heart rate monitoring is accepted as a reliable and valid measure of physical activity over extended time periods, but it is an indirect measure which indicates the relative stress placed on the cardiorespiratory system. Several other factors beside physical activity can influence heart rate, particularly during low intensity physical activity. Examples include anxiety, emotional stress, fatigue, body position, active muscle group, type of muscle contraction, training status, level of fitness, food intake, state of hydration, ambient temperature and humidity (cf. Armstrong & Van Mechelen, 1998; Armstrong, 2004).

The interpretation of heart rate data is complex. More than 20 different methods of data reduction have been identified. This wide range makes direct comparisons between studies very difficult. Generally heart rate has been used to either estimate energy expenditure or to provide "thresholds" equating to moderate and/or vigorous physical activity.

Despite the problems with its assessment and interpretation heart rate monitoring has provided valuable insights into young people's physical activity patterns. By the end of the 1980s heart rate monitoring technology had advanced to the point where unobtrusive telemetry systems allowed monitoring over several days. Studies of European children and adolescents which have employed heart rate monitoring over at least a three day period and from which relevant data can be extracted have been summarized and collated in table 4.1.

In order to provide a comprehensive picture of young people's physical activity patterns as measured by heart rate monitoring and also to show the difficulty to compare data selective studies and findings are presented in table 4.1.

**Tab. 4.1.** *Habitual physical activity measured over at least 3 days using heart rate monitoring (Armstrong, 2004; modified)*

Citation	Participants	Physical activity measure	Outcomes
Armstrong et al. (1990)	163 girls, 103 boys; aged 11 to 16 years England	4-day heart rate monitoring	Boys had HR (heart rate) $>139$ beats·min <sup>-1</sup> for significantly greater % age of time than girls (6,2 % vs 4,3 %) during 3 weekdays and a Saturday, boys (n=92) 5,6 % vs girls (n=120) 2,6 %. A significant negative correlation with age was found with girls (weekday $r = -0.27$ , Saturday $r = -0.21$ ) but not with boys. 51,5 % of girls and 35,9 % of boys did not exhibit a single 10-minute sustained period with HR $>139$ beats·min <sup>-1</sup> over 3 weekdays. On Saturday the corresponding figures were 70,7 % of boys and 93,3 % of girls.
Riddoch et al. (1991)	22 girls, 23 boys; aged 11 to 16 years Northern Ireland	2-4-day heart rate monitoring	No significant gender difference in daily time spent with HR $>50$ % peak $\text{VO}_2$ (boys, 24 min; girls 17 min). Boys spent significantly more time than girls with HR $>70$ % peak $\text{VO}_2$ (8 min vs 4 min). Younger boys engaged in significantly more total activity than older boys and in more vigorous activity than younger girls. A significant negative correlation ( $r = -0.48$ ) was found between age and total activity in boys but not in girls.
Maniōs et al. (1998)	22 girls, 17 boys; aged 6 years Greece	3-day heart rate monitoring	Children from urban areas had significantly longer activity intervals than those from rural areas. The time spent in activity intervals was significantly longer during weekdays than weekend days.
Armstrong et al. (2000)	98 girls, 104 boys; aged 11 to 13 years England	3-day heart rate monitoring	In the first year of the study 76,2 % of boys and 73,5 % of girls accumulated 30 min with HR $>139$ beats·min <sup>-1</sup> , in the final year the figures were 44,4 % and 31,6 % for boys and girls respectively. At 11 years of age 22,1 % of boys and 29,6 % of girls did not experience a single 10 min sustained period with HR $>139$ beats·min <sup>-1</sup> at age 13 the figures were 28,4 % and 51,9 % for boys and girls respectively. Physical activity declined with age with a consistent gender difference reflecting the lower physical activity of girls.
Welsman & Armstrong (2000)	42 girls, 52 boys; aged 11 to 16 years England	4-day heart rate monitoring	67,3 % of the boys and 59,5 % of the girls accumulated a daily 30 min with HR $>139$ beats·min <sup>-1</sup> . 28,8 % of boys and 54,8 % of girls did not experience a single 10 min sustained period with HR $>139$ beats·min <sup>-1</sup> .
Ekelund et al. (2001)	40 girls, 42 boys; aged 14 to 15 years Sweden	3-day heart rate monitoring	No gender differences were observed in time spent engaged in MVPA but boys activity energy expenditure (total-sedentary energy expenditure) was significantly higher than girls.
Vermorel et al (2002)	29 girls, 31 boys; aged 12 to 16 years France	5-day heart rate monitoring	Mean daily energy expenditure (DEE) increased significantly with age in boys, but not in girls. Physical activity level did not vary with gender and age. Mean DEE was 21 % higher on non-school days in the active children but 7 % lower in the sedentary children.

**The findings can be summarized as follows:**

- **Most, but not all, heart rate monitoring studies have reported boys to be more physically active than girls.**
- **Boys appear to engage in moderate and vigorous, sustained periods of physical activity more often than girls, but this type of activity does not appear to be characteristic of European youth's physical activity patterns.**
- **Studies consistently show a decline in physical activity with age, at least during the teen years.**
- **Children tend to be more active during schooldays than at weekends.**

### ***Pedometry and Accelerometry***

As almost all forms of physical activity require movement of the trunk or limbs the assessment of "movement" is appealing. The most common mechanical device for measuring movement is the pedometer. Pedometers are relatively simple motion sensors which record the acceleration and deceleration of movement in one direction and are normally used to estimate mileage walked or the number of steps taken over a period of time. Disadvantages of pedometry include the inability to measure intensity or pattern of activities performed.

Pedometry studies of European youth which have assessed physical activity over a minimum of three days have been collated in table 4.2. The measurements are less precise than with other objective measures of physical activity but the large sample sizes strengthen the results.



**Tab. 4.2.** *Habitual physical activity measured over at least 3 days using pedometry (Armstrong, 2004)*

Citation	Participants	Physical activity measure	Outcomes
Verschuur et al. (1984)	215 girls, 195 boys; aged 13 to 14 years The Netherlands	3-day pedometer monitoring	Boys spent significantly more time on "heavy activities" than girls. Boys' median 99 minutes, girls' median 1 minute.
Skalik et al. (2001)	58 girls, 68 boys; aged 16 to 18 years. Czech Republic, Poland and Sweden	7-day accelerometer and pedometer monitoring	Mean daily energy expenditure (DEE) in physical activity was $9.7 \text{ kcal} \cdot \text{kg}^{-1} \cdot \text{day}^{-1}$ in girls and $11.21 \text{ kcal} \cdot \text{kg}^{-1} \cdot \text{day}^{-1}$ in boys. In all regions boys had a higher level of physical activity. 17 % of girls failed to reach $6 \text{ kcal} \cdot \text{kg}^{-1} \cdot \text{day}^{-1}$ .
Vincent et al. (2001)	324 girls, 356 boys; aged 7 to 12 years Sweden	4-day pedometer monitoring	The 12-year-old boys in the most active tertile accumulated more steps than the 7-year-olds. In the least active tertile the younger boys accumulated more steps than the older boys. In both the most active and the least active tertiles the younger girls accumulated more steps than the older girls.
Loucaides et al. (2003, 2004)	127 girls, 129 boys; aged 11 to 12 years Cyprus	4-day pedometer monitoring in winter 4-day pedometer monitoring in summer	Urban schoolchildren significantly more active in winter than rural schoolchildren and rural schoolchildren more active in the summer. Boys acquired significantly higher mean daily step counts than girls in winter.
Raustorp et al. (2004)	435 girls, 457 boys; aged 7-14 years Sweden	4-day pedometer monitoring	Boys were significantly more active than girls across all age groups. For both boys and girls the most active age groups were 10-year-olds. With the exception of 10-year-olds, activity levels were quite stable among children 7 to 11 years but there tended to be a drop-off in step counts among adolescents in the 13 and 14-year-old age groups.

Findings are very consistent across the countries surveyed and show that boys are more active than girls at all ages from 7 to 18 years. Swedish studies across the age range 7 to 14 years indicate that girls' activity declines with age although the decline in boys' physical activity with age may not commence until the early teens (cf. Engström, 2002; Patriksson, Augustsson, Eriksson & Stråhlmann, 2003).

Accelerometers are more sophisticated motion sensors than pedometers and they record movement through piezo-electric transducers and microprocessors that convert recorded accelerations to a quantifiable digital signal referred to as "counts". Accelerometers are normally attached to a belt at the hip and relative to heart rate monitors they are less burdensome to children. Accelerometers provide an objective, non-reactive and re-usable technique with which to assess

habitual physical activity. Unfortunately only relatively few accelerometry studies of the physical activity of European youth have been published. The most substantial study of European children's physical activity using accelerometry was carried out as part of the European Youth Heart Study. 9- and 15-year-old subjects were recruited to broadly represent boys and girls either side of puberty.

- **The accelerometry studies show a remarkable consistency of the results and confirm the findings of the studies using pedometry.**
- **Physical activity levels and age and gender differences were mirrored across Denmark, Portugal, Estonia and Norway despite the wide differences in geography, socio-economic circumstances, culture and climate.**
- **The findings suggest that physical activity habits in children may be determined by biological factors as much as by environmental factors.**

#### **4.1.2 Subjective measures of physical activity**

To interpret adequately the habitual physical activity of European youth measurement issues must be considered and the data evaluated in the context of the methodology used. As mentioned before, self-report of physical activity is the most widely used method in epidemiological research due to the ease and low costs of implementation. Self-report methods include retrospective questionnaires, interview-administered recall, activity diaries and mail surveys.

Self-administered questionnaires are less accurate than those administered by an interviewer and large discrepancies have been demonstrated between the two methods. It is difficult to ascertain at what age children become able to produce meaningful questionnaire data but it has been suggested that children under the age of 12 years cannot recall activities accurately and are unable to quantify the time frame of activity.

Physical activity diaries have been reported to be superior to retrospective questionnaires, but some studies have found that the quality of completed diaries is inconsistent with children and concluded that physical activity diaries were unsuitable for use with children under 15 to 16 years of age.

Self-report and objective measures of physical activity should be compared cautiously. Children have been reported to overestimate their recall of vigorous physical activity and not unfrequently discrepancies were found between self-reported and objectively measured estimates of vigorous physical activity. When moderate intensity physical activity is considered children tend to underestimate their level of physical activity compared with objective measures.

The use of self-report techniques is common in studies of children's physical activity but in anything but large studies with high statistical power the data need to be interpreted cautiously. Studies of non-representative samples of young people are widely available and data have emerged from almost all EU-countries (Austria, Belgium, the Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Spain, Slovakia, Slovenia, Sweden and United Kingdom).

As an exemplar reference is made to two UK studies. The National Diet and Nutrition Survey Report in the UK (Department of Health, 2000) concluded that that there were high levels of inactivity amongst young people. Although the majority of young people achieved at least half an hour of moderate intensity physical activity per day, fewer achieved at least an hour a day of at least moderate physical activity (61 % of young men and 42 % of young women). These proportions declined with age such that the 15 to 18 years age group showed the lowest levels of activity. There was no difference in participation rates according to social class, region household income or being at school or work.

The most frequently cited modes of physical activity in the 11 to 18 years age range were football, brisk walking, ball games and cycling for young men; and

brisk walking and Physical Education or gym for young women. This pattern of results is similar to that seen in other surveys.

Another recent study on prevalence rates and opportunities for activity in and out of school is 'Young people and sport, National Survey 1999'. It reports the results of a random cross sectional sample of young people aged 6 to 16 years old (n=3,319). The 1999 study found that the number spending two hours or more on physical education decreased from 46 % to 33 %, with decreases most marked for primary school children. Therefore, the trend is in more young people doing shorter rather than longer physical education. All secondary schools had at least one member of staff with a specialist physical education qualification in contrast to primary schools where only half did. A quarter of all teachers surveyed felt that the sports facilities in their school were inadequate (Eppi-Centre, 2001).

Levels of physical activity cannot be confidently compared across studies, but age and gender-related trends are consistent. Some of the more comprehensive surveys will be used to illustrate general trends.

In 1989/90 a survey was carried out involving 9 EU countries and 37,681 young people. Three age groups were selected to simulate a longitudinal study, the median ages were set at 11, 13 and 15 years. The young people were asked how often per week they exercised, outside school hours, to the point they got out of breath or sweated. The percentages of boys and girls who exercised at least four times a week out of school are illustrated in figure 4.1 and 4.2, respectively.

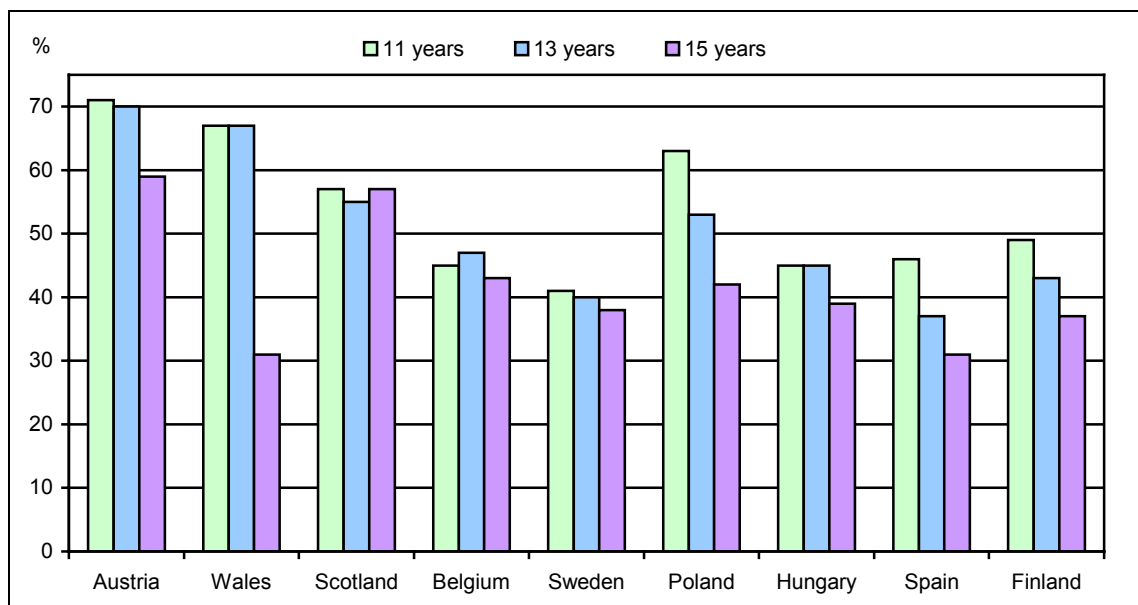


Fig. 4.1. Percentage of boys who exercise at least four times a week out of school (The figure is drawn from data reported by King & Coles, 1992).

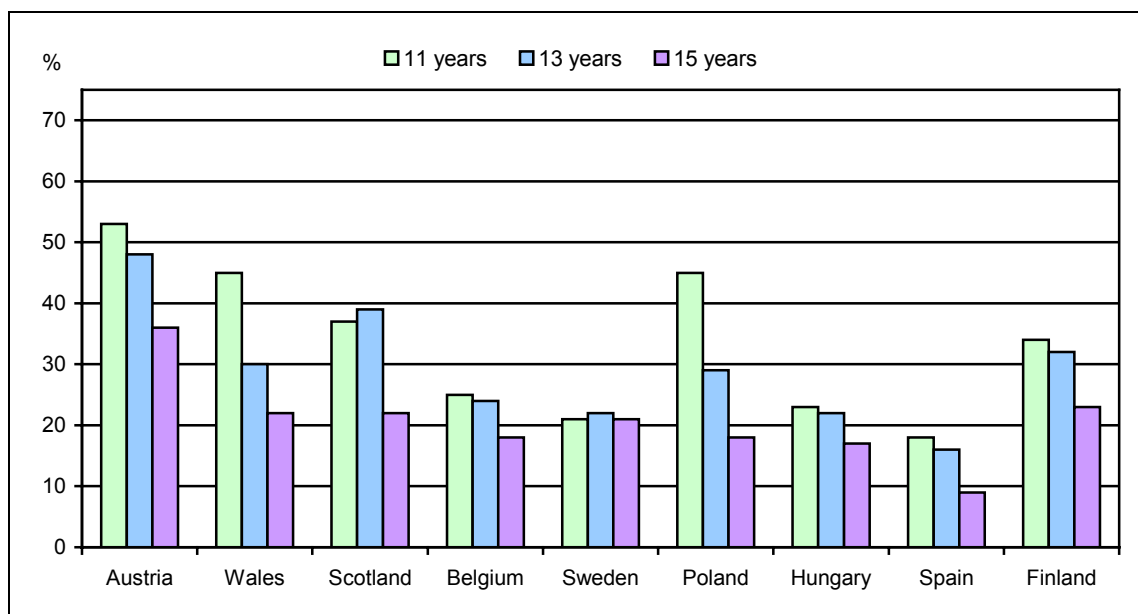


Fig. 4.2. Percentage of girls who exercise at least four times a week out of school (The figure is drawn from data reported by King & Coles, 1992).

The decrease in participation in physical activity with age, especially for girls, is readily apparent and consistent across countries. Fewer girls than boys exercise at least once a week at all ages and across all countries. Similarly, more boys exercise at least four times a week at all ages and across all countries.

The 1993/94 survey involved 16 EU countries and 86.225 young people of the same age groups. The participants were asked the same questions as in 1989/90.

The results are similar: More boys than girls exercise at least twice per week in all countries and at all ages. In several countries the gender difference is noteworthy. The trend for a decrease in physical activity with age is apparent with girls in all countries surveyed and only in Latvia and Lithuania were 15-year-olds the most active group of boys.

The 1997/98 survey involved 18 EU countries and 90.246 young people. The same age groups as in the 1989/90 study were selected. The students were asked how often and how many hours a week they took part in vigorous activity outside school hours. Vigorous physical activity was defined as equivalent to at least slow jogging, which might be expected to leave the participant feeling out of breath and sweaty. The data are illustrated in figure 4.3 and 4.4 for boys and girls, respectively.

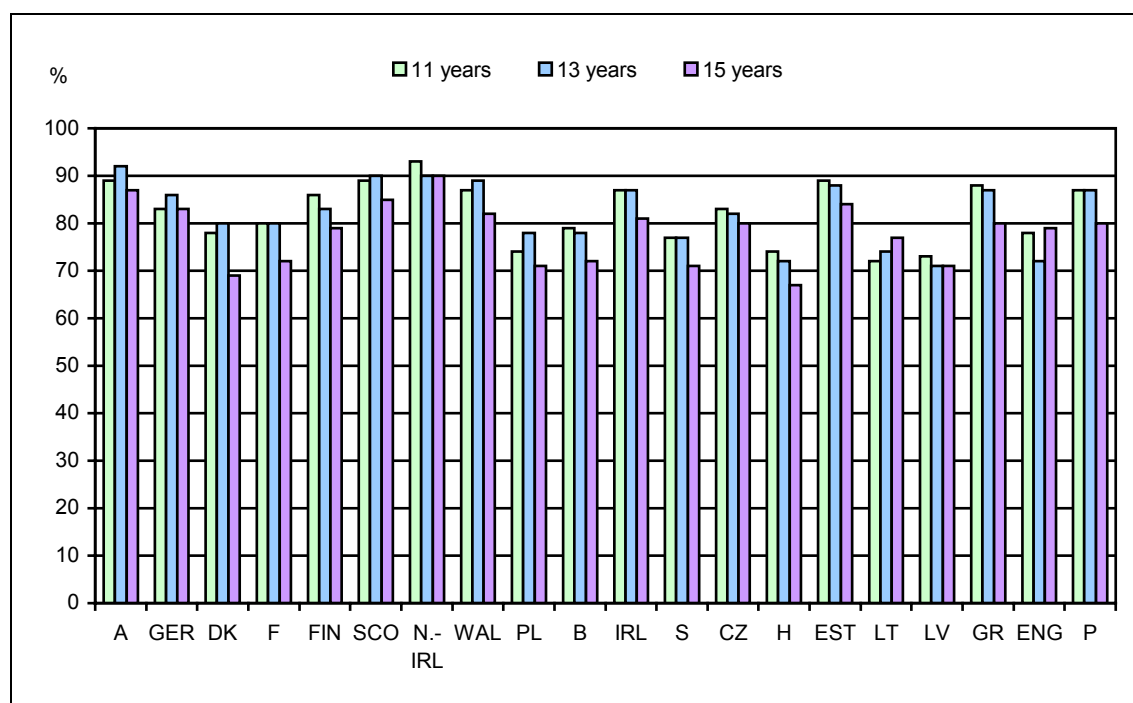


Fig. 4.3. Percentage of boys who exercise twice a week or more out of school (The figure is drawn from data reported by Currie et al., 2000).

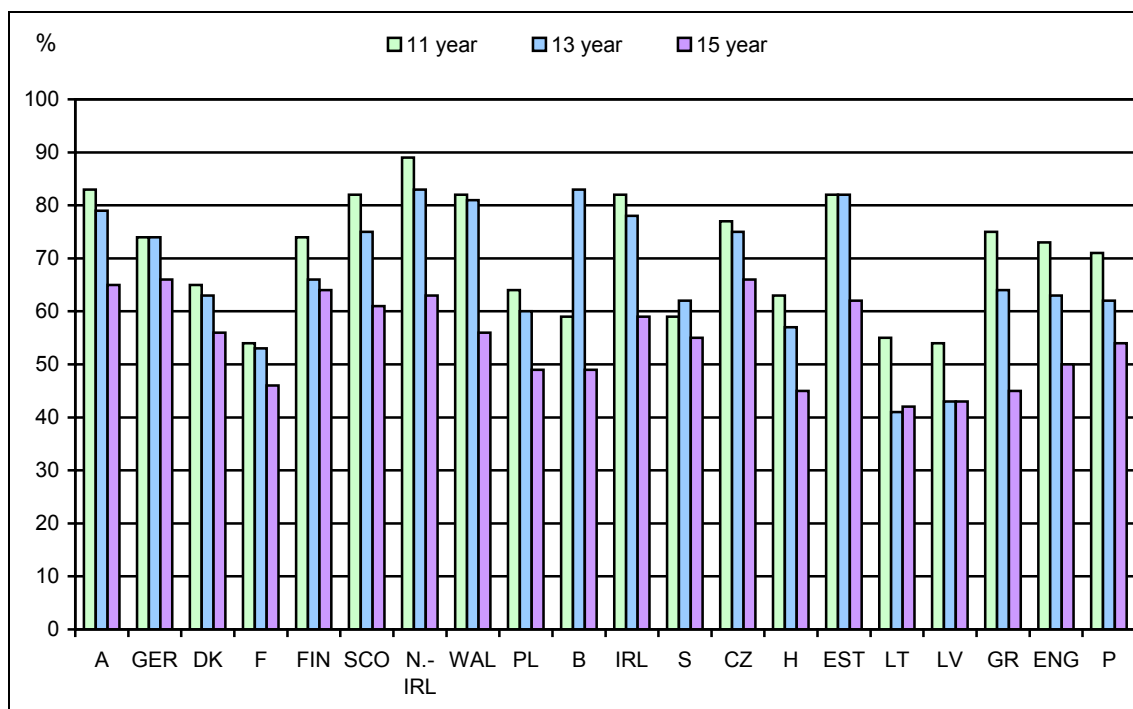


Fig. 4.4. Percentage of girls who exercise twice a week or more out of school (The figure is drawn from data reported by Currie et al., 2000).

Figure 4.3 and 4.4 show that across all countries, regular exercise is more common among boys than among girls and it declines with age, especially for girls. The gender difference is very pronounced in several countries.

Although the different surveys cannot be compared directly with one another as the definitions of physical activity vary considerably the major findings are remarkably consistent.

**Consistent with most other surveys also the latest WHO-report clearly shows across all countries and across all three age groups:**

- Boys more often than girls are physically active for at least 60 minutes a day.
- The frequency of physical activity declines with age, particularly in girls.
- The decline is more pronounced in some countries than others (cf. Currie et al., 2004).

#### **4.1.3     *Involvement in organised sport and informal sport activities***

Though for an increasing percentage of young people sport activities with an aura of action, thrill and entertainment become more and more and more attractive, millions of boys and girls all over Europe participate in programs offering traditional sports.

In many countries organised sport programs and traditional sports such as athletics, soccer, swimming, gymnastics and tennis are associated with sport clubs, whose downfall has been predicted by many since years, but whose attraction has remained unchanged.

Memberships in sport clubs vary by age and gender, and also from country to country. As the sport systems and the organisational network differ within Europe the participation rates cannot be compared across the countries.

In order to outline some trends findings from selected European countries are taken as exemplars:

The latest Swedish studies show that more than half of all young people are members in sport clubs. In the age group 10 to 13 years about two thirds or more participate in club organised sport activities. Though involvement in organised sport and club memberships vary according to environmental factors and are therefore difficult to compare the Swedish studies generally show that the participation rates have increased in the course of the last decades, especially among girls (cf. Patriksson & Stråhlman, 2004).

In Finland, too, sport has traditionally been the domain of sport clubs. At present the participation rates of the 3 to 5 graders, who are involved in club organised sporting activities at least once a week are about 50 % for boys and about 40 % for girls. About 20 % of the boys and 10 % of the girls take actively part in sport activities in clubs three times per week (figure 4.5).



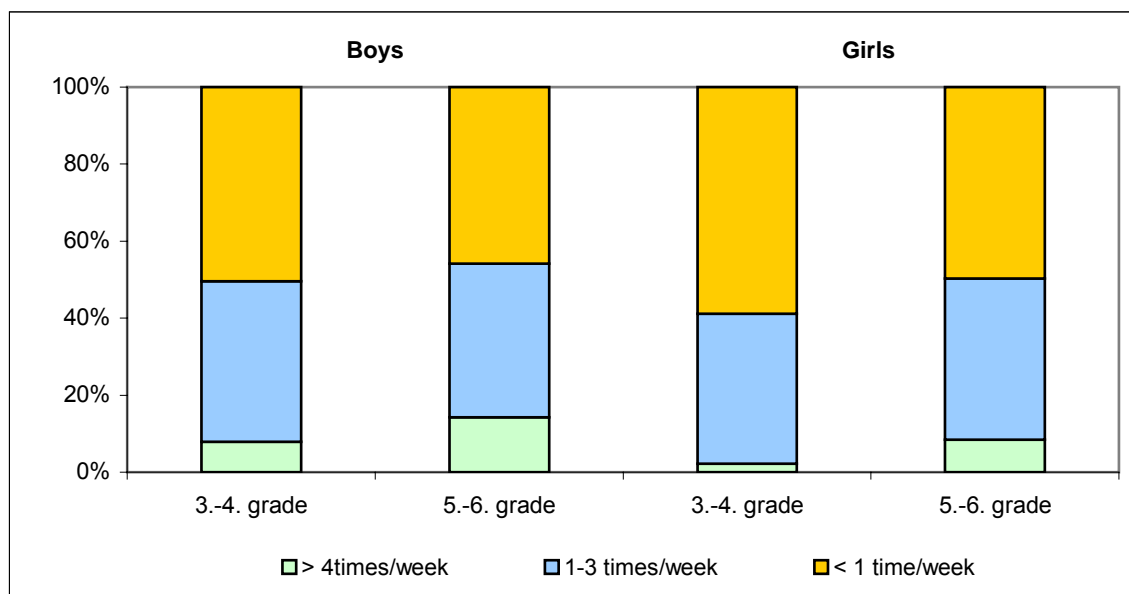


Fig. 4.5. Sport club activity among 3 to 6 graders in Finland (Laakso, Nupponen & Telama, 2004)

As in Sweden participation in sport organised by sport clubs has clearly increased during the last few decades; especially among girls the percentage is still growing (cf. Laakso et al., 2004).

In Belgium and the Netherlands, too, sports clubs provide a very popular and accessible social setting for sport and physical activities. A recent survey (n=35.442) on sport club membership among Belgian 10- to 18-year-old teenagers shows the following participation rates (Kliksons, 2004):

Current sport club membership: 58 %

Former sport club membership: 21 %

Never sport club membership: 21 %

In terms of participation in sport and exercise outside of school, in the UK there was a slight increase (from 74 % to 79 %) in the proportion of young people taking part after school on most days.

Young men were more likely to play team games out of school than young women. There was a general increase in young people taking part in extra curricular sport (from 37 % to 45 %), with football being the most popular activity. Similarly, there was an increase in the number who were members of an organised sports club independent of school (from 42 % to 46 %) – this was higher amongst young men.

As sport related youth research can look back on a long tradition in Germany studies on sport participation and involvement in club sport have been carried out regularly and can provide us with detailed data (figure 4.6).

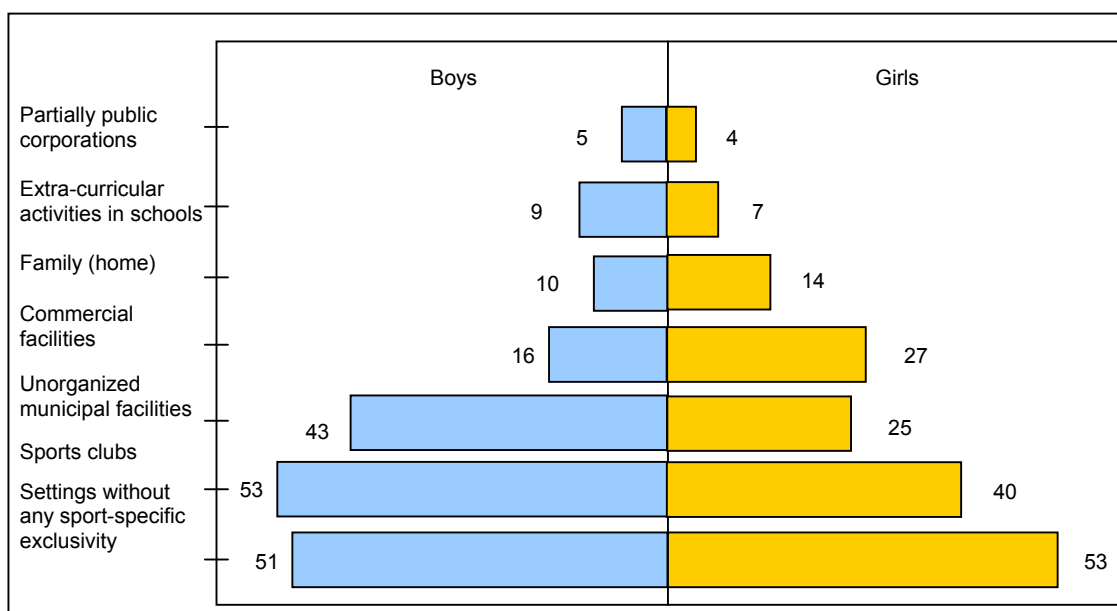


Fig. 4.6. Sport participation (at least once per week) in different settings (%) (Kurz & Tietjens, 2000, p.394, in Gogoll, Kurz & Menze-Sonneck, 2003, modified)

The findings of the most recent studies (Baur & Burrmann, 2000; Brettschneider & Kleine, 2002; Kurz, Sack & Brinkhoff, 1998) agree that

- sport clubs are the No 1 youth organisation. No other organisation attracts as many children and adolescents as sport clubs do.
- About 70 % of 10- to 12-year-olds and about 40 % of the 18-year-olds are organised in clubs, where they spend about 5 hours per week.

- Social inequalities can be observed. More boys (ca. 50 %) than girls (ca. 35 to 40 %), more children than adolescents are organised in clubs. Young people from lower social strata are distinctly underrepresented.
- On average young people's commitment in sport clubs lasts ca. 8 years.
- Only 15 % of children and youth have never had contact with sport clubs while passing through their teen years.
- Concerning time trends evidence based statements are difficult to make. Though the level of participation appears to remain stable over the last decades an increasing percentage of young people is being attracted by new informal indoor, and even more, outdoor activities.

As far as the eastern countries are concerned the data base is comparatively weak. In addition the results cannot be compared to western European countries as the educational systems and sport systems differ considerably. Whereas there are no data available for sport clubs in the Baltic states information can be provided for the Czech Republic, Slovenia and Poland.

In the Czech Republic young males favour competitive sports and regard sport clubs as their no. 1 setting, whereas girls favour informal activities outside clubs (figure 4.7).

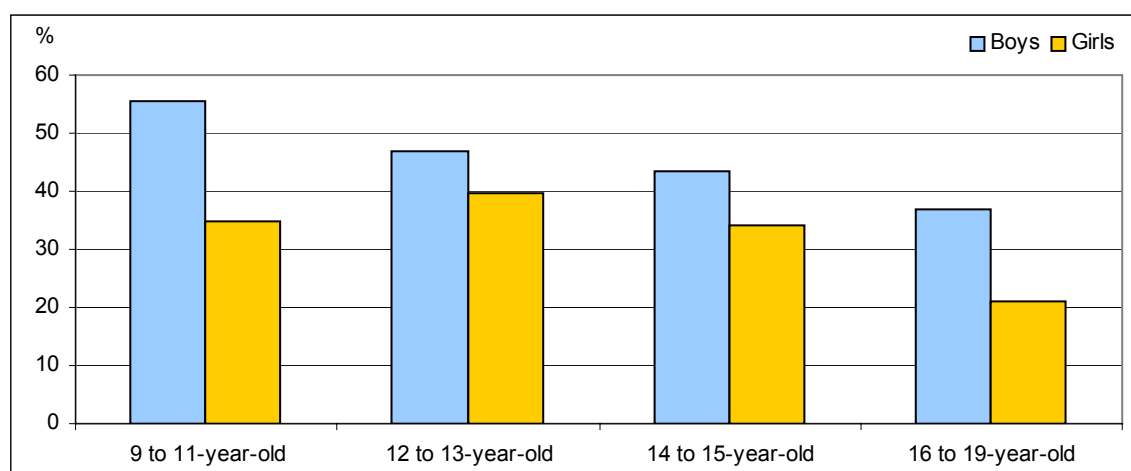


Fig. 4.7. Membership in sports clubs of Czech Youth (%) (Rychtecký, 2004)

In Slovenia, too, organised sport is young people's main attraction. Though still a male domain the trend towards a social levelling between the genders can be distinctly observed. As far as time trends are concerned the modern sport infrastructure that has been established in Slovenia in the last decade has made sport activity in clubs even more attractive to young people. In addition a growing popularity of informal sport activities for girls and boys can be identified.

In Poland extra-curricular sport activity at school as well as organised sport in clubs attract about 50 % of the 6- to 16-year-old males each. Among the females 83 % are involved in school-based activities, whereas the participation rate in sport clubs is ca. 17 % for girls. Unlike western European countries the participation rate in Poland increases with age for boys and girls. Obviously differences between rural and urban areas affect the participation rates in Polish sport clubs to a large degree. The following table 4.3 shows the differences according to age, gender and environment in the area of Greater Warsaw (cf. Charzewski, 1997).

Tab. 4.3. *Participation in organised sport among 12- to 13- and 17-year- old Polish adolescents (Charzewski, 1997)*

				Do you participate in organised sport now?		Where do you go in for sport?		
Age	Gender	Urbanization	Number	No	Yes	Extra-cur. physical education	Sports Clubs	Other
12- to 13-year- old	Boys	Large City	433	42.5 %	57.5 %	66.7 %	27.7 %	18.1 %
		Medium Town	449	53.0 %	47.0 %	57.3 %	31.3 %	19.4 %
		Small Town	484	57.6 %	42.4 %	61.0 %	52.7 %	7.3 %
		Village	501	56.9 %	43.1 %	59.7 %	33.3 %	9.7 %
		Total	1867	52.8 %	47.2 %	61.4 %	35.8 %	13.8 %
	Girls	Large City	429	57.8 %	42.2 %	55.2 %	21.5 %	33.7 %
		Medium Town	424	68.4 %	31.6 %	73.9 %	5.2 %	23.1 %
		Small Town	460	72.4 %	27.4 %	69.0 %	18.3 %	23.8 %
		Village	524	59.5 %	40.5 %	88.7 %	17.5 %	6.1 %
		Total	1837	64.5 %	35.5 %	72.6 %	16.2 %	20.7 %
17-year- old	Boys	Large City	207	50.7 %		45.1 %	56.9 %	45.1 %
		Medium Town	220	54.5 %		47.0 %	54.0 %	47.0 %
		Small Town	219	51.6 %		59.0 %	42.5 %	59.0 %
		Village	172	64.0 %		48.4 %	51.6 %	48.4 %
		Total	818	54.8 %		50.3 %	51.1 %	50.3 %
	Girls	Large City	269	66.9 %		29.2 %	71.9 %	29.2 %
		Medium Town	285	74.0 %		27.0 %	74.3 %	27.0 %
		Small Town	257	66.9 %		24.7 %	75.3 %	24.7 %
		Village	219	79.5 %		31.1 %	68.9 %	31.1 %
		Total	1030	71.6 %		27.6 %	73.0 %	27.6 %

As stated before participation rates in sport clubs are an inappropriate criterion for assessing physical activity. But being the no. 1 youth organisation in many northern, central and western EU-countries sport clubs contribute to the level of young people's physical activity in a remarkable way.

Concerning other settings in which children and adolescents participate in sports activities data are available from only a few countries. But as the studies differ in design, and data are not representative, findings cannot be compared across countries. Therefore only general information on settings other than sport clubs can be provided:

- **Whereas boys tend to favour involvement in organized sport girls are much more attracted by informal activities.**
- **Activity patterns tend to be sporadic among children, whereas sustained periods of moderate (girls) to vigorous (boys) activity are experienced by adolescents.**
- **Whereas organized sport is attractive in urban areas, the lack of an appropriate infrastructure and the attractiveness of the natural environment in rural area enhance the popularity of spontaneous play and unorganised activities.**
- **Fitness centres, dance studios and other commercial sport providers are more attractive for young females than for young males.**
- **Girls are more likely to practise physical activity while on their own and among family members.**
- **When asked for their motivation for involvement in informal activities young people make clear that they like to be the creators of their own sport participation and dislike the social control of adults.**

#### **4.1.4 Guidelines for physical activity and sport**

Although reliable data concerning secular trends of young people's activity levels are urgently needed they are hardly to be found. The reason is quite simple: Objective techniques of assessing young people's physical activity have only been in use for about 15 years. So far only one study appears to have examined secular trends in the physical activity patterns of European youth. In the late 1980s, Armstrong and his colleagues (1990) continuously monitored the heart rates of 11- to 16-year-olds over three weekdays and a weekend day. Ten years later the same research team (Welsman & Armstrong, 2000) re-visited the same communities as their original study. They used identical methodology and interpretation techniques and reported remarkable consistencies between the findings of the two studies, particularly with reference to the percentage of children achieving sustained periods of physical activity and gender and age differences in these measures. Although they found sedentary lifestyles were common they concluded that a positive outcome of the study was that a notable decline in habitual physical activity over the last 10 years had not been observed in this population. According to self-report based follow-up studies in other countries young people's physical activity is likely to have declined over the last decades. The findings are inconclusive.

In order to evaluate the physical activity level of European youth we should also consider current physical activity guidelines, the history of which is confusing. Whereas in 1988 the American College of Sports Medicine (ACSM) recommended that children and adolescents should achieve 20 to 30 minutes of vigorous exercise each day, in 1993 an International Consensus Conference on Physical Activity Guidelines for Adolescents (ICC) recommended that young people should be physically active daily in the context of play, games and sport in different settings and that they should engage in at least three sessions per week of activities that last 20 minutes and require moderate to rigorous levels of exertion. The rationale for this guideline was that regular participation in continuous activity enhances psychosocial health and increases aerobic fitness.

In 1998 in England the Health Education Authority (HEA) proposed recommendations which shifted the emphasis to a participation in physical activity of moderate intensity for one hour accumulated over a day. This recommendation was intended to take into account the modern lifestyles of young people and their current physical patterns. Though this recommendation has been influential in the conclusions drawn from recent European studies the scientific evidence has been challenged. It was argued that based on empirical evidence the current guidelines are as valid as stating that every increase in physical activity can have some beneficial health effects for young people.

Despite these difficulties it is interesting and important to come to know the percentage of young people classified as meeting the recommendation of more than 60 minutes of moderate activity a day on most days. The data are illustrated in figure 4.8 and 4.9 for boys and girls, respectively. It refers to the most recent WHO survey and provides information on the percentage of children and adolescents meeting the primary recommendation of UKHEA (Biddle, Sallis & Cavill, 1998).

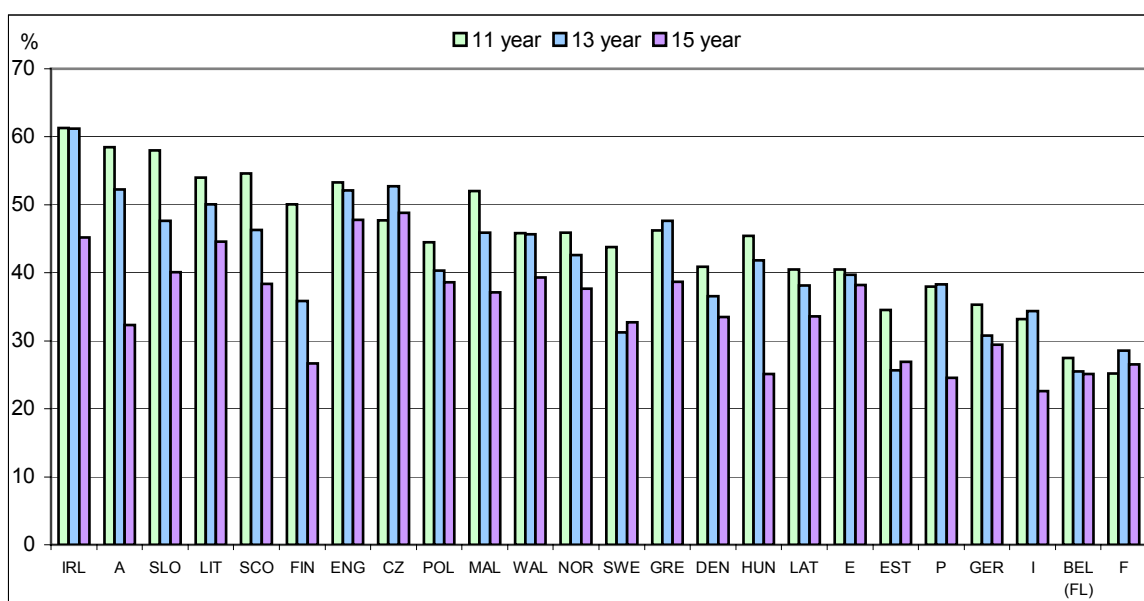


Fig. 4.8. Percentage of boys meeting the primary UKHEA guidelines on physical activity (The figure is drawn from data reported by Currie et al., 2004).

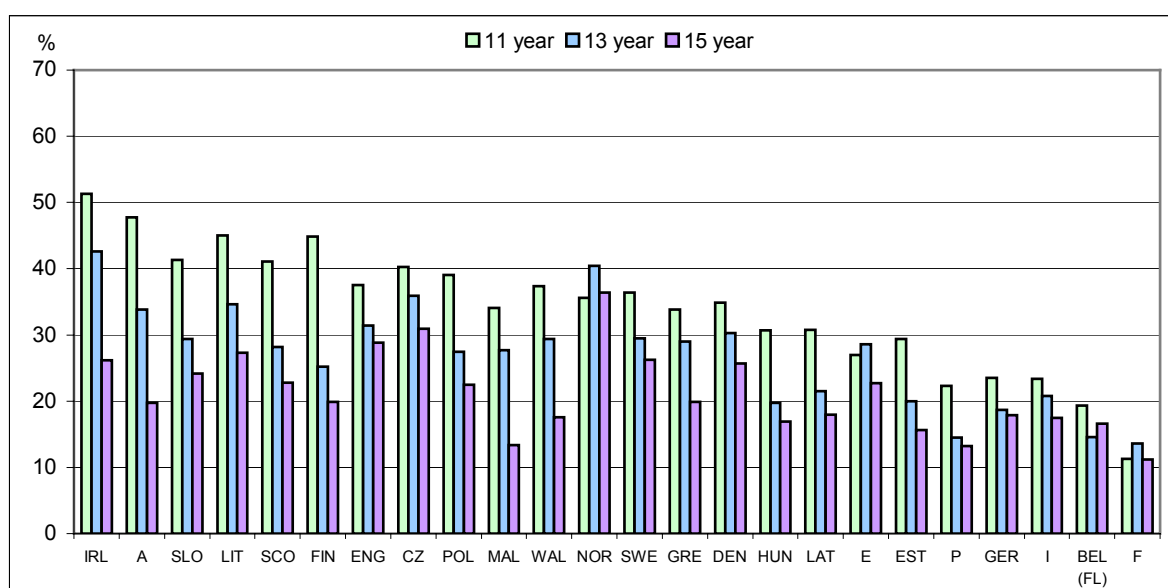


Fig. 4.9. Percentage of girls meeting the primary UKHEA guidelines on physical activity (The figure is drawn from data reported by Currie et al., 2004).

Figure 4.8 and 4.9 indicate that about two thirds of young people do not meet the current physical activity guidelines. In other words: It appears that only 30 to 40 % of young people take sufficient appropriate physical activity according to the recommendations.

There are wide variations across countries. And although cross-country comparisons must be made cautiously it is 13 out of 25 EU countries with fewer than 20 % of 15-year-old girls reported to meet the guidelines.

It should be clear that comparisons within countries are more secure and also provide detailed information. The following tables 4.4 and 4.5 show the wide variations within and between the countries.

Tab. 4.4. Finnish and Norwegian girls meeting the guidelines for physical activity (Laakso, et al., 2004)

	Finland	Norway
11-year-old	44.9 %	25.4 %
13-year-old	25.2 %	20.4 %
15-year-old	19.9 %	19.5 %



Tab. 4.5. *Finnish and Norwegian boys meeting the guidelines for physical activity (Laakso, et al., 2004)*

	Finland	Norway
11-year-old	50.1 %	34.2 %
13-year-old	35.9 %	27.0 %
15-year-old	26.7 %	26.8 %

The Norwegian figures show relatively small gender differences and a moderate decline of physical activity through the teen years, whereas in Finland the decline with age and the difference between boys and girls are remarkable.

**The findings concerning the amount and intensity of physical activity are remarkably consistent across studies and European countries.**

- **About two thirds of young Europeans do not take sufficient appropriate physical activity.**
- **The level of activity declines with age and is more pronounced in girls.**
- **There is no evidence to indicate major differences in the level of physical activity of young people living in Europe in comparison to those living in North America (Armstrong, 2004; Currie et al., 2000; 2004).**
- **Data concerning the development of physical activity over the last decades indicate a decline in physical activity.**

## 4.2 Use of media

Young people's everyday life is almost unthinkable without media. Both the amount and diversity of media are increasing. The following discussion will concentrate on young people's use of media. In addition to the television as a classical medium, newer technologies have become central elements in the life of the young generation. The access to media and entertainment electronics is

growing as more households and particularly children and adolescents themselves own electronic devices. Media use, which is an important component of young people's sedentary behaviour, increasingly determines the lifestyle of many children and adolescents.

In many European countries, television is still the most popular medium used by children and adolescents. This can be exemplified by Germany, where two recent longer-term studies that were representative for Germany – “Kinder und Medien” (KIM; Children and Media) (Feierabend & Klingler, 2003b, 2003c, 2004) and “Jugend, Informationen, (Multi-)Media” (JIM; „Adolescence, Information, (Multi-)Media“) (Feierabend & Klingler, 2002, 2003a) – have rigorously dealt with the media behaviour of children and adolescents, respectively. Both are longitudinal studies, and have been conducted by the “Medienpädagogischen Forschungsverbund Südwest” (Media-Pedagogical Research Group Southwest) annually since 1998 (MPFS 1998, 2000a, 2000b, 2000c, 2001, 2002a, 2002b, 2003a, 2003b, 2004).

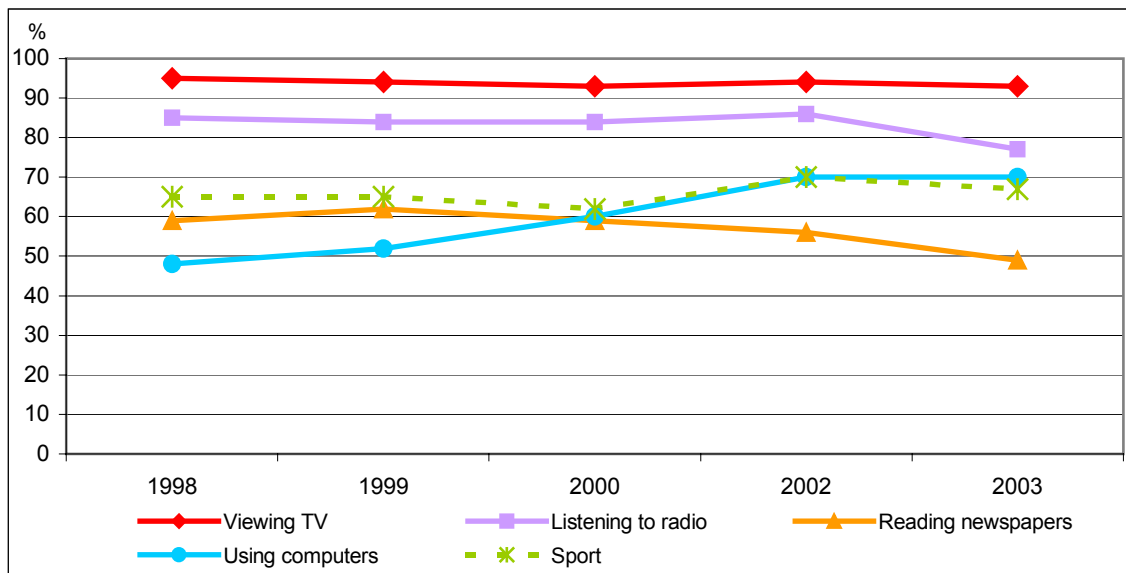


Fig. 4.10. Media use (daily or several days per week) by German adolescents, 1998-2003 (the figure is drawn from data reported by MPFS).

In Germany, about 93 % of the adolescents and 98 % of the children view television every day or several times per week (MPFS, 2002b, 2003a, 2004). Almost no changes have occurred in the amount of television viewing since the study was first conducted in 1998 (figure 4.10).

Following the television, audio media are the most used, in particular by adolescents. However, while the use of audio media has remained relatively stable between 1998 and 2002, it declined for the first time in 2003. For example, while 93 % of the adolescents listened to music (e.g., via CD) every day or several times per week in 2002, this number declined to 89 % in 2003. Similarly, the use of the radio declined from 86 % in 2002 to 77 % in 2003. Children do not use audio media as much as adolescents. However, as in the case of the adolescents, audio media are the second (CD use: 81 % in 2003) and third (Radio use: 69 % in 2003) most popular media among children. The importance of the newspaper as an information medium has also declined over the study period. While 59 % of the adolescents read the newspaper every day or several times per week in 1998, only 49 % did so in 2003.

The decline in the reading of newspapers and listening to audio media coincides with an enormous increase in the importance of computers over the last few years. In 1998, about half (48 %) of the German adolescents used a computer every day or several times per week, and 20 % had no interest at all in this rather modern medium. By 2003, the number of adolescent computer users had increased to 70 %, and the number of non-users declined to 3 %. As shown in figure 4.10, this constant increase in computer use was paralleled by a constant decrease in newspaper use, with the computer displacing the newspaper to a lower level of importance for the first time in 2000. The gap between the use of the two media is increasing (approximately 21 %). Similarly, the difference in computer and radio use is decreasing (approximately 7 % more radio use).

The German KIM and JIM studies also examined the extent to which children and adolescents play sports. As shown in figure 4.10, between 60 and 70 % of the adolescents were physically active in sports every day or several times per week between 1998 and 2003. However, whereas sport was more popular than computer use throughout most of the study period, it appears as if computer use is now replacing sport in popularity: in 2003, 67 % of the adolescents played sports and 70 % used computers every day or several times per week. Children use computers less frequently than adolescents. However, even among children, an enormous increase in computer use can be noted: in 1999, 34 % of the children used computers on a daily basis or at least several times per week; by 2002, this number had increased to 53 % (MPFS, 2000c, 2002b, 2004).

As the preceding discussion and figure 4.10 indicate, there appears to be a major shift in media use among children and adolescents: the use of computers increases at the expense of the use of traditional media such as radio, CD, and newspaper. It is possible that this shift is due to the fact that modern computers can perform a number of operations, including the playing of music and providing information (e.g., news) through the internet. In Germany, the only medium that remains entirely unaffected by these changes is television.

As already shown for German adolescents (figure 4.10), increases and decreases in the time expended on the use of different media can also be illustrated in minutes per day for Dutch adolescents (table 4.6).

Tab. 4.6. *Time expenditure on mass media and computer by Dutch adolescents (12 to 19 year) in minutes per day (1990-2000) (1990: n = 395; 1995: n = 382; 2000: n = 189) (Social and Cultural Planning Office of The Netherlands, 2000)*

		Watching TV/VCR			Radio/Audio			Computer use (off line)			Internet
		1990	1995	2000	1990	1995	2000	1990	1995	2000	2000
Total		106	115	92	15	11	11	8	18	25	6
Gender	Boys	111	119	102	17	12	9	12	27	36	4
	Girls	101	110	80	12	8	13	3	6	12	7
Age	12 to 15	114	115	98	15	12	12	7	18	27	4
	16 to 18	97	115	84	14	9	9	8	17	22	7
		Reading Books			Reading Newspapers			Reading Magazines			
		1990	1995	2000	1990	1995	2000	1990	1995	2000	
Total		14	6	6	3	2	1	6	6	4	
Gender	Boys	8	4	3	4	3	2	6	5	4	
	Girls	19	9	9	2	2	1	6	8	5	
Age	12 to 15	18	6	4	2	1	1	6	7	5	
	16 to 18	9	6	9	5	4	2	7	5	3	

Despite a decrease in use of about 11 % over a five-year time span, the television has remained the primary medium used by Dutch adolescents. However, in contrast to German adolescents, the daily time Dutch adolescents expend on computer use has already surpassed that expended on audio media. As among Germany's young generation, the sedentary activity 'reading' is only moderately popular among this generation in the Netherlands: the reading of books as well as newspapers and magazines has experienced a decrease in popularity over a 10-year time period.

In the Scandinavian countries Sweden and Denmark, the use of modern technologies (e.g., computers) has also increased during the 1990s (Socialstryrelsen, 2001; Larsen, 2003). In Denmark, this increase was paralleled by a decrease in reading activities, but not of books but rather of magazines, papers, and cartoons. In general, the development of media consumption in Scandinavian countries has been similar to that observed in Germany and the Netherlands. The only exception to this rule has been the change of television use, which, along with computer use, has increased in both Sweden and Denmark.

In contrast to these “old” EU member states, no conclusions can be made regarding temporal shifts in media use in the “new” EU member states in the eastern part of Europe. However, data exist regarding the current importance of different media, which slightly differs from that thus far described (Muszkieta, 1998; Rychtecký, 2000; [www.iuventa.sk](http://www.iuventa.sk)). The television has a top ranking, but not unrestrictedly so. Among both Czech girls as well as among Slovakian children and adolescents, listening to music has a higher rank than viewing television. Among these same groups, the use of computers currently also has a lower rank than the reading of books, newspapers, and magazines. In contrast, Czech boys and Polish adolescents have similar preferences as German and Dutch adolescents.

Just as there is no conclusive information about temporal shifts in media use in eastern European countries, so too is none available for Finland and Portugal. However, as in the previously described countries, television is clearly the most important medium in both Finland and Portugal.

### ***TV viewing***

The time European children and adolescents spend in front of the television is shown in table 4.7, which provides data on television viewing times among the young generation in some of the EU member states. The data are derived from the national reviews. Due to the lack of nationally representative studies in some countries but in order to at least indicate potential national trends, the data are partially based on local or regional studies only. Similarly, due to different operational definitions and specifications of age groups, a comparison between countries is problematic. Nonetheless, table 4.7 indicates a trend that corresponds to the geographic pattern described in the HBSC survey (table 4.8).

Tab. 4.7. *Time spent on viewing TV in different EU member states (The table is drawn from data – Laskiene, Zaborskis, Zemaitiene, Abele, & Zeringyte, 2004; Erjavec, 1999; Nadoh, 2001; Strel, Kovac & Jurak, 2004; Diniz, 2004; Doxa/Federalimentare, 2004; www.iuventa.sk; Feierabend & Klingler, 2002, 2003a, 2003b, 2003c, 2004; Social and Cultural Planning Office of the Netherlands, 2000 – reported in the different national reviews)*

Country	Age class	Time spend on viewing TV	
		Original data for children and/or adolescents	Minutes/day
Baltic States	School-aged children	22,5 hours/week or 3,2 hours/day	192 min/day
Slovenia	11- to 14-year-olds	153 min/day*	153 min/day
Portugal	Children & adolescents	Nearly $\frac{2}{3}$ > 2 hours/weekday Nearly $\frac{1}{4}$ of them > 4 hours/weekday $\frac{3}{4}$ > 2 hours/weekend-day on average a child watches 2 $\frac{1}{2}$ hours/day	150 min/day
Italy	Children	82 % ~ 90 min/day + 18 % having watched a video for 66 min/day as a whole: 2 $\frac{1}{2}$ hours/day	128 min/day
	Adolescents	88 % ~ 90 min/day + 16 % having watched a video for 14 min/day as a whole: 1 $\frac{3}{4}$ hours/day	
Slovakia	Adolescents	An average adolescent spends approx. 2 hours/day watching TV	120 min/day
Germany	3- to 13-year-olds	93 min/day	106 min/day
	14- to 19-year-olds	118 min/day	
Netherlands	12- to 15-year-olds	98 min/day	106 min/day
	16- to 18-year-olds	84 min/day	
Finland	3- to 8-year-olds	At least $\frac{1}{2}$ hour a day	
Sweden	15- to 16-year-olds	80 % > 4 hours/week $\frac{1}{3}$ of this group > 10 hours/week	

\*Measurement during summer holidays

According to the national reviews, and despite not clearly determinable numbers, Swedish and Finnish children and adolescents appear to have generally low television viewing times compared to children and adolescents from other European countries. This finding corresponds to data from the HBSC study, which exclusively dealt with “permanent viewers” , i.e. those viewing more than 4 hours of television per weekday. Based on this study, the proportion of Scandinavian “permanent viewers” is below the European average of 24.1 %. 17.9 % of the Swedish and 19.1 % of the Finnish adolescents are “permanent viewers.” In contrast, the Baltic States are among the top television consumers both in terms of overall average minutes per day (more than three hours [192 minutes] per day) and in terms of the percentage of “permanent viewers” (38.8 % view more than 4 hours of television per weekday). The position of Slovenia and the

Netherlands varies in the two different depictions (i.e. minutes per day versus permanent viewing). This inconsistency may be due to the fact that, in contrast to the other national reports, the Slovenian and Dutch ones dealt with adolescents only. In addition, the Slovenian data shown in table 4.7 were solely collected during the summer holidays.

*Tab. 4.8. Percentage of young people who watch television  $\geq 4$  hours a day on weekdays (%) (The table is drawn from HBSC data reported by Currie et al., 2000).*

	Male			Female			Total (11- to 15-year-old boys and girls)
	Age class						
	11-year-olds	13-year-olds	15-year-olds	11-year-olds	13-year-olds	15-year-olds	
Latvia	46.1	42.6	40.7	32.7	39.3	31.6	38.8
Estonia	42.1	47.0	40.8	35.7	35.8	29.2	38.4
Lithuania	35.4	40.8	39.1	31.6	31.0	25.4	33.9
Portugal	28.4	37.9	28.2	28.6	41.2	32.0	32.7
UK	31.7	31.8	30.5	28.4	33.0	30.2	30.9
Poland	34.0	35.3	33.3	24.1	26.8	22.2	29.3
Czech R.	26.1	31.3	30.5	23.1	22.0	23.5	26.1
Netherlands	22.2	29.3	29.6	16.8	22.8	21.6	23.7
Denmark	22.7	27.7	26.2	15.8	26.4	21.2	23.3
Italy	19.8	22.3	21.3	17.0	28.8	27.3	22.8
Spain	19.8	23.5	25.0	15.8	23.7	26.3	22.4
Belgium	22.8	26.7	21.9	15.6	17.6	19.9	20.8
Germany	15.5	25.3	27.0	11.7	20.7	22.6	20.5
Hungary	22.2	23.2	20.6	17.9	22.9	15.6	20.4
Ireland	20.0	24.9	19.6	16.0	17.7	18.2	19.4
France	18.3	23.2	22.7	13.3	17.5	19.9	19.2
Finland	17.4	19.7	18.6	21.7	19.2	17.8	19.1
Slovenia	23.1	23.3	16.4	16.8	20.0	13.9	18.9
Greece	19.5	24.6	21.0	12.0	18.0	13.4	18.1
Malta	18.9	22.4	17.0	12.1	24.6	12.1	17.9
Sweden	13.2	18.6	24.3	11.7	19.5	19.8	17.9
Austria	12.9	17.5	20.1	8.6	15.0	16.0	15.0
EU average	24.2	28.1	26.1	19.4	24.7	21.8	24.1

In general, it can be concluded that television consumption is greater on weekend days than on school days. While nearly one quarter (24.1 %) of the European adolescents views more than four hours of television per weekday, nearly twice as many (43.3 %) do so on the weekend days. This means that on an ordinary Saturday or Sunday, nearly half of the European adolescents spend a significant amount of their time on the couch in front of the television. However, the data vary widely. In Italy, “only” 27.8 % of the adolescents view more than



four hours of television per weekend day; in Latvia, much more than one half of the adolescents (63.7 %) do so.

With respect to gender, it can be concluded that boys view more television than girls. Only in a few isolated cases is this ratio more balanced or do girls have a slightly higher television consumption than boys, e.g., in Portugal, Italy, and Finland.

Data regarding the influence of age on television viewing are inconsistent - no uniform conclusion can be made about European children and adolescents. Within the group of adolescents, television viewing times differ between the younger and older adolescents: in general, television consumption is greatest at age 13, and slightly decreases with increasing age. Results concerning differences between children and adolescents are ambiguous: in Italy, children view more television than adolescents; in Germany, the reverse is true.

While the findings regarding age effects are rather inconsistent, there are clear differences depending on socio-economic stratum. Children from lower social strata view more television than children from higher social strata.

Another strong factor influencing the extent of TV viewing among children and adolescents is the viewing behaviour of the parents themselves. Accordingly, the parental behaviour appears to have an important role model effect on the behaviour of their children.

Furthermore, children with low educational levels view TV, videotapes, and DVDs more often than children with higher academic aspirations.

Apart from the quantity of television viewing, the quality of the programs viewed is of significance. Only one study (Feierabend & Klingler, 2004) addresses this issue. About 55 % of the programs viewed by 3- to 13-year-old German children falls into the category fiction (e.g., primarily cartoons but also comedies such as sitcoms, suspense films, and daily soap operas), which basically does not stimulate cognitive abilities at all. Children expend another 14 % of their television viewing time on entertainment shows (e.g., game shows, talk shows), and

an equal amount of time is spent viewing educational programs. The remaining time is expended on viewing sport shows (3 %), and a relatively high percentage on viewing commercials (12 %).

### ***Computer use***

To date, no robust, nationally and EU-wide representative data exist regarding the use of computers among children and adolescents. There are only a few isolated datasets that were compiled on the basis of local or regional studies. However, due to dissimilar definitions of use times in the different studies, the datasets are not comparable. The only currently available source that allows for a European comparison is the HBSC study, according to which 13.3 % of the European adolescents use a computer for more than three hours per weekday.

While no accurate conclusions can be drawn about geographical patterns of computer usage among the young generation across Europe, it can be concluded that – with the exception of Portugal (14.9 %) and Malta (14.4 %) – adolescents from southern European countries do not use the computer as much as adolescents from other European regions. While on average only between 7.7 % and 10 % of the 11- to 15-year-olds in France (7.7 %), Italy (7.8 %), Greece (9.2 %), and Spain (10.0 %) use the computer for more than three hours per weekday, 19.5 % of the 11- to 15-year-olds do so in the United Kingdom – the top-ranking country in terms of adolescent computer usage. The new EU members in the Baltic states and eastern Europe do not indicate regionally consistent computer usage times. Adolescents from Estonia (17.8 %), Latvia (14.8 %), and Lithuania (11.9 %) as well as Poland (16.4 %), the Czech Republic (14.3 %), Hungary (12.2 %), and Slovenia (10.5 %) are dispersed over the “light-, medium-, and heavy users”. Similarly, no consistent conclusions can be made about northern Europe (Sweden: 17.5 %; Denmark: 16.3 %, Finland: 10.6 %) and the more centrally located states (Netherlands: 16.2 %; Belgium: 12.8 %; Austria: 12.2 %; Germany: 12.1 %). For the weekend, too, no clear geographical patterns can be identified: on average, 13.3 % of the European adolescents use the computer on weekdays; on weekend days, this average proportion increases to 23.8 %. The heaviest computer users at weekends are Pol-

ish adolescents, of whom more than one third (33.4 %) use the computer for more than three hours per weekend day. The lightest computer users are adolescents from a southern European country, Italy (11.7 %).

Just as gender differences can be observed with respect to television use, so too can they with regards to computer use: again, boys pursue this sedentary activity more so than girls. Among the Dutch adolescence, this difference is as follows: in 2000, boys used the computer offline three times as much as girls, but girls used the computer online (i.e., internet) twice as much as boys (Social and Cultural Planning Office of The Netherlands, 2000). As in other European countries, differences can also be observed in Germany. However, Germany is currently undergoing a levelling process, which suggests that computer use will no longer be a predominantly male activity in the future.

With respect to age-specific differences, it can be asserted that reading as well as the use of electronic and computer games declines with increasing age. In contrast, the use of the computer for online activities and creative work increases with increasing age.

Furthermore, children whose parents are more educated spend more time in front of a computer, and children with worse academic results play electronic and computer games more often.

Just as there are few data concerning the quality of television use, so too are there few statistics about the quality of computer use. A German study reports that the daily computer use among German children and adolescents varies with gender: girls use the computer much more constructively than boys (Feierabend & Klingler, 2003a). When female adolescents spend time in front of the computer, they typically use the internet, primarily to write emails and to search for information. About 53 % of the female adolescents do so daily or several times per week. When the girls are not on the internet, they particularly use the computer to write texts (44 %) or work on school assignments (36 %). One out of 5 girls spends time playing computer games. The situation is quite

different among German boys. About 66 % of the male adolescents pursue their favourite activity on the computer – playing games – every day or several times per week. The second favourite activity among the boys is being online: the use of the internet has risen significantly among both boys and girls between 1998 (boys: 10 %; girls: 3 %) and 2002 (boys: 59 %; girls: 53 %). The third favourite activity among the German boys is listening to music via the computer (52 %). Only 37 % or 29 % of the boys consider using the computer for writing texts or doing homework, respectively.

Unfortunately, the HBSC survey does not provide information about how many of the “permanent television viewers” ( $\geq 4$  hrs/day) are also intensive computer users ( $\geq 3$  hrs/day). If one attempts to correlate the HBSC data on computer use and television consumption, one arrives at two potential conclusions. Both represent extremes between which reality is most likely going to lie:

- Alternative 1: Extreme television viewers and intensive computer users are two different groups of persons. In this case, 37.4 % of the European adolescents spend at least three hours per weekday in front of a screen.
- Alternative 2: The intensive computer users are also extreme television viewers. In this case, 13.3 % of the European adolescents spend at least seven hours per weekday in front of a screen.

The countries associated with the greatest proportions in both scenarios are Estonia (Alternative 1: 56.2 %; Alternative 2: 17.8 %) and the United Kingdom (Alternative 1: 50.4 %; Alternative 2: 19.5 %). The country with the lowest proportions is France (Alternative 1: 26.9 %; Alternative 2: 7.7 %).

### ***Ownership of electronic media***

The ownership of (media-related) electronic devices can be considered as one cause for increased media consumption. In Slovenia, access to new media is easy (table 4.9) (Erjavec, 1999; Nadoh, 2001; Strel et al., 2004). With the exception of mobile phones, access depends on the education of the children's parents. Boys have more frequent access to electronic games than girls and

play them more frequently. Access to computers and mobile phones differs according to age. Older children make use of the computer more frequently than younger children. Internet and mobile phones are more easily accessible in urban areas than in rural areas. Television remains the most popular medium – every Slovenian household has a television set. Boys are more likely to have a television in their room than girls. Age does not appear to determine television viewing time.

Tab. 4.9. *Percentage of 11- to 14-year-old children in Slovenia with access to new media and to TV (Erjavec, 1999; Nadoh, 2001; Strel et al., 2004)*

Medium	Access (%)	
	At home	In own room
TV	98	28
Electronic or computer games	80	40
Mobile phone – for talking and sending sms	82	82
Internet	47	20
Computer	81	40

- Media are part of young people's sedentary behaviour that increasingly determines the lifestyles of many children and adolescents.
- Overall, boys view more television and use the computer more frequently than girls.
- Findings with respect to the influence of age on television consumption are inconsistent. In contrast, there are definite trends with respect to the influence of age on computer use. The use of electronic and computer games declines with increasing age. In contrast, internet use and computer use for creative work increase with increasing age.
- Children from lower social strata view more television and use the computer less than children from higher social strata.
- The greatest amount in TV viewing occurs in the Baltic States, where school-aged children view on average of 3.2 hours of television per day.

- The smallest amount of computer use occurs among adolescents from southern European countries.

### **TV**

- In most European countries, television is still the most popular medium among children and adolescents.
- No conclusions can be drawn with respect to temporal shifts in television use. For example, in Germany, almost no changes have occurred during the last years; in the Netherlands, television use decreased by 11% within a five-year time period; in Sweden and Denmark, young people increased their television viewing time.
- The proportion of adolescent “permanent viewers” – viewers that spend more than four hours per weekday in front of a television – in the EU is approximately 24.1%.
- On weekend days, this proportion increases to 43.3%. This means: on an ordinary Saturday or Sunday, nearly half of the European adolescents spend a significant portion of their time on the couch in front of the television.

### **Computer**

- In contrast to time trend analyses of television use, the use of computers unambiguously increases at the expense of the use of traditional media such as radio, CD, and newspaper in most parts of Europe.
- On average, 13.3% of the European adolescents expend more than three hours per weekday on computer use. On the weekend days, this proportion increases to 23.8%.

### 4.3 Eating habits and nutritional behaviour among European children and adolescents

#### *Daily meals*

The nutritional behaviour of children and adolescents is determined by their daily meals, among other things. Breakfast is customarily the first meal of the day. However, many people, including children and adolescents as well as adults, omit this meal. Frequent explanations for this omission are, for example, lack of time, lack of appetite, or habit (Narring et al., 1994). Nonetheless, abandoning this important meal can lead to midmorning fatigue and interfere with cognition and learning (Pollitt & Mathews, 1998). The following list provides data on eating patterns in some European countries, in which at least local or regional studies were conducted on the topic. These data are also compared with data from the HBSC study on 11- to 15-year-old children.

#### *Italy*

- In Italy, 92 % of the children eat an “adequate” breakfast, that is, a breakfast that includes at least milk and/or some food. However, this proportion steadily decreases with increasing age: 84 % at age 11 to 14, 79 % at 15 to 17, 78 % at 18 to 19 (and only about 69 % of working adults) (Istat, 2000, 2001, 2002a,b,c,d, 2003).
- The HBSC survey confirms this trend. However, the reported proportion of those eating breakfast is much lower (62.4 %).

#### *Spain*

- The proportion of Spanish children and adolescents who eat breakfast is similarly high. About 91.2 % of the boys and 92.2 % of the girls usually eat breakfast. Males aged 18 and older and 14- to 17-year-old girls have the lowest breakfast consumption rates (Aranceta, Serra-Majem, Ribas & Perez-Rodrigo, 2001).
- The reference value of the HBSC-survey is 72.2 %.

### *Northern Ireland*

- Most children from Northern Ireland do not leave home without having breakfast either. About 86 % of them eat breakfast on all five weekdays. However, 6 % do not have breakfast at all on weekdays. Breakfast consumption differs between girls (80 %) and boys (91 %) as well as between children (92 %) and adolescents (79 %). Boys and children eat breakfast more often than girls and adolescents (HPA, 2001).
- The HBSC survey does not provide any data for Northern Ireland.

### *Switzerland*

- According to different local and regional studies in Switzerland, between 65 % and 90 % of children and adolescents eat breakfast regularly. This proportion appears to decrease with increasing age: with increasing age, fewer adolescents eat breakfast and instead distribute their meals among the main meals of the day. In fact, breakfast most frequently falls a victim to a changed eating behaviour (Cavadini 1999; Baerlocher, Laimbacher & ter Velde, 1998; Narring et al., 1994; Hoffmann-Müller & Amstad, 1994).
- The reference value of the HBSC-survey is 53.5 %.

### *Sweden*

- In Sweden, two thirds of the girls and three quarters of the boys eat breakfast on 4 or 5 days during the school week (The National Institute of Public Health, 2004).
- The HBSC value for 11- to 15-year-olds is 73.4 %.

### *Slovakia*

- The last exemplary country is Slovakia, where 65 % of the children eat a complete breakfast regularly. Out of the group of adolescents, 79 % of the



boys and 50 % of the girls eat a complete breakfast regularly (www.iuventa.sk).

- No HBSC data are available for Slovakia.

In total, the values of the HBSC survey seem to be lower than in the local and regional reports. However, when comparing the different reports and all breakfast data of the HBSC survey, one trend regarding geographical patterns seems to be the same: children and adolescents in the new EU member states in the eastern part of Europe have the lowest consumption rates of breakfast compared to other European regions. With the exception of Poland (69.0 %), all East European countries (Hungary 53.4 %; Czech Republic 51.8 %; Slovenia 39.2 %) measured in the HBSC survey had breakfast rates below the EU average of 65.2 %.

Furthermore, young people in the Scandinavian countries eat breakfast more often than the EU average (Sweden 73.4 %; Denmark 72.8 %; Norway 69.3 %; Finland 67.5 %). Other regional breakfast rates vary. Portugal (80.8 %), Spain (72.2 %), and France (71.4 %) have higher breakfast rates than the EU average. The other southern European countries do not reach the average value (Italy 62.4 %; Malta 52.2 %; Greece 45.6 %). Rates for young people in central Europe vary greatly (Netherlands 77.8 %; Belgium 69.9 %; Germany 67.0 %; Austria 57.4 %; Switzerland 53.5 %). Finally, the rates of the Baltic States vary as well. Whereas Latvia (74.8 %) and Estonia (73.7 %) have a great number of 11- to 15-year-olds who eat breakfast every school day, only 62.0 % of those from Lithuania eat before leaving their home in the morning.

Regarding gender and age differences, similar conclusions can be drawn from all local and regional studies as well as the HBSC survey. With increasing age, the breakfast rates decrease and girls have lower rates than boys of the same age.

Those who do not eat breakfast frequently compensate by consuming snacks, which are high in fat and sugar contents and have low fibre contents. For instance, a Swiss survey came to the conclusion that snacks represented 23.0 % and 20.4 % of the total daily energy intake in adolescent girls and boys, respectively. In comparison, this survey found that energy provided by breakfast accounted for only 19 % of the daily energy intake, lunch 31 %, and dinner 29 % (Decarli et al., 2000). A comparison of northern and southern European countries showed that snacking and eating light meals were very common in the Scandinavian countries, contributing 25 to 35 % of the daily energy intake (Samuelson, 2000), whereas snacking and eating out in fast food restaurants seemed to be less frequent in the southern part of Europe than in most Nordic countries (Cruz, 2000).

Data on rates of eating lunch are difficult to find and those available are hard to compare. Whether young people have lunch on school days and which kind of food they eat depends on the school system and whether one or both parents with one or both have jobs.

### ***Food consumption***

Subsequent to the description of eating patterns, the following shows to which proportion different foods are consumed. Just as there are no national studies on eating patterns, there are no data available on the proportions of different foods consumed for all countries in Europe. Consequently, this review can only provide examples, one of which is a regional study from Germany, which describes trends that largely correspond with the few findings from other European countries. The German DONALD study (Kersting, Alexy, Kroke & Lentze, 2004) illustrates the nutritional behaviour of children and adolescents by means of the “optimised mixed diet” prevention concept, which was developed by the Forschungsinstitut für Kinderernährung (FKE; Research Institute of Child Nutrition Dortmund), and allows for a comparison of the actual value versus the nominal value.

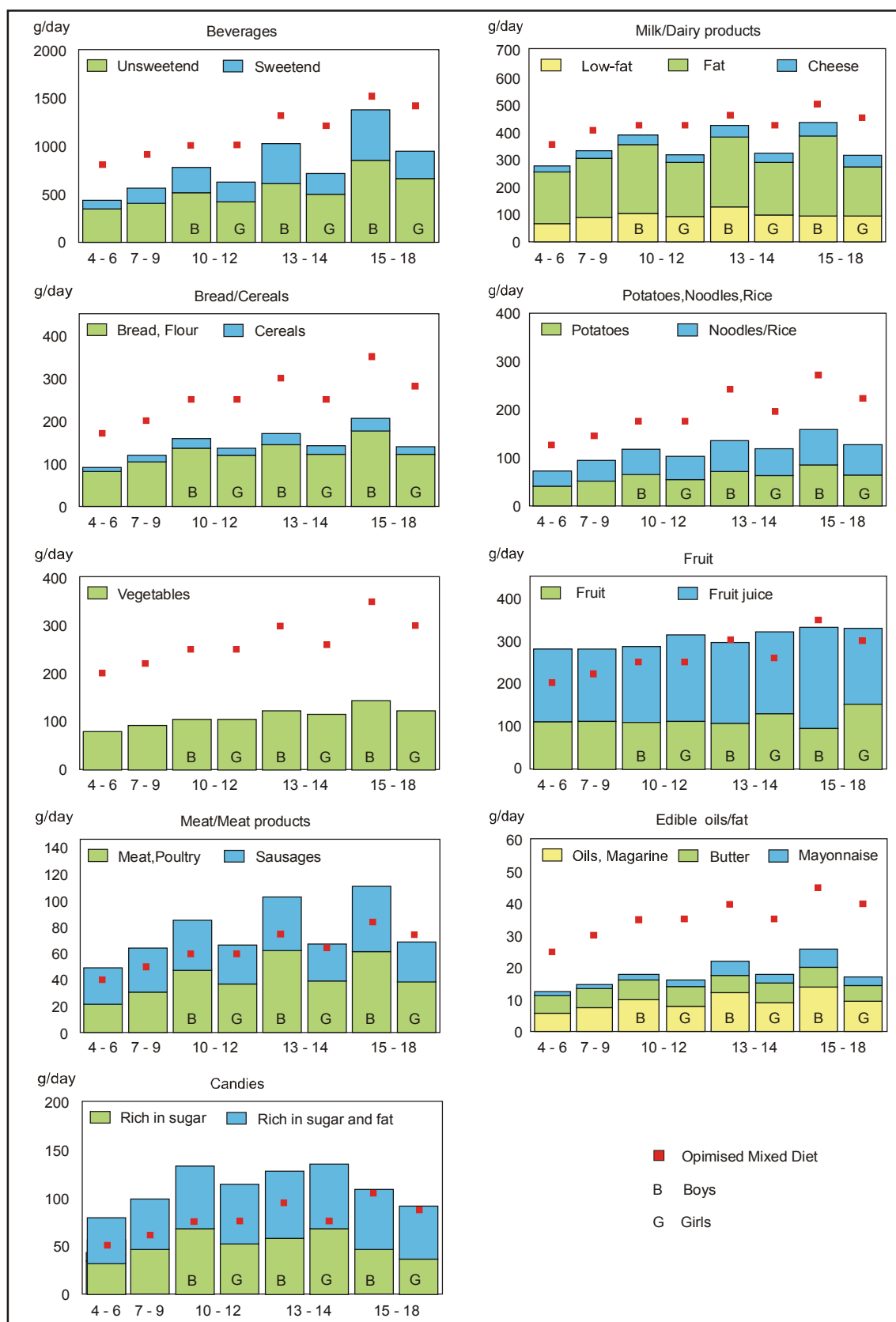


Fig. 4.11. Consumption of different foods among the 500 4- to 18-year-old German test persons of the DONALD-study, 1998-2002 (Kersting et al., 2004, modified)

On one hand, children and adolescents drink much less than recommended by an optimised mixed diet (figure 4.11). The same applies to the consumption of bread, cereal products, potatoes, noodles, and rice, which are the primary providers of energy, as well as vegetables, the consumption of which is 50 % below the recommended daily value. On the other hand, the consumption of meat and sausages – especially among male adolescents – as well as the consumption of sweets that are high in sugar and fat content is far above the recommendations. The consumption of dairy products and fruit largely corresponds to the recommended amounts; however, the recommended daily fruit value is primarily reached by consuming fruit juices. The rates for eating “real” fruits are similarly low as the rates for eating vegetables. In total, the consumption of different foods by children and adolescents examined in the German DONALD study is in part very different from the recommended nutrition – this is valid more obviously for boys than for girls.

Identical or similar findings were obtained for Spain, Ireland, Poland, and Sweden (Vazquez et al., 1996; Hurson & Corish, 1997; Oblacinska & Jodkowska, 2000; Gronowska-Senger, Drywien & Hamulka, 1998; Casado, Casado & Diaz, 1999; The National Institute of Public Health, 2004). In these countries, vegetables were seldom eaten. In Spain and Poland, the intake of carbohydrates in the form of cereals, potatoes, dark bread, and grain was determined to be too low, while the intake of meats, sausages, sweets, and sugar was found to be too high. The Irish and Swedish surveys did not discuss these foods at all. The intake of fruits was appropriate in Spain but too low in Poland and Sweden. Furthermore, the consumption of milk and dairy products was at a low level among Polish children and adolescents.

### ***Energy intake***

The description of the different foods consumed already indicated trends regarding the proportion to which the energy intake is composed of different energy-providing nutrients. Just as the intake of meats and sausages was too

high, the proportion of fats consumed was determined to be too high or rather at the limit in all of the countries mentioned in table 4.10.

*Tab. 4.10. Proportional distribution of energy-providing nutrients in the daily energy intake (Vazquez et al., 1996; Moreno, Sarria, Lazaro & Bueno, 2000; Roma-Giannikou, Admidis, Gianniou, Nikolara & Matsaniotis, 1997; Augustyniak & Brzozowska, 2002; www.iuventa.sk; Decarli et al., 2000; Ruxton, Kirk, Belton & Holmes, 1996; Hurson & Corish, 1997; Kersting, Sichert-Hellert, Alexy, Manz & Schoch, 1998; Kersting et al., 2004; Sepp, Lennernas, Pettersson & Abrahamsson, 2001; Soltysova & Bellisle, 1994; Cruz, 2000)*

Country	Age Group	Year of Publication	Fat (% of energy intake)	Carbohydrates (% of energy intake)	Proteins (% of energy intake)
Spain					
(Madrid)	6- to 14-year-olds	1996	43%	40 %	17 %
(different regions)	6- to 10-year-olds	2000	38 to 48 % (SFA* 16 to 18 %; MUFA* 19 to 20 %)		
	11- to 14-year-olds	2000	41 to 51 % (SFA* 12 to 18 %; MUFA* 20 %)		
Greece	2- to 14-year-olds	1997	41 % (SFA* approx. 15 %; MUFA* 17 %; PUFA* 6 %)	44 %	15 %
Poland	11- to 15-year-olds	1990-2000	37 to 42 %	47 to 52 %	10 to 11%
Slovakia	Children & adolescents	2003	36 to 39.7 %		
Switzerland	11- to 16-year-olds	2000	37 %	49 %	14 %
United Kingdom	7- to 8-year-olds	1996	37 %	49 %	
Ireland	12- to 18-year-olds	1997	35.4 to 37 %	46.8 to 50 %	13.7 to 14.5 %
Germany	1- to 18-year-olds	1985	39 %	49 %	13 %
		1998	38 % (SFA* 17 %; MUFA* 16 %; PUFA* 5 %)		
		2000	36 %		
Sweden	3- to 5-year-olds	2001	36 %	52 %	14 %
Czech Republic	10-year-olds	1994	35 %	54 %	11 %
Italy	Adolescents	2000	~ 35 %		
Portugal	Adolescents	2000	31 to 33 %		

\*SFA= saturated fatty acids; MUFA= monounsaturated fatty acids; PUFA= polyunsaturated fatty acids

For example, in Slovakia, the proportion of fats in the daily energy intake (36 % to 39.7 %) is clearly far above the recommended proportion of 27 %. Slovakian children exceed the recommended volume of lipids by 35 % to 37 %, and Slovakian adolescents by 25 % to 44 %. In Germany, the proportion of fats in the daily energy intake by children and adolescents has decreased from 39 % to 36

% during a 15-year time span. However, this proportion is still greater than that recommended in Germany (30 % to 35 %).

A comparison between the total energy intake and the recommended energy intake is possible for six EU countries. In Spain, the eating survey revealed a diet consisting of 'normal' calorie intakes (Casado et al., 1999). Children in the United Kingdom have energy intakes close to the estimated average requirements for both boys and girls (Ruxton et al., 1996). In the remaining four countries, children and adolescents have an energy intake that is lower than the country-specific recommendations. Whereas no precise data are available for Germany, in Slovakia the average energy intake of 90 % to 93 % is below the recommended nutrition amount. Only the group of Slovakian adolescent boys slightly exceeds the recommended amount (107 %) ([www.iuventa.sk](http://www.iuventa.sk)). In Switzerland (Decarli et al., 2000), the average intake of nutrients is reported to be 10 % below the Swiss standard. Likewise, the daily energy intake in the Czech Republic is 10 % below the Czech recommendations (Soltysova & Bellisle, 1994).

Regarding temporal shifts in energy intake, information could only be found for two countries. In the German DONALD study, the amount of the entire energy input remained unchanged over the 15-year study period. The share of fats in the energy input decreased from 39 % to 36 % between 1985 and 2000. However, this decline was offset by an increased input of carbohydrates. Almost no changes occurred in the total daily energy intake. In contrast to the nearly unchanged values in Germany, a decrease of energy input was observed in the Netherlands during the 10-year time period between 1987/88 and 1997/98. While 13- to 18-year-old Dutch boys took in 12,139 kilojoules per day in 1987/88, this amount decreased over the next ten years by 8.2 % to 11,137 kilojoules per day. Among the girls, the daily energy input decreased by 6.4 %, from 9,515 kilojoules per day in 1987/88 to 8,903 kilojoules per day in 1997/98 (Health Council of the Netherlands, 2002).

## **Diet**

In Europe, many adolescents are dissatisfied with their body. This dissatisfaction increases with increasing age. Girls often consider themselves as being overweight.

For example, in Italy, 18.4 % of the girls and 10.9 % of the boys report being on a weight-loss diet. Depending on sample, sample size, age group sampled, and date of measurement, between 12.8 % and 37 % of Swiss girls and between 4.2 % and 17.4 % of Swiss boys report being on a diet (table 4.11).

Furthermore, 57 % of Swiss girls and 14 % of Swiss boys have already tried to reduce their bodyweight and more than half of the girls (53 % to 62 %) and 13.5 % to 23 % of the boys would like to reduce their bodyweight. It can be assumed that the current ideal of a slim and attractive body is the instigator for these efforts.

*Tab. 4.11. Weight reduction among Swiss children and adolescents*

Reference	Region	Dates of survey	Age Group/ sample size	Results
Delagrande	Switzerland	1998	12- to 15-year-olds/ 7196	36.6 % of the girls and 17.4 % of the boys to are of the opinion to reduce their bodyweight; 12.8 % of the girls and 4.2 % of the boys are dieting
Zimmermann et al.	Switzerland	1999	6- to 12-year-olds/ 595	30 % of the girls and 17.4 % of the boys are dieting, 57 % of the girls and 14% of the boys have tried to reduce their bodyweight
Baerlocher et al.	St-Gallen	1994-97	13- to 21-year-olds/ 1862	57 % of the girls/ 14 % of the boys have tried to reduce their bodyweight
Narring et al.	German Swiss	1992/93	15- to 20-year-olds/ 1318	62 % of the girls and 23 % of the boys like to reduce their bodyweight; 37 % of the girls and 9 % the boys are dieting
Hoffmann-Müller & Amstad	Basel	1993	14- to 19-year-olds/ 356	53 % of the girls and 13.5 % of the boys like to reduce their bodyweight; 14.8 % of the girls and 3.6 % of the boys are dieting

### ***Determinants of nutritional behaviour***

The nutritional habits of children and adolescents vary, particularly among the different social strata. The percentage of an optimised diet is significantly higher in upper strata than in lower strata.

Furthermore, children of parents with a low educational level consume food of lower quality than children of parents with a higher educational level.

In addition, young people from homes with a migration background also show more irregular and unhealthier eating habits than those from homes in which the parents are indigenous to the country in which their children are living.

Differences in nutrition also exist among children of normal- and overweight parents and among children with different degrees of physical activity: the nutrition pattern deteriorates with increasing weight of the parents and an increasing degree of inactivity.

Gender-related conclusions must be drawn in a differentiated way: whereas girls skip breakfast more often and have more irregular eating habits than boys, girls eat foods of higher quality than boys.

In addition to these psychological and social correlates, commercials influence the nutritional behaviour of children and adolescents. Commercials stimulate the buying behaviour of young people as well as that of their parents, ultimately influencing their nutritional behaviour (Glogauer, 1999; Baacke, Sander, Vollbrecht & Kammer, 1999). Not infrequently commercials advertise food products in a misleading way. Commercials or product labels often provide information that is based on assertions rather than reliable results of scientific tests. Sometimes the amount of information is confusing. Furthermore, products that are high in sugar and fat content are more frequently advertised than healthy nutrition.



### Daily meals

- Breakfast is an important meal that many children and adolescents omit. More than one third (34.8%) of young Europeans do not eat breakfast on every school day.
- Adolescents in eastern European countries have the lowest breakfast consumption rates.
- Those who do not eat breakfast frequently compensate by consuming snacks, which are high in fat and sugar contents and have low fibre contents.

### Food consumption

- European children and adolescents seldom eat vegetables.
- The intake of cereals, potatoes, noodles, rice, dark bread, and grain also seems to be too low.
- The intake of meat, sausages, sweets and sugar was found to be too high.
- The intake of fruits differs from country to country. While the intake is appropriate among Spanish children and adolescents, it is inappropriate among Polish and Swedish young people.

### Energy intake

- Compared to recommended values, the share of fats in the daily energy intake is too high among European children and adolescents.
- Overall, the total daily energy intake is *lower* than the recommended values.
- Based on data from Germany and the Netherlands, energy intake has not increased over the last years. In Germany, energy intake among children and adolescents has remained unchanged over a 15-year time span; in the Netherlands, a decrease occurred over a 10-year time period.

### **Determinants of nutritional behaviour**

- The percentage of young people with an optimised diet is significantly higher in upper social strata than in lower strata.
- Children of parents with a lower educational level consume food of lower quality than children of parents with a higher educational level.
- Young people from homes with a migration background also show more irregular and unhealthier eating habits than those from homes in which the parents are indigenous to the country in which their children are living.
- Girls skip breakfast more often, have more irregular eating habits, and report being on a diet more often than boys. However, girls eat food of higher quality than boys.
- Breakfast rates decrease with increasing age.
- Commercials influence the buying behaviour, and, consequently, the nutritional behaviour of children and adolescents.

## **4.4 Risk behaviour – substance use**

Substance use among children and adolescents is usually considered as risk behaviour. The notion of risk has changed its semantic context over the last years. Risk tends to have a negative connotation. Today there is a tendency of trying to shield young people from the experience of risk taking. Being at risk puts emphasis on the vulnerability of young people. Such a concept ignores that experimenting and trying new things is part of coping with developmental tasks in the context of growing-up.

Risk behaviour in adolescence implies that it is the aim for the individual to gain maximum subjective utility. The incorporation of the subjective perspective leads to the following concept of risk (Brandl-Bredenbeck, 2004).

Risk behaviour as a deviant pattern in the adult world	Risk behaviour as a form of coping in the adolescent world
Risk behaviour as being destructive with regards to the individual's development	Risk behaviour as being productive with regard to the individual's development
Development as risk behaviour (as un-successful coping)	Risk behaviour as part of development (as successful coping)

From a health perspective it can not be ignored that the desire to take risks can lead to destructive outcomes. This is the case, if risk is trivialised (Furedi, 2000). Not infrequently trivialising risk can be observed in the context of substance use. Today drinking and smoking are elements of the lifestyles of many young people. As they increase the risk of health damage prevalence and trends concerning consumption must be observed.

### ***Smoking***

In relation to smoking data assessed illustrate wide variations across countries. The only pattern that can be identified is that the smoking rates increase substantially with age, found in all countries and for both genders.

In most countries the boys' rates for daily smoking exceed those for girls. Nevertheless there are countries where the differences are small or even the opposite is true. Regardless of country and ethnic group the factors influencing the frequency of smoking are more or less the same: Young people want to be up to date; they want to imitate fashionable manners and values. Peer and parent modelling plays an important role for some of them. Some youngsters smoke because they believe that smoking reduces stress and nervous tension.

Ethnicity, the cultural and geographical context might influence the frequency of smoking and the percentage of non-smokers or heavy smokers. Therefore data should be interpreted with caution.

Figure 4.12 shows the prevalence rates of daily smoking in the EU-countries.

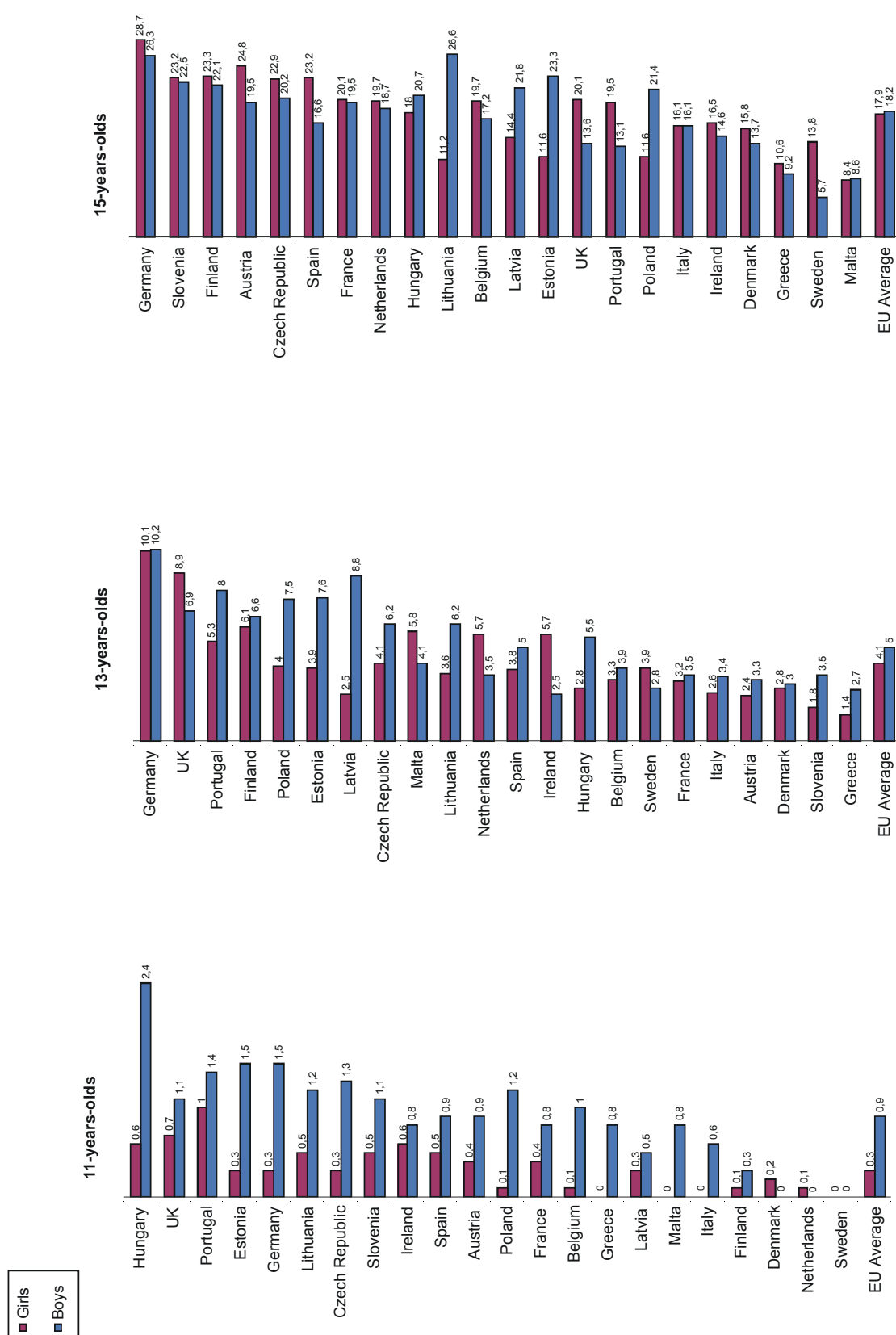


Fig. 4.12. Young people who smoke daily (%) (The figure is drawn from data reported by Currie et al., 2004)

A comparison of the prevalence rates of daily smoking for young people in the Czech Republic, Hungary, Poland and Slovenia shows that Czech and Slovenian 15-year-old girls smoke more than boys of the same age (though the differences are small); in Hungary it is the boys who smoke more, (though the girls' rates are almost as high); in Poland boys smoke twice as much as girls.

Tab. 4.12. *Young people who smoke every day(%) (HBSC, 2002)*

Age	11-year-old		13-year-old		15-year-old	
Country/Gender	Boys	Girls	Boys	Girls	Boys	Girls
Czech Republic	1.3	0.3	6.2	4.1	20.2	22.9
Hungary	2.4	0.6	5.5	2.8	20.7	18
Poland	1.2	0.1	7.5	4.0	21.4	11.6
Slovenia	1.1	0.5	3.5	1.8	22.5	23.2

As it might be particularly interesting to have a closer look at the prevalence rates concerning smoking in one of the new members of the EU. Therefore Lithuania is taken as an exemplar.

Research in Lithuania provides evidence that boys and girls start smoking at an early age: one in five boys starts smoking under the age of 8; one in five girls starts smoking under the age of 11. HBSC data from 2002 state that more than three quarters of 11- to 15-year-old boys and 85 % of the girls are non-smokers, with no difference between young people from rural or urban areas.

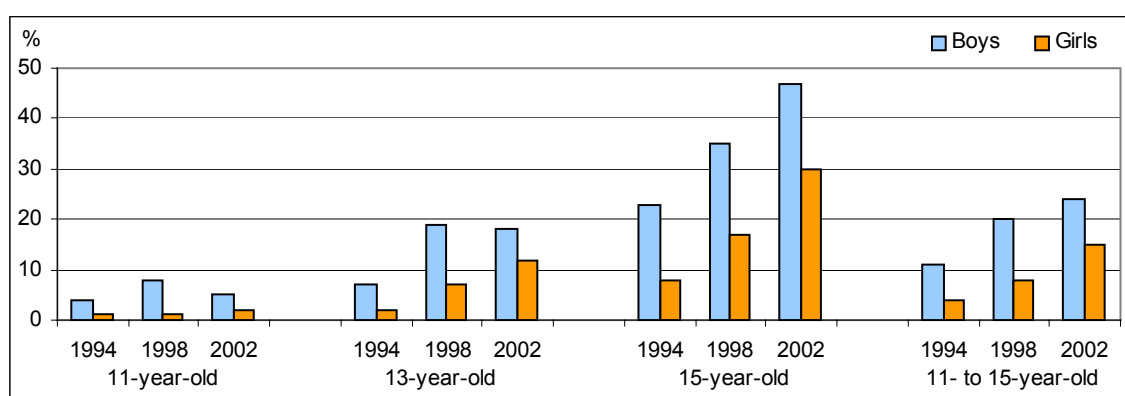


Fig. 4.13. *Lithuanian school-aged children and their smoking habits according to sex and age. Total sum % of the choices "smoking daily", "smoking at least once a week but not daily" or "smoking" less frequently than once a week" (Currie et al., 2004)*

Fig. 4.13 shows the dramatic increase of the prevalence rates between 1994 and 2002. Today it is about one fourth of the boys and 15 % of the girls who smoke. That means that the percentage of the adolescents who smoke has more than doubled over the past decades, in particular in the older age-groups with the difference between the boys and girls who smoke constantly being reduced. In addition the habit of smoking develops at an earlier age compared with previous years (Zaborskis, 1996; 1997).

Data from Portugal show some differences when compared to Lithuanian data. In a study carried out with teenagers from the municipality of Lisbon (Diniz, 2004) there was evidence of teenage smoking increase, particularly in girls. In 16-year-olds, almost 33 % of the boys and 25 % of the girls report smoking or having smoked.

Results from 12- to 16-year-old students (n=572) from high and junior high schools at Coimbra (Mendes et al., 1999) showed that almost 80 % were non-smokers.

In another study also carried out in the Centre Region (Coimbra), Silva (2001) found, in a sample of 798 15- to 18-years olds, that 12 % of the boys and 11 % of the girls smoked regularly. He also found that boys started smoking at 14 and girls at 15 years of age.

Data from the Portuguese sample in the HBSC 2002-study give evidence that there is a predominance of males both in experimentation and usual consumption of tobacco. Boys report more often than girls to smoke regularly and to have had the first cigarette at young age.

Whereas an increase of smoking is reported in most EU-countries, we find a different situation in Sweden. Smoking was much more common during the early 1970 than is today. The decrease of smoking took part as a consequence of information campaigns. Young people changed their attitude towards smoking. Sweden has today the lowest proportion of smokers in Europe. In Sweden

girls smoke more than boys. In 2002 there were 11 % daily smokers among 15-year-old girls and 6 % among boys (Hvitfeldt, 2003).

Marklund (1998) showed that there were fewer smokers among physically active adolescents compared to physically inactive individuals. In Berggrens (1998) study a statistically significant inverse correlation between high physical activity smoking was reported. Rasmussen, Eriksson, Bokedal and Schäfer-Elinder (2004) confirmed this association between smoking and physical activity. Non-smokers were physically more active than smokers.

This finding is being confirmed by studies in other European countries as well. A recent Swiss meta-analysis of studies carried out in order to look for relationships between physical activity and substance use gives unequivocal evidence: Swiss, German, French, Italian and British studies agree on an inverse relationship between sport participation and smoking (Brettschneider & Kleine, 2002; Dai, Marti, Rickenbach & Gutzwiler, 1990; Ferrante et al., 1993; Ferron, Narring, Cauderay & Michaud, 1999; Locher, 2001; Michaud, Narring, Cauderay & Cavadini, 1999; Sasco, Merrill, Benhaim-Luzon, G  rard & Freyer, 2003; Schmid, 2002; Sygusch, 2001; R  thlisberger & Calmonte, 1995).

Some of the more differentiated studies show that young athletes who are involved in team sports such as soccer, handball and basketball are more prone to smoking than other young sportspeople (Brettschneider & Kleine, 2002; Locher, 2001; Sygusch, 2001).

### ***Drinking***

Alcohol consumption seems to be a common practice in youth. The consumption rates vary considerably from country to country. Unlike the gender patterning in smoking that is split geographically and culturally drinking is much more widespread among boys than girls. In almost all countries the abstinence rates of young girls exceed those of boys. But the girls' consumption rates have constantly increased in many European countries over the last 10 years.

In figure 4.14 substantial differences between countries can be identified.

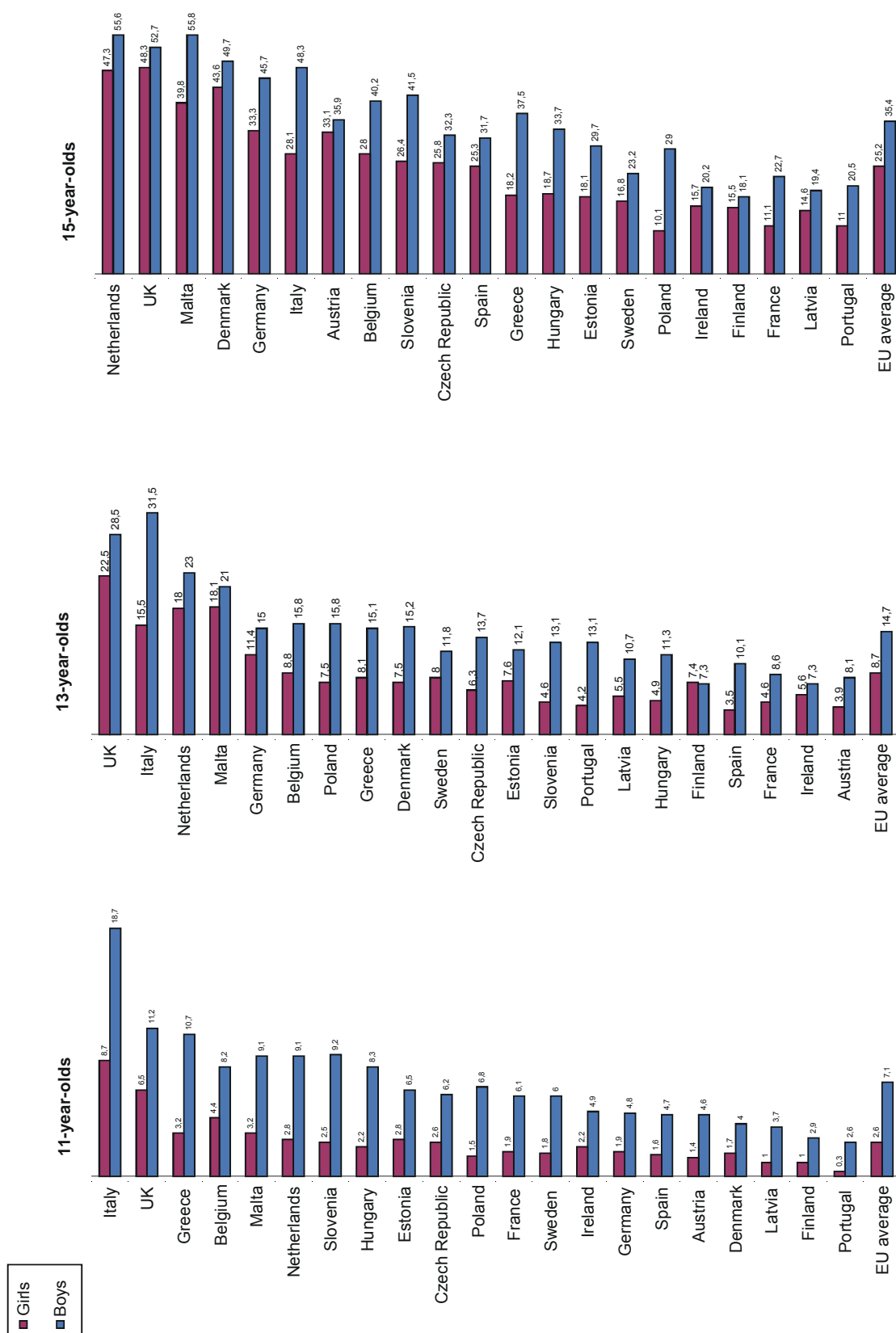


Fig. 4.14. Young people who drink any alcoholic drink weekly (%) (The figure is drawn from data reported by Currie et al., 2004)



In addition to these data results from European studies indicate Denmark, Finland and the UK the countries whose 15- to 16-year-olds most often report being drunk at least 10 times in the last 12 months. Young people in Italy and France are at the bottom of these “charts”. This appears strange insofar as the percentages strongly increase with age with values of 37 % for wine / beer and 21 % for spirits (Eurispes, 2003). And also in the latest HBSC study Italy ranks in the top positions with repeat to alcohol consumption, as summarized in table 4.13.

Tab. 4.13. *Alcohol use in Italian young people vs others in the HBSC study (% values) (Currie et al., 2004)*

*a. Young people who drink any alcoholic beverage weekly*

	11-year-old		13-year-old		15-year-old	
	Males	Females	Males	Females	Males	Females
Italy	18.7	8.5	31.5	15.5	48.3	28.1
HBSC average	7.3	3.0	15.3	9.2	34.3	23.9

*b. Young people who drink wine weekly*

	11-year-old		13-year-old		15-year-old	
	Males	Females	Males	Females	Males	Females
Italy	12.5	4.1	18.6	8.0	24.0	12.9
HBSC average	2.7	0.9	4.7	2.6	8.3	6.2

*c. Young people who drink spirits weekly*

	11-years-old		13-years-old		15-years-old	
	Males	Females	Males	Females	Males	Females
Italy	2.3	0.7	7.3	3.2	23.3	13.9
HBSC average	1.6	0.6	4.5	3.1	12.4	9.7

These findings might be hampered by culturally bound attitudes. Young Italians indicate they do not want to get drunk. They perceive themselves of not being drunk, despite having consumed large quantities. And also young people in France are likely not to admit drunkenness, because the youth in wine-producing countries annoys excessive beer drinking (Fleurance, 2000).

The Danish government is worried about the beer and spirit drinking habits of Danish youth. They are among those who start at an very early age and consume more alcohol than other young people in Europe (Mattiessen et al., 2003).

Concerning drinking habits among Danish girls and boys (MULD-rapport) three out of four respondents reported to have been drinking alcohol at least on one occasion the week before they responded to the questionnaire. 21 % of the boys and 13 % of the girls had been drinking more than the given limit for adults' alcohol intake. 13 % of the boys and 6 % of the girls reported to have been drunk at least once within the last four weeks. 17 % of the boys and 10 % of the girls reported to have had problems as a consequence of alcohol abuse. According to Jensen the alcohol abuse is increasing in young people from higher social status. The HBSC-study (2004) confirms the problematic alcohol situation among Danish youth (especially among the 15-year-olds). People with a sportive background sometimes argue that sport can be seen as a kind of protective resource against consumption of alcohol. This assumption would be testified if negative relationships between sporting practice and the amount of alcohol consumption could be shown. The results of the above-mentioned Swiss meta-analysis indicate that no clear pattern concerning the relationship between sport participation and alcohol consumption can be identified. Some studies find positive associations between sport involvement and drinking, others find negative relationships, particularly in girls, and there are studies which do not find any relationship at all.

French studies drawing a distinction between occasional consumption (once a month) and regular consumption (ten or more times a month) show the following results:

No link exists between playing sport and occasional consumption. However, high alcohol consumption is associated with sport activities outside club environment. And the same trend is found when regular drunkenness is assessed. The rise in drunkenness as a function of time spent doing sports is lower outside a club setting than in clubs (Choquet, 2000).

In Sweden where the government operates a restrictive policy on alcohol availability by 5 % since Swedish accession to the EU and the abolishment of the governmental monopoly on alcohol in 1995. Recent and representative data

from a national survey indicate no difference between young active sport club members and non-members. Interestingly enough the amount and intensity of sport activity does not make any systematic difference (Romelsjö, 2000). Cross-sectional studies (Locher, 2001; Sygusch, 2001) and one longitudinal study (Brettschneider & Kleine, 2002) carried out in Germany confirm these findings. Neither persistent positive nor negative effects of activity in sport clubs could be identified. The consumption rates of non-members were very similar to those of members in the course of adolescence, regardless of gender (figure 4.15).

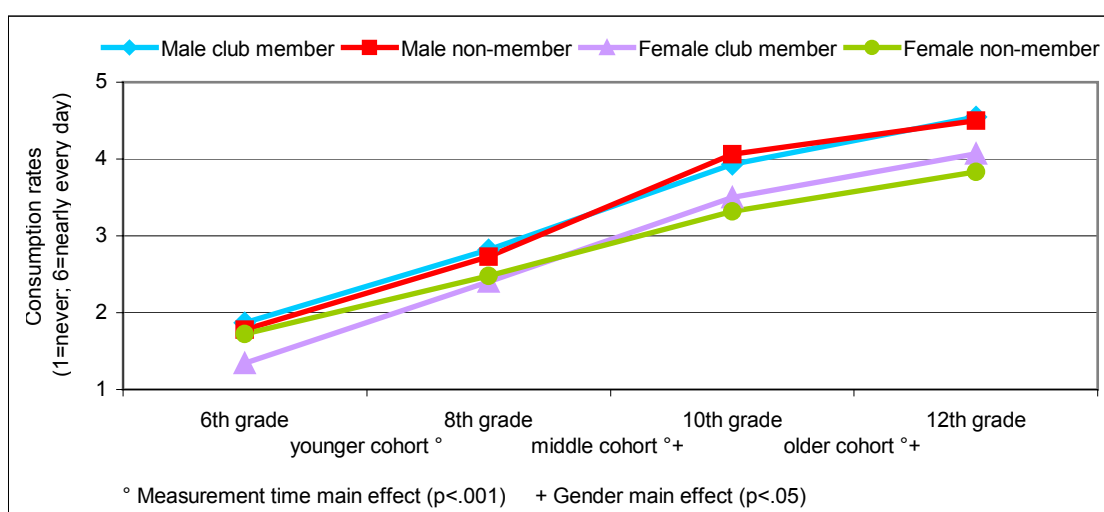


Fig. 4.15. Development of beer consumption rates in all three cohorts (Brettschneider & Kleine, 2002)

In Lithuania we find gender influencing the relationship between sport participation and alcohol consumption. The more physically active the girls are the less alcohol abuse is noted. The opposite relationship was found in boys. Physically active males consumed alcohol more frequently and in bigger quantities than those physically inactive (Zaborskis, 1996; Zaborskis, 1997). Sport has been incorporated into many programs, especially those established to tackle risk behavior such as drinking and smoking. So far positive effects have not yet been reported.

#### **European literature shows**

- **a great variation concerning smoking and drinking rates;**
- **boys consuming more alcohol than girls;**
- **a decreasing difference between the genders concerning smoking;**
- **an increase of alcohol and nicotine consumption with age;**
- **neither positive nor negative relationships between sport participation and drinking;**
- **negative association between sporting activity and smoking.**

#### **4.5 Relationships of the different lifestyle-elements**

Following the detailed description of the different lifestyle components, this section briefly outlines potential relationships among the various lifestyle components. Contrary to general expectations, both international as well as national studies conclude that there is no relationship between media use and physical activity (Biddle, Gorely, Marshall, Murdey & Cameron, 2004; Burrmann, 2003; Flammer, Alsaker & Noack, 1999; Marshall, Biddle, Sallis, McKenzie & Conway, 2002; Schmidt 2003; Van den Bulck, 2000). The hypothesis that viewing TV or pursuing other sedentary activities displace physical activity (AKA “displacement hypothesis”) may thus have to be rejected (Biddle et al., 2004). Rather, time seems to be available for media use *and* physical activity, and children and adolescents are either very active or inactive in both areas.

However, there is a relationship between nutritional behaviour and media consumption on one hand, and between nutritional behaviour and physical activity on the other hand (Lowry, Wechsler, Galuska, Fulton & Kann, 2002). In general, children and adolescents consume snacks and drinks while viewing television (cf. Dennison, Tara, Erb & Jenkins., 2002; Gortmaker et al., 1996, 1999; Suter, Betton & Vetter., 2002). In this context, the TV-associated consumption of foods is higher among heavy viewers than among lighter viewers (Van den Bulck,

2000). With respect to physical activity, the consumption of foods unfavourable from a nutrient perspective, is statistically significantly positively correlated with physical inactivity and sedentariness. In contrast, the consumption of foods favourable from a nutrient perspective is positively correlated with sport and physical activity in a statistically significant way, and negatively correlated with a sedentary lifestyle (Raithel, 2002).

With reference to overweight and obesity the following relationships between the constituents of young people's lifestyles should be considered.

- **Media use and physical activity:**
  - **There is no relationship between the variables.**
- **Nutrition and physical activity:**
  - **Sporting activity and healthy nutrition are positively correlated.**
  - **Sedentary behaviour and unhealthy nutrition are positively correlated.**
  - **Sedentary behaviour and healthy nutrition are negatively correlated.**
- **Media consumption and nutrition**
  - **Media consumption and high food consumption are positively correlated.**

## 5 Modern lifestyles and their consequences

### 5.1 Physical fitness as motor fitness and cardiorespiratory fitness

In some European countries the term physical fitness may refer to motor fitness as well as to cardiorespiratory fitness. Though they are often used interchangeably they are not synonymous. The terms require clarification:

- Motor fitness is a complex set of general and skill related motor abilities which include components such as body composition, agility, muscle endurance and strength, balance, flexibility and coordination.
- Cardiorespiratory, aerobic or health-related fitness exclude motor skill related abilities and focus on components of endurance capacity.

Awareness about the status of physical fitness among young people in Europe has been early expressed by the Council of Europe's Committee for the Development of Sport (CDDS) which started already in the late 1970s. After five research seminars of experts (1978-1986) including a variety of pre-test studies (approximately 50,000 students in 15 EU countries) a final version of a commonly agreed European test battery with a manual was published (cf. CDDS 1988). The EUROFIT test includes 10 items which include body composition, motor and cardiorespiratory fitness: body-mass-index, flamingo balance, plate tapping, standing broad jump, hand grip, sit ups, bent arm hang, sit & reach, 10 x 5m shuttle-run, endurance shuttle-run (Léger & Lambert, 1982).

From 1988 up to the mid 1990s many national adoptions of the EUROFIT test with reference norms were published in western, northern and southern European countries (e.g. in Belgium, Catalonia, Denmark, Italy, the Netherlands, Greece) and Turkey. After the velvet revolutions in eastern Europe in addition national versions of the EUROFIT manuals have been published, e.g. in Lithuania, Poland, Slovakia and Hungary. Since 1992 national EUROFIT studies have

been conducted in almost every old and new EU member country (cf. Kemper & van Mechelen, 1996; Kull & Jurimäe, 1994; Jurimäe & Volbekiene, 1998).

With regard to the EUROFIT studies on young people comparable data should be expected for Europe because of the same test items and sets of reference norms. However, this is not the case. The studies vary regarding the selected items of the test battery, the sample sizes, age groups, validation procedures, and reference systems.

The greatest barrier to achieve comparability between the different national EUROFIT studies has to be seen in the availability of test instruments and equipment which varies from country to country and from school to school. In addition, some test items such as “sit ups” can be and have been conducted and measured in different ways. Therefore it is not surprising that doubts have been expressed concerning the practicability and economy of the EUROFIT test.

Comparisons of EUROFIT test results on a European level should be made in a cautious way (cf. Pohl 1995). So far neither comparative cross-sectional studies nor longitudinal studies including more than two EU-countries using the complete EUROFIT test battery have been published. An EU-wide survey on the physical fitness of young people is overdue.

### **5.1.1     *Physical fitness as motor ability***

Motor ability is an important indicator of an individual's physical fitness. It is strongly related to the ability to learn technical skills and to perform physical activity and to participate in the various sport activities.

As the terms for the constituents and components of physical fitness are not the same in all EU-countries and the sample sizes, the contextual conditions and the methods to assess motor ability vary from study to study it is difficult, if not impossible, to compare results even – as mentioned before – in the context of EUROFIT studies. Yet, with respect to changes in lifestyles it is interesting to

have a look at the development of physical fitness and motor abilities in young people over the past decades.

Reference is made to a meta-analysis of about 50 studies from selected western European countries including about 100.000 girls and boys aged 6 – 17 and to some studies from eastern European countries that enable us to assess young people's motor development during childhood and adolescence as well as time trends in young people between 7 and 14 years of age between 1983 and 2003 (cf. Bös 2003).

In order to assess young people's motor ability and its components we refer to a 6-Minutes run and a 12-Minutes run for measuring general endurance, a 20-metre run for speed, a bend forward for flexibility, sit-ups for abdominal muscle strength and a standing broad jump for explosive power.

The following results have been found:

Concerning the development of the central motor abilities during childhood and adolescence the pattern appears to be almost identical in the various countries and studies that have been analysed. Studies from across Europe are taken as exemplars to demonstrate the development of motor ability during childhood and adolescence.

Analyses of the development of explosive power – measured by standing broad jump – show almost similar lines of development between boys and girls up to ca. 12 years. After this turning point strong gender differences can be observed (figure 5.1).



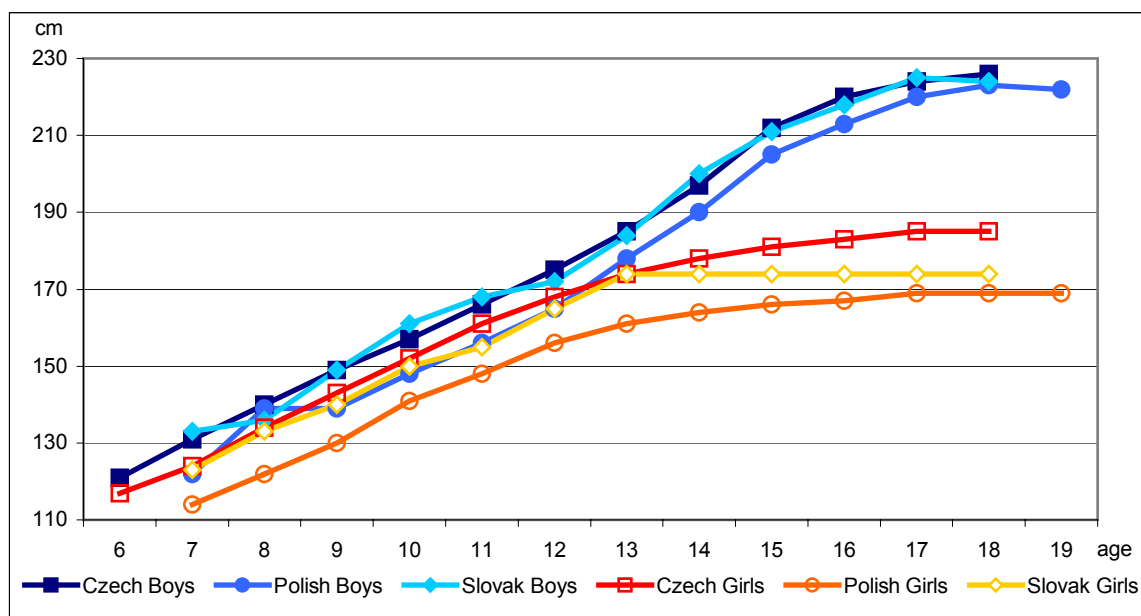


Fig. 5.1. Standing broad jump in Czech, Polish and Slovak youth (cm); (Czech (1991), N=10 000; Polish (2003), N=73 890; Slovak (1993), N=5 000; samples of both genders) (Rychtecký, 2004)

In this example only minor differences occurred between the three eastern European countries Czech Republic, Slovakia and Poland. In another non-representative comparative study between 12- and 15-year-old boys and girls from Belgium, Czech Republic, Estonia, Finland, Germany and Hungary only minor north-east differences were found (table 5.1).

Tab. 5.1. Standing broad jump/mean (cm) (Telama, Naul, Nupponen, Rychtecký & Vuolle, 2002)

		Belgium	Czech R.	Estonia	Finland	Germany	Hungary
12-year-old	Boys	171,3	179,4	174,4	177,5	167,6	175,6
	Girls	154,8	162,2	162,4	162,2	159,4	167,5
15-year-old	Boys	203,5	206,0	204,7	202,3	204,1	198,6
	Girls	161,9	178,7	174,9	170,7	167,7	176,1

The figure concerning the development of speed – measured by a 50 m run – shows the well-known pattern: From about 15 years on there is also a stagnation or a decline in the girls' performance, whereas the performance of the boys increases in an almost linear way with age (figure 5.2).

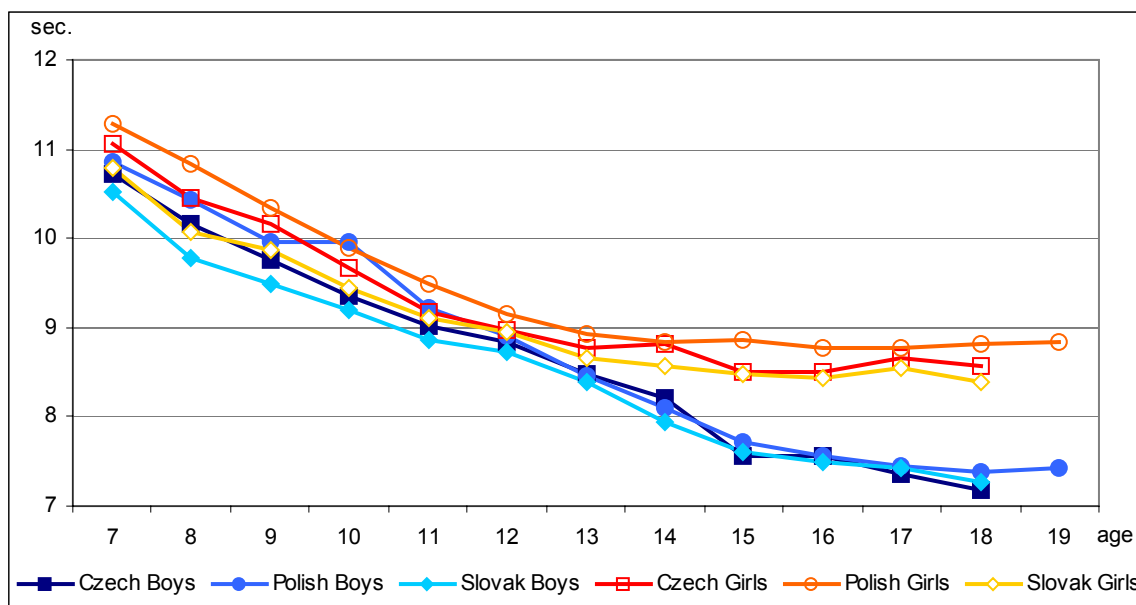


Fig. 5.2. Results of the 50 m dash in Czech (60s), Polish (30s), Slovak (30s) and Slovenian (60s) youth (Samples of both genders: Czech (1991), N=10 000; Polish (2003), N=73 890; Slovak (1991), N=10 000) (Rychtecký, 2004)

The patterns of the development of motor abilities in the course of childhood up to 10 and 12 years are almost identical, regardless of study and country. There are differences concerning age and gender. As to the different European countries and cultural contexts we find more similarities than differences. With only minor differences this result including some other physical fitness items (e.g. cardiovascular endurance, flexibility) is also confirmed by a cross-cultural study comparing the physical fitness of Belgian, German, Finnish, Estonian, Czech and Hungarian children and youth in the mid nineties (cf. Telama et al., 2002).

### ***Secular trends in motor ability***

What do the studies tell us about time trends? Does the level of motor performance change over time?

Tab. 5.2. *Changes of motor abilities in Czech, Polish, Slovak and Slovenian youth in designated period (Rychtecký, 2004)*

a) Czech youth

Motor abilities	Boys	Girls
12 min run (1991- 1996)	- 0,3 %	-0,2 %
Standing broad jump (1991-2000)	+0,3 %	-0,1 %
Bent arm hang (1991-2000)	- 21,64 %	- 34,60 %
Sit – ups tests (1991 – 2000)	+ 22,35 %	+ 6,60 %
50 m dash (1965 – 1991)	- 0,1 %	+1,7 %
Shuttle run 4 x 10 m (1996 –2000)	- 2,4 %	- 1,9 %

b) Polish youth

Motor abilities	Boys	Girls
12 min run (1989- 1999)	- 6,74 %	-6,73 %
Standing broad jump (1989- 1999)	- 3,99 %	- 6,7 %
Bent arm hang (1989- 1999)	- 21,7 %	- 19,49 %
Sit – ups tests (1989- 1999)	+ 8,37 %	+11,74 %

c) Slovak youth

Motor abilities	Boys	Girls
Standing broad jump (1991-2000)	-5,84 %	- 2,1 %
Bent arm hang (1991-2000)	%	-20,9 %

d) Slovenian youth

Motor abilities	Boys	Girls
Speed of alternate motion (arm plate tapping) (1990-2000)	+ 0,6 %	+ 0.9 %
Explosive power (standing long jump) (1990-2000)	- 1,0 %	- 2.0 %
Co-ordination of body movements (polygon backwards) (1990-2000)	+ 3.9 %	+ 7.2 %
Strength of abdominal muscles (sit-ups) (1990-2000)	+ 10.2 %	+ 14.0 %
Flexibility (bend forward on the bench) (1990-2000)	+ 1.6 %	+ 1.3 %
Bent arm hang (1990-2000)	- 9.8 %	- 1.5 %
Sprint speed (60-metre run) (1990-2000)	- 1.1 %	- 1.1 %
General endurance (600-metre run) (1990-2000)	- 5.7 %	- 5.7 %

The results in table 5.2 show the increases and decreases of motor abilities in Czech, Polish, Slovak and Slovenian youth (9 to 18 years) measured by validated motor tests.

Studies in Germany and other central European countries that were carried out between 1975 and 2000 as well as a series of studies carried out in Slovenia between 1990 and 2000 show results that document some similar time trends (Beunen et al., 1992; Kemper, 2004; Medeková, Šelingerová & Havlíček, 2001).

For many western European countries a loss of 10 to 12 % concerning speed, endurance, strength and a moderate decrease in flexibility and power can be identified, whereas there is a slight increase in the strength of abdominal muscles (sit-ups) in boys and in girls over the last 25 years (figure 5.3).

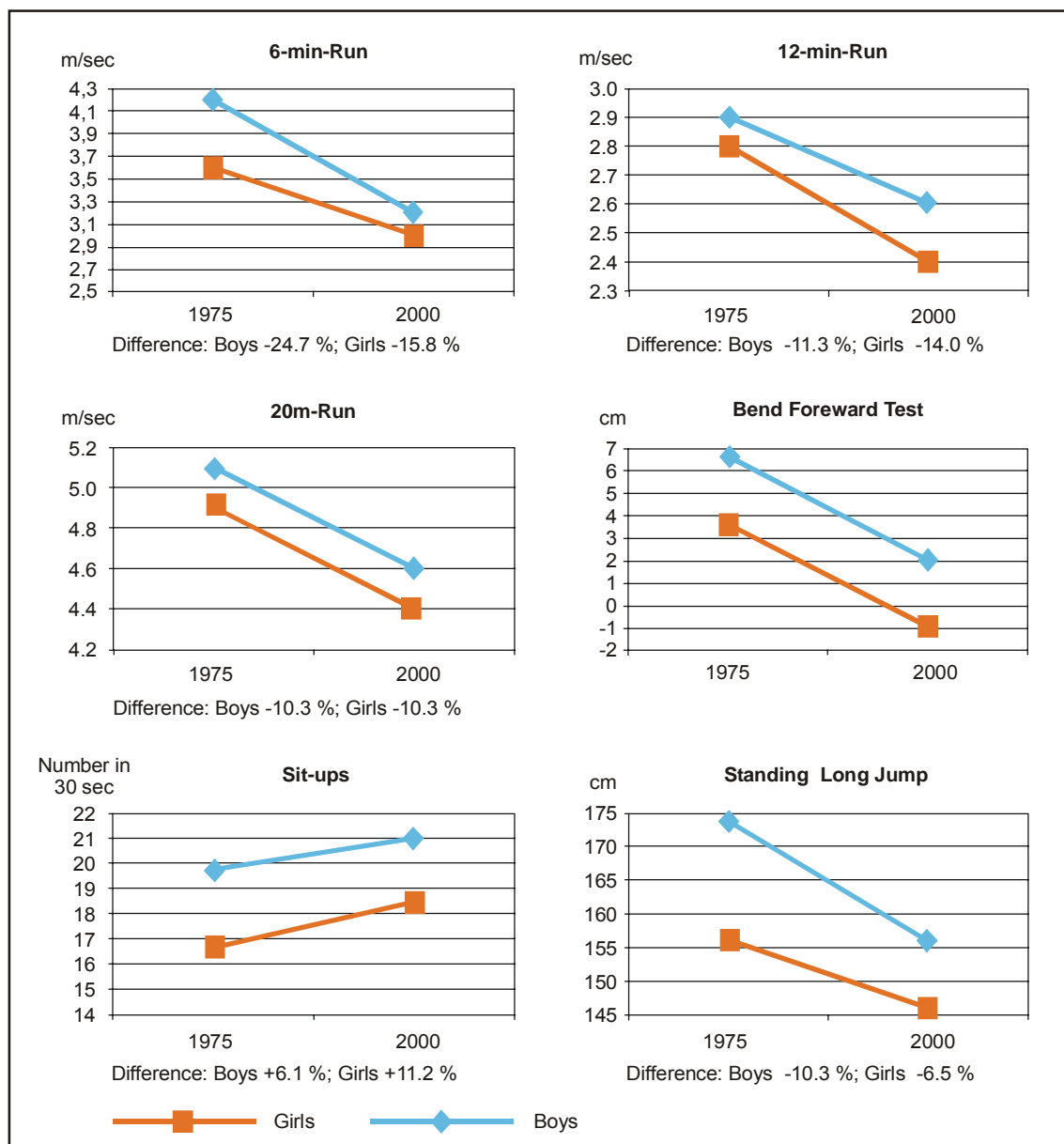


Fig.5.3. Regression equation for the measured data coming from the assignments conducted from 1975 – 2000 (modified from Bös, 2003)

For Slovenia, too, distinct trends over the last 20 years are noticeable: There are distinct and positive changes in strength in boys and girls, there is a moderate increase in coordination of body movement for both genders, in particular for girls, whereas negative trends can be identified in endurance capacity for boys and girls and in muscular strength and endurance of the upper limbs, particularly for boys. No changes have been observed in explosive power and speed (table 5.3).

Tab. 5.3. *Indexes of average changes in the motor abilities of school children aged 8 to 19 years in the period 1990-2000 (Strel, Kovac, Jurak & Bednarik, 2003)*

Area of measuring	Male	Female	Both
Speed of alternate motion (arm plate tapping)	+ 0.6 %	+ 0.9 %	+ 0.75 %
Explosive power (standing long jump)	- 1.0 %	- 2.0 %	- 1.5 %
Co-ordination of body movements (polygon backwards)	+ 3.9 %	+ 7.2 %	+ 5.6 %
Strength of abdominal muscles (sit-ups)	+ 10.2 %	+ 14.0 %	+ 12.1 %
Flexibility (bend forward on the bench)	+ 1.6 %	+ 1.3 %	+ 1.45 %
Muscular endurance of the shoulder girdle and arms (bent arm hang)	- 9.8 %	- 1.5 %	- 5.65 %
Sprint speed (60-metre run)	- 1.1 %	- 1.1 %	- 1.1 %
General endurance (600-metre run)	- 5.7 %	- 5.7 %	- 5.7 %

A few physical fitness studies among children and youth have been carried out in Sweden. Sollerhed and Ejlertsson (1999) used a test battery consisting of nine items to measure main characteristics of physical fitness in upper secondary schools (16- to 19-year-old students). The results cannot be compared to other European data as the study aims at assessing the effects of different educational programs. And so does a Swedish follow-up study, in which a modified EUROFIT test battery was carried out in upper secondary pupils (Zederin, 2000; Patriksson, 2002). Results of the first wave indicated also lower current performance values compared to earlier studies in Sweden.

In another representative sample of 16-year-old Swedish pupils Westerstahl (2003) found differences in motor ability between boys and girls, influenced by educational programmes status. Another aim of this study was to analyse temporal shifts in physical fitness between 1974, 1976 and 1995. The results showed that maximum strength in legs and back increased, while on the other hand running capacity (aerobic fitness), muscular endurance in stomach and arms decreased.

All these different studies seem to suggest that during the last two or three decades strength has increased among older adolescents, but aerobic fitness and muscular endurance have decreased. The trend is obvious: The overall level of physical fitness and motor performance in today's Swedish children and adolescents is lower than it was 15 to 25 years ago.

The other remarkable result is that the gap between the most fit and the least fit young people has increased. This result seems to reflect a specific time trend in northern and western European countries around the turn of the century.

Analyses of physical fitness and motor ability tests in young people in Finland in the course of the last 30 years allow the following cautious statement.

Endurance findings – measured with a 1500 m resp. 2000 m run – show a clear decline in the performance of boys and in girls, with a strong decrease in males (figure 5.4 and 5.5).

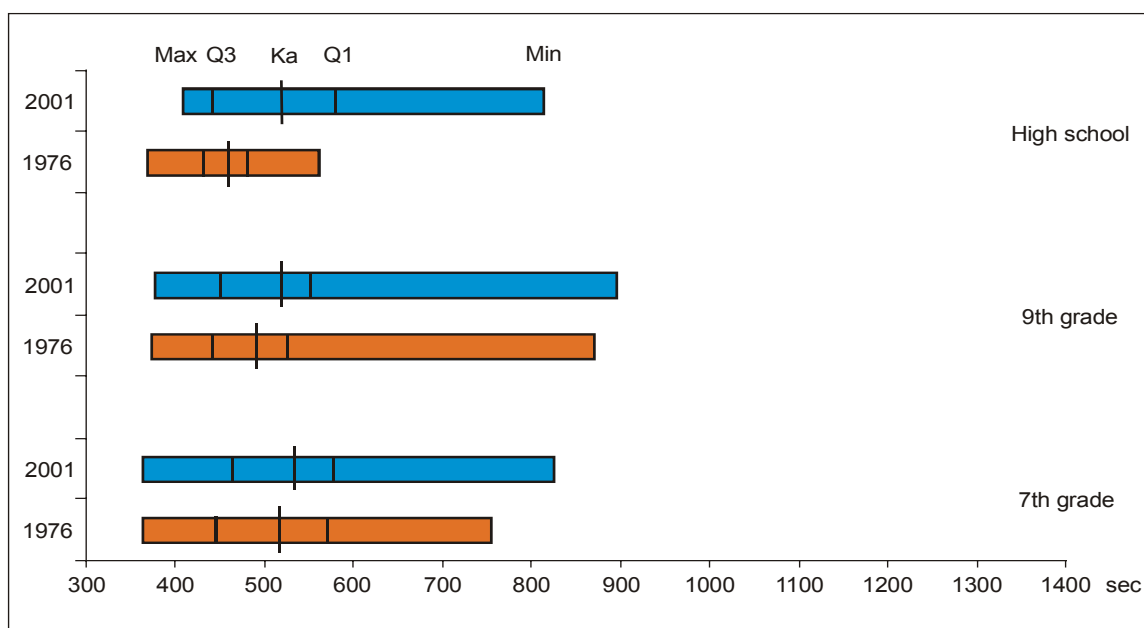


Fig. 5.4. 1500 meters run girls (Nupponen & Huotari, 2002)

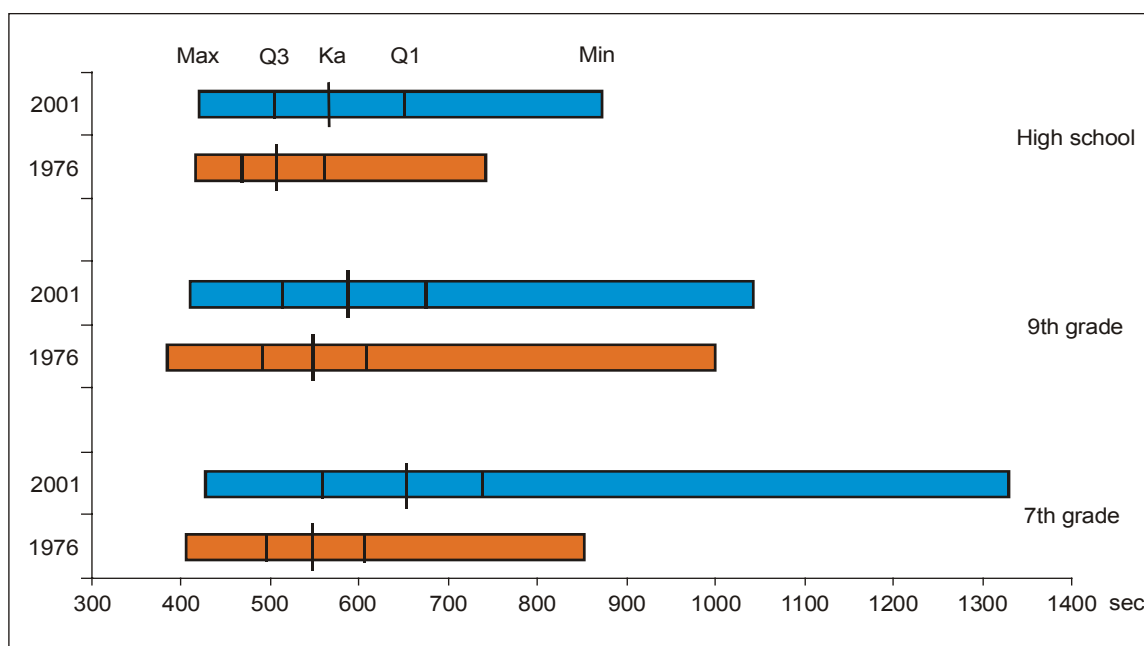


Fig. 5.5. 2000 meters run boys (Nupponen & Huotari, 2002)

A moderate decline of performance can be identified in explosive power, agility and flexibility. The results concerning speed showed no difference in the course of 25 years.

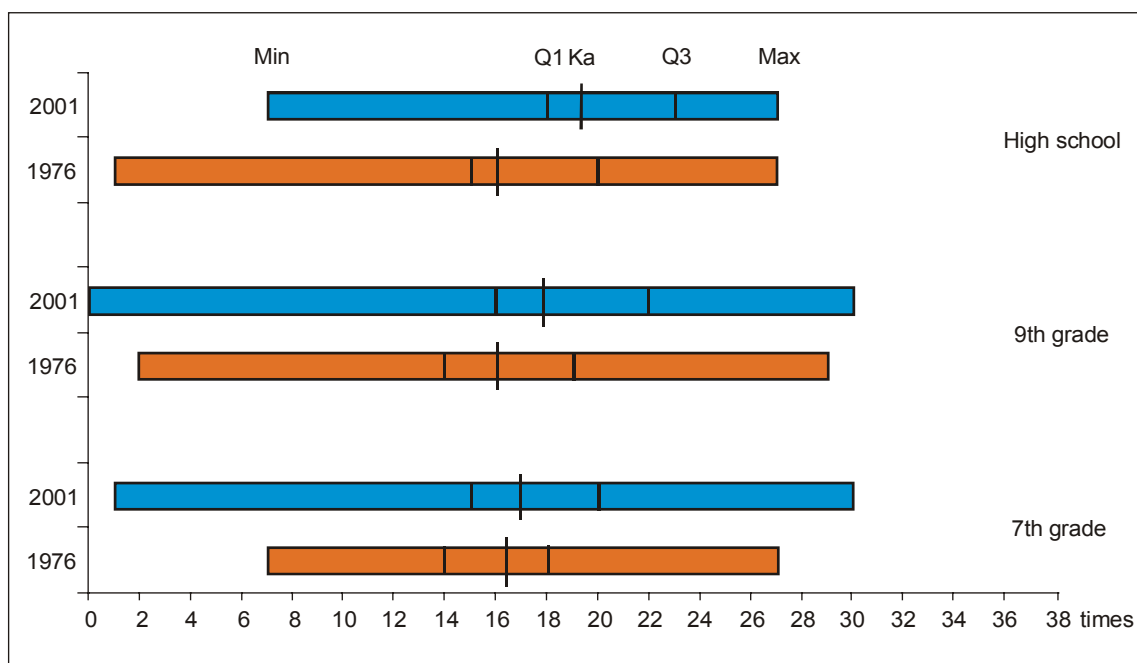


Fig. 5.6. Sit-up girls (Nupponen & Huotari, 2002)

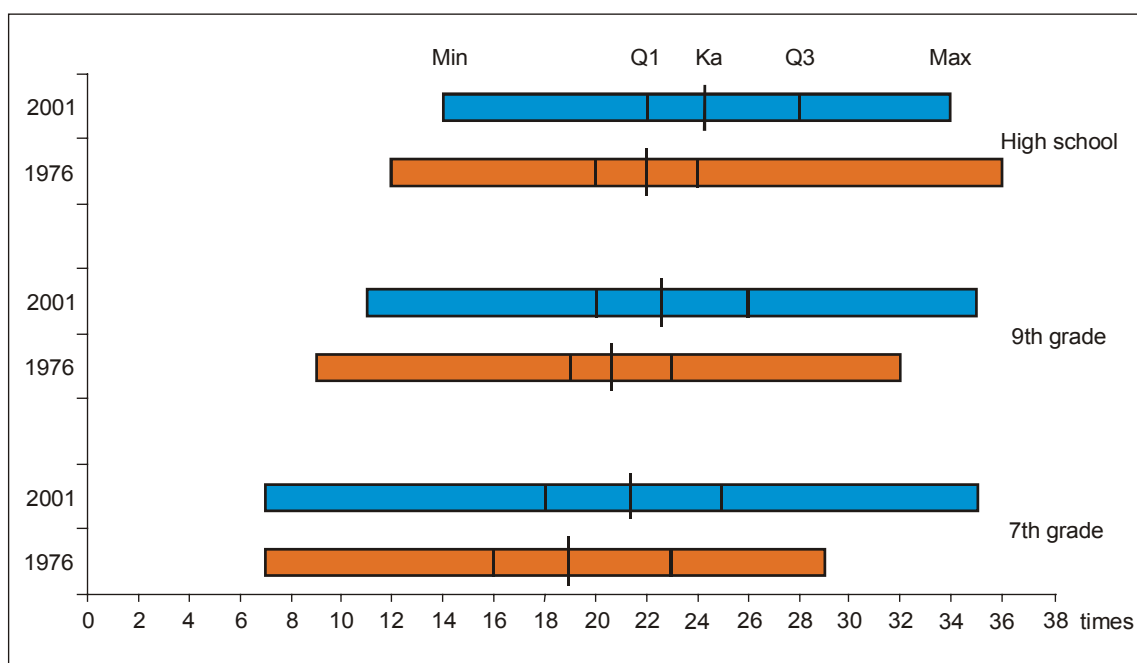


Fig. 5.7. Sit-up boys (Nupponen & Huotari, 2002)

The only increase was found in the sit-up test measuring abdominal muscle endurance/strength capacity.

The most significant difference that appeared over time was the strong increase in variance. In all tests, in all age groups and in both genders the standard deviation in recent studies was higher than in the studies carried out 25 to 30 years ago.

Comparatively huge sets of data on motor ability exist in Portugal. Studies have been carried out systematically in the Autonomous Region of the Azores and Madeira and in the two major urban areas of Lisbon and Oporto (Diniz, Onofre, Carvalho, Mira & Carreiro da Costa, 2001; Freitas, 2001; Gomes, 2004; Maia, Lopes, Monteiro, Barbosa & Magalhães, 2001; Perreira, 1996; Pinto, 1997; Silva, 2002; Sobral & Silva, 2001). Studies with samples of national scope have not been carried out.

Table 5.4 shows the results of the different motor abilities in 6- to 9-year-old children. The results can be summarized as follows:

*Tab. 5.4. Measurements of Coordination in regional Portuguese studies (Diniz, 2004)*

	Age (years)	(1996) Gomes	(1997) Pinto	(2002) Maia & Lopes	(1996) Gomes	(1997) Pinto	(2002) Maia & Lopes
	Boys				Girls		
ER	6			29.21 ± 11.9			29.38 ± 12.29
	7		24.9 ± 4.8	35.40 ± 13.3		30.7 ± 4.9	32.69 ± 13.28
	8	45.1 ± 12.0	26.8 ± 4.2	40.64 ± 13.5	44.0 ± 9.9	31.1 ± 5.4	40.08 ± 12.92
	9	50.1 ± 9.7	34.6 ± 4.9	45.13 ± 13.4	47.1 ± 9.9	31.1 ± 6.1	42.31 ± 12.97
TL	6			14.86 ± 2.84			14.04 ± 2.7
	7			15.83 ± 3.17			14.95 ± 3.08
	8	17.8 ± 2.7		17.55 ± 3.36	16.3 ± 2.7		16.81 ± 2.94
	9	19.3 ± 3.6		19.07 ± 3.58	17.4 ± 3.06		18.05 ± 3.22
SL	6			30.93 ± 8.67			30.09 ± 8.02
	7		29.9 ± 6.2	35.44 ± 9.44		42.8 ± 8.6	35.33 ± 10.98
	8	48.3 ± 12.5	27.0 ± 8.6	41.70 ± 11.93	47.3 ± 9.8	46.7 ± 7.7	43.2 ± 11.75
	9	52.2 ± 10.3	49.2 ± 11.8	46.98 ± 12.37	54.0 ± 11.8	50.6 ± 7.2	48.74 ± 11.59
SM	6			17.96 ± 10.96			17.48 ± 9.96
	7		4.36 ± 5.4	26.69 ± 12.78		5.0 ± 5.6	23.44 ± 11.69
	8	37.9 ± 13.1	13.5 ± 4.5	34.20 ± 14.28	34.5 ± 10.3	12.0 ± 7.2	31.11 ± 11.24
	9	47.0 ± 10.2	14.2 ± 6.0	41.09 ± 13.77	41.1 ± 13.1	13.9 ± 6.0	35.45 ± 13.75
CM	6			93.37 ± 26.76			91.85 ± 24.87
	7			113.32 ± 30.31			106.42 ± 30.43
	8	149.10'		133.96 ± 34.61	142.10'		131.26 ± 29.77
	9	168.60'		152.76 ± 35.14	159.60'		144.51 ± 33.08



Coordination increases with age in both genders. The boys' test values are higher than those of the girls. No temporal shift can be identified for the last decades. The flexibility tests show higher values for the females. There has been a moderate decrease in flexibility for boys and girls during the last decade. Abdominal endurance strength tests produce higher mean values for boys. A moderate increase in endurance has been observed in recent studies compared to earlier ones. The 12 minutes run shows results for today's young people that are superior to those of earlier studies, particularly in boys.

In the age-group of the 10- to 17-year-olds there are higher mean values in boys when flexibility is tested. A comparison of findings in recent studies with results of studies carried out in the early nineties shows the tendency of leveling the results of performance between the genders. Considering abdominal muscle endurance the boys have the better results, but there is no evidence for a specific time trend.

The 12 minute run assessing endurance shows an increase in performance between 10 and 15 years. Concerning the gender-specific performance the findings are inconsistent and do not allow any statement on time trend.

Due to different methods used for data assessment and due to the lack of some representative national data in some EU-countries the summarized findings should be interpreted with caution.

**Summarizing the results of the motor tests in various European studies the cautious conclusion is as follows:**

- **In most European countries a moderate decrease in young people's physical performance, i.e. in most motor abilities, can be identified over the last 2-3 decades. Data from Portugal are inconsistent, but appear to indicate a moderate increase.**
- **There is a strong decrease in endurance for boys and girls; power decreases moderately.**

- The values concerning speed and flexibility remain almost unchanged.
- Interestingly enough, there is an increase in the strength of abdominal muscles (sit-ups) in boys and girls over the last 20 years. This trend can be identified in most countries.

The results can be explained in a plausible way as consequences of evolving changes of daily lifestyles:

Due to changes in the daily life of young people and in their environments, e.g. increase of motorized transportation, there are less opportunities and individual challenges to develop endurance capacity.

But it is the importance of a styled body and an attractive appearance that encourages boys as well as girls to train their abdominal muscles. At the same time a fundamental change in young people's sport concept becomes obvious. In their subjective view sport is no longer associated with endurance, speed and strength, but characterized by flexibility, agility, coordination and aesthetic movements as represented by so-called "fun sports", "extreme sports" and "adventure sports" such as skateboarding, rollerblading or even sub-cultural variants of traditional games. The trend appears to be currently greatest and continuing to grow in those countries which were part of the Soviet bloc about a decade ago.

### **5.1.2 Physical fitness as aerobic fitness**

Maximal oxygen uptake ( $\text{VO}_2 \text{ max}$ ), the highest rate at which an individual can consume oxygen during exercise, limits the capacity to perform aerobic exercise and is widely recognized as the best single measure of adults' aerobic fitness (American College of Sports Medicine, 1995). It is well-documented that the majority of young people can exercise to exhaustion without demonstrating a true  $\text{VO}_2 \text{ max}$  plateau (Armstrong, Kriby, McManus & Welsman, 1995). The appropri-

ate term to use with children and adolescents is therefore peak oxygen uptake, i.e. the highest oxygen uptake observed during an exercise test to exhaustion, rather than  $\text{VO}_2$  max which conventionally implies the existence of a  $\text{VO}_2$  plateau.

The aerobic fitness of European youth has been documented since the pioneering studies of Swedish young people over 50 years ago. Studies of aerobic fitness have emerged from almost all European countries except from Luxembourg, Slovakia, Cyprus and Malta. So far no data are available on randomly selected groups of children. Participants are volunteers and selection bias cannot be ruled out, as relatively few participants are likely to be drawn from the markedly sedentary or overweight sections of the population. Sample sizes are generally small and often not necessarily representative of any country or region. This prevents valid comparisons of youth peak  $\text{VO}_2$  across countries. Nevertheless, both cross-sectional and longitudinal studies provide a consistent picture of the aerobic fitness of European youth.

### ***Aerobic Fitness in relation to age***

Cross-sectional data from EU countries indicate that boys' peak  $\text{VO}_2$  demonstrates a progressive increase in relation to chronological age. Girls' data demonstrate a similar but less consistent trend with a tendency for peak  $\text{VO}_2$  to level-off from about 13 to 14 years of age. Longitudinal studies provide a more secure analysis of aerobic fitness in relation to age but only four studies of untrained children and adolescents from EU states have been published.

The boys' data are consistent and show peak  $\text{VO}_2$  to double over the age range 11 to 17/18 years. The largest annual increase occurred between 13 and 14 years in all studies covering this age range. Girls' data are less clear and peak  $\text{VO}_2$  appears to progressively rise from 11 to 13 years and then level-off from about age 14 years. In a British study girls exhibited about a 45 % increase in peak  $\text{VO}_2$  from 11 to 17 years (Armstrong & Welsman, 2001). In the Amsterdam Growth and Health study Dutch girls observed from 13 to 16 years exhibited a

levelling-off, but not a reduction, in peak  $\text{VO}_2$  with only a 2 % from 14 to 16 years (Kemper, 2004). This is generally consistent with findings from cross-sectional studies.

The rise in peak  $\text{VO}_2$  with age during childhood and adolescence appears to be primarily due to an increase in stroke volume and therefore cardiac output.

Tab. 5.5. Longitudinal studies of aerobic fitness. Values are mean (standard deviation)

Citation	Country	Age (years)	N	Mode	Peak VO <sub>2</sub> (L·min <sup>-1</sup> )
Boys					
Rutenfranz et al. (1981)	Germany	12.7	28	CE	2.33 (0.32)
		13.7	27	CE	2.50 (0.46)
		14.7	26	CE	2.83 (0.49)
		15.8	27	CE	3.05 (0.54)
		16.7	23	CE	3.00 (0.34)
		17.8	26	CE	3.11 (0.48)
Sprynarova et al.(1987)	Czechoslovakia	11	90	TM	1.74 (0.23)
		12	90	TM	2.02 (0.31)
		13	90	TM	2.20 (0.35)
		14	90	TM	2.76 (0.45)
		15	90	TM	3.24 (0.47)
		16	39	TM	3.38 (0.47)
		17	39	TM	3.38 (0.47)
		18	39	TM	3.53 (0.48)
Amsterdam Growth Study (Van Mechelen, pers comm., in Armstrong & Van Mechelen (1998))	Netherlands	13	83	TM	2.66 (0.39)
		14	80	TM	3.07 (0.48)
		15	84	TM	3.37 (0.43)
		16	79	TM	3.68 (0.52)
Armstrong et al. (1999) Armstrong & Welsman (2001)	United Kingdom	11.2	119	TM	1.81 (0.26)
		12.1	94	TM	2.11 (0.34)
		13.1	93	TM	2.39 (0.44)
		17.0	37	TM	3.55 (0.55)
Girls					
Rutenfranz et al. (1981)	Germany	12.7	24	CE	2.19 (0.30)
		13.7	24	CE	2.20 (0.22)
		14.7	22	CE	2.26 (0.26)
		15.7	22	CE	2.18 (0.29)
		16.7	17	CE	1.97 (0.31)
		17.8	19	CE	2.06 (0.33)
Amsterdam Growth Study (Van Mechelen, pers comm., in Armstrong & Van Mechelen (1998))	Netherlands	13	97	TM	2.45 (0.31)
		14	97	TM	2.60 (0.35)
		15	96	TM	2.58 (0.34)
		16	96	TM	2.65 (0.33)
Armstrong et al. (1999) Armstrong & Welsman (2001)	United Kingdom	11.2	115	TM	1.63 (0.28)
		12.2	88	TM	1.89 (0.29)
		13.1	81	TM	2.10 (0.30)
		17.0	26	TM	2.39 (0.40)

### ***Aerobic Fitness in the context of growth and maturation***

Peak  $\text{VO}_2$  is strongly related to body size with correlation coefficients describing its relationship with body mass or stature typically exceeding  $r=0.70$  (Armstrong & Welsman, 1994). Thus, much of the age-related increase in peak  $\text{VO}_2$  reflects the overall increase in body size during the transition from childhood through adolescence.

Longitudinal studies generally confirm the stability of boys' mass-related peak  $\text{VO}_2$  with age, whereas studies of girls' mass-related peak  $\text{VO}_2$  show unequivocally a progressive decline with age (Van Mechelen & Kemper, 1995). Boys demonstrate higher mass-related peak  $\text{VO}_2$  than girls throughout childhood and adolescence, the sex difference being reinforced by the greater accumulation of body fat by girls during puberty (Armstrong & Welsman, 2000; Malina & Bouchard, 1991).

As young people grow they also mature and the physiological responses of adolescents must be considered in relation to biological as well as chronological age. Relatively few studies have investigated the relationship between peak  $\text{VO}_2$  and maturity, perhaps because of the difficulty in assessing maturity. The existing studies demonstrate a significant effect of maturation on peak  $\text{VO}_2$  independent of chronological age and body mass. The positive effect of maturation on aerobic fitness was consistent for both boys and girls.

### ***Aerobic Fitness and Gender***

Boys' peak  $\text{VO}_2$  values are consistently higher than those of girls by late childhood and the sex difference becomes more pronounced as young people progress through adolescence. Gender differences during childhood and adolescence have been attributed to a combination of factors including habitual physical activity, body composition and blood haemoglobin concentration. Boys are more physically active than girls (Armstrong & van Mechelen, 1998), but the

evidence relating habitual physical activity to young people's peak  $\text{VO}_2$  is weak (Morrow & Freedson, 1994).

Muscle mass increases through childhood and although boys generally have more muscle mass than girls, marked gender differences do not become apparent until the adolescent growth spurt. Between 5 and 16 years boys' relative muscle mass increases from 42 to 54 % of body mass whereas in girls muscle mass increases from 40 to 45 % of body mass between 5 and 13 years and then, in relative terms, it declines due to an increase in fat accumulation during adolescence. Girls have slightly more body fat than boys during childhood but during the adolescent growth spurt, girls' body fat increases to about 25 % of body mass while boys' declines to about 12 to 14 % (Malina & Bouchard, 1991). These dramatic changes in body composition during puberty are highly likely to contribute to the progressive increase in sex differences in peak  $\text{VO}_2$  over this period.

### ***Are Young Europeans fit?***

As there is no consensus about levels of optimal aerobic fitness for children and adolescent, the question whether young people in Europe are fit or unfit, is difficult to answer. The European group of Paediatric Work Physiology suggested levels of peak  $\text{VO}_2$  as "health indicators" for 12- to 14-year-old boys and girls. They proposed  $35 \text{ mL kg}^{-1} \cdot \text{min}^{-1}$  for boys and  $30 \text{ mL kg}^{-1} \cdot \text{min}^{-1}$  for girls as "health risks" and suggested levels greater than  $40 \text{ mL kg}^{-1} \cdot \text{min}^{-1}$  for boys and  $35 \text{ mL kg}^{-1} \cdot \text{min}^{-1}$  for girls as "health indicators" (cf. Armstrong, 2004).

The number of young people falling below these levels of peak  $\text{VO}_2$  max was low in the 1980s and before. The percentage of males "at risk" increased from 1 to 8 % over the age range 13 to 17 years and the percentage of females falling into this category rose from 3 to 17 % over the same time span. The higher percentage of females "at risk" was partly explained by the extra gain in body mass caused by the sex-specific increase in body fat during puberty (Kemper & Ver-

schuur, 1990). A study in the mid 1990s showed a moderate increase of young people at risk.

Tab. 5.6. Predicted  $\dot{V}O_2$  max of 12- and 15-year-old European boys (Telama et al., 2002)

	Czech R.	Estonia	Finland	Germany	Hungary	Total
12-year-old boys						
Mean	41.2	39.7	39.1	35.0	36.7	38.3
Sd	7.6	5.8	7.8	8.2	4.1	6.7
Min	25.0	25.8	21.3	17.5	29.0	55.2
Q1	37.0	36.4	33.6	29.5	35.0	34.3
Median	42.0	39.9	37.5	34.4	36.4	38.0
Q3	47.0	43.9	44.2	41.1	39.2	43.1
Max	56.0	55.0	55.0	60.6	58.7	58.2
15-year-old boys						
Mean	39.3	46.0	41.5	40.0	37.7	40.9
Sd	6.8	6.1	8.4	8.4	3.9	6.7
Min	23.0	29.5	16.7	16.9	28.3	22.9
Q1	34.0	41.8	35.8	34.3	35.0	36.2
Median	40.0	45.8	41.3	40.5	37.1	40.9
Q3	44.0	50.8	47.4	45.2	40.0	45.5
Max	56.0	61.1	62.4	61.2	58.7	59.9

Tab. 5.7. Predicted  $\dot{V}O_2$  max of 12- and 15-year-old European girls (Telama et al., 2002)

	Czech R.	Estonia	Finland	Germany	Hungary	Total
12-year-old girls						
Mean	35.3	34.8	34.4	31.0	34.0	33.9
Sd	9.5	5.0	6.3	6.0	3.1	6.0
Min	25.0	25.2	20.3	16.9	26.0	22.7
Q1	27.0	31.0	30.2	36.8	31.8	29.4
Median	32.0	34.3	34.0	30.8	33.8	33.0
Q3	43.0	38.5	38.7	35.7	35.7	38.2
Max	57.0	50.8	50.2	48.7	41.8	49.7
15-year-old girls						
Mean	35.7	35.1	34.6	30.7	35.4	34.3
Sd	6.4	5.1	6.7	6.3	2.1	5.3
Min	26.0	25.1	17.0	18.9	28.3	23.1
Q1	31.0	31.0	30.5	24.8	34.3	30.3
Median	35.0	35.0	33.8	30.6	35.7	34.0
Q3	38.8	38.5	37.9	35.0	36.4	37.3
Max	57.0	50.8	57.4	55.4	41.8	52.5

In this study the multistage 20m shuttle run (cf. Ramsbottom, Brewer & Williams, 1988) was applied. The test is a developed version of the Léger-test to predict peak  $\text{VO}_2$  max consumption (cf. Léger & Lambert, 1982)..

Data for the bottom quartile (Q 1) for 12- and 15-year-old boys and girls reveal a close limit to the “health risk” level for some sample groups. With regard to this study performance levels between the “bottom” (Q 1) and “upper” (Q 3) quartile levels of peak  $\text{VO}_2$  for girls as well as for boys seem to be more homogenous in young people in eastern Europe than in western or northern European countries (cf. Telama et al., 2002; Naul et al, 2003).

Another study of a representative sample of 11-year-old pre-pubertal children reported that all children had values of peak  $\text{VO}_2$  above the “health risk” threshold. All girls demonstrated a level of aerobic fitness above the “health indicator” threshold and only two boys had peak  $\text{VO}_2$  values below  $40 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$  (cf. Armstrong, 2004). Much of the variation in the studies can be attributed to the fact that heavier (usually older) children are penalised and lighter (usually younger) children are favoured by the method of scaling.

### ***Secular Trends in Aerobic Fitness***

Observation of the results of studies over the last 50 years suggests a consistency over time in young people's peak  $\text{VO}_2$  (Armstrong & Welsman, 1994; Armstrong & van Mechelen, 1998), but no study involving direct determinations of peak  $\text{VO}_2$  has specifically addressed the issue of secular trends in aerobic fitness.

In a cross-cultural review, including 9 current EU member states, over the period 1980-2000 a great deal of variability was found between countries in the magnitude of secular changes in performance ranging (Tomkinson, Leger, Olds & Cazonla., 2003). When age-groups rather than countries were analysed, a more consistent trend was revealed with a reduction in aerobic fitness of 0.5 to



0.3 % per year in children and 1 % per year in adolescents. The study noted, however, that children and adolescents were fatter in 2000 than in 1980.

A Swedish study, (Westerstahl, 2003) investigated changes in 16-year-olds' fitness from 1974 to 1995. Both boys and girls performed less well in 1995 compared to 1974 but in 1995 girls and boys weighed more and had a higher body mass index (BMI) than in 1974. More boys and more girls were overweight in 1995 and the increase in body dimensions in 1995 compared to 1974 statistically explained the decrease of fitness.

A large Polish study (Przeweda & Dobosz, 2003) estimated the aerobic fitness of more than 200.000 7 to 19-year-olds in 1989 and 73,890 in 1999. The authors reported that the trend was a decrease in performance in 1999 compared to 1989 but no statistical analysis was reported. They suggested that the socio-economic transformation that took place in Poland over this decade might have brought about a less active lifestyle in children and consequently a decline in fitness. However, body mass also increased over the decade and this is likely to have affected aerobic fitness.

Data on the fitness of Slovenian young people have been collected periodically since 1970 (Strel et al., 2004). Fitness was shown to deteriorate from 1970 with a marked decline in the final decade (1993-2003). However, the authors acknowledged that the decrease was at least partially a result of large increases in body fat. Body mass, body fatness and the number of children overweight and/or obese all increased over the period 1983-2003.

Two studies from Scandinavia used laboratory-based tests to predict peak oxygen uptake ( $\text{mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ ) in 10-, 13- and 16-year-olds in 1987 and 2001. In the Swedish study the boys' aerobic fitness was reported to decline by 12 % from 1987 to 2001 but no significant change was observed in girls' predicted peak  $\text{VO}_2$  (Ekblom, Oddson & Ekblom, 2004).

For Denmark a huge body of data is available for young people's aerobic fitness. But only few generalizing findings could be identified concerning motor ability. The second rapport of the Danish National Board of Health ("Unges livsstil og dagligdag" MULD samarbejdet – Monitorering af Unges Livsstil og Dagligdag; MULD – rapport, 2003) was on young people's lifestyles and health. It referred to a nationwide representative sample consisting of 3000 boys and girls and of addition samples from selected counties (Amt) in Denmark - Vestsjællands Amt (1500 respondents) and Ribe Amt (1000 respondents) and the community of Copenhagen (15000 respondents). Concerning well-being and health related behaviour the results showed a great similarity in the different parts of Denmark. The majority of the respondents reported their life situation to be pleasant and their fitness status satisfying.

Andersen, Grønfeldt and Froberg (2003) emphasize the importance of physical activity for children's well-being and their health-related fitness status. Wedderkopp (2000) measured physical fitness in 9-year-old children in Odense over a period of 30 years. He found a lower physical fitness in the nineties compared to that of children in the mid sixties. He emphasized the importance of young people's physical activity in the process of improving their motor abilities.

The Danish Odense-study on aerobic fitness (Wedderkopp, Froberg, Hansen & Andersen, 2004) analysed secular trends through two cross-sectional surveys performed 12 years apart (1985/86 – 1997/98) on representative samples of 9-year-old children. The boys in 1997-98 had a lower fitness level and a higher fat percentage than those in 1985-86, whereas no overall differences in fitness or fatness were found between girls in 1997-98 or 1985-86. The percentage of children who exceeded internationally accepted BMI thresholds of obesity was significantly greater in 1997-98 than in 1985-86. It was noted that in 1997-98, the most fit boys had the same level of fitness as in 1985-86, and the most fit girls had a significantly higher level of fitness in 1997-98 than in 1985-86. Both the girls and boys with the poorest fitness level in 1997-98 had a significantly lower level of fitness than the poorest fitness levels of girls and boys from 1985-86 respectively.

The authors observed that the difference between the least fit and the most fit increased over time in both boys and girls. In boys the difference between the top 10 % and the lowest 10 % in aerobic fitness, expressed in relation to body mass, was 38 % in 1985-86 and 45 % in 1997-98. The same polarization was found in girls, with a difference between the top 10 % and the lowest 10 % of 37 % in 1985-86 and 44 % in 1997-98.

- **The aerobic fitness of European children and adolescents compares favourably with that of young people from elsewhere.**
- **Relatively few young people fall into the category of being “at risk”, though this group seems to be growing.**
- **Data examining secular trends in aerobic fitness are sparse.**
- **Generally they indicate a decrease in aerobic fitness.**
- **This decrease may be a reflection of the rise in paediatric overweight and obesity throughout Europe over the last 20 years rather than a true reduction in peak  $\text{VO}_2$ .**
- **Recent data show an emerging polarisation with the difference between fit and unfit young people increasing over time.**
- **It appears that the secular increase in body mass is not being accompanied by a proportional increase in aerobic fitness.**
- **The inevitable result is that in activities which involve moving body mass young people's maximal performance is declining.**

## **5.2 Physical activity and fitness in relation to cardiovascular disease in young people**

Physical inactivity and low fitness are associated with higher mortality rates and rates of common diseases such as cardiovascular disease (CVD) and diabetes in adults. Even if these diseases are not manifest in children, there are good reasons to promote a physically active lifestyle in early life instead of prevention

at a later time in the lifespan when irreversible pathological changes have occurred.

A large percentage of children have a lifestyle which is so sedentary that it may increase the risk of developing atherosclerosis or other diseases prematurely. Atherosclerosis refers to degenerative changes in the arterial wall which decreases the elasticity and narrows the lumen, and eventually may result in coronary heart disease, stroke or peripheral artery disease. It develops over decades from the first microscopic changes in the wall until clinical symptoms may occur later in life. The causes of atherosclerosis are multi-factorial and are only partly elucidated. The whole process of atherosclerosis starts in early childhood and progresses throughout life. The degree of atherosclerosis is related to the level of biological CVD risk factors. The Cardiovascular in Young Finns Study studied CVD risk factors in children 12 to 18 years of age and found that levels in LDL, systolic blood pressure, BMI and smoking were associated to arterial wall thickness at the age of 24 to 39 years (Raitakari et al., 2003). The Amsterdam Growth and Health Study measured risk factors several times from childhood (age 12 years) through adolescence and into adulthood (cf. Twisk, Kemper, Mellenbergh, Van Mechelen & Post, 1996; Twisk, Kemper & Van Mechelen, 2000), and boys with a low fitness level in childhood had greater arterial wall thicknesses at the age of 36 years, and in those where fitness increased, the walls of the artery was less stiff (Ferreira et al., 2003). Other studies have shown that obesity, a low level of HDL and increased blood pressure during childhood are associated with increased atherosclerosis of the coronary arteries 15 to 20 years later (Mahoney et al., 1996). Finally, children with hypertension and especially obese children with hypertension have developed an increased heart, a condition which in adults is associated with increased risk of heart disease (Daniels, Loggie, Khoury & Kimbal, 1998; Hansen, Nielsen, Froberg & Hyldebrandt, 1992).

In conclusion, atherosclerosis develops over decades starting in early childhood with the development of fatty streaks. Fatty streaks may develop into plaques which can be seen in some adolescents. Plaques may later result in infarctions

in the heart, the brain or in the legs. The degree of atherosclerosis is related to the level in CVD risk factors.

There is convincing evidence that physical activity decreases the progressive evolution of atherosclerosis through physiological mechanisms. Among the central mechanism mediating the effect of physical activity are increased insulin sensitivity, glucose uptake that causes lower insulin release, an improved ratio between HDL and LDL cholesterol and improved function of other metabolism. Considering the effects of physical activity beneficial for health it should be clear, that

- (1) it is necessary to differentiate between changes by acute bouts of exercise and those by training programs over months;
- (2) many of the changes take place in the trained muscle, but are important for the whole body. In other word: The improvements are local, but the effects are global.

A negative association between physical activity and CVD was already found about 50 years ago and also the association between CVD risk factors and physical activity or fitness received increasing attention since then. The interest in CVD risk factors in children grew in many countries simultaneously, data on CVD risk factors and physical activity and fitness have been collected in many European countries.

Among the early studies of CVD risk factors in children was the “Know Your Body” program, where many European countries participated (Puska et al., 1981) Quite large differences were found in 13-year-olds in cholesterol and blood pressure levels between countries and in the prevalence of these risk factors. In boys, the prevalence of children having a cholesterol level above 180 mg/dl varied between 10 % in Greece and Italy and 69 % in Finland. Similar differences were found in girls, where 9 % of Greek girls and 70 % of Finnish girls were above this level. The prevalence of children having a systolic blood pressure above 130 mmHg varied between none and 21 % between countries,

but large differences were found between genders. In some countries girls had higher blood pressure and in others it was boys who had the highest pressure. However, in the same country differences between boys and girls are persistent from study to study, and the differences may therefore be attributed to environmental or lifestyle factors (Andersen, Henckel & Saltin, 1989).

Considering physical activity and physical fitness, the association between CVD risk factors and physical activity and fitness is weak, when risk factors are analysed isolated. Studies on children have shown that risk factors cluster and as many as 15 % of 9-year-old children have clustered risks. Analyses also show that this clustering is strongly related to low physical activity fitness. In the Danish part of the ongoing European Youth Heart Study fitness is a strong predictor of clustering of biological CVD risk factor at baseline (Andersen et al., 2003; Wedderkopp, Froberg, Hansen, Riddoch & Andersen, 2003). The risk of having three or more risk factors was eleven times higher in the least fit group compared to the most fit group. Concerning the impact of physical activity on risk clustering the findings are less clear for two reasons. The main reason for a weak relationship have to be seen in a large variation in physical activity variables as well as in the fact that most children are quite physically active and negative effects of a sedentary life only become apparent, when the activity levels are very low, or while children develop.

In conclusion, associations between physical activity or fitness and isolated CVD risk factors do exist, but they are weak. Controlled trials with physical activity show a positive effect on risk factors.

Clustering of risk factors included in the metabolic syndrome, i.e. fatness, hypertension, blood lipids and insuline levels, is found in children and adolescents. It is distinctly associated with low levels of fitness. Due to the large variation of physical activity in young people the relationship between clustered risk and physical activity is weak.

***Tracking of physical activity, physical fitness and CVD risk factors***

With respect to a convincing rationale for primary prevention in relation to CVD and health promotion in children and youth an important question is whether childhood and adolescence levels of physical activity and fitness can be used as predictors of adulthood. In other words: Is there any tracking of physical activity, fitness and CVD risk factors?

Tracking is a measure of how well subjects keep rank order within a variable over time.

Coefficients concerning physical activity are low. Part of the explanation may be seen in the problems of assessing physical activity with self-report methods.

So far only one study followed subjects from adolescence to adulthood. A significant but moderate tracking was found for young men, but not for females.

Physical fitness can be assessed as aerobic fitness or as measures of power, strength and flexibility. Aerobic fitness tracks moderately from adolescence to young adulthood; somewhat higher coefficients are found when strength is assessed.

As to CVD risk factors the results are as follows:

Lipids and blood pressure track from childhood to adulthood moderately. Higher correlation coefficients are found for cholesterol. Children with high cholesterol have a 2 to 3 fold risk of having the same problem 15 years later. Tracking of clustered risk from adolescence to adulthood in men but not in women was reported in a Danish study (Andersen, 1996). Another report showed that those who had a clustered risk as teenager had a six fold increased risk of having clustered risk as young adults (Andersen et al., 2003).

- **Physical activity tracks moderately from childhood into adolescence and young adulthood.**
- **Inactivity tracks as well over this period.**
- **Physical fitness tracks strongly.**
- **CVD factors, when analysed isolated, track moderately.**
- **Clustered risk factors show a strong tracking.**
- **Associations between CVD risk factors and physical activity/ physical fitness do exist, but they are weak, when risk factors are analysed isolated.**
- **In young people risk factors cluster and this clustering is strongly related to low physical activity or low fitness.**

### **5.3 Overweight and obesity in young people – prevalence and trends**

Increasing attention has in recent years been paid to the rapid rise of overweight and obesity in children and adolescents in most parts of Europe. About 10–15 per cent of Europe's school aged children are carrying excess body fat with a strong likelihood of ca. 20 to 25 % of children and youth maintaining overweight and obesity into adult age and of some having an increased risk for chronic disease before or during early adulthood. Considering their epidemic proportions and consequences it is justified to state that overweight and obesity in young people constitute one of the most important public health problems.

The full burden upon the health services cannot yet be estimated. Although childhood obesity brings a number of problems – hyper-insulinaemia, a raised risk of type 2 diabetes, hypertension, sleep apnoea, social exclusion and depression – the greatest health problems will be seen in the next generation of adults as the present childhood obesity epidemic passes through to adulthood. Considerably increased rates of heart disease, diabetes, endocrine disorders and other obesity related conditions will be found in adult populations, and their need for medical treatment may last for their remaining lifetime. Also indirect



costs are attributable to obesity such as psychological stress and social dysfunction. The costs for the health services, and the burden for society and individuals will be great.

Our understanding of the circumstances surrounding obesity in children and adolescents is limited due to the lack of comparable representative data from different countries and, in particular, due to the use of varying criteria for defining overweight and obesity among different countries and researchers.

Compare five information on prevalence and trends of overweight and obesity 7- to 10-year-olds refer to published data and some additional unpublished data collected by the International Obesity Task Force (IOTF) in collaboration with regional task forces (Lobstein, Baur & Uauy, 2004).

Findings on 13- and 15-year-old adolescents refer to data from the most recent WHO survey: Young people's health in context – Health behaviour in school aged children (HBSC) study: International report from the 2001/2002 survey (WHO, 2004). These data divide subjects in boys and girls, in two age groups (13-year-olds and 15-year-olds) and into pre-obese and obese groups, which correspond to the adult BMI values of 25.0–29.9 and > 30.0 and over.

In European countries a number of studies have examined the trends in childhood obesity (cf. Twisk et al., 1999), including material collected by IOTF in collaboration with the European Childhood Obesity Group (IOTF, 2002). Table 5.8 shows the prevalence rates of 7- to 10-year-old children in some EU-countries. It allows an overview neglecting the complex patterns in prevalence which vary with age, sex and geographical region within the individual countries. The highest prevalence levels are observed in southern European countries. Children in central and northern Europe generally have overweight prevalence rates of 10–20 %, while in southern Europe the prevalence rates are 20–35 %.

Tab. 5.8. *Prevalence (percentage) of overweight children in various European countries. Overweight defined by IOTF criteria (includes obese). Children aged around 7–10 years. Based on surveys in different years after 1990. (The table is drawn from data reported by Lobstein et al., 2004)*

Country	Prevalence (%)
Italy	36
Malta	35
Spain	34
Cyprus	33
Greece	31
United Kingdom	20
France	19
Belgium	18
Rumania	18
Sweden	18
Polen	18
Czech Republic	17
Serbia	17
Germany	16
Denmark	15
Holland	12
Slovakia	12
Russia	10

The reasons for a north–south gradient are not clear. Genetic factors are unlikely, because the gradient can be shown even within a single country, such as Italy (cf. Caroli, 2003).

Studies conducted over the past 15 years in various Italian regions show prevalence rates of obesity in children (8- to 10-year-olds) ranging from 10 to 12 % in northern Italy (early 1990s) to over 20 % in southern areas in the late 1990s, with a peak of 34.4 % in a 1999 study on 22,000 subjects from Latium (Istituto Auxologico Italiano, 2003). Methodological differences, particularly in defining cutoff points, clearly play a role, as also noted before.

As a whole, current estimates are that, in children of 6 to 9 years, overweight exceeds 30 to 35 % and obesity 10 to 12 % (Table 5.9). Rates appear to be highest in this age range and lower at later ages. A comprehensive cross-sectional study conducted on a sample of about 55,000 school boys and girls aged 6 to 20 from 16 of the 20 Italian regions reports a prevalence of overweight of 27 % (boys) and 19 % (girls) in the south vs 17 % (boys) and 10 % (girls) in the north (Cacciari et al. 2002). Intermediate values are reported in another survey, conducted on about 44,000 subjects aged 3 to 17.5 s from central Italy (Cel et al. 2003).

Tab. 5.9. *Overweight and obesity in Italian children and adolescents (% values) (Istat, 2002b) (Istat, 2002b Congress on overweight from infancy to adolescence; additional data and elaborations by Eurispes (2003) and by Istituto Auxologico Italiano (2003). Data computed according to the guidelines of the IOTF, 2002.)*

Age class	Males	Females	Overweight	Obese
6 to 9	34.6	33.6	30-35*	10-12*
10 to 13	30.9	19.8		
14 to 17	17.3	10.5		

\* Estimates based on the Istat survey and further elaborations by Istituto Auxologico Italiano.

It is quite interesting to have a closer look at other southern European countries. In a Greek study carried out in Thessaloniki the prevalence of overweight and obesity in 2.500 subjects (6- to 17-year-olds) was 22.2 % for overweight and 4.1 % for obesity. The prevalence was higher in children when compared to adolescents and in males when compared to females. The prevalence of overweight and obese children in Greece has been increasing during the last 6 decades, particularly in boys (Krassas, Tzotzas, Tsametis & Konstantinidis, 2001). Like in Italy in Greece, too, a north-south gradient can be observed. Cretan children are fatter than their age mates in northern Greece (Karayiannis, Yannakoulia, Terzidou, Sidossis & Kokkevi, 2003; Mamalakis, Kafatos, Manios, Anagnostopoulou & Apostolaki, 2000; Meksis, Bogkanis & Maridaki, 2004).

And when it comes to Spain – again the childhood obesity distribution by regions shows the highest prevalence in the southern areas compared to the northern parts with values ranging from 7.5 % to 15 % in boys and 4 % to 12 % in girls (Martinez, Moreno & Martinez-González, 2004; Rios, Fluiters, Perez Mendez, Garcia-Mayor & Garcia-Mayor, 1999).

Despite considerable methodology problems (sample size, methods of assessment, reference system) it is worth while looking at some data on body height and weight and BMI in some eastern European countries as well.

In the case of Slovenia data of 1970-2003 show that today's young people have their biggest growth spurt one year earlier than their counterparts 30 years ago. Girls have their growth spurt of 7 cm between 10 and 11 years, whereas boys

have their biggest growth spurt of 8 cm between 12 and 13 years. Today's boys and girls are 5 resp. 4 cm taller than their counterparts 30 years ago. Most of these changes were recorded in the period 1970 to 1983, whereas in the last ten years stagnation can be noticed (Strel et al., 2004; Strel et al., 2003).

For Czech young people the typical feature of the development of body weight in the period of the last thirty years is its decrease. This trend has continued during the last decades and implicates changes in body proportions. It leads to the slimmer figure of today's young people (cf. Sigmund, Frömel, Neuls, Skalik & Groffik, 2002). In girls this trend is noticeably influenced by weight control, in particular within the pubertal period (Moravec, 1990). In the Slovenian samples significant changes in weight were registered. An interesting finding is that today's Slovenian girls, have a smaller amount of skin fat than they had 30 years ago. This is being explained by a change in dietary habits, more sports activity, fashion trends and, perhaps, artificial food additives (Strel et al., 2004; Gabrijelčič Blenkuš, 2001).

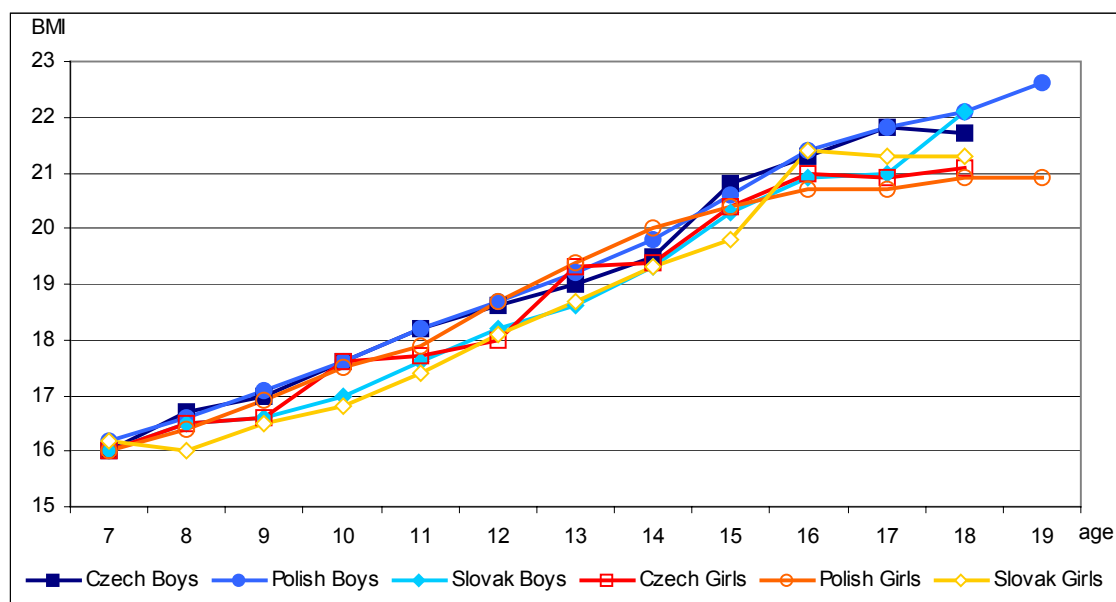


Fig. 5.8. BMI in Czech, Polish and Slovak youth (Samples of both genders: Czech (1991), N=10 000; Polish (2003), N=70 000; Slovak (1993), N=10 000) (Rychtecký, 2004)

If it comes to the body mass data figure 5.8 shows the development of 7- to 18-year-olds. Data are – regardless of gender and country of origin – very similar.

There are differences between the compared countries. After the age of 16 the BMI begins to differ with gender.

BMI data pertaining to the Slovenian youth (Strel, Kovač & Jurák, 2004) are interesting insofar as they include a comparison of the percentage of children and youth having an appropriate weight. The results document a great oscillation (74.6 to 87.4 %) in 12- and 16-year-old boys and (75.1 to 89.3 %) in 19-year-old girls. The comparison of the results of the period 1983 – 2003 shows that in 1983 the percentage of children having an appropriate weight was about 10 % lower than in 2003. The biggest percentage of overweight Slovenian children according to the BMI (25 to 30kg/m<sup>2</sup>) was found in boys m<sup>2</sup> between 9 and 14 and girls between 8 and 13 years. In Slovakia (Belej & Brtková, 1995) and Poland (Oblacińska, Wrocławska & Woynarowska, 1997; Dłużniewska, Janik & Lutyński, 1995; Przewęda & Dobosz, 2003) studies focusing on the BMI and obesity of youngsters found a higher BMI today when compared to decades ago. The change in Polish children and youth is being interpreted as a result of biological changes and improved life conditions in the Polish society (Herman & Groffik, 2004).

As to be seen in table 5.10 (Currie et al., 2004) the percentage of overweight boys and girls (the sum of pre-obese and obese young people) in the Czech Republic, Poland and Slovenia varies with country, gender and age groups from 4.3 % in Poland in 13-year-old girls to 17.5 % in Slovenia in 15-year-old boys. Polish and Czech young people are less overweight than their counterparts in Slovenia.

Figure 5.9 describes the percentage of body fat in Czech and Slovenian children and adolescents. In Czech youth both genders experience a decrease in the percentage of body fat with age. In Slovenian youngsters we see an opposite tendency with the percentage of body fat increasing with age.

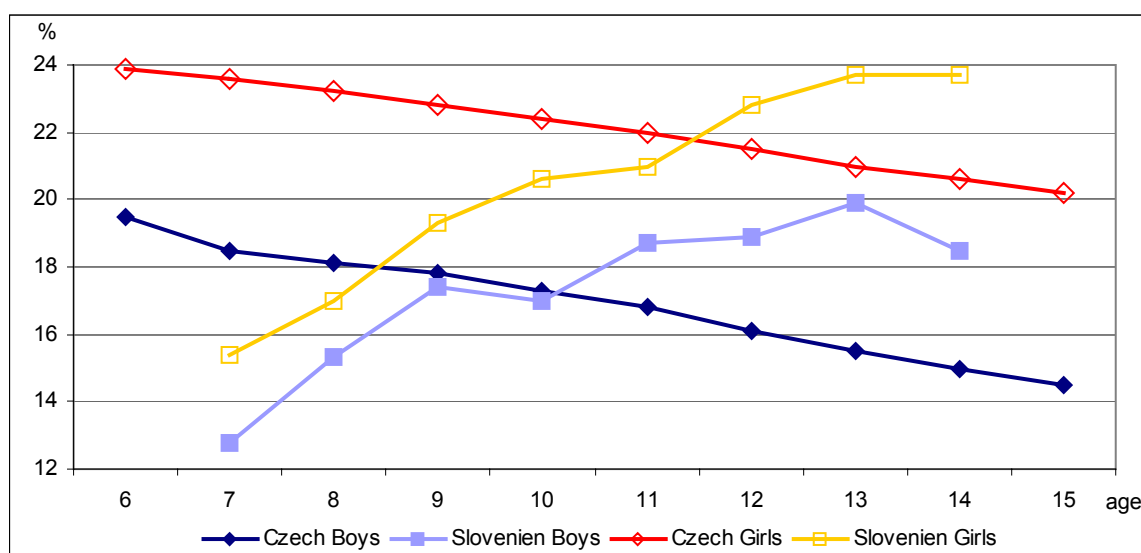


Fig. 5.9. The mean values of percentage of body fat for Czech and Slovenian YouthCzech (2000), N=3 300; Slovenian (2002), N=250 000; samples of both genders (Rychtecký, 2004)

Other reasons to explain the intra-Europe differences:

The child's household or family income may be a relevant variable, possibly mediated through income-related dietary factors such as maternal nutrition during pregnancy, or breast or bottle-feeding in infancy.

Economic recession may affect the rate of increase in overweight levels. In Poland in 1994, during a period of economic crisis, the prevalence of overweight and obesity declined (Oblacińska et al., 1997), while in the Czech Republic, less economically damaged overweight (above 90th centile 1991 reference) rose modestly from 10 % to 12.5 % in the period 1991–1999 (Bláha & Vignerová, 2002).

The most recent study on overweight and obesity is the above-mentioned HBSC study. The method used in the HBSC study is self report. The questions in the questionnaires:

*How much do you weigh without clothes?*

*How tall are you with shoes?*

Age-and gender-specific international cut-off points were used to calculate the prevalence of overweight and obesity (Cole, Bellizzi, Flegal & Dietz., 2000).

The tables developed by Cole et al. (2000) are useful for epidemiological research in that children and adolescents can be categorized as non-overweight, overweight or obese using a single standard tool. The cut off points were developed using several data sets. Therefore they represent an international reference that is suitable for research use and for monitoring and evaluating changes in populations, because the cut-offs provide a standard benchmark against which all population groups can be compared and trends assessed world-wide.

The findings are illustrated in figure 5.10 and shown in table 5.10.

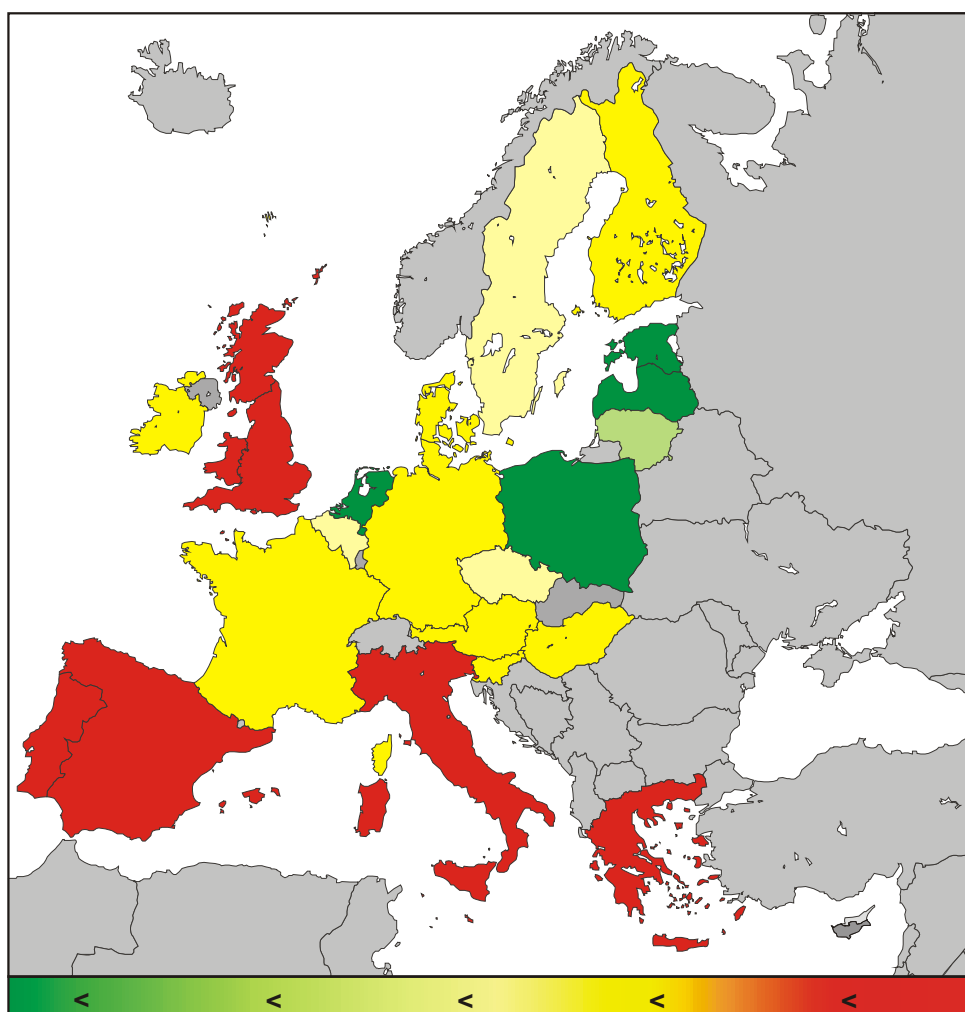


Fig. 5.10. 13- to 15-year-olds who are overweight/obese according to BMI, (%). (The figure is drawn from data by Currie et al., 2004)

Tab. 5.10. 13- to 15-year-olds who are overweight/obese according to BMI, (%). (The table is drawn from data by Currie et al., 2004)

Country	Age class	Gender	Pre-obese	Obese	Total over-weight	Total (13- to 15-year old boys and girls)
Malta	13-year olds	Boys	24.7	9.1	33.8	25.5
		Girls	18.1	5.4	23.5	
	15-year olds	Boys	18.6	9.3	27.9	
Spain	13-year olds	Boys	21.5	3.2	24.7	16.9
		Girls	11.1	0.6	11.7	
	15-year olds	Boys	17.7	2.9	20.6	
UK	13-year olds	Boys	14.9	4.1	19.0	16.4
		Girls	12.9	2.4	15.3	
	15-year olds	Boys	13.7	3.9	17.6	
Greece	13-year olds	Boys	17.5	2.8	20.3	16.0
		Girls	10.4	1.7	12.1	
	15-year olds	Boys	20.3	2.7	23.0	
Italy	13-year olds	Boys	17.9	3.1	21.0	15.2
		Girls	10.9	1.5	12.4	
	15-year olds	Boys	17.1	2.5	19.6	
Portugal	13-year olds	Boys	16.1	4.3	20.4	14.3
		Girls	11.6	1.3	12.9	
	15-year olds	Boys	15.1	1.7	16.8	
Slovenia	13-year olds	Boys	6.4	0.8	7.2	13.5
		Girls	12.4	3.3	15.7	
	15-year olds	Boys	11.0	1.4	12.4	
Finland	13-year olds	Boys	16.6	1.9	18.5	13.3
		Girls	6.6	0.8	7.4	
	15-year olds	Boys	12.8	3.1	15.9	
Hungary	13-year olds	Boys	9.8	1.2	11.0	12.8
		Girls	14.3	2.8	17.1	
	15-year olds	Boys	7.9	1.4	9.3	
Ireland	13-year olds	Boys	13.0	2.5	15.5	12.1
		Girls	9.5	1.4	10.9	
	15-year olds	Boys	11.7	3.7	15.4	
Austria	13-year olds	Boys	7.5	1.8	9.3	11.9
		Girls	10.5	3.9	14.4	
	15-year olds	Boys	8.4	2.1	10.5	
Germany	13-year olds	Boys	9.6	1.4	11.0	11.3
		Girls	10.8	1.8	12.6	
	15-year olds	Boys	13.3	1.7	15.0	
France	13-year olds	Boys	10.1	0.9	11.0	11.2
		Girls	10.0	3.3	13.3	
	15-year olds	Boys	7.5	0.7	8.2	
Belgium	13-year olds	Boys	11.9	2.6	14.5	10.9
		Girls	7.2	1.1	8.3	
	15-year olds	Boys	13.7	2.1	15.8	
Sweden	13-year olds	Boys	5.5	1.1	6.6	10.4
		Girls	11.8	2.0	13.8	
	15-year olds	Boys	7.9	0.8	8.7	
Denmark	13-year olds	Boys	10.3	1.8	12.1	10.3
		Girls	7.6	2.4	10.0	
	15-year olds	Boys	10.7	1.7	12.4	
Czech Republic	13-year olds	Boys	8.4	1.1	9.5	9.4
		Girls	10.5	1.7	12.2	
	15-year olds	Boys	7.6	1.8	9.4	
Netherlands	13-year olds	Boys	10.5	0.7	11.2	7.6
		Girls	7.0	1.5	8.5	
	15-year olds	Boys	12.7	1.9	14.6	
Poland	13-year olds	Boys	6.0	1.1	7.1	7.1
		Girls	7.5	0.9	8.4	
	15-year olds	Boys	8.3	0.9	9.2	
Estonia	13-year olds	Boys	12.8	1.4	14.2	7.1
		Girls	8.6	0.9	9.5	
	15-year olds	Boys	10.3	1.4	11.7	
Latvia	13-year olds	Boys	6.4	0.7	7.1	6.0
		Girls	11.5	1.6	13.1	
	15-year olds	Boys	5.0	0.5	5.5	
Lithuania	13-year olds	Boys	7.4	0.7	8.1	4.4
		Girls	4.2	0.3	4.5	
	15-year olds	Boys	8.8	1.0	9.8	
EU mean	13-year olds	Boys	7.1	0.8	7.9	12.0
		Girls	9.7	1.3	11.0	
	15-year olds	Boys	3.9	0.4	4.3	
	13-year olds	Boys	7.0	0.8	7.8	
		Girls	4.2	1.1	5.3	
	15-year olds	Boys	9.0	1.1	10.1	
	13-year olds	Boys	4.1	0.3	4.4	
		Girls	8.1	1.2	9.3	
	15-year olds	Boys	3.8	0.8	4.6	
	13-year olds	Boys	6.9	0.6	7.5	
		Girls	3.0	0.6	3.6	
	15-year olds	Boys	7.9	0.7	8.6	
	13-year olds	Boys	5.3	0.4	5.7	
		Girls	3.6	0.1	3.7	
	15-year olds	Boys	4.4	0.6	5.0	
	13-year olds	Boys	3.0	0.3	3.3	
		Girls	12.5	2.5	15.0	
	15-year olds	Boys	8.5	1.3	9.8	
	13-year olds	Boys	12.4	2.3	14.7	
		Girls	7.0	1.4	8.6	
	15-year olds	Boys	12.4	2.3	14.7	



Data show a clear relationship between the prevalence of overweight and the development of obesity: Countries with higher percentages of overweight also report higher obesity rates.

In both 13- and 15-year-olds, overweight appears to show a geographical pattern confirming the mentioned north–south gradient. Prevalence is highest in some southern European countries: Greece, Italy, Malta, Portugal, Spain (with the UK countries as an exception). The Scandinavian and the central European countries have a lower percentage of overweight young people. Prevalence is lowest in the eastern EU countries.

Among 13-year-olds, boys have higher rates than girls in a number of countries, with the highest gender differences found in Malta and Spain. Among 15-year-olds, again boys have higher rates than girls in 10 countries with the highest gender differences in Greece, Italy, Malta and Slovenia.

In the majority of countries the prevalence of obesity is much higher in boys. Again, similar to the findings for overweight, prevalence of obesity does not increase or decrease considerably between the two ages.

*Tab. 5.11. Comparison of young people who are overweight/obese according to BMI, (%) between WHO data (Currie et al., 2004) and IOTF data (IOTF, 2004)*

Country	Overweight/obesity in 13-year-old children WHO data	Overweight/obesity in 15-year-old adolescents WHO data	Overweight/obesity in 7- to 10-year-old children IOTF data
Malta	28.6	22.5	35
Spain	18.2	15.7	34
England	16.9	14.6	20
Italy	16.7	14.7	36
Greece	16.2	15.8	31
Germany	11.4	11.2	16
France	11.3	11.1	19
Belgium	10.9	10.7	18
Sweden	10.0	10.9	18
Czech Republic	9.4	9.3	17
Denmark	8.8	11.9	15
Poland	7.7	6.6	18
Netherlands	6.6	8.8	12

In table 5.11 the IOTF data on 7- to 10-year-olds are compared with the WHO data on 13- and 15-year-olds. There is a clear difference in the data, showing a much lower percentage of overweight children in the WHO study. The reason for this is not clear. But the percentage of missing BMI data in the WHO data was high. Findings of an analysis of the characteristics of the young people who did not report their height and weight suggest that they are likely to be overweight or obese and dissatisfied with the size and weight of their bodies. They are likely to come from higher socioeconomic groups, less likely to be physically active, are more likely to be dieting or feel the need to lose weight and consume less fruit and vegetables. A shift in overweight and obesity from child to adolescent is unlikely as this has not been seen in longitudinal studies following children from childhood into adolescence.

There are clear indications that overweight and obesity in children are increasing (Strauss & Pollack, 2001). In order to demonstrate secular trends in the prevalence of young people's overweight and obesity reference is made to the development in England and the Netherlands as exemplars (figure 5.11, 5.12 and 5.13).

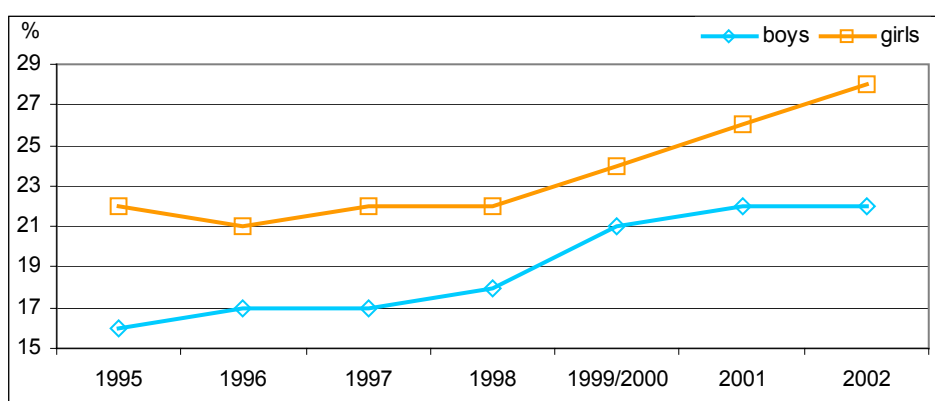


Fig. 5.11. Prevalence of overweight/obesity in children in England (%) (Seidell, 2004)

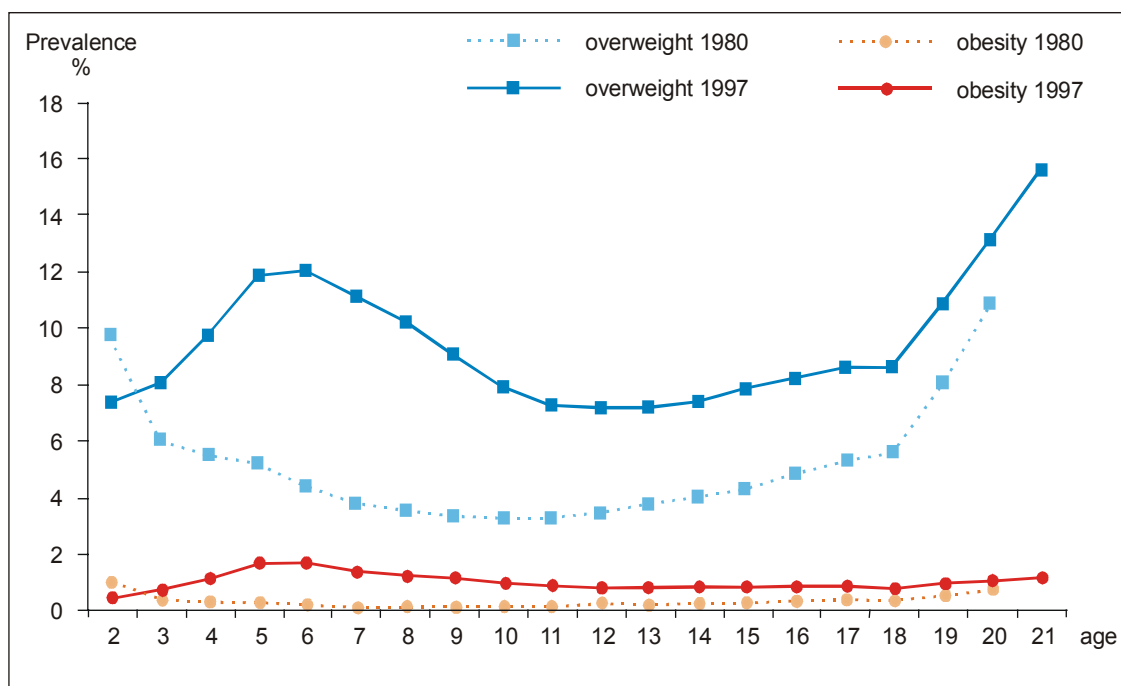


Fig. 5.12. Prevalence of overweight and obesity among Dutch boys (%) (Hirasing, Fredriks, Van Buuren, Verloove-Vanhorick, & Wit, 2001)

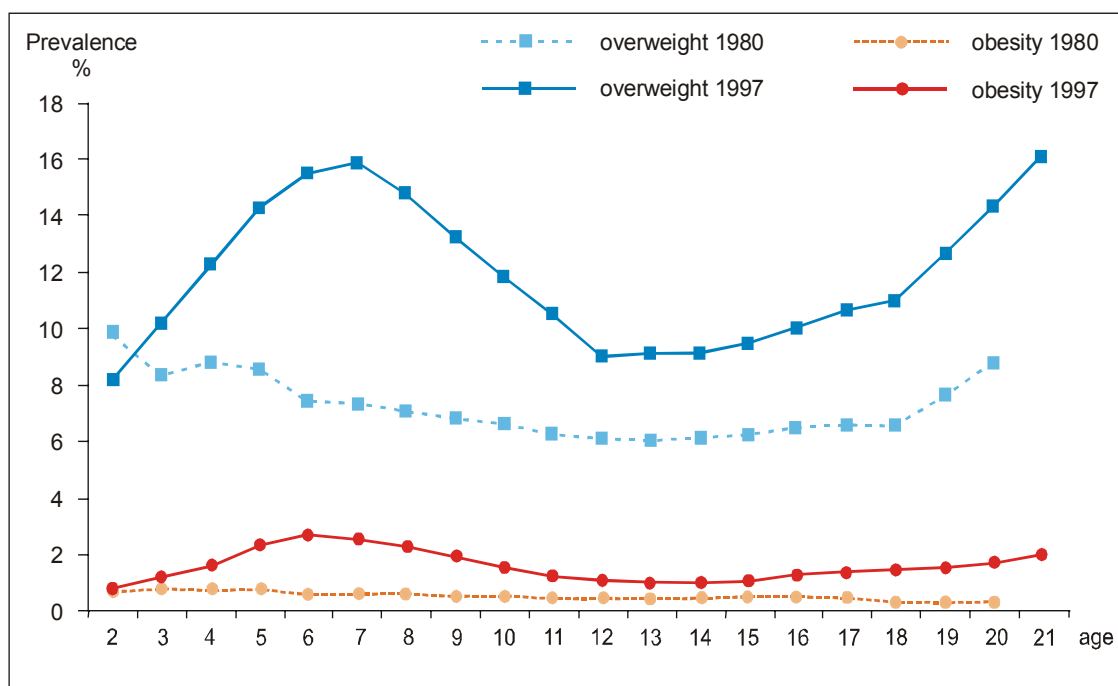


Fig. 5.13. Prevalence of overweight and obesity among Dutch girls (%) (Hirasing, et al., 2001)

As there is substantial evidence that obesity during childhood lays the metabolic groundwork for adult cardiovascular disease (Gidding et al., 1996), and as children who were obese at ages 6 to 9 have been shown to be 8.8 times as likely to be obese in their 20s, compared with non-obese peers (Whiteaker, Wright, Pepe, Seidell & Dietz, 1997), the question to the factors influencing the development of overweight and obesity in young people is becoming more and more important.

It is safe to say that the aetiology of overweight and obesity is likely to exist in the interactive effects of genotype and environmental influences. A range of additional sociodemographic and psychosocial influences can modify these relationships. Our knowledge concerning these complex relationships is limited.

The three main causes of overweight and obesity in young children are likely to be genetic predisposition, high energy intake and low energy expenditure.

There is evidence for an genetic component to overweight and obesity. For most of overweight and obese children the genes overweight are expressed where the environment allows and encourages their expression (obesogenic' environment).

A genetic predisposition to accumulate weight is a significant element in the development of overweight and obesity, but the whole process of becoming overweight is complex. Given the high level of genetic predetermination of obesity risk it is clear that large numbers of children are likely to develop excess body weight wherever the situation permits it. Certain physical and social environments are likely to encourage weight gain, and so are certain groups of young people such as children with physical disability, adolescents with type 1 diabetes, children with psychological problems and children with eating disorders. But also ethnicity, parental obesity, and low birth weight and social deprivation are essential and influencing factors (for details see Lobstein et al., 2004). For some children, foetal growth is related to obesity.

Also the influence of breast-feeding has been suggested to have a protective influence on subsequent childhood obesity (Armstrong & Reilly, 2002). The evidence in this field is still tentative.

The dramatic secular increase in the prevalence of young people's overweight and obesity cannot be explained by genetic factors only, as the gene pool is unlikely to have fundamentally changed over recent years.

Given a certain percentage of the tendency to gain weight to be inherited and given the influence of foetal growth and breast-feeding these factors are not sufficient to explain the rapidly rising general trend and the different prevalence rates in different parts of Europe during the last years. It seems likely that the rise of prevalence of overweight and obesity in children and adolescents can be linked

- (1) to dietary factors such as the consumption of energy-dense, nutrient-poor food and soft drinks, that are high in sugar and fat, in place of fruit and vegetables,
- (2) to the growing amount of sedentary behaviours such in young people's leisure time as listening to music, TV viewing, videogame playing and computer and communication technology use, and
- (3) to the low level of physical activity that seems to have been affected by the changes in urban culture, the absence of play areas, the social erosions in the family structure and the need of motorised mobility in daily life.

The changing nature of the environment towards greater inducement of obesity has been described in WHO Technical Report (2002) on chronic disease as follows:

"Changes in the world food economy have contributed to shifting dietary patterns, for example, increased consumption of energy-dense diets high in fat, particularly saturated fat, and low in unrefined carbohydrates. These patterns

are combined with a decline in energy expenditure that is associated with a sedentary lifestyle-motorized transport, labour-saving devices at home, the phasing out of physically demanding manual tasks in the workplace, and leisure time that is preponderantly devoted to physically undemanding pastimes.”

The two main environmental influences on overweight and obesity are likely to be high energy intakes and low physical activity. There appears to have been a modest decline in the energy intake. Mean energy intakes of 14-year-old girls have falling from 2,600 kcal./day to 1,800 kcal./day over the last 50 years, and the decline in 14-year-old boys over the same period is 3,100 kcal./day to 2,400 kcal./day. It has therefore been argued that low levels of physical activity are the main cause of the rise in obesity. Obesity is rising in the face of unchanged or slightly declining energy intake in adults, whereas indices of physical inactivity (motorized transport, TV viewing, computer games) are increasing. It appears that fatness is increasing in the face of declining energy intakes and growing sedentary behaviour. There is little evidence that obese children consume more calories than non-obese children (Rolland-Cachera et al., 1988). Some multi-variate studies have found that television viewing and playing video games for longer periods of time, or not participating in sports outside of school, promotes obesity, whilst physical activity shows protective effects (Berkey et al., 2000; Wedderkopp, Andersen, Hansen & Froberg, 2001).

- **Though the definition of overweight and obesity, the assessment methods and the reference systems may vary from survey to survey all findings confirm the rapid rise in the prevalence of overweight in children and youth in most parts of Europe during the last decades. This development is likely to indicate a secular trend.**
- **By presenting data for overweight and obesity in a geographical perspective the prevalence rates and highest in southern Europe and in UK. Lower levels of overweight children are found in central and northern Europe. Prevalence is lowest in the Baltic states and some countries in eastern Europe.**

- **Overweight and obesity are linked to serious complications and ill health in childhood and adolescence. Overweight and obese young people are at risk of becoming overweight and obese adults (“fat children become fat adults”) with an associated raised likelihood of ill health (CVD, hypertension, diabetes mellitus, osteoporosis, deficits in functionality). The findings give evidence of a strong relationship between young people’s lifestyles and adult health status.**
- **The three essential causes for overweight and obesity are genetic predisposition, high energy intake and low energy expenditure.**
- **The dramatic secular increase in the prevalence of young people’s overweight and obesity is unlikely to be explained by genetic factors. The two main environmental factors appear to be high energy intake and physical inactivity.**
- **As the mean energy intakes of young people have fallen over the last decades, physical inactivity in the daily lives of young people is likely to be the main cause for the rapid rise of overweight.**
- **The level of sedentary behaviour is likely to be the key factor in the rise of young people’s overweight and obesity.**

## **6 Barriers to, facilitators of young people's physical activity – determinants and correlates**

The misleading use of the terms “determinant” and “correlate” asks for clarification. Concerning their connotations the terms “determinant” and “correlate” differ from each other if used in an empirical and statistical context, though they are not unfrequently being used interchangeably in everyday language and sometimes even in scientific language. The term “determinant” refers to a clear causal relationship between two variables in longitudinal and experimental studies, whereas the term “correlate” refers to a correlational relationship between two variables in studies with a cross-sectional design. Exemplar: If an effect of gender on competitiveness in sport is identified, gender is the “determinant”, because the cause-and-effect relationship is obvious. On the other hand a correlation between physical activity and cognitive development does not tell us anything about the cause-and-effect relationship. The question whether physical activity or cognition is the determinant remains unanswered. In this situation “correlate” would be the appropriate term.

As stated above physical activity during childhood has remarkable health benefits for adolescents and young adults. Physical inactivity is associated favourably with cardiovascular disease risk factors profiles. It also contributes to a normal skeletal development. And anticipating the results of the next chapter physical activity is mostly associated positively with mental and social health outcomes, such as higher levels of self esteem, emotional stability and social integration and inversely related to lower levels of depression and anxiety.

Despite these potential benefits a decline of physical activity can be identified as young people pass through their teen years.

A better knowledge of the determinants and correlates of physical activity will contribute to the development of prevention and interventions programs promot-



ing an active and preventing a sedentary lifestyle. Information on the influencing variables will enhance the quality and effectiveness of the programs. After extensive computer searches and manual searches about 80 studies were found that met the criteria for potential correlates and determinants of physical activity. The majority of the studies was cross-sectional. Only a limited number was longitudinal in design.

There was a lot of inconsistency in the empirical findings. Possible explanations for this situation: There was a wide range of theoretical concepts guiding the empirical study and implicitly favouring or excluding certain influencing factors. Only few studies used objective measures to assess physical activity; most of the results were based on self-report measures with mostly unvalidated scales. Size and recruitment of the samples varied. The study population differed from study to study. Different statistical procedures and strategies of analysis were applied. These features may have had an influence on the results and explain why it is so difficult to compare the studies and their findings. Despite these limitations cross-sectional studies provide information, that is valuable for our search for variables influencing physical activity. What do these studies tell us about the variables influencing young people's physical activity?

In the model of Sallis, Prochaska and Taylor (2000) the correlates of physical activity in young people were categorized in 5 groups:

- Biological and demographic variables (such as parental overweight and age);
- Psychological, cognitive and emotional variables (such as self-efficacy and expected benefits);
- Behavioural variables (such as playing video games and internet surfing).
- Social and cultural variables (such as parental modelling and local traditions);
- Physical environmental variables (such as access to sport facilities; safe streets and parks).

Sallis et al. (2000) examined correlates among young people aged 13 to 18 and identified: factors which have been shown to have a consistent negative or positive relationship; an inconsistent; or no relationship. A summary of their results is displayed in table 6.1 below.

*Tab. 6.1. Factors found to be consistently related to physical activity levels; inconsistently related; or unrelated (Abstracted from the systematic review by Sallis et al., 2000)*

	Consistent relationship		Inconsistent relationship	Unrelated
	Positive	Negative		
Demographic and biological factors	* young men more active * whites more active	* adolescents less active than children	* body weight * adiposity	* socio-economic status
Psychological factors	* achievement orientation * perceived competence * intention to be active	* depression	* perceived benefits * self-efficacy * body image * attitudes and knowledge * enjoyment of PE	* perceived barriers * external locus of control * self-esteem * self-motivation * enjoyment of exercise * perceived stress
Behavioural factors	* sensation seeking * past participation in sports in the community	* sedentary behaviour after school and at weekends	* smoking	* alcohol use * healthy eating * sedentary time in general
Social / cultural factors	* parental support * support from 'significant others' * sibling activity levels		* support from peers	* parental activity levels * peer modelling * teacher or coach support
Physical environment	* opportunities to exercise			* sports media influence * availability of equipment

We modify this model by emphasizing that behaviours have multiple levels of influence, including *intra-personal*, *interpersonal* and *environmental variables*, all of them embedded in *historical developments* and trends (cf. Biddle & Nigg, 2000). This leads to the assumption that the underlying combination of psycho-social, environmental and societal variables caused by historical changes will best explain physical activity (cf. Sallis et al., 2000).

Such an approach can look back to a tradition in the social sciences. It refers to modern socialisation theories which emphasize that the development of young people must be understood as an ecological, transactional or dialectical process

in which individual and environment are mutually influencing each other. But the ecological approach suggests a moderate shift of emphasis from the psychosocial variables, which have been more extensively studied so far, to the environmental variables to which less attention has been given.

## **6.1 Psychosocial correlates and determinants**

When differentiated by age-groups, i.e. children and adolescents and by psychosocial and environmental variables, the findings can be cautiously summarized as follows:

### ***Psychosocial variables in children***

Children are reported to be the most active part of the population.

- Studies report higher levels of activity in boys than in girls; overall boys are 15 % to 20 % more physically active than girls; boys are more involved in vigorous physical activities; girls favour a more moderate mode;
- Age is unlikely to be a decisive factor for physical activity during childhood;
- There is a consistent association between self-efficacy and physical activity;
- Contrary to popular assumptions there is no clear evidence for a relationship between BMI and physical activity;
- There is substantial evidence that parental support promotes physical activity of children. Parental modelling may have a negative or a positive impact on boys' and girls' physical activity levels.

### ***Psychosocial variables in adolescents***

Adolescence is the period for intensive participation in sport. But it is also the period in which physical activity declines with age.

- Gender is one of the most evident determinants. Activity levels are higher in boys than in girls. Boys are much more involved in vigorous physical activity.
- Studies agree that physical activity significantly declines with age in males and females with about 3 % decline per year for boys and about 7 % for girls.
- There is a consistent positive association between self-efficacy and physical activity.
- Concerning perceptions of benefits or barriers to physical activity gender differences appear with girls showing lower levels of perceived benefits and higher levels of perceived barriers and costs.
- Peer modelling and support is strongly associated with physical activity levels of adolescents.
- There is a strong influence of the socio-economic status of the family, parent education and educational aspiration. High socio-economic status and high level of education was significantly associated with increased likelihood of being physically active. Ethnicity appears to hinder or facilitates physical activity and sport participation. But clear data are lacking.

- **Comparing the results on the correlates and determinants of children's and adolescents' physical activity we find gender, self-efficacy and perceived benefits as well as family and peer modelling and support to be associated with physical activity in both age-groups.**
- **Age is an important determinant during adolescence. In this period physical activity declines with age.**
- **Parental socio-economic status and the level of education are likely to have a strong impact on young people's physical activity.**

## 6.2 Environmental correlates and determinants

The term “environment” is used in different ways in studies on physical activity, physical fitness, sport and health. Many bio-medical studies take a wide view of environmental influence. Everything which can affect an individual physically (e.g. BMI) or physiologically (e.g. CVD), excepting only his or her genetic makeup, gender and age, is considered to be “environmental” if it correlates at all with these purely physical or physiological features and might conceivably influence them positively or negatively in any way. We also hear of “social environments” or “psycho-social environments”. These are factors or determinants, variable quantities that include the social context in the family (e.g. young people’s family background together with their economic background, standard of education and siblings), the social characteristics of their leisure behaviour (e.g. forms of participation in physical activities, kinds of physical activities, frequency, intensity) and even certain psycho-social personality or behavioural characteristics (e.g. self-efficacy, self-concept, motivation); our study will not use the term “environmental” for these – in the widest sense – social factors. In previous chapters, these factors – which to a greater or lesser extent shape and influence an active or sedentary lifestyle – have been alternatively described as “social correlates and determinants”.

The term “environmental correlates and determinants” is used to denote certain characteristics that might exert an influence by virtue of their material existence (e.g. ownership of sports equipment) or, in the case of facilities (e.g. gymnasias, playing fields, swimming pools), by virtue of their physical presence as infrastructure elements or specific geographical features (e.g. climate, pollution, rural-urban settings, landscape, access to open places and spaces, road systems, transportation systems). Other factors such as land-use policy, city planning and construction design also have a considerable influence on this infrastructure as environmental variables for young people’s curricular and extra-curricular physical education and their organised and unorganised physical activity and personal aspirations to exercise (cf. Sallis et al. 2001). All these environmental variables affect physical and material conditions, for example the

provision of physical education in schools and the sport facilities available in community sport clubs. The combination of the domestic environment, day-to-day movement behaviour, e.g. the trip to school and back home again, nearby local access to play and sport arenas are all important as environmental correlates and are often decisive variables for young people's daily physical activity. At present, European studies dealing with young people's active and sedentary lifestyles unfortunately still often underestimate these factors.

### ***Environmental determinants and correlates for PE***

The CDDC survey carried out by Hardman (2002) already recorded a number of parameters relating to the infrastructure of sporting facilities used for school-based PE in a large number of EU countries. For some of these countries the report revealed a shortage of premises and materials hampering the use of gymnasias or playing fields for physical education, as well as deficiencies in the condition of the buildings. Among other factors, the report for Lithuania and Latvia found premises were too small and classes too large, and the meagre provision of sports equipment was also criticised (Laskiene et al., 2004). In Poland, for example, only every other school (52 %) has a gymnasium and only 1 % of schools has a swimming pool (cf. Główny Urząd Statystyczny, 2004). Comparable criticism of the availability of sport facilities and the poor ratios shown by numbers of facilities and numbers of school classes and students are also reported for physical education in the Czech Republic and Slovakia. A lack of proper sport grounds and facilities is also reported for some southern European countries (Portugal, Greece). An additional problem is the distances that have to be covered to get from the school grounds to the sport facilities, particularly in many crowded urban areas. In England the provision of space and facilities for school sports has also deteriorated because many schools' playing fields have simply been sold off for economic reasons.

### ***Environmental determinants and correlates for physical activity and sport***

There are similar problems for physical activity in sport clubs, both for school sports clubs and for young people who join sports associations' clubs in their

municipality, because the two groups often have to share the same sport facilities. In a number of EU countries such as Portugal, and also in countries such as Lithuania, Latvia, Slovakia and particularly Slovenia, children and young people engage in more informal sport in the open air, in yards and open spaces, than organised sport in any sports clubs (cf. Diniz, 2004; Laskiene et al., 2004). This is also related to admission fees and the cost of membership in sports clubs; in many of the countries in eastern Europe these are simply beyond the parents' economic means.

While various studies from Finland report a reduction in young people's rate of participation in organised sport club activities during the 1990s we simultaneously hear of an increase in informal sports activities. Individual walking, running and cycling have increased in correlation with the completion of appropriate paths and tracks in the communities (cf. Laakso et al., 2004). Studies in the Czech Republic also report that up to 30 % of boys' sporting activities and up to 40 % for girls takes place in the open air, also using streets, parks and open spaces for this purpose (cf. Rychtecký, 2004). A similarly high level of use of the immediate vicinity of the home for physical activity is also reported by Portuguese studies, in which young males cited "backyards" (up to 80 %), "open spaces" (71 %) and "in the street" (58 %) as their preferred location for physical activity, with only slightly lower values for the girls (cf. Silva, 2001). These results are all from EU countries with a high proportion of rural areas; the percentages for other EU countries are likely to be somewhat lower.

### ***Motorised vs. active transportation of children and youth***

One of the environmental variables that is most frequently cited in connection with young people's increasingly sedentary lifestyles is "motorised transportation". This variable principally affects the journey to school, but also includes travelling to remote sport places and facilities for active leisure pursuits. The Swiss 2000 Microcensus (2001) reports that children between six and nine spend an average of almost 80 minutes per day travelling, an average of 3.5 trips per day within a radius of over 17 kilometres. Only 62.5 % of these children still walk or cycle to school, 28 % travel to school in their parents' car, even

when the distance is less than 1000 meters. But motorised transportation by parents is a two-edged sword. Certainly transportation to remote movement locations increases the time children and young people spent in a sedentary state, but American studies (cf. Sallis, McKenzie & Hovell, 1999; Hoefer, McKenzie, Sallis, Marshall & Conway, 2001) indicate that it is their parents' provision of motorised transport that enables children and adolescents to spend their free time participating in physical activities and that the time spent in active movement is greater for children and young people with motorised services.

The Department of the Environment in the UK reports (2000) that motorised transportation for young people under the age of 16 has almost doubled in not quite 10 years, from 16 % in 1985/86 to 30 % in 1997/98. School projects in the UK with "walking buses" (parents accompanying their children to school on foot, with a fixed route plan and timetable of stops for other children to join the group) also lead to reductions of up to 30 % in the use of cars for school transportation. A recent study by Cooper, Page, Foster and Oahwaji (2003) at English primary schools in Bristol (average age 10.4 years) confirms that the 65 % of school-children who commute to school actively (walking) are also more physically active after school, in the afternoon and evening, although this result applies only partially to the girls. This result agrees with earlier American studies: the more time children spend outside in the open air (and not at home) the more physically active they are (cf. Klesges, Eck & Hanson, 1990; Sallis et. al., 1993). It is not surprising that WHO (2002) is already promoting daily walking and cycling as active means of transport for young people travelling to school.

### ***Health benefits of active transport to school and leisure places for young people***

There is some evidence supported by European studies in France, Ireland, Denmark, the Netherlands and Belgium, albeit only with samples of adults, that active transportation to work by walking and (particularly) cycling was beneficial to increase energy expenditure and lower CVD risk factors (cf. Wagner et. al., 2001; Andersen, Schnohr, Schroll & Hein, 2000; Bovens et. al., 1993; Bour-



deaudhuij, Sallis & Saelens, 2003). Recently published American research reviews, including meta-analysis of the influences of environmental factors and active transportation (cf. Owen, Humpel, Leslie & Baumann, 2004; Sallis, Frank, Saelens & Kraft, 2004) clearly document the significance of some environmental factors on the exercise of physical activity. For walking, for example, four factors were found: aesthetic attributes, convenience of pavements and tracks, accessibility of destinations (shops, parks, beaches), and perceptions of traffic and busy roads (safety). As other European comparative studies also show, the perception of the environment plays a major part in accepting community opportunities for physical activities (cf. Rütten et.al 2001). Safe roads and parks, clean streets and open spaces, an attractive neighbourhood (pavements and tracks), objectively measured density of facilities around homes, equipment in gardens and school playgrounds are important in convincing parents (cf. Sallis, McKenzie, Elder, Broyles & Nader, 1997) to opt for non-motorised transportation to school, sport clubs' facilities and other places, as well as in stimulating young people to engage in more physical activity, games and sports.

### **6.3 Historical developments and “zeitgeist”-trends**

The current social transformations and cultural changes observable in many European societies have a significant influence on the process of coping with these development tasks and also affect the formation of young people's lifestyles. Though the rapidness and the intensity of the impact of the social changes may change from country to country the developments are similar. In particular in the western, southern, northern and central countries of the EU the historical and “Zeitgeist”-trends is obvious and can be summarized as follows:

Young people of today can no longer rely on secure traditional ties such as family or church, or on given standards, social norms and life-patterns. Unlike the generations of their parents and grandparents, modern adolescents are called upon to be the producers of their own biographies and to rely on their own decisions.

This has produced a double-edged sword for adolescents. On the brighter side, the changes have allowed a growing spectrum of biographical options for adolescents. Conversely, the search for the real me during this dynamic and intense period of transition has led to a greater susceptibility to disturbed identity formation. Just as the standardized biography of former times has been replaced by a patchwork biography, the uniform adolescent lifestyle has given way to a great variety of lifestyles during adolescence (Beck, 1986).

In the eastern European countries this development has already started and is on high revs in young people's leisure time (cf. Centrs, 2003; Croatian Health Service Year Book, 1998; Latvijas statistikas gadagramata, 1999).

In the EU-countries west of the former iron curtain the traditional value systems have declined without being replaced by strong new alternatives. For many young people the body has become a bastion on which to build a reliable sense of identity. Not only has the relationship between the body and identity become stronger, but also the links between the physical self and the lifestyles. Young people are increasingly concerned with the management and appearance of the body, both as a constituent of the self and as a social symbol (Beck 1986; Shilling 1993). In this context it may be emphasized that during adolescence it is the physical self that to a large degree determines and explains the quality of self esteem (Fox, 1997).

The new emphasis on the body has allowed it to take on the quality of a social power resource. Similar to our money (economic capital), our relationships (social capital), our educational qualifications (cultural capital), the body has a social currency value that can be converted into economic, cultural, and social profit. In short, a sporting, fit and aesthetic body has become a source of power and status in society, which is well reflected in young people's lifestyles (Bourdieu, 1983; Brandl-Bredenbeck, 1999; Shilling, 1993).

The improved status of body capital for young people seems directly linked to the increase in importance that sport and physical activity have acquired in youth cultures around Europe. Physical activity and sport provide an arena for displaying the importance of appearance and of the performing aspects of the body and of young people's lifestyles. This observation is valid for all parts of the EU, regardless of the geographical area.

## **7 Benefits of physical activity – the relationship between physical activity and psychosocial development in children and youth**

In youth reports and journals of many European countries the young generation is occasionally diagnosed as favouring an unhealthy and sedentary lifestyle and tending towards social, emotional and mental impoverishment. Not infrequently this state is seen as a consequence of insufficient physical activity and sedentariness. Deficits in young people's physical, cognitive, emotional and social development are used as arguments for the necessity of extending school physical education time, of developing recreational sports programmes, and of promoting community-based or club sports.

Traditionally research into the benefits of physical activity has focused on the physical aspects of health. And this report, too, has so far shown the potential of physical activity for enhancing physical fitness and preventing diseases in childhood and adolescence. With a broader concept of health the psychological and social dimensions gain more and more attention in the public, particularly with respect to children and adolescents.

In this context a number of questions arises: Do physical activity and involvement in sport have an impact on young people's academic performance? Do they promote the social and emotional development of children? Do they contribute to the development of self esteem and identity formation? Do they build character and support the all-round development of young people?

Many people particularly physical education teachers and sport officials tend to answer in the affirmative. They favour a line of argument focusing on the idea of a causal link between the physical and the psychosocial, i.e. that physical activity has a beneficial effect on young people's development in all its facets.

## 7.1 Physical activity and cognition

In order to justify the presence of physical education in schools reference is often made to its cognitive benefits. Reference is made to physiological mechanisms, such as increased blood flow, alteration, in brain neurotransmitters and changes in the central nervous system which are based on the physical changes in the body brought about by physical activity. The other explanation refers to learning mechanisms which state that movement and physical activity provide experiences that support cognitive development.

Findings from surveys seem to give support to these assumptions. As an exemplar we refer to an American study, that has recently been published. In this so-called California study, reading and mathematics scores of the Stanford Achievement Test were matched with fitness scores of the so-called Fitnessgram by the Cooper Institute. The sample consisted of one million kids between 10 and 14 (figure 7.1).

The bar graphs show a significant relationship between the two types of scores that were matched.

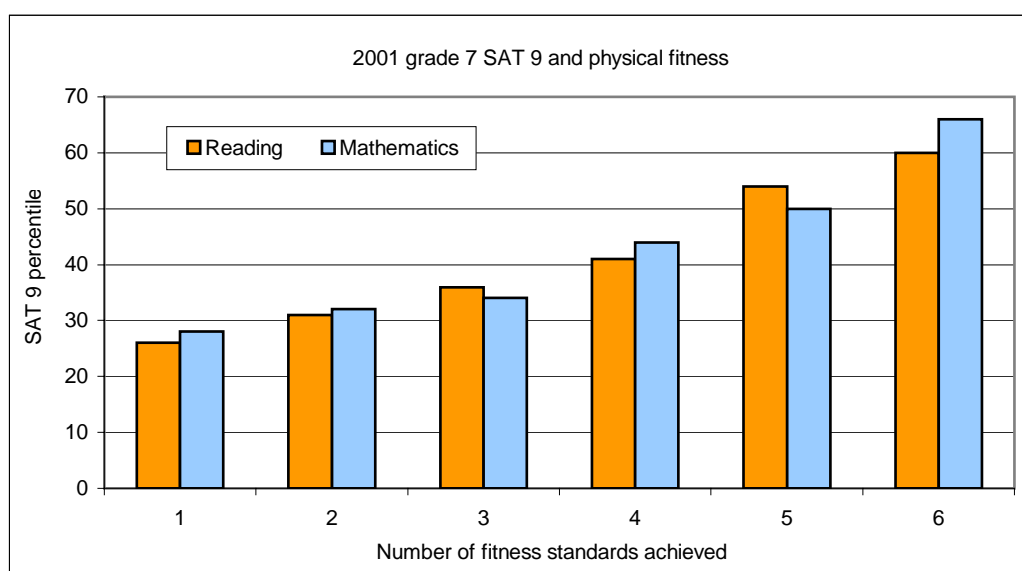


Fig. 7.1. Relationship between academic achievement and physical fitness (National Association for Sport and Physical Education, 2002)

Key findings of the study are:

- Higher achievement was associated with higher levels of fitness at each of the grade levels measured.
- The relationship between academic achievement and fitness was greater in mathematics than in reading, particularly at higher fitness levels.
- Females demonstrated higher achievement than males, particularly at higher fitness levels.

At first sight support to these findings is given by two recent reviews of more than 50 studies (Mutrie & Parfitt, 1998; Sibley & Etrier, 2003). From these reviews it is concluded that there is a significant positive relationship between physical activity and cognitive functioning in children and adolescents.

However, the findings of the reviews should be interpreted with caution. There are a number of serious concerns that make them substantially less compelling. The most important one is that most studies being reviewed are cross-sectional. Conclusions from correlational studies are flawed by their design. It is possible that differences in cognition as a function of fitness are not actually caused by the physical activity, but are pre-exercise cognitive differences that existed prior to sport participation.

To truly establish a cause-and-effect relationship for physical activity and cognition studies are necessary that are genuinely experimental in design, in which participants are randomly assigned to treatment conditions. An alternative is to conduct longitudinal studies which provide data that are collected from the same respondents in repeated surveys held over time.

But both kinds of studies are lacking in Europe. Despite the findings of the cross-sectional studies a causal relationship between physical activity and cognitive performance has yet to be established. Rather than bringing conclusion in the area of young people's physical activity and cognition the results of the reviews suggest that further research is needed. We particularly need experimen-

tal work in order to show, if a causal link exists and to clarify the type, amount and intensity of physical activity that may promote cognitive development. There is only little evidence to support positive outcomes from physical activity on academic performance and cognitive function.

## **7.2 Physical activity and its link to mental and social development**

It belongs to the ritual of sport and youth policy in almost all European countries to emphasize the role physical activity and sport can play in the mental and social development of children and adolescents. And indeed if physical activity can be shown to have an impact on the development of good mental health, as well as in the prevention of mental health and social interaction problems increased attention would be paid to programs enhancing the mental and social development of young people.

Referring to the most recent meta-analyses by Biddle (1993), Calfas and Taylor (1994) and Mutrie and Parfit (1998) on physical activity promoting good mental health and establishing positive social relationships the findings suggest that the potential for physical activity and sport participation to provide opportunities for supporting young people's mental and social development is widely recognised, but convincing empirical evidence is scarce. Though the few studies suggest there are moderate effects of physical activity anxiety and depression cautious conclusions drawn from cross-sectional studies and correlational data suggesting that physical activity is negatively linked with stress and depression and positively associated with zest for life need to be backed up by experimental studies.

The strongest evidence of physical activity being linked with good mental health is in the area of self-esteem. But there might be also the chance to show the dark side of physical activity, that is the case when negative experiences with physical performance damage the self-esteem of boys and girls. For both alternatives the central cause-and-effect question remains open.

As to the social development there is broad agreement that physical activity and even more involvement in sport can enhance the social and cooperative skills of young people. But again empirical evidence is hard to find (Mutrie & Parfitt, 1998). In a cross-cultural study on the relationship between sport participation and the vulnerability to violence in young Germans and Israeli boys and girls neither significant positive nor negative associations of physical activity with anti-social behaviour were found (Brettschneider, Brand-Bredenbeck, Hofmann & Eldar, 2004). Even if politicians and curriculum-architects do not like it: The effectiveness of sport as an antidote to juvenile delinquency is still unclear.

When it comes to the question of clear outcomes of physical activity on young people's social relationships with peers reference can be made to research of self-concept. There is some experimental work to show that there are positive short-term and long-term effects of outdoor activities on the general self and the social facets of self-concept (Marsh, Richards & Barnes, 1986a, 1986b). A series of longitudinal studies on the outcomes of sport involvement on self-concept has been carried out by a German group research. The aim of the studies was (1) to identify possible effects of physical activity as intra-individual changes of self-concept and (2) to compare physically active boys and girls with less active peers.

The first study was a quasi-experimental study over three years with active involvement in organised sports club membership as the "treatment". It looked at 12- to 18-year-old sports active club members and compared them to physically less active young people (Brettschneider & Kleine, 2002).

Figure 7.2 summarizes the course of development of self-esteem for three different cohorts. Involvement in sports club activities has a positive, but not significant influence on the development of self-esteem in adolescents. However, there are variations by gender: Girls discover sports as a source of self-esteem earlier than boys; the latter group stands to gain longer.



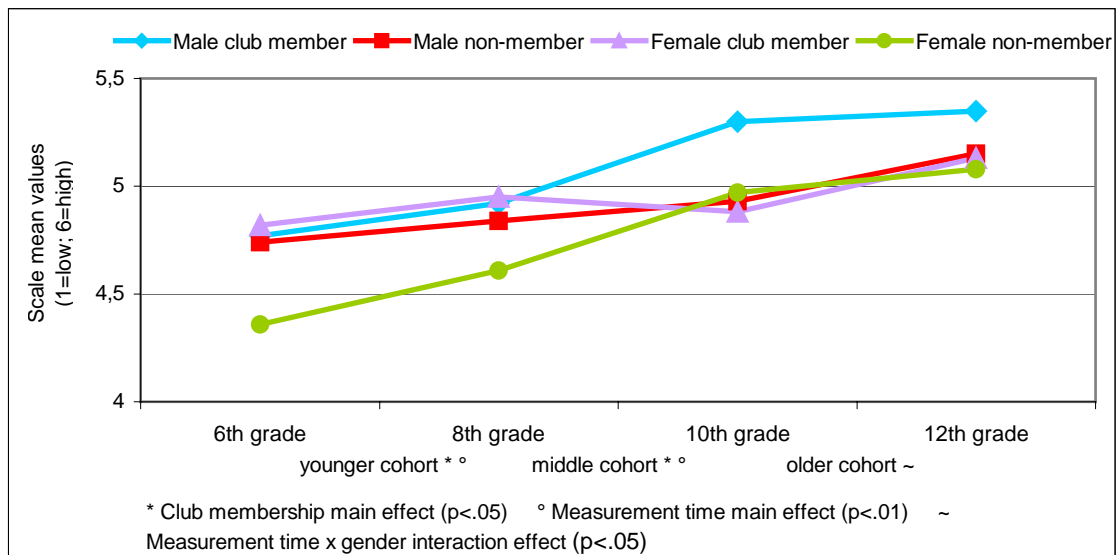


Fig. 7.2. Development of self-esteem for all three cohorts (Brettschneider, 2001)

If young people fail to cope with stress the organism may react in two ways: with psychosomatic constraints or deviant behaviour and juvenile delinquency. The prevalence rates are low and show that age and even more so gender, are the most important influencing variables. Again, a systematic effect of sports club activity does not emerge from the data.

As to the relationships with their peers of both sexes and their parents, adolescent members of sports clubs do not differ significantly from those who are non-members. No persistent effect of sports clubs on the social self-concept of adolescents has been found.

Study 2 attempts to investigate the possible effects of top-level sport involvement on adolescents' self-concept. It compares 800 young top athletes of between 12 and 18 years of age with male and female adolescents with no pronounced sports biography (Brettschneider & Klimek, 1998).

The study also shows that young people in top sport have a broadly based and stable social network. They give their relationship with parents and friends positive scores.

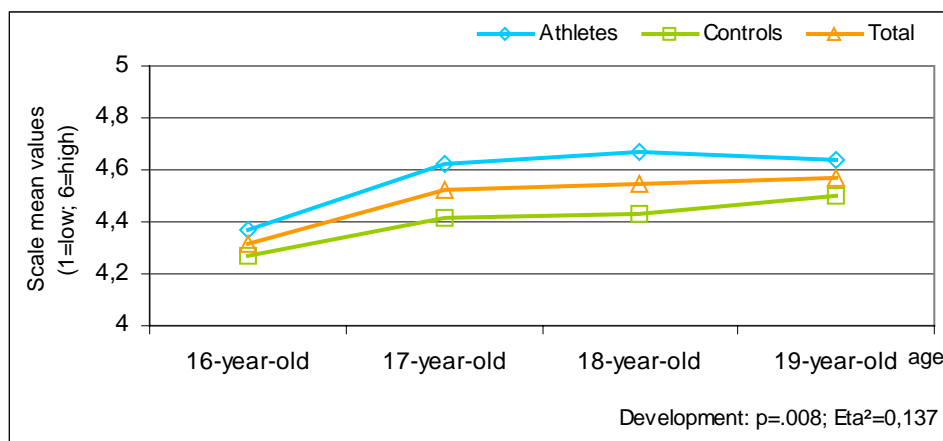


Fig. 7.3. *Development of Self-Concept of relations to opposite-sex peers, elite athletes, aged 16 to 19 years (Brettschneider, 2001)*

These relationships do not essentially develop any differently for the young athletes than is the case among adolescents who are less active. In the development of the emotional self, too, neither a positive nor a negative effect of sports activity can be detected.

Self-esteem also gains remarkably high scores, independently of gender. Gender-based differences in scoring emerge during the course of adolescence: Girls who are active in top sport manifest a higher self-esteem in early and mid adolescence, boys profit from their activity in a later phase. It appears that the girls' self-esteem is initially determined by their perception of their own ability to achieve and their physical fitness, while later, their assessment of their physical attractiveness dominates. Overall girls seem to benefit from sports.

Overall, the results on top junior sport indicate that involvement in high-level sport does not systematically involve a risk to the development of the young personality. On the other hand, there is only episodic evidence of such sports activity having a supportive effect and being of developmental benefit.

Study 3 is on physical activity and self-concept in children. This longitudinal study, which is still running divides 1400 7- to 10-year-old children into three

groups – (1) children active and talented in sports, (2) children interested in sport but not ambitious and (3) children who are not active in sport. It examines their physical abilities by means of motor tests, and their psychosocial health by means of validated scales (Brettschneider & Gerlach, 2004).

When viewed in a cross-sectional perspective, the overall pattern is as follows:

Children, who are involved in sport

- are physically fitter
- show a more positive self
- have a higher self-esteem
- are integrated more firmly into a social network
- are emotionally more stable and suffer less from psychosomatic complaints
- have lower prevalence rates concerning deviant behaviour

In the longitudinal view a tendentially positive effect between sports activity and the development of self-esteem and social relationships can be identified, though this observation is not statistically safe. And reflecting the results of the two studies on adolescents, in the group of children too, the girls seem to benefit more than the boys from involvement in sport.

Following Sonstroem (1997) there are currently two main approaches to the connection between self-esteem, the body, and sports activity. One is the *self-enhancement hypothesis* (Sonstroem, 1997), in which self-esteem acts as the motivational determinant. Teenagers with a positive self-esteem, especially as regards the body, are more likely to seek out sports- and body-related contexts. These are the areas where they can experience their own effectiveness and stabilise or even enhance their competence and self-esteem by performing sports activities.

The second explanatory approach is the *skill development hypothesis*. This assumes that physical and motor experience can change self-esteem in both a positive and a negative direction. In contrast to the self-enhancement hypothesis, which is more strongly based in motivation theory, the skill development hypothesis regards self-esteem more as the effect of sporting commitment and physical activity. It is therefore the theoretical foundation for many sports-related intervention schemes.

The question of causal relationships between sports activity and development in young people, i.e. the question whether there is a selection or a socialization effect can not yet be answered in a satisfying way. The findings are inconclusive. Physical activity and sport are evidently an ideal scenario for experiencing and demonstrating one's own physical ability and attractiveness as well as one's social competence. Sport activity has considerable explanatory potential for the all-round development of young people. But effects do not happen automatically. They have to be produced by carefully designed intervention programs.

## Part III

### 8 Major findings

On the basis of fifteen reports from different EU member states, database research and conventional literature research, the report has attempted to throw light on the lifestyles and sedentariness of European adolescents with emphasis on the problem of overweight and on the question for the role of sport from an interdisciplinary point of view.

The central results are to be summarized here in note form, before finally taking up the issue of the role of sport in the context of education and before giving recommendations.

Differences between the countries concerning the geographical location and the climatic conditions, the social and cultural contexts as well as the historical, political and socio-demographic developments influence the results and allow a picture to evolve that is diverse and colourful, but that at the same time shows more similarities than differences.

As a consequence of globalisation, in all EU member states lifestyles of adolescents can be identified in which physical activity, exposure to media and nutrition must be considered essential elements.

#### ***Physical activity and sport participation***

The results from all countries are consistent and show the following pattern: boys are more active than girls; boys prefer intense activity, girls a more moderate one;

Sport stands in the centre of the physical activities – in its organised and informal form;

Sports and school systems determine the way sport is organised in the different countries. Therefore participation rates are not comparable. In all countries the informal sport activities are significantly increasing.

Particularly countries of central, western and northern Europe report growing polarities in the adolescent population, which is caused by parents' socio-economic status and by individuals' own career of school and education.

No clear statement can be made regarding secular trends. Some countries report a slight increase, some report a slight decrease, and others report stagnation. Not least because of the lack of objective data on intensity, duration and frequency of the activities, a comparison is made more difficult. In many countries a paradoxical situation prevails: never before have so many adolescents done sports at an early age whereas at the same time the majority of children and adolescents, and particularly of the girls in the examined EU member states, have, on average, not achieved the standards that are being mentioned in the recommendations on health-promoting physical activity, i.e. cumulated activity at a daily total of one hour. Obviously, the commitment to sport is unable to compensate deficits school in physical education and sedentariness in everyday life.

### ***Use of media***

Media form an essential part of the everyday life of adolescents and, partly, determine its course. The spread of media varies among the countries and also within the individual EU member states. The respective findings are in part inconsistent.

In most EU countries, television is the most popular medium. On weekends, almost half of all European children and adolescents spend a major part of their time in front of the television set. Boys watch more television than girls.

Uniform time trends with respect to television-watching are not recognisable in Europe.

A fifth of European adolescents uses a computer on the average three hours daily. Computer games decline, whereas the use of the internet and creative work increases with age. The use of computers increases in the time-related comparison.

Again, a social polarisation is recognisable: watching television and playing videogames are domains of boys and girls from families with a weaker social position, whereas in the field of computer and internet use, children from privileged strata are overrepresented.

### ***Nutrition***

Concerning the eating habits and the nutritional behaviour of European young persons, the findings are inconsistent and inconclusive. As for having regular breaks to eat, data of local studies and the comparative HBSC vary across countries.

As to food consumption all twelve existing studies agree that the consumption rates of meat and sausages as well as sugar and sweets are too high, whereas the intake of cereals, potatoes, rice and noodles as well as fruit and vegetables was generally found to be too low among young people, though the consumption rates vary across Europe.

The total energy intake of children and youth in Europe does not exceed the values recommended by national nutrition organisations. In most cases the empirical data on young people's total intake are close to or even well below the recommended standards.

A clear nutritional pattern cannot be identified. Again the socio-economic status plays an important role: young people from lower social strata are likely to have unfavourable eating habits and an unhealthy nutritional behaviour. The nutrition pattern deteriorates with an increasing degree of physical inactivity.

Data concerning temporal shifts hardly exist. Countries which carry out studies that allow time-related comparisons report that the total daily intake has not changed or has slightly decreased over the last years.

### ***Relationship of the different lifestyle elements***

Of high importance are the findings concerning the relationship between the various lifestyle elements. Contrary to general expectations, studies report no relationship between media use and physical activity. The assumption that watching television or pursuing other sedentary activities displace physical activity (“displacement hypothesis”) is not valid and must be rejected. Rather, time seems to be available for both media use and physical activity. Children and adolescents are either very active or inactive in both areas. However, there is a relationship between nutritional behaviour and media consumption on the one hand, and between nutritional behaviour and physical activity on the other hand. In general, children and adolescents consume snacks and drinks while watching television. In this context, the TV-related consumption of foods is higher among heavy viewers than among lighter viewers. With respect to physical activity, the consumption of foods unfavourable from a nutrient perspective is statistically significantly positively correlated with physical inactivity, whereas in contrast, the consumption of foods favourable for physical performance from a nutrient perspective is statistically significantly positively correlated with physical activity, and negatively correlated with lack of movement.

### ***Consequences of young people’s lifestyles and sedentariness***

The consequences of sedentary lifestyles are important in so far as they entail negative consequences for physical fitness. While the decline in aerobic fitness is rather moderate, the last 20 years have brought a perspicuous decline of motor abilities throughout all European countries. Boys are generally fitter; fitness decreases with age.

Attention is not only required by the physical effects of sedentariness, but also by its implications for the mental and social development of young people.



Since there is a positive relationship between physical activity and cognitive, social and emotional skills, increasing sedentariness possibly entails a decline of psychosocial competences. However, it must be kept in mind that correlative data do not allow conclusions about causal relationships.

Reduced activity and fitness during childhood and adolescence entail effects for the further course of life. It is well documented that inactivity and lacking fitness during infancy, including the related risk factors, continue as features up to early adult age.

The sedentary lifestyle is determined by multifaceted psychosocial factors, environmental conditions and historical developments. The negative consequences for the development of individuals and society are serious. Thus such solutions have to be sought that promote an active lifestyle. This implies a major role for sportive activities in the context of education.

In the formation of young people's lifestyles in all their facets a growing impact of social inequalities has been identified. The result is an increasing polarization within the population of young people across the EU countries.

### ***Overweight and obesity***

Inactivity also brings with it the risk of overweight and obesity. The definitions of overweight and obesity, the assessment methods and the reference systems vary from country to country. And so do the prevalence rates across Europe. They are highest in the south of Europe and lowest in the Baltic States with central and northern Europe in between. Congruence lies in the continuing increase as a secular trend. The extent gives reason to speak about an epidemic. The burden that individuals and society carry is substantial, and it endangers individual and social developments.

Overweight children are likely to become overweight adults with an associated raised likelihood of ill health.

The essential causes for overweight and obesity are genetic predisposition, high energy intake and low energy expenditure. As the dramatic increase of overweight cannot be explained by sudden changes in the human gene pool and the average total energy intake has slightly decreased in the course of the last decades physical inactivity in the lives of young people is likely to be the main cause for overweight and obesity. Inactivity and sedentariness are the key factors in the epidemic rise of children's and adolescents' overweight.

In this context it should also be mentioned that – along with the growing prevalence of “anorexia nervosa” and “bulimia” – the prevalence of underweight young people, mostly girls, is also constantly increasing in Europe

**The patchwork of young people's lifestyles and sedentariness is complex and characterized by a number of interactional mechanisms, the interplay of which has yet to be decoded. Sport and physical activity play a major role in the network of lifestyle elements, not only as a measure to keep an even energy balance, but as a fundamental source for stimulating emotional factors and their interactions in gene expression and homeostasis.**

## **9 The role of physical activity and sport in the context of education for restoring the balance**

One of the central questions in this EU project is whether and how, in view of the sobering figures showing the increase in young people's sedentariness throughout Europe, it will be possible to stimulate these boys and girls to become more physically active by means of physical activity and sport in the context of education. At first sight this question can be answered by demanding more physical education lessons with moderate to vigorous physical activity in schools' weekly timetables. Without any doubt such a demand is justified. But as we have seen, in view of the causes and attendant circumstances of this sedentariness, it is not that simple and not that easy. Come to that, such a solution is difficult under the current constraints that apply to physical education in European schools. Anyone who studies the results of physical education audits for various European countries might reach the opposite conclusion, namely that in most European countries school physical education is no longer able to provide the required balance for an active lifestyle.

Neither naively optimistic calls for more physical education lessons nor an overly pessimistic assessment on the basis of reduced time allocations for physical education in Europe will help us to answer the above mentioned question. In order to answer the question in a convincing way, it will be necessary to consider all the factors responsible for the increase in sedentariness and all those that govern and relativise physical activity and sport in the context of education. We need a more precise examination of what genuine chances and opportunities are available and to what extent the context of education is sufficient to resolve the problem. In addition we have to ask which other possible concomitant and supplementary contexts over and above education and school will be required in order to restore the balance.

### **9.1 Current status of physical education and opportunities for physical activity and sport in the context of education**

The school subject physical education is compulsory in all 25 EU countries and is governed by government-sanctioned curricula and/or regulations for school teaching. Recent studies (cf. Hardman & Marshall, 2000; Hardman, 2002, 2003; Marshall et al., 2002) do criticise numerous deficiencies as regards physical education funding, its acceptance at various levels of the school system, its status in schools and its actual time allocation. Nobody denies that the tasks and objectives of physical education as a school discipline – as formulated in former and current UNESCO charters as human rights for the education of young people (cf. Telama, 2002) – are largely complied with; the criticism is, and available results from the cited studies confirm, that there is a considerable difference between what is officially recommended for physical education and what is actually implemented and practised in the schools. In Hardman's study (2002), between 11 % (southern Europe) and 21 % (western Europe) of those surveyed agreed with the assessment that physical education is not an important subject in the curriculum of European schools. In the EU countries Denmark, Germany, Italy, the Netherlands, Norway, Slovakia and Slovenia physical education lessons are cancelled more often than those of other subjects (Hardman 2002). This sobering result is not really very new. It is a recurring theme in the history of school physical education that is now heard throughout Europe.

In many European countries national, regional or local lesson schedules for school physical education are not fully implemented, so that there is a discrepancy between the prescribed lessons and those actually given by the schools. A number of empirical investigations that were carried out at various times during the 1990s provide an overview of the officially scheduled lessons for physical education in individual countries.

Country	Schoolyear															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
Austria	100		150		200		150 - 200		150	150 - 200		100				
Belgium	100						100 - 150									
Czech Rep.	90															
Denmark	90				135		90									
Estonia	90						90 - 135									
Finland	90			135			90				45					
Germany	Land specific variations between 1-4 school hours a school year, ø 105 min															
Greece	not regulated															
Italy						60				120						
Latvia	80	80 - 120														
Lithuania	105	135			90											
Luxembourg	150						100			50						
Malta	150						200			90						
Netherlands	hours are no longer compulsory, though 2 lessons for one year at basic education level have to be taught															
Poland	135				200					90						
Portugal	100				150											
Slovakia	135				90					135						
Slovenia	145						90			145						
Spain	200										120					
Sweden	100									local variations						

Fig. 9.1. Minutes per week allocated to physical education / sport in EU countries (Hardman, 2002)

Looking back a few more years we find a temporal parallel, namely between the previously documented reduction in young people's daily physical activity and physical fitness and a reduction in the number of physical education lessons per week that the schools actually provide.

In many European countries the 1970s are considered the "golden years of physical education". The time allotment for physical education at school was increased from one lesson to two (90 to 120 minutes, depending on the type of school and age group) or from two to three (120 to 180 minutes); additional extra-curricular activities were offered; there was increased building of sports grounds; qualified physical education teachers were engaged – all fulfilling important requirements for the promotion and improvement of school physical

education. Admittedly, there has to date been no statistical proof of the specific contribution made by the decline of physical education at school since 1980 in the current increase in young people's overweight, obesity and reduced physical activity. But the decline of physical education at school is certainly more likely to have encouraged this lifestyle trend in children and young people than to have effectively counteracted it.

In this context, alongside an extremely disproportionate increase in obese young people (38 % compared to the national average of 25 %), the US state Michigan reported a marked decrease in school-based and community based physical education programmes. A Swiss survey also established that in those cantons in which physical education was allotted only two hours instead of three the proportion of schoolchildren who spent their leisure time actively was lower than in those cantons that retained the allotment of three hours physical education per week (cf. Lamprecht, Murer & Stamm, 2000).

Judging by available analyses of the status of physical education in schools, the significance of physical activity and sport in almost all EU countries' schools over the last ten years has been eroded rather than improved, while simultaneously other factors have also brought about a reduction in young people's daily physical exercise outside school. It would be more accurate to speak of a redoubling influence in favour of sedentariness than to expect modern school physical education to have a lasting compensatory effect on these alterations in young people's lifestyles.

**In view of the reduction in physical education in European schools it is justified to be sceptical about the extent to which school-based physical education is really in a position to solve the current problems of sedentariness by providing for more physical activity and sport.**

In all EU countries it is principally fiscal constraints that threaten physical education, but we can also observe an erosion in the pedagogical acceptance of the subject, both in the schools themselves and in national education

the subject, both in the schools themselves and in national education systems: this effect has now also reached some of the Nordic and western countries in the EU and – most markedly – the east European countries following their “velvet revolutions”. There are new demands for education and training (e.g. more foreign languages, natural sciences and computer science). And the growing competitive situation for job-seekers at the end of their schooling increase parents’ tendency to question whether the effective support of school physical education is as advantageous as promoting other subjects and new areas.

In addition to these reasons there is a further tendency that has already destabilised physical education in many schools throughout Europe: the introduction of flexible schedules, i.e. school-specific lesson plans for specific subjects that are introduced along with decentral school administration and autonomy for local schools within the social community. Available studies on this development for several European countries (cf. Naul & te Uhle, 2001) confirm that, with increasing decentralisation, physical education tends to be reduced in favour of other subjects and there is inadequate inclusion of physical education in the planning of school programmes for local schools.

**The answer to the question, whether children’s and young people’s current opportunities for physical activities and sport in the context of their school education are appropriate, and sufficient to restore the balance of sedentariness by introducing new and attractive concepts as a part of the physical education curriculum, remains somewhat doubtful. The reason has to be seen in the critical status of the subject in the context of current school education and the partial decline of its time allocation during the 1990s.**

## 9.2 Are European concepts of physical education appropriate to restore the balance?

Changes in economic constraints, education politics and school administration that are currently revolutionising education at school and having their effect on physical education. Our quantitative analyses show the extent to which the prescribed lessons and physical education curricula are actually implemented. In addition to these findings we have to examine the criteria governing the quality and content of professional physical education teaching. The question is: are the currently popular didactic concepts for physical education in individual European countries suitable for creating physical education lessons that can effectively counter the problems and dangers associated with sedentari-ness? Can these didactic concepts effectively promote an active lifestyle?

This question is not easy to answer, because the overall picture of physical education in Europe at the current time is characterised by a great deal of variety and national differences. A historical retrospective would discern a variety of major concepts spread over a period of several decades, - in spite of international assimilation and exchange processes affecting gymnastics, games and sports (cf. Renson, 1999; Naul, 2003). By the 1970s the whole of Europe was experiencing a “sportification” of its physical education curricula (for example, in Sweden and Finland in northern Europe and in Spain and Portugal in the south). We find its precursors in western Europe (West Germany, France, England and Wales and Northern Ireland) and also in eastern European countries that were still under communist rule (East Germany, Poland, Czechoslovakia). The intensity of this process of “sportification” in the individual countries was, however, diverse. Sometimes this development is merely supplementing traditional forms of physical education as in France (*education physique et sport*) or the traditionally health-related gymnastics as in Sweden (*idrott i hälsa*). Occasionally this development led to a new subject called “Sport” as was the case in (e.g.) the two parts of Germany by the mid and late 1960s (cf. Naul & Hardman, 2002).



Despite the differences in the intensity with which the “sportification” of physical education was adopted by EU countries and implemented in their curricula we can still record one point of international agreement that contrasts with the ideas of previous decades (1950 to 1970): teaching in physical education should, in particular, promote physical and motor development. A moderate to intensive workout for the cardiovascular system was an objective that was entirely consistent with the subject’s other pedagogical tasks and therefore harmonised with them.

Today, the school subject physical education in Europe can no longer demonstrate the broad consensus that its “sport concept” maintained throughout the EU countries in the 1970s. In the 1980s and 1990s two major trends led to similar developments of school physical education in many EU countries. These two development processes that have affected physical education over the past 20 years can be labelled as the “**de-construction of sport**” and “**re-construction of education**”.

### ***De-construction of Sport***

This term incorporates two separate criticisms of sport: of the contents of physical education curricula and of the pedagogical objectives of professional physical education teaching.

The criticism from a pedagogical view is that studying, practising and training specific technical and tactical skills leads to an impoverishment of children’s and young people’s motor potential. A sport related concept neglects and fails to teach other desirable forms of movement that are not directed towards optimisation, improvement and records.

It is therefore considered important for children to learn and physical education to teach other forms of movement than sport, in particular to modify and distort the characteristic movements of specific sports techniques. Running, jumping and throwing should not be taught and learned only as institutionalised and codified sports. Occasionally, older non-sportive forms of movement and play,

such as cooperative games, are called in to replace sports in order to avoid their schematic behavioural pattern “triumph or defeat” (cf. Pfister, 2004).

### ***Re-construction of Education***

The call for the de-construction of sport in physical education is not infrequently automatically linked with reclaiming education as an element of physical education teaching; sometimes this link is simply assumed. The logic of sport, as expressed by the Olympic motto “citius, altius, fortius”, is considered by protagonists of non-sporting education to be too one-sided and pedagogically questionable.

Sometimes sporting principles as a means of improving children’s and young people’s motor and physical performance and their educational significance are questioned. According to some of these critics such objectives can be reached in a better way by means of non-sportive forms of movement. Empirical evidence both for sport’s presumed unsuitability for the achievement of educational objectives and, conversely, for the fulfilment of such objectives by these non-sportive forms of movement and behaviour is still missing.

**Alongside this concept that emphasises and pays more attention to educational tasks by abstaining from sport, over the last few years another concept has gained attention in many EU countries. This concept aims at using sport and selected sporting principles as means to restore educational tasks to the foreground.**

As the background for this trend reference is made to the individual and societal loss of values. For many children and young people, aggression and violence are a part of their day-to-day lives in schools and playgrounds. Respect for others, acknowledgement of their peers’ cultural and ethnic differences, mutual regard and fair play in their dealings with one another, honouring and complying with rules are ethical norms that are missing among young people

in many EU countries today. It seems possible to link the call for the “reconstruction of education” with the restoration of these specific standards and values. They are not necessarily found in those types of modern hedonistic and narcissistic sport that emphasise action, fun and thrills, neither do they automatically occur in the traditional Olympic sports. In order to experience what these values mean sporting activities have to be arranged in an appropriate way.

These values, which are hopefully to be achieved by “education through sport”, have been restored to the foreground by the European Union’s EYES 2004. They received attention under the appellation “Olympic Education” (Parry, 1998; Müller, 1998; Naul, 1998) and were reinforced by the president of the EU’s commission for “Culture and Education”, Vivian Reding, in her speeches at EYES 2004.

**The question remains whether there are any major physical education concepts in the EU that are especially suitable for employing physical activity and sport to balance sedentariness.**

#### ***Four major European physical education concepts***

In the face of the two current trends we have described the answer will have to remain ambivalent, so long as intensive forms of physical activity and sport (i.e. those that offer an adequate cardiovascular workout) fall to the educational demand for the “de-construction” of sport in physical education because the principles of practising and training in physical education teaching are regarded as pedagogically questionable.

On the other hand, besides the trends critically challenging the “sportification” of physical education, there are also already established physical education concepts in EU countries that offer an entirely suitable overall concept for the

intensive promotion of play, games and sport as elements of preventative health care, thus making them an acceptable way of restoring the balance.

As one of four dominant physical education concepts in Europe reference is made to the model “**sport education**” as the successor to “sportification”. At present it is probably most widely known in England and Wales and Northern Ireland, most German *Länder* and a few eastern European countries.

In contrast, “de-sportified” physical education concepts such as the *bewegingsonderwijs* in the Netherlands and “*l'éducation motoricité*” in some parts of France, Spain and Portugal have a certain tradition in primary schools. New conceptual forms of “**movement education**” are being applied the Flemish part of Belgium, the Netherlands, in some German curricula and Austria.

A variety of physical education curricula exhibiting a combination of traditional contents and objectives with a moderate admixture of sportive elements are in use in those countries that retain the term “**physical education**”, such as Italy, Spain, Portugal and the Wallonic part of Belgium, or have coined new terminology for the combination (France).

A marked accent on preventative health care plus determined attention to the risk factors as a result of young people's passive lifestyles may be seen in various curricula in northern Europe and, more recently with reference to US American models, in Greece and a number of eastern European states. In Sweden, the sporting content (*idrott*) is expressly related to active preventative health care; in the upper school physical education lessons also include theoretical teaching of this aspect (cf. Fouqué, 2000). In Finland this form of “**health education**” has special status: since 1994 “Health Education” has been a separate subject independent of physical education; it consists almost entirely of theoretical teaching and takes in the current dangers of children's and young people's sedentariness and its long-term implications (cf. Turunen, Tossovainen, Jakonen, Salomaki & Vertio, 1999; Haikinaro-Johansson & Telama, 2004).

The status of preventative health care, with theoretical teaching and practical furtherance within the school discipline physical education, is thus viewed very differently by the various European physical education concepts. We can observe no uniform status for the “promotion of health” among these major physical education concepts. Nor is the understanding of “health education” within physical education teaching any more consistent. Although the WHO’s comprehensive formulation constitutes a consensus of what is to be understood by “health”, the emphases on “physical well-being” and “social well-being” are not integrated into these major physical education concepts but are often stated and understood as alternatives. This picture is completed by the results of Hardman’s European study (2002): “active lifestyle” and “physical fitness” were respectively placed only 7<sup>th</sup> and 11<sup>th</sup> in the list of teaching objectives for physical education in primary schools: eight European countries explicitly mentioned “active lifestyle” as an objective, and eleven mentioned “physical fitness”.

**Concerning the question as to whether physical education concepts in Europe are appropriate for restoring the balance the answer is: some countries offer favourable conditions by virtue of adequately formulated targets in physical education curricula. Some other countries place different educational objectives in the foreground; their physical education curricula do not particularly promote or require the necessary sporting or physiological emphasis. Equally, in discussions among physical education experts, there appears to be no consensus in favour of following Finland’s example by setting up a separate new school discipline for children’s and young people’s preventative health care throughout Europe.**

### **9.3 What kind of education do we need to promote active lifestyles at EU schools?**

In view of the results regarding the status of physical education in European schools (9.1) and the diverse pedagogical concepts and didactic objectives for physical education found in the individual member countries of the EU (9.2) we have to ask the question: what kind of education do we need to restore the balance? A further reduction in the time allotted to physical education in schools, and objectives for physical education lessons that consider desportified contents involving little motor and physiological exercise to be pedagogically desirable do not appear favourable. Without any doubt school physical education can help to combat sedentariness. But its contribution remains limited, if the focus is on the quantitative aspect and the qualitative aspect is neglected.

Studies on physical education teaching in Belgium, the Netherlands, France, Germany and Portugal, report little time spent in active movement by children and young people during physical education lessons (often less than 10 to 15 minutes per lesson). Doubts concerning the efficacy of physical education lessons seem justified (cf. Koutedakis & Bouziotas, 2003). On the other hand there is also positive evidence, e.g. from France and Lithuania, that effective teaching is fundamentally possible during physical education lessons and is capable of improving schoolchildren's physiological performance over a period of a school term (cf. Baquet, Berthoin & Van Praagh, 2002; Baquet et al., 2002; Deliène, 1999).

In view of curricular experience with health-oriented physical education and health education in Scandinavian schools one fundamental question has to be considered.

“Can the promotion of health, aiming to change passive leisure behaviour, incorrect nutrition and low levels of participation in sport be achieved only by

promoting practical sporting exercise during physical education lessons?” Do we not rather also need a broader theoretical directive to achieve our aim of restoring combating sedentariness and the balance?

**The answer to question of whether other EU countries should follow Finland’s example and introduce “Health Education” as a separate school discipline remains ambivalent. Since, however, sedentariness is an extremely complex structured pattern of behaviour, including not only external motor and physiological features but also and primarily internal attitudes in the form of psycho-social and cognitively grounded behavioural patterns, the vital question is: Can any number of practical physical education lessons and any amount of physical activity succeed in combating the problem?**

Some kind of directive to schools throughout Europe seems to be needed that is appropriate to this overall structural problem of sedentariness and able to counteract it with the necessary instruction and behavioural changes cognitively, emotionally and with physical exercise and sport. This may well violate the traditional structure of the physical education discipline in a number of EU countries, but there are also examples from England, Sweden and Germany of upper secondary schools that already offer theoretical lessons on sport and sport sciences, enabling students to gain credits towards academic certificates (e.g. GCSE, A levels, *Abitur* or university degrees). Supplementary theoretical instruction – appropriate for the age group and standard of development – and not affecting the amount of time allocated to practical lessons for movement, games and sports – could contribute to the aim of overcoming sedentariness. Sample projects such as CATCH and SPARK from the USA demonstrate that such ideas can indeed be successfully implemented in elementary schools and do lead to appropriate positive behavioural changes in both movement and nutrition (Sallis et. al., 1997, 1999; Kelder et. al., 2003; McKenzie et. al., 2003).

The fundamental question is not whether theoretical instruction is still physical education, but rather how can we effectively combat the problem of sedentariness by means of educational measures within schools. It seems to be unfavourable to continue to think and act within the traditional boundaries of the discipline. Instead, all school disciplines need to be asked a legitimate question, namely what they contribute towards children's and young people's present and future "quality of life".

**This problem can be considered one of the key questions in education for the future of Europe. Coping with the educational task of restoring the balance implies a curricular alliance of several disciplines or structured interdisciplinary modules, into which physical activity and sport could be integrated. Such a curricular perspective would include physical education in a group of subjects for "active living". Such a concept would see a number of school subjects in the same way that certain academic disciplines see themselves as part of "life sciences". They collectively concentrate on society's specific medical, human, social and ecological challenges.**

Such an interdisciplinary network of different areas of learning in school-based education could conceptually combat the manifold problems of sedentariness in an appropriate way. This interdisciplinary network would also enable a certain amount of time per week to be devoted to "active living". Two problems still remain unsolved:

- (1) Where and how will "active living" be practised in school and experienced by the schoolchildren themselves, on the basis of "learning by doing"?
- (2) Where and how can a daily allotment of time be made available for regular and adequately strenuous movement for their own bodies?

(1) In addition to setting up a suitable curricular network to appropriately combat the problem structure of sedentariness it is also necessary to emphasise extra-curricular facets of day-to-day school life as "social correlates", as sup-



porting measures that can reinforce the corresponding educational impulses. Banning vending machines and the sale of soft drinks and sweets in schools, as English and French legislators are currently attempting to do does not appear to be the “via regia”. Prohibition alone has never been the appropriate way to convince children and young people to change their habits: the numerous anti-smoking campaigns may be taken as exemplars. How appropriate practical changes in favour of an active lifestyle can be made to the school environment and day-to-day school life may be seen from a number of successful North American school programmes. Some of them studied changes to nutritional habits by using targeted food offers at break and lunch times (cf. Luepker et. al., 1996; Sallis et. al., 2003). Other successful North American projects sought contact with schoolchildren’s parents and held social events in schools. This way they were able to engage parents’ support for joint intervention measures to promote their children’s movement behaviour and modify their eating habits. Such measures even included joint “cookery classes” for parents and their children within school community programmes, applying “learning by doing” to enhance their “calorie awareness” and restrict and modify their nutritional consumption.

(2) In view of the rather sobering results for the status of physical education at European schools and the rather ambivalent promotion of intensive sporting activity in the concepts for physical education there are serious doubts whether an average of two physical education lessons per week will be sufficient to restore the balance. But in the face of the frequently documented development trends from the 1990s the obvious call for an appropriate increase in the time allotment for school physical education does not seem promising.

Anticipating an unsuccessful outcome numerous initiatives have been launched over the past few years in order to introduce more physical activity into school life. Break projects have been introduced in many European countries. Thus children and young people get more and additional opportunities for physical activity during the day, with supervised running or ball games in

breaks between lessons, either in the school yard or in neighbouring playgrounds. These also include voluntary offers and model measures for informal gatherings before and after school to utilise the school grounds more and more intensively for exercise. Under the sobriquet “moving school” there are already model measures and school trials in place in primary schools in a number of central European countries to combat hyperactivity and improve concentration by interpolating brief pauses for movement into regular classes (cf. Thiel, Teubert & Kleindienst-Cachay, 2004).

As important as these and other programmes are in promoting more physical activity in day-to-day school life, and however well they fulfil their specific purpose in improving the learning environment, the small amount of time allotted (generally 5 to 10 minutes) makes it unlikely that they make sufficient contribution to restore the balance. But their educational effect should not be underestimated: by way of experiences and discoveries shared with the peer group they promote interests outside the daily rhythm of school life, motivating children and young people to join clubs and to arrange their own opportunities in and around the home to spend more time practising these and other physical activities and sport.

**What kind of education do we need to restore the balance? We need both interdisciplinary school intervention programmes appropriate to the magnitude of the problem of sedentariness and practical programmes promoting experiences and discoveries in school life, not only for children and young people but also for their parents and teachers. In this context valuable incentives can be gained from a careful examination of US American projects over the past ten years. Every initiative aiming at increasing the amount of physical activity in the context of the school is important. Without initiating and progressively expanding new “networks” going beyond the institution “school” and incorporating the home, sports clubs, public health authorities and the social community at large the effect of these measures will remain limited.**

#### **9.4 Can school-based education and interventions restore the balance?**

Even if all the previous curricular and extra-curricular suggestions and organisational recommendations are adopted and supplemented by learning by doing to practically and theoretically combat the sedentariness in school life we still have to ask whether the institution school will, by itself, be in a position to resolve the problem.

This question should not be misunderstood: of course we need all these offers and impulses in schools for “active living”. But since what we learn at school we learn for life it is all-important that these impulses, motivations and new habits are followed up, reinforced and confirmed in the children’s and young people’s lives. For children and young people the school is one environment out of many and at certain ages schoolchildren more and more frequently judge this particular environment to be less important to them; personal learning impulses become effective and their importance and interest realised only by way of extra-curricular experience and other activities. The problem of sedentariness does not begin at the school gate and does not end on the way out of the yard – it is like a thread pursuing and linking children’s and young people’s various living and social environments; our aim therefore has to be to continue to restore the balance beyond the institution school, in children’s and young people’s other environments.

**A holistic consideration of the problem of sedentariness calls for a holistic intervention strategy.**

It is important to bundle and coordinate the various educational and other intervention measures in such a way that they can mesh, can reinforce each other and their effect be felt in other living environments outside the school. This might happen, for instance, where most children and young people at whole-day schools are active in their sports clubs (e.g. in France or Finland) or in specific cooperative projects between schools and sports associations pur-

suings common educational objectives (e.g. in Belgium, England, Germany and the Netherlands). As we saw in chapter 4, the numbers of children and young people who regularly participate in the activities of national sports association clubs vary considerably across the EU and differ greatly between a number of western and eastern European countries. But in the EU sport clubs do offer boys and girls a social environment in which they have the opportunity for physical activity and vigorous physiological and motor performance and can engage in additional sport activity two or three times a week in addition to school. In individual EU countries some sports clubs already have special offers for children and young people who are overweight or obese.

In a number of EU countries there are some good examples based on appropriate project experience that show how cooperation between the schools and the sports clubs can be intensified in the various areas of a community: these are found particularly in the Netherlands (cf. NISB, 2001) and England. The following diagram illustrates one particular graduated network of communal schools and sports clubs that is currently being implemented in England under the title “Quality physical education” (cf. Gilliver, 2003).

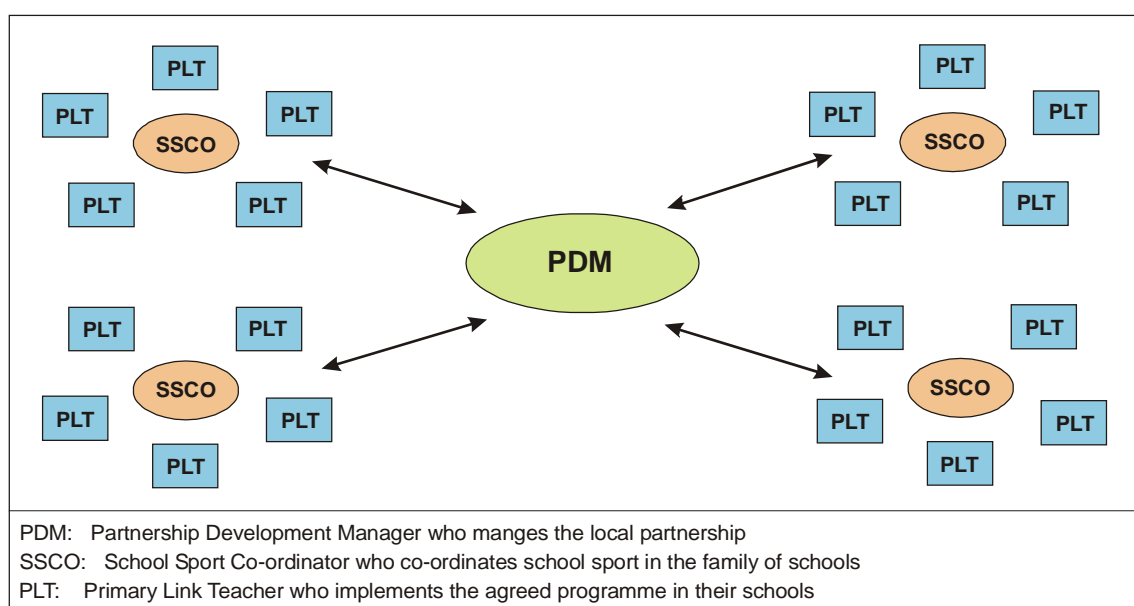


Fig. 9.2. Preferred Partnership Model (Gilliver, 2003)

This model aims at creating a new infrastructure for physical education in schools that will improve the relationship between schools, local sports clubs, local administration and regional sports associations. Such partnerships constitute an internal network connecting a number of primary and secondary schools within local areas. A full-time “partnership development manager” is engaged and financed by the appropriate ministry. His or her task is to set up and establish new internal relationships between the schools as well as external relationships between those schools and local sports clubs and regional sports associations. This strategy is intended to forge new links between the individuals and institutions involved in English sports, where the organisation of school sport was previously strictly isolated from that of association sport. The project’s primary objective is for participation in community-based programmes to (re)invigorate children’s and young people’s flagging level of physical activity outside the school.

Seen alongside the networking of schools with sports clubs and similar institutions for the qualitative and quantitative promotion of an active lifestyle, young people’s numerous informal and self-organised activities and play environments can not be neglected.

The infrastructure in and around the home, open spaces and clean parks, safe routes to schools and other places and spaces for leisure purposes are of decisive significance (environmental correlates). The variable “environment” as a factor in combating the sedentariness of children and young people has previously been underestimated and neglected by empirical studies in Europe. Reports from a limited number of countries show how towns’ and conurbations’ land-use and city planning policies have erected featureless developments and modified road systems over the last 20 years. These have not only functionally restricted the environments vital to children’s freedom of movement (walking, running, playing, cycling, skating, etc.) but also rendered these environments dangerous and remote, often accessible only by public or private motorised transport. With no available European studies of children and young

people we must here fall back on North American results. They show that parents are willing to dispense with cars or school buses provided the routes for walking or cycling to schools, parks and recreational sport centres are safe and clean and no violent criminal milieu in the locality renders them hazardous (cf. Hoefer et al., 2001; McCormack et al., 2004; Morgan et al., 2003). After a short time, those children and young people who then regularly travelled to school on foot, skateboard or bike showed a markedly better health than those of their classmates who continued to be driven to school (cf. Sallis et al., 2003; McKenzie et al., 2004).

**Considering the question of whether it is possible for school education alone – however good and broad-based it may be and however well it follows the recommendation in this chapter – to resolve the problem of sedentariness, the answer is: Most unlikely. This is not because we have no faith in the effectiveness of educational measures. Rather it derives from the problem of sedentariness itself, like an unbreakable thread linking and pursuing every part of children's and adolescents' daily life and social environment. For this reason alone it is vital to initiate suitable forms of intervention in all young people's institutional and informal environments and to implement appropriate structural modifications to enable the various impulses for an active lifestyle to complement and reinforce each other. To this end it is necessary to set up communal networks of education authorities, sports providers and other social institutions, including health care bodies and representatives of the food industry, with their efforts supported by all types of local media. Without public relations, media support, and appropriate ambassadors (e.g. sporting idols) identifying with such projects, it will be difficult for networked intervention measures to halt the pan-European trend of sedentariness during the coming decades.**

## 10 Recommendations

In the 1990s there were numerous international declarations from leading world and European bodies in the field of health (WHO), sport (IOC), education (UNESCO), physical education (EUPEA) and sport sciences (ICSSPE), all of which expressed concern about the declining status of PE at school and recommended physical activity and sports as an important part of an active lifestyle for young people both in and out of school. With the current European Year of Education through Sport (EYES 2004) the EU not only shares former concerns about the role of physical activity and sport in education but really opens doors to enhance the role of sport in formal and informal education with an even more balanced approach: supporting the range of health-related physical and psycho-social benefits for the individual in formal and informal education as well as affirming a set of social and moral values and virtues for physical activity and sport for the further development of the social community in Europe. This is an important step leading to a more complex view on the purposes and outcomes of physical activity and sport for young people.

As mentioned and documented previously, young people's sedentariness is a genuine cluster which embraces many aspects and elements of an individual's whole body and has also been linked with a variety of social contexts, including society and the environment. It follows that a successful intervention strategy can neither be restricted to the individual, not even with a holistic approach, nor to a single social agency such as the school or the community.

**The complex cluster of sedentariness demands an intervention strategy which must be designed as an integrated approach of a multisectoral balanced network of different interventions linking the various settings in the living environment of children and adolescents: home, school, sport or social club, community. In order to establish such a**

**network and make it efficient for successful interventions new demands on policy and decision making are needed. They include further research, evaluation of the outcome and advocacy for changes of sedentary lifestyles.**

One prerequisite for counteracting a sedentary lifestyle is of course physical and sporting activities on a moderate to a vigorous level. Results of the numerous bio-medical and social research projects and many intervention projects reported on here are demonstrating the range of physical and psychosocial benefits from exercise. But the main problem which still remains is: how do we get young people with overweight and obesity to take that exercise? This is less of a physical problem but more of a mental one – to change their daily habits of sedentariness.

To overcome the mental pattern of sedentariness we need more than merely to prove the effectiveness of physical activity and sport for an individual who decides to extend or intensify his or her physical activities. Changing to an active lifestyle calls for more than the effective promotion of physical activity and sport, more than good nutritional advice and more than merely educational intervention. In each setting, we need to identify those factors that support sedentariness, and these are by no means merely individual or merely physical. Restoring the lost balance must not be understood as merely a cognitive process, whereby we only need to explain about nutritional input and energy consumption and list the advantages of regular sport. Important as this knowledge and cognitive insight are, they often fail to bring about the corresponding necessary practical action to modify the sedentary lifestyle.

It follows that whatever types of intervention projects are set up, and wherever they take place in children's and young people's living environments, they have to address those young people's emotional and affective moods, because it is rare for overweight children to feel comfortable with their bodies and



they are often socially stigmatised as “XXL kids”, particularly at school, during physical education classes and within the peer group during their leisure time.

In order to illustrate these interconnections between individuals and the social contexts that characterise their living environments for the complex furtherance of an active lifestyle let us consider an ecological approach that was recently adopted in the USA as the basis for networking all the elements that make up the cluster of sedentariness and, at the same time, as the basis for promoting an active lifestyle for young people and clarifying the necessary interaction of the various interventions.

The central question here is: how can we convince children and young people that they are capable of modifying their passive lifestyle (“I can do it!”) and that from their own viewpoint it is personally valuable to do so (“and it’s worth it!”).

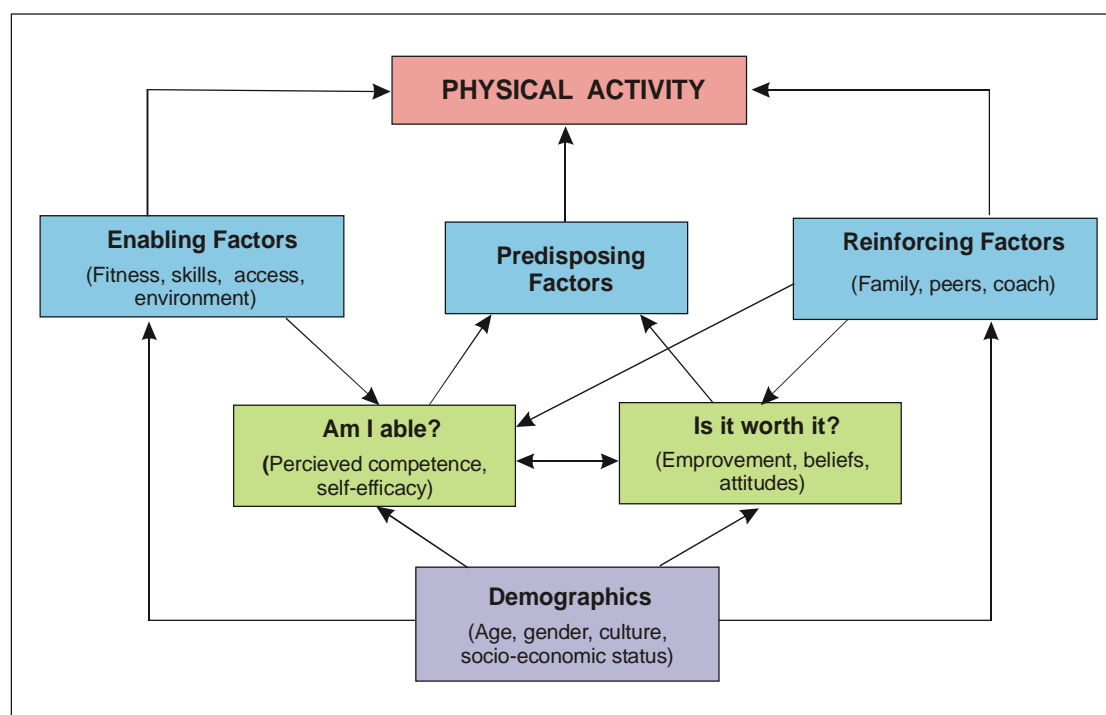


Fig. 10.1. The US Physical Activity Promotion Model (modified by Welk, 1999)

In addition to the necessary “outward” networking of their living environments that this model illustrates this also calls for a style of teaching that is absolutely not typical for schools, which can also create this network “inwardly”, tem-

peramentally, so that children's and young people's own feelings of value and well-being enable them to emotionally accept their desired lifestyle and take the appropriate action. This will not be achieved by nutritional instruction alone, nor just by intensive sporting demands at school, but only with intervention aids that offer space and opportunity for "learning by doing" in all their settings, naturally also within school subjects.

To explore the possibilities and find out "I can do it" and "it is worth doing" are essential experiences for young people to really change their sedentary behaviour patterns.

**Two fundamental principles for combating the problem of sedentariness in the future can be defined. We need a multisectoral intervention strategy between the various settings (home, school, sport or social club, community). Besides providing cognitive information about the risks of sedentariness, this strategy must pay more attention to the emotional and practical aspects. It should aim at linking young people's self-acceptance with their own desire to try out different forms of nutritional, movement and leisure behaviour (learning by doing).**

Besides these two basic principles there are a number of particular impulses that should also be employed jointly as measures affecting children's and young people's individual living environments.

### ***Home***

Parents should encourage their children to play less in the house and more out of doors. Time spent watching television should be agreed and restricted to an appropriate number of hours per week. More television should be permitted only when more self-initiated exercise and motor activities also take place.

During school visits and open days, class teachers should not only inform parents about their children's scholastic prowess but also their health, whether they are overweight (BMI) or have motor deficits, whether they are in a healthy fitness zone or an unhealthy one, and, where appropriate, what action needs to be taken at home.

In principle, children should travel to school on foot; older children may cycle. Parents' school runs and "taxi services" to leisure centres should be an exception rather than the rule. Moderate daily sport in the vicinity of the home is to be preferred to twice-weekly training at some remote location that can be reached only with motorised transportation. When parents spend money on their children's holidays and trips they should pay attention to the exercise and sport programmes in the brochures. Sports camps should be given priority, either to pursue an existing sporting interest or to learn about new types of sport.

As regards nutrition, joint parent-school projects should be set up to provide practical experience of basic foodstuffs and appropriate recipes. Many European families have regular private or official menu plans (e.g. fish on Fridays). Regular days should also be introduced for salad, vegetables, fruit and pasta, appropriate to the time of year, as a change from the unvarying routine of chips – pizza – chips. Similar rules should apply to sweets and soft drinks, for instance: a child who drinks a can of cola has to drink milk or water next before he or she may open a new can. When purchasing gifts for young people's birthdays and other occasions, make sure they are suitable for outdoor play and calculated to encourage the child's habits of exercise.

Summarising: wherever parents already congregate on their children's behalf or in their company, and whenever they visit the various environments of their children's daily, weekly or monthly lives (e.g. in kindergartens, day-care centres, schools, sports clubs, social community centres, etc.), they should be

offered information evenings, meetings, and joint workshops. Practically-oriented parent-child projects for a healthy lifestyle (“how can I ...”) should be offered, with the emphasis on the family’s nutrition, exercise and leisure behaviour.

### ***Schools***

As the environment in which children and young people learn and move the school has manifold opportunities to inform them about the disadvantages and consequences of sedentary lifestyles and introduce and promote measures for active ones, even though most EU countries impose constraints and make only limited resources available for schools’ physical activity and sport programmes (see chapter 9), which do restrict the scope and comprehensiveness of such measures.

The contents of several school disciplines also offer possibilities for addressing individual elements of the “sedentary lifestyle” cluster in an appropriate curricular context. Subjects such as biology, health studies, nutrition and home economics can offer information and explanations of the bio-medical manifestations and functional and physiological effects of sedentariness and “wrong” eating habits, along with the appropriate measures necessary to prevent them. In other subjects, particularly physical education, it would in principle be possible to explain and “try out” psycho-social perspectives and practical behaviour patterns, along with exercises to promote an active lifestyle; this will be particularly effective if all breaks and other opportunities during the school day are also used to get as much exercise as possible.

The problem is, however, that many EU countries have concepts of physical education that focus on the whole range of educational aims. Such concepts can be justified. They imply that the promotion of health-related physical fitness and active lifestyles are being regarded as one objective among others.

**The EU commission could make a point by launching an initiative. In 1991 EUPEA's "Declaration of Madrid" started: "There is a need to explore a minimum European curriculum for physical education and to ensure the provision of resources to implement it". This "minimum" is now made manifest in the problem of sedentariness affecting all old and new EU countries.**

But as chapter 9 documents, in many EU countries this problem is not yet given sufficient attention in the context of school curricula. The EU commission could therefore require, as a curricular minimum, that a number of criteria and standards for the promotion of an active lifestyle be implemented at schools throughout Europe by means of physical activity and sport. The Brussels commission would not thereby encroach on individual countries' cultural prerogatives as regards education systems and school curricula. But in each EU country there would be an impulse to (e.g.) re-examine national physical education concepts to determine how adequately they have previously addressed and paid attention to the problem of sedentariness.

Besides these curricular forms there are a whole series of additional extra-curricular possibilities for schools to carry out campaigns and measures e.g. action days or project weeks ("health", "exercise" "nutrition", "cooking") and regular games and sports in the afternoons to raise children's and adolescents' awareness. Information events held by partners outside the school and schoolchildren's visits to such partners in the social community are useful for guiding teachers and children towards an active lifestyle. Here we need school partnerships with (e.g.) insurance companies, sports clubs and other sports providers, public health authorities, etc., who are able to support and promote the schools networking in the fight against sedentariness, both idealistically and materially.

Finally, the constructional and spatial infrastructure of the school grounds and its surroundings should enable and allow young people to organise themselves in their leisure time and at weekends and engage as often as possible in their chosen games and sports. School yards that offer playing areas for soccer, basketball and other sport activities or/and open spaces that are laid out invitingly to encourage e.g rollerblading, mountain-biking and skateboard activities: these all are all environmental aspects that make the areas, roads and paths around the school interesting for young people because they feel encouraged to get regular and varied exercise.

Summarising: wherever permitted by their imposed schedule of educational programmes schools should include promotion of an active lifestyle using a variety of curricular elements for the various disciplines. They should offer as many as possible extra-curricular possibilities for reinforcing an active lifestyle with “learning by doing”, and create and design constructional and spatial conditions in and around the school yard so as to enable numerous forms of attractive, informal physical exercise for young people with balls, roller-blades and bikes.

### ***Sport Clubs and Social Organisations***

Basically, the previously cited environmental aspects for school grounds and their surroundings apply equally to sports grounds belonging to sports clubs and other associations. The EU still has too many small and traditional gyms which offer modern young people too little opportunity or inadequate premises to engage in their chosen sports, numerous games and various activities. Many possibilities for play are often restricted or even forbidden. Even generously proportioned modern buildings can often not be used because children on roller-blades “would damage the floor”.

But restricted possibilities for young people to engage in their preferred modern forms of activity are not always the main problem. It is often young peo-

ple's own expectations and wishes that they fail to find or recognise in the facilities offered by sports clubs.

Modern young people's motivation and desire to engage in sport in associations and clubs has markedly expanded. Nowadays characteristics such as "fitness", "good-looks", "shaped body" and similar attributes are in the foreground, along with "action" and "fun". The programmes that many clubs offer to young people fail to accommodate the inherent "lightness" of this type of sport. Sporting associations' activities for young people often emphasise objectives related to training and competition that no longer correspond to the wider-ranging wishes and needs of children and young people today.

Children and adolescents in sports clubs therefore need new programmes besides high-performance and competitive sports. Fewer and fewer young people possess the necessary physical requirements for competitive sport, and some of those that do have other desires and motivations for their sport. In order to keep these girls and boys active it is therefore particularly important for sports clubs to offer widely varied exercise programmes and courses that fulfil their changing requirements. A sizeable proportion of boys and girls terminate their sports club activities at the age of 12 or 13; more attractive and more suitable programmes might be able to "hold" them.

But we also need targeted programmes, and we need to set up special courses that will be suitable for overweight youngsters and – in particular – will be able to give them a sense of achievement. The sport clubs must overcome the considerable inhibitions that particularly overweight children and young people have; these young people associate only the talented athletes and "really sporty types" in their peer group with the sports club, and their personal observations and feelings prevent them from including themselves in such a group. Special courses offered for "fat kids" also facilitate additional meetings and gatherings as a way of furthering social contact, encouraging partnerships

between parents, school and local authorities, and broadening the existing public health measures for children and young people.

**Here, too, the EU commission, in partnership with ENGSO, could initiate a campaign throughout Europe to have every sport club and every sporting association standardly offer special exercise and play courses for overweight children. Sports associations that are able to become more open in this respect and offer suitable programmes for problem youngsters will simultaneously be taking a step in the right direction for their own membership drives.**

### ***Communities***

There are also manifold demands on communities and their local authorities to play their part in overcoming the problem of sedentariness, beginning with the communities in their capacity as school authorities when, for instance, as currently the case in a number of EU countries, youth work, social care and schools are bundled into the provision of an increasing number of whole-day schools. This social provision of afternoon support might also include offering daily sports activities.

New forms of cooperation between (e.g.) the various departments of a local authority (health, social and children's officer, school, construction and town planning) can lead to synergies in the public health sector. There are a number of positive examples, for instance from the Netherlands, in which such arrangements have benefited the infrastructure of sport in the relevant area.

Similarly, new forms of cooperation are also possible between local administration bodies and private local sports associations and health care providers. The concept used in the Netherlands, the "*sportservicepunt*", creates a kind of "sporting citizens' advice bureau" in the community, informing the public what



facilities are available, who provides them, where they are located, at what times, and how much they cost. With suitable adjustments to accommodate the national idiosyncrasies of individual EU countries this concept could become a model for “communal European sports management”.

One decisive element in the fight against sedentariness, as recent American research makes clear, is the measures that local authorities employ in their town planning; how close are sports grounds to residential areas; which roads are safe, which streets are pedestrianised; which open spaces are open to the public and clean, and so on. In view of the continuing trend towards individualisation in informal sporting activities, healthy brisk walking, moderate jogging, skating, cycling, etc. are increasingly dependent on the fulfilment of these environmental requirements and on the maintained quality of the locality – so that it remains an inviting prospect to engage in physical activity just around the corner or down the block.

Changes in popular forms of sport and people's sporting needs place land-use policies, urban development and active living as a health benefit in the spotlight of the fight against sedentariness, because initial results from the EU also show that more children use the available roads or cycle tracks to walk or cycle to school and sports grounds if those routes are safe. As in a number of the other points we have mentioned, many EU countries still need to put some work into such aspects of cooperation between local authorities, ministries, organised sport and other partners in the local community.

### ***Policy Making***

The suggestions for cooperation at local community level apply equally to the corresponding authorities, ministries and commissions at regional, national and European level. Campaign alliances constitute an important step forward, for instance the platform “Movement and nutrition” recently founded in Germany in which representatives of ministries, the food industry, doctors, organ-

ised sport and scientists together search for solutions and plan appropriate measures. The international sporting goods industry is particularly urged to play its part in the fight against sedentariness.

We should not underestimate the power of media politics in this matter. Well-known sportsmen and sportswomen and a number of sporting organisations in several European countries support a variety of programmes aimed at promoting an active lifestyle by means of correct nutrition, movement and exercise, games and sport. Earlier this year many print media responded to the WHO study and our EU conference in Essen on this research project. Comparable awareness of obesity and sedentariness has apparently not yet reached the electronic media.

**The EU commission could take action here, together with media contacts from the various EU countries, and actively enter the fight against sedentariness by initiating measures such as (but not restricted to) those recommended in the various sections of this document.**

Measures affecting education policy also need to be specified. Over the next few years the Bologna Declaration will lead to a progressive formal harmonisation of BA and MA certificates at Europe's universities and colleges. All academic courses leading to a degree in sport science or a teaching qualification in school physical education should include a compulsory module on "active living", dealing with the causes and effects of a sedentary lifestyle and appropriate intervention strategies, so that students are given appropriate technical information and properly qualified for their profession. The same should apply, adapted as necessary, to the training of coaches and trainers at all levels.

Last but not least, we also need a research policy at European level that can take appropriate action to counteract the difficulties and disparities so frequently recorded in this report, in order to obtain a common and truly comparable picture of the problem of sedentariness for the majority of EU countries. This begins with details: when entirely different standards are used to carry out bio-medical investigations and record their results; when studies take into account many, few, or absolutely no social and environmental contexts; finally, when in the schools of the EU's national education systems we see only tentative attempts, or none at all, to take appropriate action in school curricula to effectively promote an active lifestyle with physical activity and sport.

**As research policy we therefore recommend the EU commission to set up a “European Task Force for Active Living”, involving scientific experts from all disciplines and all parts of Europe, to conduct an empirically-based EU survey according to agreed and internationally accepted criteria. This survey should incorporate the network of environmental settings called for in this report (home, school, sports or social club, community) in the design of its investigation into the cluster of sedentariness, and implement it in all EU countries according to this design and using uniform criteria.**

**Such a task force could also work out an outline programme indicating which criteria and minimum standards for “active living” should be provided by all national, regional or local school curricula throughout the EU.**

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