HCSC

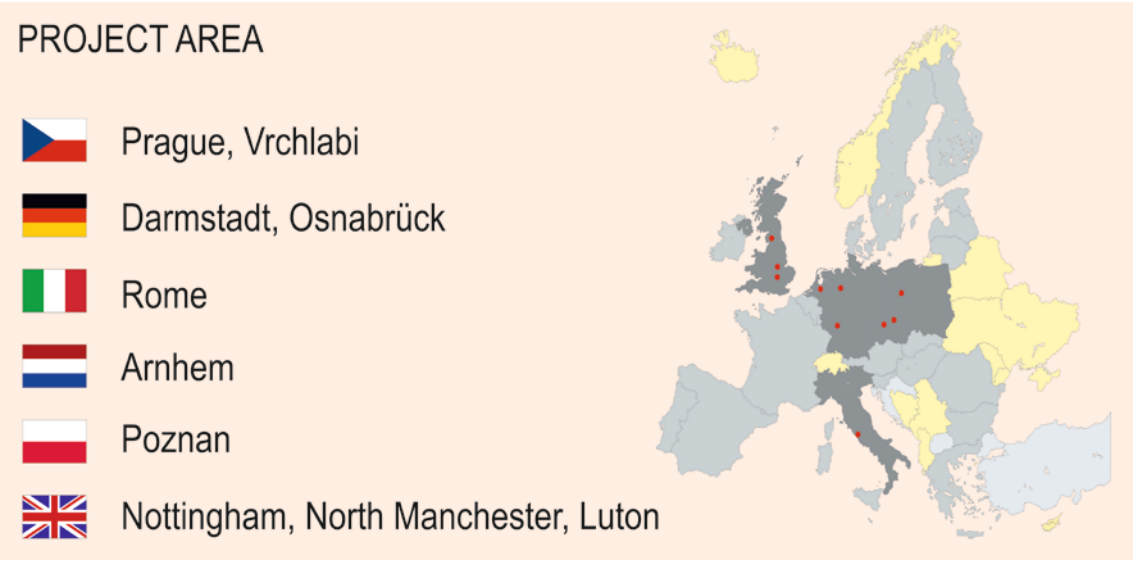
Final Report

Technical Implementation

Preparatory Action in the Field of Sport 2010-2011

EAC/21/2009/033

"Healthy children in sound communities (HCSC): diffusion and implementation of a multi-actor network for enhanced physical activity for children and youth on EU-local community level"



Contents

Introduction

The HCSC final report on technical implementation of the project no. EAC/21/2009/033 is divided into two volumes. Volume I includes three parts of the report on implementation and evaluation of the HCSC project. Volume II documents the appendix. The appendix includes five sections (A,B,C,D,E). Appendix B provides a data handbook about evaluation and outcome of measurements to which this report in volume I refers to.

In PART ONE of the report the main purposes and objectives of the HCSC project are highlighted with references to the granted application form. A relevant part of the application form has been reprinted and is documented in appendix A (chapters 1 and 2).

PART TWO informs about the realization and implementation of the HCSC project regarding the application form. The 10 municipalities with 16 schools out of the six participating EU-countries (CZ, DE, IT, NL, Pl, UK) are recorded including the three steps of development to establish the multi-purpose local network in each municipality, the sample of the participating pupils, meetings of the project partners and fact-finding tours of the lead partner and the Willibald Gebhardt Research Institute as the responsible partner for programme management and evaluation of the project (chapters 3 and 4).

In PART THREE the evaluation and outcome of the HCSC project is recorded in detail with references to the appendix B. Part three includes six chapters. The socio-demographic data of the children's sample group were recorded (5.1); the cut-off criteria of BMI measurement and level of assessments, the range of physical fitness and motor test items are introduced and documented with reference data for evaluation assessment (5.2); the outcome of the BMI development is documented for the total and a sub-sample group of overweight and obese pupils (5.3); the outcome of the physical fitness and motor ability development (5.4) and finally, the correlations between the development of BMI and motor abilities of the sample groups (5.5). In addition, results of a study of the parents' assessment of their children's lifestyle factors (physical activity, media consumption, nutrition behavior) and their personal attitudes towards these lifestyle factors are included (6.). In chapter 7 main results of the project will be discussed with final recommendations (chapter 8).

Volume I finish with references to literature and some studies which influenced the design, methods of investigation and provide reference norms/intervals for evaluation of the HCSC study.

As the responsible partner who served for implementation and evaluation of the HCSC study on behalf of the lead partner (Deutsche Sportjugend) and as the co-coordinator of the consortium of all partners, I kindly thank all my colleagues in Czech Republic, Germany, Italy, the Netherlands, Poland and the United Kingdom for their successful cooperation and mutual support in this project. All these personal and institutional partners are listed at the end of this volume.

Finally, my gratitude goes to Rebekka Kemmler-Müller of German Sport Youth and ENGSO Youth for the financial management of the project, to Caren Behnke MA (University of Duisburg-Essen) who assisted me at my office at Essen to implement and conduct the project, to Dennis Dreiskaemper (University of Münster) and his support for data analysis and computing, and to Uta Schmitz and Dorothee Schmelt who both helped to prepare the manuscript of the final report.

Essen, May 2011

Roland Naul

PART ONE

1. Description of the HCSC-EU project according to application form

1.1 Purpose and objective of the project/action

The purpose of the applied EU-based “Healthy children in sound community” project (HCSC-EU) is to transfer/diffuse and implement the strategy, structure and experiences of the Dutch-German cross-border project “Gesunde Kinder in gesunden Kommunen / gezonde kinderen in een gezonde kindomgeving” (see www.gk-gk.eu) to several other local communities in other EU-countries as well as to other provinces/ states/ cities outside the cross-border region in the Netherlands and in Germany.

The objectives of the project are (1) to diffuse the strategy, structure and “good practice” experiences of the gkgk/hcsc-concept to “partner organizations” in other EU-countries and (2) to implement the HCSC-programme together with these “partner organizations” into selected municipalities in their EU countries with respective public and civil society stakeholders on education, health, and sport (“third parties”) over there. The “best practice” experiences in Dutch and German schools/sport clubs of the previous gkgk/hcsc-DE/NL project will be transferred/diffused to schools and sport clubs in other EU-municipalities (cf. application form, 2009, p.10/11).

1.2 Organization and implementation

Public authorities (school board and health board of the municipality) and civil societal partners (representatives of local sport club organizations and single sport clubs, private based health centres) build a community based multi-actor network (“front office”) to combine their single efforts and programmes for a commonly agreed health-enhanced PE/PA-programme for local children to promote and implement more opportunities for an active lifestyle to counteract physical inactivity and overweight/obesity.

The applicant body (German Sport Youth) and all “partner organizations” build together a common network to diffuse, implement and evaluate the HCSC-EU project (steering committee).

The applicant body has different “partner organizations” in six selected EU countries. “Partner organizations” of the applicant body are sport/youth sport organizations as well as university based higher learning institutes with research units in PA and youth sports: Youth Sport Trust – YST (UK), Český Svaz Tělesné Výchovy-CSTV (CZ), Nederlands Instituut for Sport en

Bewegen -NISB (NL), European Non-Governmental Sport Organizations - ENGSO Youth (EU), the (European Academy of Sports, Velen - eads (DE), Federazione Italiana Aerobica e Fitness – FIAF (IT); Charles University of Prague (CZ), E. Piasecki Uniuversity School of Physical Education (AWF - PL) and the Willibald Gebhardt Research Institute (WGI - DE) based at the University of Duisburg-Essen (cf. application form 2009, p.11).

The applicant and partner organizations in each of the six EU-countries will become responsible to transfer/diffuse, to implement and to evaluate the HCSC-programme into selected municipalities of these countries, assisted locally by “third parties” (schools/sport clubs).

Each partner organization as a “second organizer” will establish a national “back office” in his/her country for further support of all national “third parties” who build a community based “round table” network as a “front office” at municipalities which participate in the project.

With support of the second organizers in the different EU-countries the local schools and sport clubs at selected municipalities will implement the HCSC programmes of extended and health-enhanced PE/PA units including nutrition aspects into the school curriculum and including further education units for teachers and coaches (cf. application form 2009, p.12).

One important duty of the national “back offices” is the evaluation of the HCSC project in cooperation with their “front offices” of the municipalities who represent the local network partners (schools, sport clubs, municipality offices for health, education and sport) as well as in cooperation with experts of other “second organizations” who represent together the international “steering committee” of this EU-project.

1.3 Arrangements for evaluation/supervision of the project

Besides the establishment of national back offices (second organizer) and the establishment of local front offices (round table- third parties) at municipalities which participate in the project each partner organization is responsible for monitoring the process and outcome of implementation and evaluation of the project. The steering committee and the national “back offices” will provide two manuals: one for monitoring the implementation process and one for measurements of BMI, physical fitness & motor development, and physical activity. Measurements will be conducted two times: at the beginning of the school year 2010/11 in autumn 2010 and after

6 months of health enhanced teaching and coaching in primary schools or sport clubs in spring 2011 (cf. application form 2009, p. 13).

In addition, the steering committee, headed by the lead partner and by the WGI, will do fact-finding-visits to municipalities to supervise implementation and evaluation activities (cf. application form, 2009, p. 12).

2. Duration and time table for carrying out the project acc. to the application form

The action will start on January 1st, 2010 and will be completed on March 31st, 2011. The duration of this preparatory work will be divided into three stages: stage 1 – January 2010 to June 2010, stage 2 - July 2010 to January 2011, stage 3 – February 2011 to March 2011. It has been recommended that after stage 3 this project should be continued according to the 4 years intervention project of HCSC-NL/DE.

In stage 1.1 (until March 2010) the steering committee should be established and all second organizations should build up their “back office” for support of the “third parties” in local communities. In stage 1.2 (from March onwards until June 2010) the lead partner and the partners should identify at least one municipality in their country and set up a local network of stakeholders for the education (school), health and sport system at this municipality (to establish the “front offices”). Since the beginning of stage 1.2 1 ENGO Youth and the eads should also strengthen their ties to diffuse the design and concept, purpose and objectives of the HCSC project to their other partners in other EU-countries (ENGSO) respectively to other Euregio border regions (eads) (cf. application form 2009, p.15).

In stage 2 – July 2010 to January 2011 the implementation, monitoring and evaluation of the HCSC project at local schools and/or sport clubs should be conducted. The second organizations are also requested in this stage to diffuse the HCSC concept and programme within their national sport organizations/networks and to identify, if possible, more than one municipality which will join the project. With support of the national “back offices” the “front offices” at the municipalities will implement the HCSC programme at least at one local school or sport club and the “back offices” will be responsible to monitor and evaluate the process and outcome of this intervention process (5 month, 200 weeks). At the start at the new school year (T 1) and at the end of this stage (T 2) the BMI, the weekly physical

activity index and a complex physical fitness and motor test will be conducted by the national partner organizations (back office) in cooperation with the “front office” and the PE teachers and sport coaches at the local schools and sport clubs (cf. application form 2009, p.16).

In stage 3 –February to March 2011 the data analysis of the T 1 and T 2 measurements will be conducted by the “back offices” in conjunction and agreement with the “steering committee”. Feed back will be given to the “front offices” as well as to the EU-Sport unit in Brussels (final report). In March 2011 a final conference (workshop at Brussels) for all partner organizations and stakeholders of the local multi-actor-networks (front offices) will be organized to document and to discuss the outcome of the project and address further items to improve multi-actor-networks to more EU-municipalities of the participating EU-countries as well as to address further diffusion and implementation of the HCSC concept into more than six EU-countries (cf. application form 2009, p.16).

PART TWO

3. The implementation and realization of the HCSC project

3.1 Purpose and objectives of the project/ action

The purpose and objectives of the project were accepted and implemented with support of the steering committee and the national partner organizations. All national partner organizations participated in the project according the application form. At the kick-off conference of the project (Frankfurt, January, 2010 – see for details agenda and minutes of the meeting in appendix C 1) it was decided to extend the range of objectives. Beside the physical activity index to assess the development of BMI and the physical fitness and motor test items of the puplis, an extended questionnaire should be developed and applied at T 2 as a parents` questionnaire of the pupils which should also include items about their children`s nutrition habits and electronic media consumption and further socio-demographic data (e.g. parents involvement in physical activity – see Parents`questionnaire in appendix D 2). It was also recommended and added compared to the application form to involve "control schools" beside the HCSC intervention schools in each municipality as far as possible.

3.2 Organization and implementation

All national partner organizations which signed their commitment and participation in the project did participate until the end of the preparatory work. They set up their national "back office", sometimes with special offices at their facilities where staff members worked on implementation and evaluation of HCSC project.

Fig. 1a,b: HCSC Office at AWF Poznan, PL

All national partners identified and selected municipalities in their countries which agreed to implement the HCSC programme at local schools which regularly also worked in partnerships with local sport clubs (except: the city of Rome and Prague). In total 10 municipalities became partners of the project which all established “round tables” where local stakeholders of the community offices for education, health, and sport worked together in cooperation with school principles, PE teachers, sport coaches and other partners.

In the 10 EU-municipalities 16 schools became “third partners” of the project. In total 852 pupils participated with their school classes in the project. Despite the application form more than only one municipality per country (ten instead of six) and more than only one or two schools/sport clubs per municipality (16 instead of 12) could be involved into the project due to the engagement of the second organizers and their back offices.

Tab. 1: Participants in the HCSC project: countries, municipalities, schools and sample of pupils

School	Municipality	Country	N= pupils	Percent
Hostynska	Prague	Czech Republic	48	5,6
Vrchlabi	Vrchlabi	Czech Republic	66	7,7
Convitto	Rome	Italy	51	6,0
Pistelli/Emnegildo	Rome	Italy	47	5,5
Johns	Manchester	United Kingdom	114	13,4
Carlton	Nottingham	United Kingdom	88	10,3
Foxdell	Luton	United Kingdom	106	12,4
Eversburg	Osnabrück	Germany	17	2,0
Heiligenweg	Osnabrück	Germany	13	1,5
Iburg	Osnabrück	Germany	25	2,9
Stüveschule	Osnabrück	Germany	17	2,0
HHS	Darmstadt	Germany	30	3,5
Schillerschule	Darmstadt	Germany	20	2,3
AnniMG	Arnheim	Netherlands	20	2,3
Drees	Arnheim	Netherlands	19	2,2
Kennedy	Arnheim	Netherlands	26	3,1
Lourde	Arnheim	Netherlands	27	3,2
Wielkopolska	Poznan	Poland	118	13,8
Total			**852**	**100,0**

All “round tables” of the municipalities and their participating “third parties” (schools, sport clubs) were selected in stage 1 of the project (until end of June 2010) and prior of the summer break, expect the Dutch community of Arnhem and participating “third parties” in this city. The delay was caused, by the municipality of Schagen, which agreed to our partner NISB in stage 1 to implement the HCSC programme, however, resigned after the summer break in August 2010. The city of Arnhem replaced Schagen in September 2010. The “round table” at the municipality of Arnhem was established in October 2010. Since November 2010 two primary schools are involved in the project with one PE class each. Teaching the extended PE hours with health enhanced PE/PA and nutrition teaching started only in late November (T 1 measurement) until end of March (T 2 measurement). Instead of the aspired 5 month of the intervention programme only 4 month of the programme could be realized before T 2 measurement at the municipality of Arnhem, caused by the delay after resignation of the municipality of Schagen.

3.3. Arrangements for evaluation/supervision of the project

The steering committee and the national “back offices” will provided the two manuals according the application form: one for monitoring the implementation process and one for measurements of BMI, physical fitness & motor development, and physical activity (see the manuals in appendix D 1, D2,D3). Measurements were also conducted two times according the application form: at the beginning of the school year 2010/11 in autumn 2010 and after 200 weeks of intervention (5 months) of health enhanced teaching and coaching in primary schools or sport clubs in January/February 2011. An exception were the two schools in the municipality of Arnhem, where because of the aforementioned delay this time was cut down to only 4 month before T 2 measurement must be executed at the end of the HCSC project (March 2011).

Representatives of the steering committee (German Sport Youth, Willibald Gebhardt Research Institute) did fact-finding visits to municipalities in all countries which participated in the project. Table 2 shows the names of the municipalities and dates when delegates of the two partners (German Sport Youth and Willibald Gebhardt Institute) visited “round table” meetings of the “front offices” with their national partners of the “back office” in stage 2 of the project.

Tab. 2: Visits to round table meetings of front offices and implementation meetings

Date	Location	Event	Participants	Contents
Jan. 26, 2010	Frankfurt (DE)	Kick off meeting HCSC	All Partners of HCSC	Planning of project implementation and time schedule
May, 6-8, 2010	Velen (DE)	Common Meeting of GKGK-Project-Partners and HCSC-Project-Partners	Partners of HCSC and GKGK	Exchange of project experiences in binational project and European project
April,26-27, 2010	Bonn (DE)	2. Zukunftskongress, Bildung für nachhaltige Entwicklung – Strategien für die internationale Jugendarbeit	DSJ	Presentation of HCSC-Project
Oct.4, 2010	Manchester (UK)	Round-Table Meeting	Representati-ves of HCSC in Manchester, DSJ	Implementation of HCSC in Manchester
Oct.13-14, 2010	Bocholt (DE)	Meeting of the GKGK-Community-Moderators	German HCSC-Community-Moderators, WGI	Exchange of Experiences and Knowledge with GKGK-Moderators and Partners
Oct. 20-24, 2010	Frankfurt a.M.	MOVE Congress 2010	WGI	Presentation of HCSC-Project
Nov. 4, 2010	Enschede (NL)	Meeting of GKGK-Project-Partners	German HCSC-Community-Moderators, WGI	Presentation of GKGK-Implementation in Enschede
Nov. 9, 2010	Rome (IT)	Round-Table-Meeting	Representati-ves of HCSC in Rome, WGI, DSJ	How to implement, extend and strengthen HCSC in Rome?
Nov.12, 2010	Trier	Workshop on Sport and Health	eads, WGI	Presentation of HCSC
Nov. 23, 2010	Prague (CZ)	HCSC-Meeting	all Partners of HCSC	Meeting of all partners to prepare an interim report and the final conference in 2011
Nov.24-26, 2010	Olomouc (CZ)	HEPA-Congress	WGI, Engso Youth	Presentation of HCSC
March 8-10, 2011	Brussels (BE)	Final conference of Healthy Children in Sound Communities	all Partners of HCSC and guests	Final report of all partners and evaluation of the project

Fig. 2 a,b: “Round Table” meetings in Rome and Poznan

The “front offices” of the municipalities of Nottigham, Luton (UK) and Vrchlabi (CZ) were visited by their national representatives of the “back office” (Youth Sport Trust, UK; CSTV, CZ).

4. Duration and time table for carrying out the project

Actions of the HCSC project started prior to January 1st, 2010, just after the signature of the contract with the EAC Sport unit in December 2009 in order to organize the kick-off meeting with the partner organizations to establish the steering committee as early as possible in January 2010 at Frankfurt/M. Germany which finally took place on Jan. 26th, 2010. It was decided to organize a common meeting in May 8th-10th, 2010 at the German community of Velen to meet representatives of the Dutch-German cross-border Interreg-network of the gkgk/hcsc project (community moderators, members and heads of the Dutch and German gkgk-front offices) to share their knowledge and experiences to establish front offices and how they implemented the gkgk programme in 2008/09 at their municipalities (examples of best practice).

Nine of the ten municipalities which participated in the HCSC-project were identified by the second partners at the end of stage 1.1 (March, 2010), except in the Netherlands. All 10 front offices of these municipalities were founded at the end of stage 1.2 (June 2010), except in the Netherlands (Arnhem, October 2010) and in Italy (Rome, July 2010). All third parties (intervention and control schools; sport clubs) were selected to implement the HCSC intervention programme at nine municipalities at the beginning of stage 2 (July), except at Arnhem.

Since the beginning of stage 1.2 (April, 2010) ENGSO Youth and the eads strengthen their ties to diffuse the design and concept, purpose and objectives of the HCSC project to their other partners in other EU-countries (ENGSO) respectively to other Euregio border regions (eads).

As a result of ENGSO Youth activities, a new cross-border network of the HCSC strategy and programme will be implemented at the Austrian-Slovenian cross-border region in 2011. The eads strengthened their ties to counterparts of the academy in the German states of Rhineland-Palintine and Brandenburg. In both states cross-border networks to Luxemburg and Belgium (German community) and a cross-border network to Poland in co-operation with the partner AWF Poznan is in progress. For more details about this diffusion and implementation of the HCSC programme into municipalities of the cross-border regions to Belgium, Luxemburg and Poland see the full report of the eads (appendix E 2.1).

According the application form, the implementation, monitoring and evaluation of the HCSC project at local schools and/or sport clubs were realized by all partners of the project in stage 2 – July 2010 to January 2011. Implementation of the HEPA-programme including nutrition teaching started after the school summer break in September/October 2010. At the same time T 1 measurements were conducted in all schools, except in the schools of Arnhem and Rome (November, 2010). Teaching the hcsc-programme started in Arnhem in November 2010 until March 2011.

The T1 measurements were executed by the national back offices in conjunction with the local front offices in nine of the 10 municipalities in September/October 2010 and repeated in January/February 2011 (T 2), except in the city of Rome, in the municipality of Arnhem and Osnabrück. T 2 measurements were realized in these three municipalities in March 2011. All details, data and results of the T 1 and T2 measurements (BMI, physical fitness and motor development test) and the respective outcome of the Parents `lifestyle questionnaire (T 2) will be recorded and discussed in PART THREE of the final report.

In stage 3 –February to March 2011- data analysis of the T 1 and T 2 measurements started at the different back offices in co-operation with the Willibald Gebhardt Institute. First results were documented and discussed at the final conference at Brussels, March 8-10th, 2011. Because of the delay in T 2 measurements in the city of Rome, the municipalities of Arnhem and Osnabrück, only results of the longitudinal development (T 1 to T 2) of the national Polish and Czech samples were documented and discussed at the

conference in Brussels (for further details, please see the agenda of the conference in appendix C 4). The T 2-data of the three UK-municipalities were only received in late March. Final data analysis and documentation of all national sample groups could only start in April 2011.

Finally, the implemented strategy, programme and realized stages of the HCSC project can be seen in figure 3.

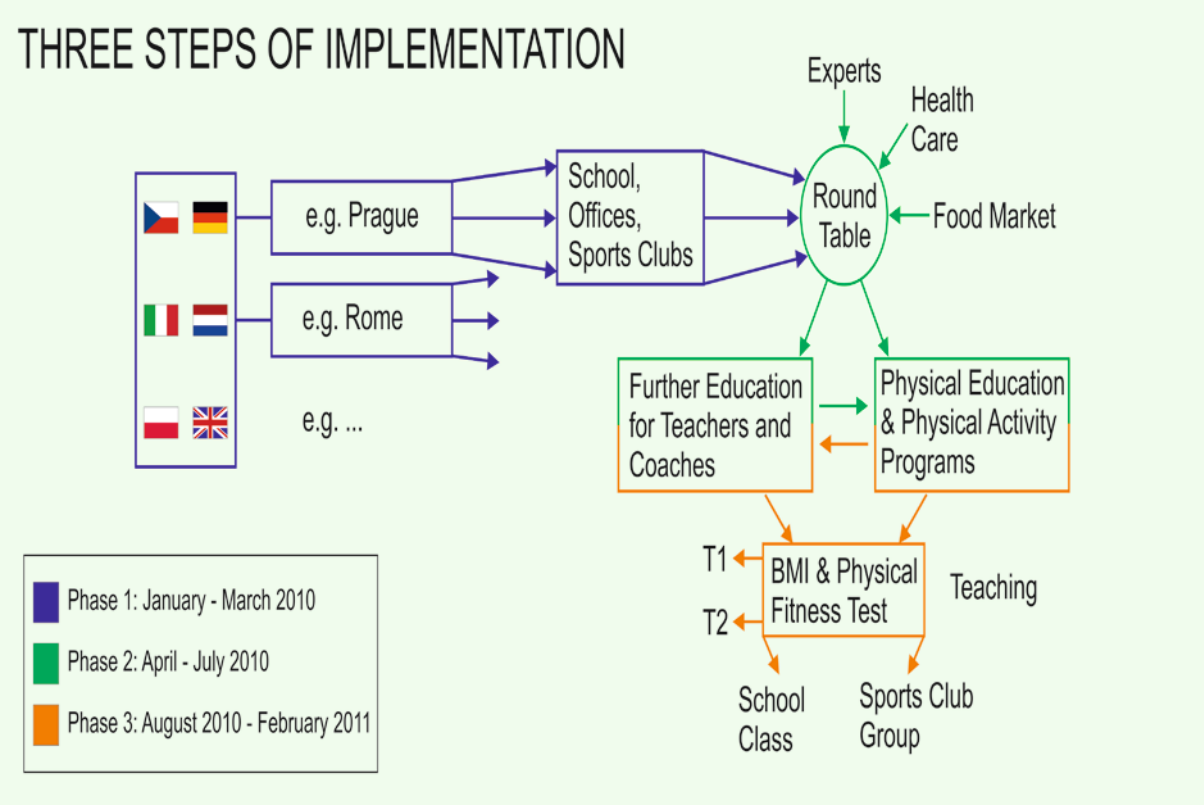


Fig. 3: Realization of the HCSC strategy, programme and stages of development

PART THREE:

5. Evaluation and outcome of the HCSC project

5.1 Socio-demographic data of the pupils

The following calculations are based on a sample group of $N_{complete}$ = 852 pupils. This data record includes 436 boys (51,16 %) and 416 girls (48,84 %) representing six countries (Germany, Netherlands, Poland, England, Czech Republic, Italy), ten communities and 18 different schools.

Tab. 3: Number of participants by country

Country	Participants	Percent
Czech Republic	114	13,4
Germany	122	14,3
Italy	98	11,5
Netherlands	92	10,8
Poland	118	13,8
United Kingdom	308	36,2
Total	**852**	**100,0**

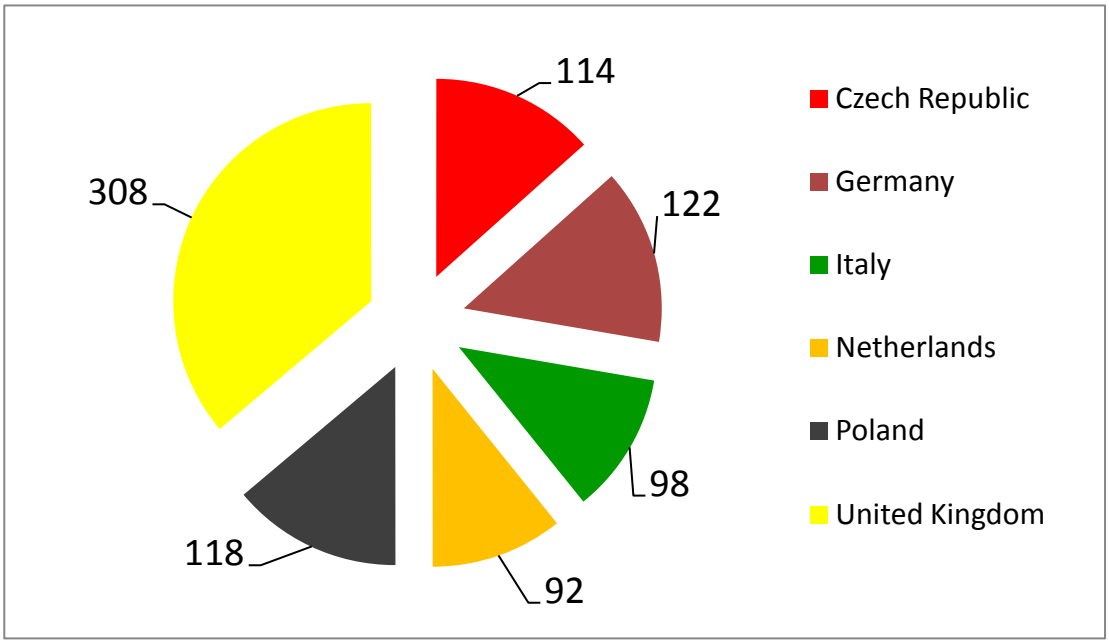


Fig. 4: Number of participants by countries

The total sample of pupils was split into two different age groups for further measurements and analysis.

Tab. 4: Participants separated into two different age groups

	Age	Participants	Percent
Italy	7-8	98	22,8
Netherlands	7-8	92	21,4
Poland	7-8	118	27,4
Germany	7-8	122	28,4
Total	**7-8**	**430**	100,0
Czech Republic	10-11	114	27,0
United Kingdom	10-11	308	73,0
Total	**10-11**	**422**	100,0

430 boys and girls in their age of 7 to 8 represent four countries (Italy n=98; Netherlands n=92; Poland n=118; Germany n=122) and another 422 boys and girls in their age of 10 to 11 are coming from the UK (n=403) and Czech Republic (n=114).

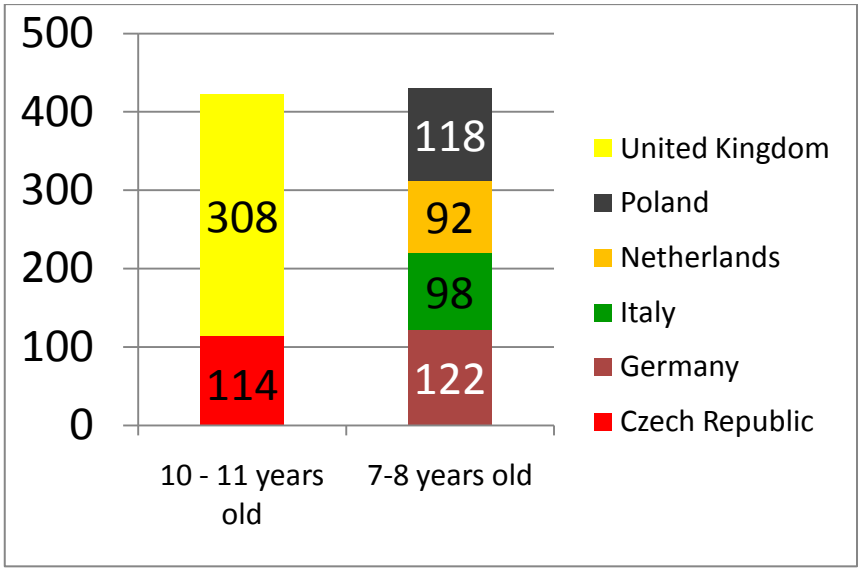


Fig. 5: Participants separated into two different age groups

Tab.5: Number and percentages of participants in intervention and control groups.

	Intervention group		Control group	
Czech Republic	**62**	**(54,4%)**	**52**	**(43,6 %)**
Germany	**122**	**(100 %)**	**0**	**(0 %)**
Italy	**53**	**(54 %)**	**45**	**(46 %)**
Netherlands	**92**	**(100 %)**	**0**	**(0 %)**
Poland	**56**	**(47,5 %)**	**62**	**(52,5 %)**
United Kingdom	**177**	**(38 %)**	**131**	**(62%)**
Total	**562**		**290**	

In Germany and the Netherlands no control groups were included. Results of all groups were compared to EU-based reference norms of age and gender. In addition, data of outcome were compared between intervention (working) groups and control groups for the respective country groups.

For further detailed analysis regarding the status and development of BMI, physical fitness and motor abilities a sub-sample of N= 155 students out of the total BMI-sample of 639 were selected. This sub-sample includes boys and girls of both age groups and of all countries who were measured at t 1 (September/October 2010) with an overweight and obese BMI and who were re-tested at t 2 (January/February 2011).
For detailed measurement and analysis of the BMI status and development of the sub-sample at t 1 and t 2 eight different percentiles of BMI measurements developed by Kromeyer-Hauschild et.al. (2001) (KRH-BMI) were used. (For further details see next chapter 5.2).

Tab. 6: Sub-sample of children with overweight and obesity at t 1 (n=115).

	BMI percentiles t1: Subsample of 115 children with overweight							
	<P3	**P3-<P10**	**P10-<P25**	**P25-<P50**	**P50-<P75**	**P75-<P90**	**P90-<P97**	**>=P97**
Czech Republic	6	8	17	22	26	16	6	5
Germany	0	5	14	26	20	13	12	6
Italy	1	4	8	15	21	19	17	9
Netherlands	2	1	6	8	8	7	5	4
Poland	0	2	14	28	32	22	8	10
United Kingdom	1	7	23	51	43	28	22	11
Total	10	27	82	150	150	105	**70**	**45**
							Subsample = 115	

5.2 EU-based reference norms for assessment of the evaluation data

5.2.1 BMI reference norms

For BMI assessment two different reference data sets were used : WHO (2007) for the complete sample and Kromeyer-Hausschild et. al (2001) for the selected sub-sample of overweight and obese children. Both reference data serve independently from age and gender by five (WHO, 2007) respectively eight (Kromeyer-Hauschild, 2001) comparable categories:

WHO, 2007
(WHO-BMI)
1 = heavy underweight
2 = underweight
3 = normal weight
4 = overweight
5 = obesity

Kromeyer-Hauschild et.al., 2001
(KRH-BMI)
1= heavy underweight (P 0 -P 03)
2 = underweight (P 03-P10)
3 = normal weight (P10-P25)
4 = normal weight (P 25-P50)
5 = normal weight (P50-P75)
6 = normal weight (P75-P90)
7 = overweight (P90-P97)
8 = obesity (P90-100)

Tab. 7: WHO 2007 BMI reference data / boys

Boys	1	2	3	4	5
6/7	< 13,0	< 13,6	**13,7 - 19,1**	> 19,2	> 21,1
8	< 12,5	< 14,2	**14,3 - 19,2**	> 19,3	> 22,6
9	< 12,8	< 13,7	**13,8 - 19,3**	> 19,4	> 21,6
10	< 13,9	< 14,6	**14,7 - 21,3**	> 21,4	> 25,0
11	< 14,0	< 14,3	**14,4 - 21,1**	> 21,2	> 23,0
12	< 14,6	< 14,8	**14,9 - 21,9**	> 22,0	> 24,8
13	< 15,6	< 16,2	**16,3 - 21,6**	> 21,7	> 24,5

Tab. 8: WHO 2007 BMI reference data / girls

Girls	1	2	3	4	5
6/7	< 12,2	< 13,3	**13,4 - 17,9**	> 18,0	> 23,1
8	< 12,2	< 13,2	**13,3 - 18,7**	> 18,8	> 22,3
9	< 13,0	< 13,7	**13,8 - 19,7**	> 19,8	> 23,4
10	< 13,4	< 14,2	**14,3 - 20,6**	> 20,7	> 23,4
11	< 13,8	< 14,7	**14,8 - 20,7**	> 20,8	> 22,9
12	< 14,8	< 15,0	**15,1 - 21,4**	> 21,5	> 23,4
13	< 15,2	< 15,6	**15,7 - 21,9**	> 22,0	> 24,4

Tab. 9: *BMI-Percentiles for boys by Kromeyer-Hauschild et.al. (2001)*

Age	P3	P10	P25	P50	P75	P90	P97
6	13,18	13,79	14,51	15,45	16,59	17,86	19,44
6,5	13,19	13,82	14,56	15,53	16,73	18,07	19,76
7	13,23	13,88	14,64	15,66	16,92	18,34	20,15
7,5	13,29	13,96	14,76	15,82	17,14	18,65	20,6
8	13,37	14,07	14,9	16,01	17,4	19,01	21,11
8,5	13,46	14,18	15,05	16,21	17,68	19,38	21,64
9	13,56	14,31	15,21	16,42	17,97	19,78	22,21
9,5	13,67	14,45	15,38	16,65	18,27	20,19	22,78
10	13,8	14,6	15,57	16,89	18,58	20,6	23,35
10,5	13,94	14,78	15,78	17,14	18,91	21,02	23,91
11	14,11	14,97	16	17,41	19,24	21,43	24,45
11,5	14,3	15,18	16,24	17,7	19,58	21,84	24,96
12	14,5	15,41	16,5	17,99	19,93	22,25	25,44
12,5	14,73	15,66	16,77	18,3	20,27	22,64	25,88

Tab. 10: BMI-*Percentiles for girls by Kromeyer-Hauschild et.al (2001)*

Age	P3	P10	P25	P50	P75	P90	P97
6	12,92	13,59	14,37	15,39	16,63	17,99	19,67
6,5	12,93	13,62	14,42	15,48	16,77	18,21	20,01
7	12,98	13,69	14,52	15,62	16,98	18,51	20,44
7,5	13,06	13,8	14,66	15,81	17,24	18,86	20,93
8	13,16	13,92	14,82	16,03	17,53	19,25	21,47
8,5	13,27	14,06	15	16,25	17,83	19,65	22,01
9	13,38	14,19	15,17	16,48	18,13	20,04	22,54
9,5	13,48	14,33	15,34	16,7	18,42	20,42	23,04
10	13,61	14,48	15,53	16,94	18,72	20,8	23,54
10,5	13,76	14,66	15,74	17,2	19,05	21,2	24,03
11	13,95	14,88	15,99	17,5	19,4	21,61	24,51
11,5	14,18	15,14	16,28	17,83	19,78	22,04	25
12	14,45	15,43	16,6	18,19	20,18	22,48	25,47
12,5	14,74	15,75	16,95	18,56	20,58	22,91	25,92

5.2.2 EU-based physical fitness and motor development standards

Selection of test items

Across Europe there exist a variety of physical fitness and motor development tests. However, many national physical fitness tests applied in the last three decades differ across Europe. One of the most popular test manual is the EUROFIT test manual (cf. CDDS, 1988). But due to needed technical equipments for measurements of some items and the extended range of test items, the EUROFIT test battery was quite differently applied between European countries (cf. Prohl, 1995; Brettschneider & Naul, 2004 pp. 72). Although there exist some national adoptions of the EUROFIT test manual in Europe (e.g. the Netherlands, Hungary etc.) the HCSC research group selected five physical fitness and motor test items which are very common across the six countries of this project and which do not need a range of technical tools. Most of the selected test items are also a part in different national test manuals.
Finally, there was an agreement to select items for measurement which also fits for the two selected age group of the project (7/8 and 10/11 years old pupils): **aerobic endurance (6min Run), endurance power (sit ups), explosive power (standing broad jump), agility/speed (20 m run) and flexibility (sit and reach).**

International reference data

International reference data for the test items of SIT UPS, STANDING BROAD JUMP, 20-METER-RUN and 6-MINUTES-RUN are taken from the data bank compendium of Beck & Bös, (1995).

SIT UPS (n = 61,226)

Tab. 11: Development standards for boys aged 6 to 12

sit ups (boys)					
Age	1	2	3	4	5
6	<7	7-9	10-13	14-16	>16
7	<8	8-11	12-15	16-20	>20
8	<9	9-12	13-15	16-18	>18
9	<11	11-15	16-19	20-23	>23
10	<12	12-15	16-19	20-23	>23
11	<14	14-17	18-21	22-26	>26
12	<16	16-19	20-23	24-27	>27

Tab. 12: Development standards for girls aged 6 to 12

sit ups (girls)					
age	1	2	3	4	5
6	<6	6-9	10-12	13-15	>15
7	<8	8-11	12-15	16-20	>20
8	<15	15-17	18-20	21-22	>22
9	<11	11-14	15-18	19-23	>23
10	<10	10-13	14-17	18-21	>21
11	<12	12-15	16-19	20-23	>23
12	<14	14-17	18-21	22-24	>24

All other tables with age and gender related development standards for the test items of STANDING BROAD JUMP, 20 m RUN and 6min RUN are documented in the handbook in appendix B 5.2.

SIT AND REACH (n = 6.264)

Reference data for the SIT and REACH test item were accumulated by our research group because this test item was not included in the data bank of Beck/Bös,1995. Other reference sources for Sit and Reach measurements consider only boys and girls form 12 years old onwards (cf. Eurofit Manual, CDDS, 1988). North-American based reference norms for our age groups were excluded because of different cultural criteria.
Our data for SIT and REACH reference norms were collected from several European studies[1]. Reference norms are as follows:

Tab. 13: Development standards for boys aged 6 to 12

Sit and Reach (boys)					
age	1	2	3	4	5
6	<-3,81	0,94 – -3,80	0,95 - 5,68	5,69- 10,42	> 10,42
7	<-3,81	0,94 – -3,80	0,95 - 5,68	5,69 - 10,42	> 10,42
8	<-6,00	-0,62- -5,99	-0,61 - 4,75	4,76 - 10,13	> 10,13
9	<-3,96	1,69- -3,95	1,70 - 7,34	7,35 - 12,99	> 12,99
10	<-4,24	1,52- -4,23	1,53 - 7,28	7,29 - 13,04	> 13,04
11 and 12	<-5,84	0,31- -5,83	0,32 - 6,45	6,45 - 12,60	> 12,60

[1] Data were collected from the age groups of 6 to 12 years old children in Czech Republic, Germany, the Netherland, Poland and Swiitzerland: cf. Collard (2010), Herman (2004), Hoffmann (2010), Rychtecky (2004), Schmid et.al. (2007).

Tab. 14: Development standards for girls aged 6 to 12

Sit and Reach (girls)					
age	1	2	3	4	5
6	<-2,42	2,64- -2,41	2,65 - 7,70	7,71 - 12,77	>12,77
7	<-2,42	2,64- -2,41	2,65 - 7,70	7,71 - 12,77	>12,77
8	<-2,53	2,34- -2,52	2,34 - 7,21	7,21 - 12,09	>12,09
9	<-0,99	4,40 - -0,98	4,40 - 9,79	9,79 - 15,19	>15,19
10	<-0,86	4,62- -0,85	4,62 - 10,09	10,09 - 15,56	>15,56
11 and 12	<-1,13	4,74- -1,12	4,74 - 10,60	10,60 - 16,47	>16,47

For all categories sample sizes were at least over 6.000 children. All categories of the different test items are defined as follows:
1 = heavy underperformance, 2 = underperformance; 3 = average performance, 4 = overperformance, 5 = heavy overperformance

Physical Ability Index

For better comparison with other criteria of the evaluation study (e.g. BMI profile; factors/ cluster of the Parents` Questionnaire) the five physical fitness and motor development items were summarized to one all over PHYSICAL ABILITY INDEX (PAI).
Two another Indices were built as well: the index of MOTOR POWER (MPI) is the sum of the means of the test items of SIT UPS and STANDING BROAD JUMP. The index of AEROBIC ENDURANCE (AEI) includes the results of 6min-RUN.
For all indices five performance categories (1 to 5) were build by international reference norms which are comparable between gender and age, but include of course different results of measurements for identical performance levels. (in categories 1-5).

Table 21 give an example how vice versa *identical results* of the physical fitness and motor development test leads in different ages for boys and girls to different assessment levels of their performance outcomes.

Example: Same test results – different levels of PA Index

Tab. 15: Ten years old boy vs. a 7 years old girl :

	Boy, 10 years	**Result**	**Girl, 7 years**
SIT UPS	2	n=15	4
SIT AND REACH	3	5 cm	3
20m-RUN	3	4,00sec.	5
S-B-JUMP	3	1,50 m	5
6min-RUN	2	17 laps	4
Motor Ability Index	**= 2,6**		**4,2**

5.3 Results: BMI

5.3.1 Results of BMI development for all pupils

For the evaluation of the BMI development only data of the longitudinal sample of the pupils (t1 to t2) was taken (n= 639).

Tab. 16: Results for BMI development.

	Heavy Underweight	Underweight	Normal Weight	Overweight	Heavy Overweight
BMI (WHO) t1	14	37	498	63	27
BMI (WHO) t2	21	42	478	67	31

BMI measurements according to the WHO cut-off criteria lead to a reduction of 20 pupils out of the Normal weight profile. 12 of these pupils changed at t 2 in a lower BMI profile, 8 of them increased their BMI profile. However, measurements according to the Kromeyer-Hauschild cut-off criteria show a more distinguished path of development for the different country groups.

Tab. 17: BMI Percentiles for t1 separated for countries

	<P3	P3-<P10	P10-<P25	P25-<P50	P50-<P75	P75-<P90	P90-<P97	>=P97
Czech Republic	6	8	17	22	26	16	6	5
Germany	0	5	14	26	20	13	12	6
Italy	1	4	8	15	21	19	17	9
Netherlands	2	1	6	8	8	7	5	4
Poland	0	2	14	28	32	22	8	10
United Kingdom	1	7	23	51	43	28	22	11

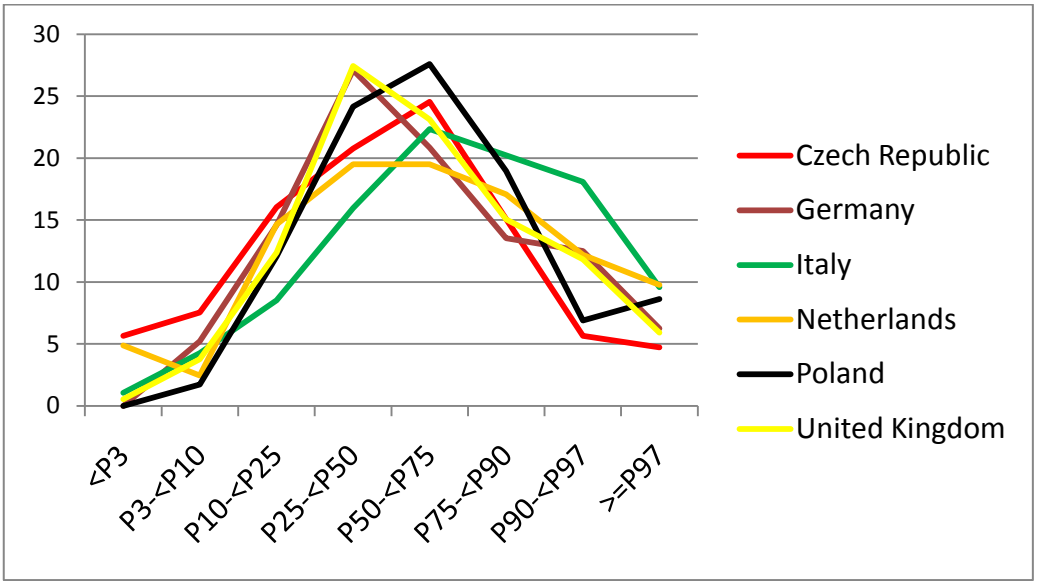


Fig. 6: Percentiles BMI for t1 per country in Percent.

Tab. 18: Percentiles for t 2 separated for countries

	<P3	P3-<P10	P10-<P25	P25-<P50	P50-<P75	P75-<P90	P90-<P97	>=P97
Czech Republic	5	11	11	25	25	18	8	3
Germany	1	7	20	18	24	8	12	6
Italy	1	7	7	20	23	18	12	6
Netherlands	6	1	6	5	6	10	3	4
Poland	1	1	16	29	31	21	9	8
United Kingdom	3	4	22	49	48	24	24	12

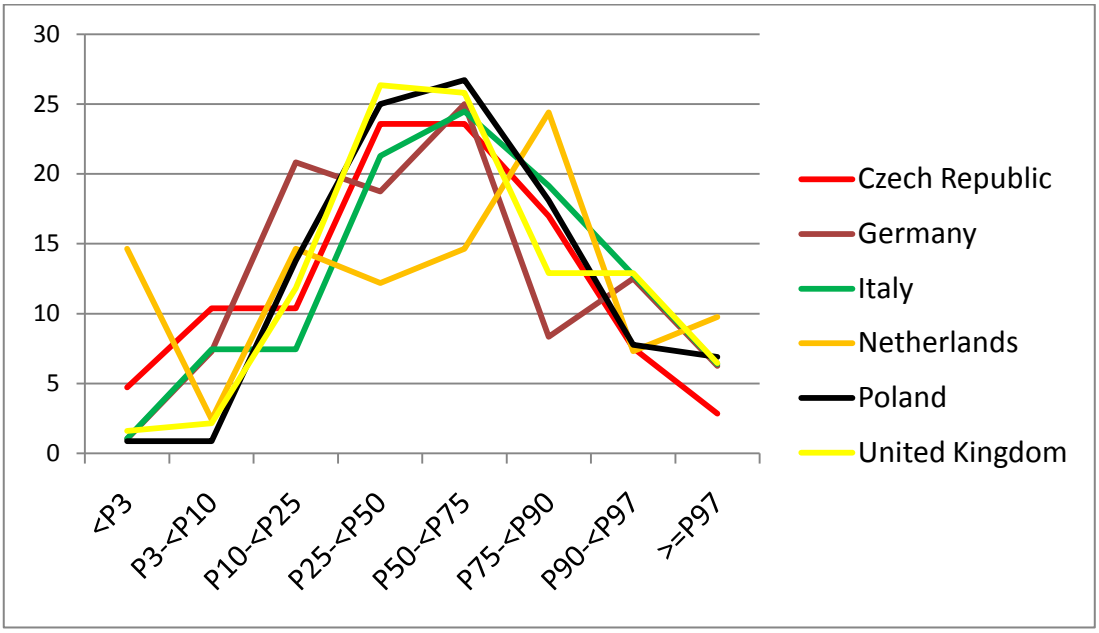


Fig. 7: Percentiles BMI for t2 per country in Percent

The number of the overweight and obesity sample group (P 90-100) of the UK increased between t 1 to t 2 from 23 up to 36 pupils whereas the numbers of the Italian young people decreased from t 1 to t 2 from 26 down to 18 boys and girls.
The BMI means measured according to the two different cut criteria (WHO-BMI and KRH-BMI) decreased both form t1 and t2 slightly, but not significantly.

Tab. 19: Decrease of means for BMI from t1 to t2

	Percentiles (KRH)	BMI (WHO)
Mean t1	4,91	3,08
Mean t2	4,81	3,07

There was also a slight but not significant BMI decrease measured according to the two cut criteria for both the intervention and the control groups (intervention group).

Tab. 20: Decrease of means for BMI from t 1 to t2 for Intervention and Control Groups

	Intervention Group Percentiles	Control Group Percentiles	Intervention Group BMI	Control Group BMI
Mean t1	4,98	4,79	3,09	3,06
Mean t2	4,86	4,73	3,09	3,04

For the intervention group the mean BMI percentile was reduced by 0.12 whereas for the control group a reduction of only of 0.06 was measured. However, measurements according to the WHO cut-off criteria reveals only a reduction of 0.03 for the intervention group and a slightly higher decrease (0.05) for the control groups.

There exists a difference in BMI development between the two age groups of the study (7/8 years old; n=347; 10/11 years old; n=292).

Tab. 21: Means of BMI (KRH & WHO) in t1 in t2 for the 7/8 years group

	Percentiles (KRH)	BMI (WHO)
t1	5,07	3,03
t2	4,85	2,98

Tab. 22: Means of BMI (KRH & WHO) in t1 and t2 for the 10/11 years old

	Percentiles (KRH)	BMI (WHO)
t1	4,73	3,14
t2	4,77	3,17

The younger group (7/8 years old) reduced their BMI mean, more stronger according to the KHR cut criteria, but the older group (10/11 years) only slightly increased their BMI mean.

Tab. 23: BMI means of boys (n= 331) and girls (n=308)

	male percentiles	female percentiles	male BMI (WHO)	female BMI (WHO
t1	4,97	4,85	3,05	3,12
t2	4,89	4,73	3,02	3,12

Boys and girls reduced their BMI mean between t 1 and t 2 more likely according to the KRH cut-off criteria. The girls` BMI mean according to WHO remains stable; for boys there is a slight reduction (-0.03).

5.3.2 Results of BMI development for the sub-sample of overweight and obese children

For the overweight and obesity sub-sample of children (n= 115) a slight decrease in BMI-WHO means occurred from 22,55 down to 22,46 compared to the total sample group (n=639), in which the WHO-BMI mean slightly increased from 17,75 up to 17,86 (+0.11). However, this increase of the total BMI mean is after 5 to 6 months (t1 to t2) less compared with the reference standard norms of WHO (2007) for both age and gender groups (see chapter 5.2 and Appendix B 2)

Table 24 and Figure 8 document the WHO and KHR means for BMI development of the sub-sample group.

Tab. 24: Percentiles (KRH) and BMI (WHO) for the sub-sample p90+ at t1 and t2

	Percentiles	BMI (WHO)
t1	7,39	3,93
t2	7,11	3,94

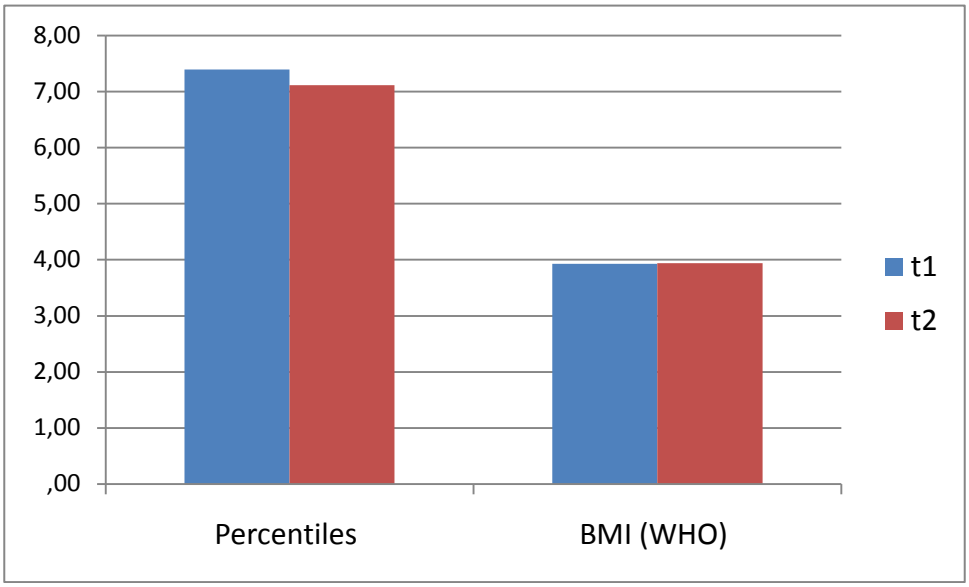


Fig. 8: Percentiles and WHO-BMI for the sub-sample p90+

According to WHO cut-off criteria the BMI mean remains stable. A decrease is visible according to the KRW percentile/ structure.

Tab. 25: KRH-BMI percentiles for t 1 and t 2

	P50-<P75	P75-<P90	P90-<P97	>=P97
t1	0	0	70	45
t2	1	24	51	39

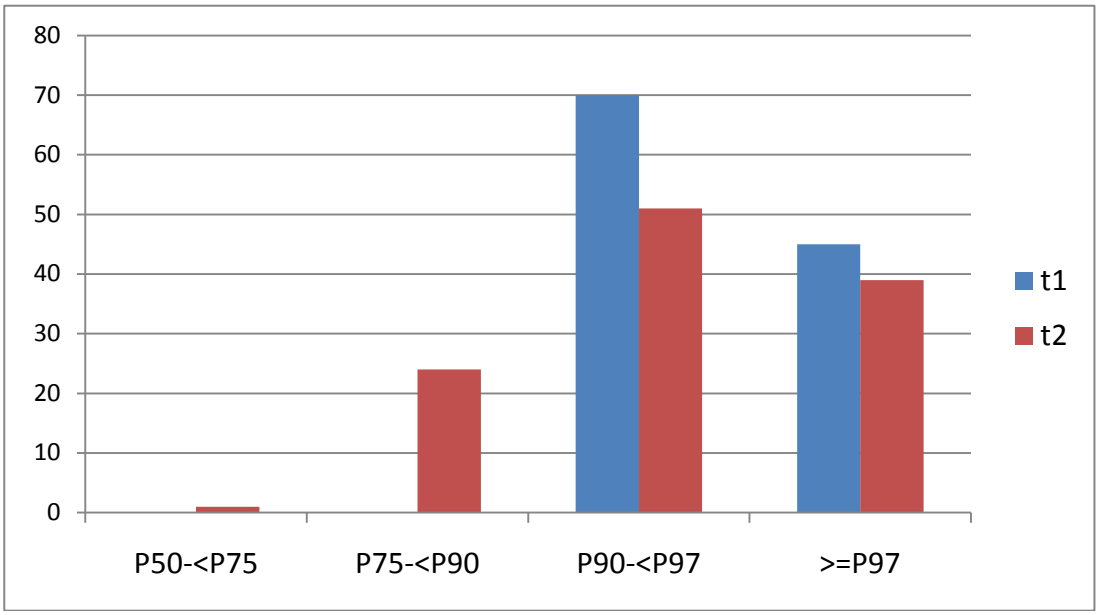


Fig. 9: Results for percentiles t1 and t2.

The development of the BMI percentiles for the sub-sample of the overweight and obese children documents some interchanges.

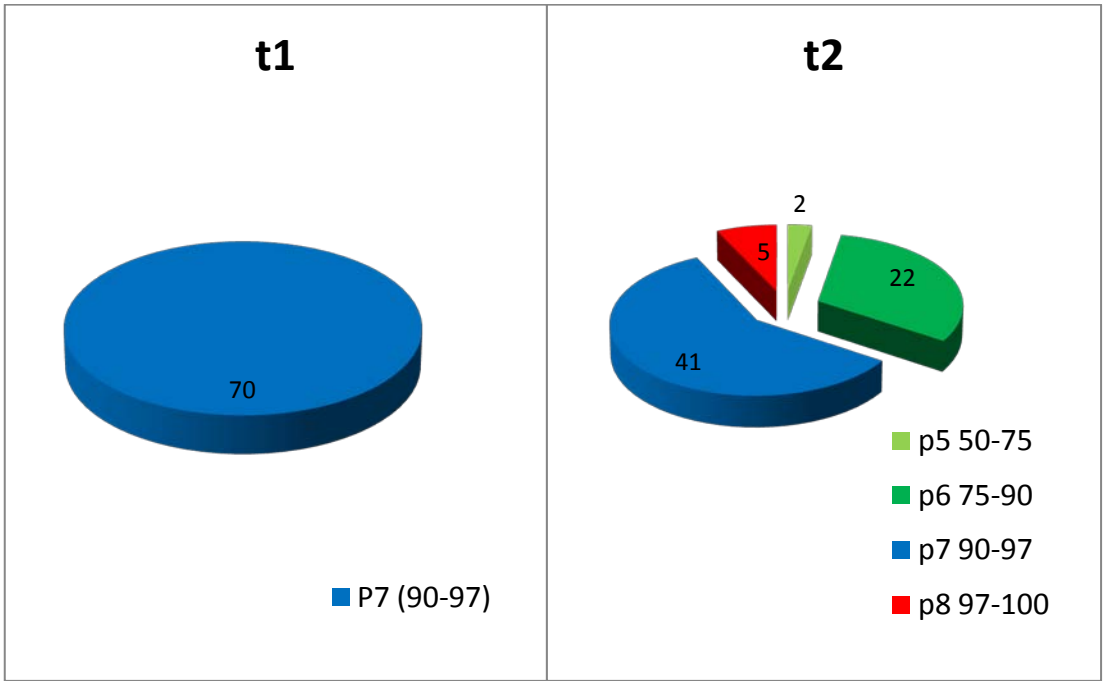


Fig. 10: Changes of overweight pupils in p7 from t1 to t 2.

29 of 70 children leave their profile of overweight (p 7, P90-97). Most of these children (22) changed into the lower p 6 (P75-90) profile which means the highest profile of normal weight. However, also 5 children out of 70 changed into the upper profile of obesity (p 8; P97-100).

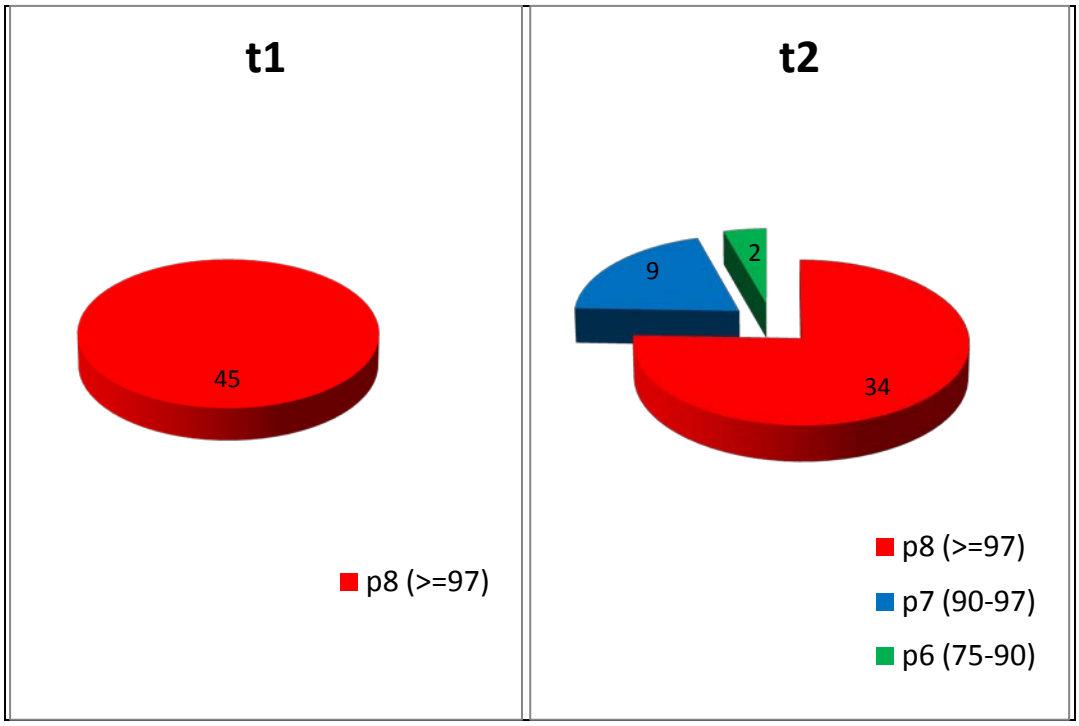


Fig. 11: Changes of pupils in BMI obesity Percentile (p8) from t1 to t2

34 out of 45 children of the obesity profile (p 8, P97-100) remained in their profile, 11 changed into a lower profile which means they have become at t2 either overweighed or normal weighed.

5.4. Results: Physical fitness and motor development

5.4.1 European Results of measuring times t1 and t2

The European results for physical fitness and motor development are based on a sample size on n= 685 pupils who took completely part in both measures (t1 and t2).

Tab. 26: Means of Physical fitness and motor development

	Sit Ups	Sit and Reach	20m-Run	Standing Broad Jump	6min-Run
t1	3,71	2,39	1,95	2,68	2,61
t2	4,09	2,62	1,81	2,52	2,83

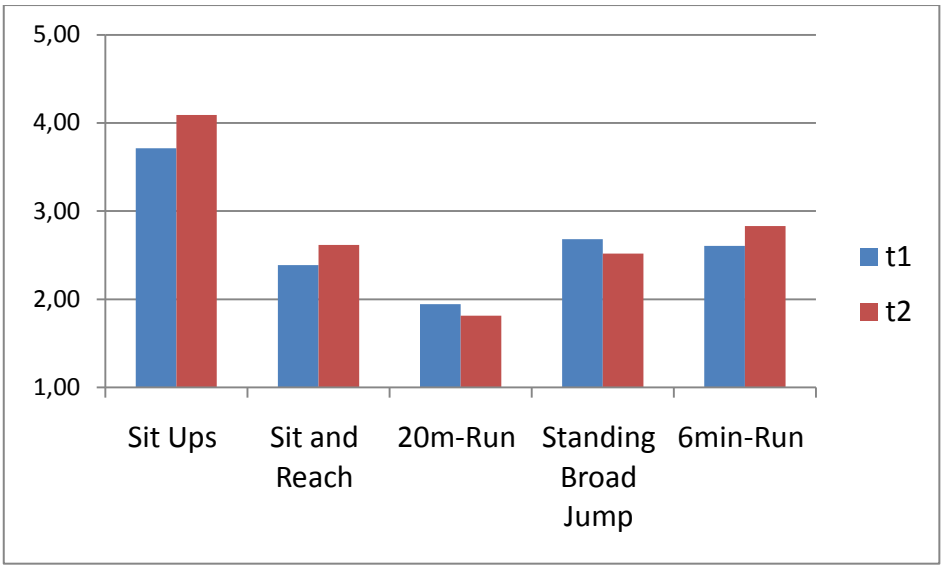


Fig. 12: Motor Ability Items

Tab. 27: Means of Motor Ability Indices

	Motor Ability Index	Motor Ability Power	Motor Ability Endurance
t1	2,67	3,20	2,61
t2	2,78	3,30	2,83

On a European level all means of the motor ability test items and the respective motor ability indices increased between t1 and t2, except the mean for standing broad jump and the mean for the 20m-Run. However, the decrease of the mean for 20 m-Run is a positive result, because the participants in this study run faster at t2 than at t1. Some physical fitness items (e.g. sit-ups: $F(1,357) = 42{,}468$ $p < .001$,. $\eta^2 = 106$, sit and reach: $F(1,357 = 46{,}124$ $p < .001$, $\eta^2 = 114$) increased significantly. Also the motor ability indices increased on a significant level: MAI $F(1,684) = 24{,}948$, $p < .001$, $\eta^2 = .035$; MA Power $F(1,684) = 15{,}534$, $p < .001$, $\eta^2 = .022$; MA Endurance $F(1,684) = 19.679$, $p < .001$, $\eta^2 = 0.28$).
Comparisons of results for the motor ability items between the intervention group and the control group only document a significant higher development between t1 and t2 for endurance capacity (6min Run). The participants of the intervention group, however, often show a minor level of motor development at t 1 compared to the control group (see Appendix B 4, Table 45).

5.4.2 Results separated for countries

The 685 children who took part in both measures represent Czech Republic (N=102), Germany (N=90), Italy (N=86), the Netherlands (N=37), Poland (N=114) and United Kingdom (N=256).

Tab. 28: Motor Items for t1 and t2 separated for countries

	Sit Ups t1	Sit Ups t2	Sit and Reach t1	Sit and Reach t2	20m-Run t1	20m-Run t2	Standing Broad Jump t1	Standing Broad Jump t2	6min-Run t1	6min-Run t2
Czech Repu-blic	3,99	4,35	2,62	2,77	2,50	2,53	2,68	2,80	3,14	3,22
Ger-many	4,07	4,13	2,74	2,97	2,61	2,31	3,01	3,32	3,18	2,79
Italy	3,52	4,43	2,57	2,91	1,71	1,23	2,31	2,83	2,71	2,27
Nether-lands	3,57	3,11	2,76	2,76	2,73	2,76	2,57	2,59	3,24	3,16
Poland	4,20	4,79	2,11	2,13	2,44	2,08	1,94	2,78	2,93	2,67
United King-dom	3,34	3,68	2,19	2,53	1,24	1,30	2,60	2,33	1,93	2,91

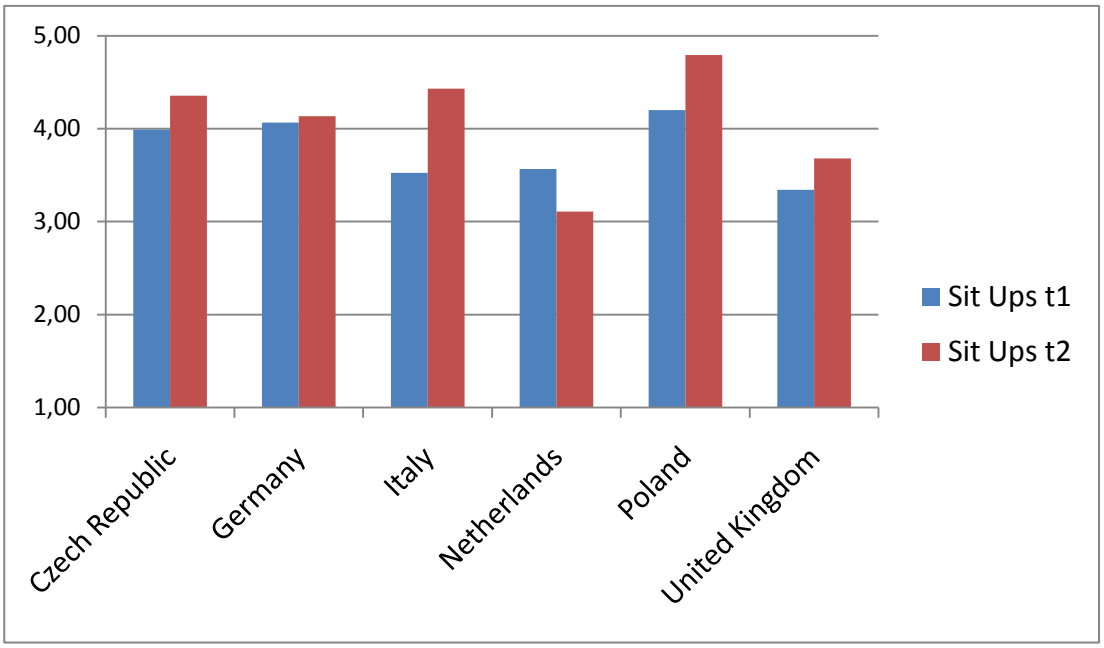


Fig. 13: Development of Sit Ups in the six countries

There are some identical and ambivalent results between the six countries. In Czech Republic, Poland, Italy and Germany all motor items increased from t1 to t2 except for the 20 m Run in Czech Republic and for the 6min Run in Poland, Italy and Germany. This reduction in endurance capacity is probably

due to the very different seasonal times of measuring: t 1 was organized after the summer term in early autumn 2010 whereas t2 was organized in the cold winter term of January/February 2011. In the UK two of the motor items decreased (20 m Run and standing broad jump). The sample group of the Netherlands increased their motor items only slightly in the 20m Run and in standing broad jump. Due to the delay in the time frame, the Dutch children only excercised about 14 weeks instead of 20 (for more details about the national results see Appendix B Tab. 46 and 47).

The Motor Ability Index increased in the Czech Republic. The Motor Ability Power Index increased in the Czech Republic, Italy and the United Kingdom. The Motor Ability Endurance Index increased in the Czech Republic and in the United Kingdom, however in each of these countries on different levels from t 1to t2 (see Appendix B 4, Table 50).

Results for intervention (working) and control Group are only documented for four countries, because in Germany and the Netherlands no control groups were identified for different reasons.

Tab. 29: Results of Motor Indices for the intervention and control groups

		Motor Ability Index t1	Motor Ability Index t2	Motor Ability Power t1	Motor Ability Power t2	Motor Ability Endurance t1	Motor Ability Endurance t2
Czech Republic	Working	3,26	3,39	3,63	3,71	3,41	3,63
	Control	2,71	2,77	3,11	3,27	2,80	2,72
Italy	Working	2,78	2,73	3,40	3,41	2,81	2,60
	Control	2,56	2,53	2,95	3,34	2,60	1,93
Poland	Working	2,85	2,75	3,43	3,37	2,93	2,62
	Control	2,93	2,71	3,55	3,36	2,93	2,72
United Kingdom	Working	2,08	2,48	2,71	3,01	1,59	2,66
	Control	2,41	2,82	3,05	3,37	2,51	3,33

In all three motor ability indices the intervention group in the Czech Republic developed better than the control group. For the control group in this country a reverse development exits for the Motor ability endurance index. The Italian sample shows almost the same development for the intervention group compared to their control group, however the motor ability index very slightly decreased for both groups likewise the Motor endurance decreased, but much stronger for the control group. Only in the UK an increase was measured for all motor indices and for both groups. The increase of aerobic endurance capacity index was significantly stronger for the intervention group than for the control group in the UK ($F (1,255) = 98,842$, $p < .001$, partially $\eta^2 = .279$).

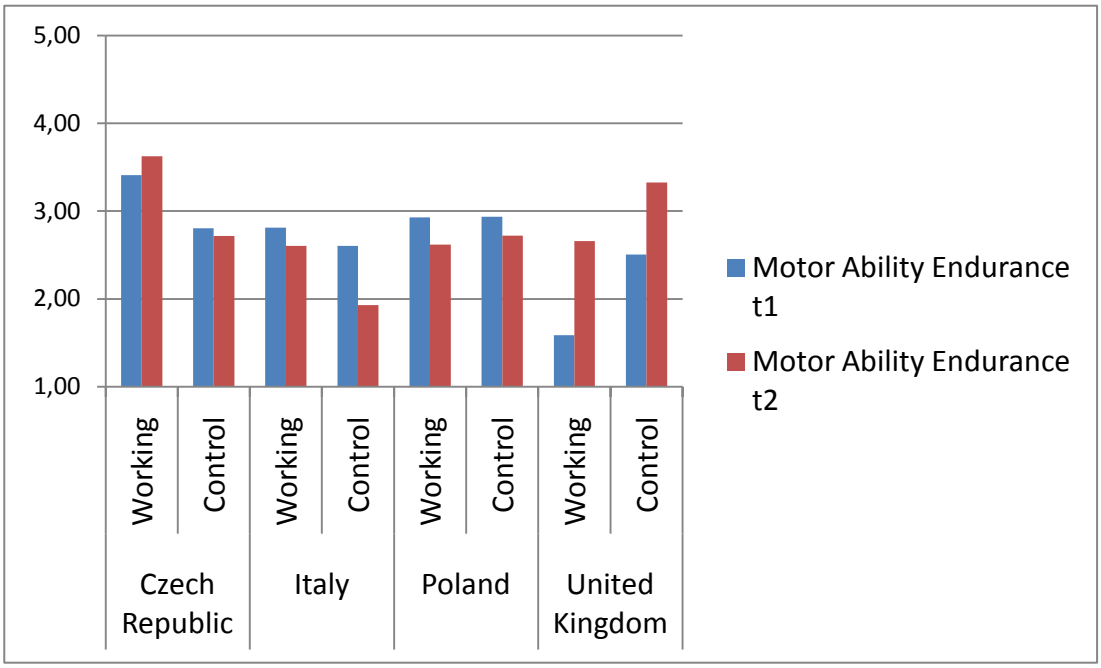


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Fig. 14: Motor Ability Endurance for Working and Control group in each country.

Results for the different age groups

Subsample 7-8 year old boys and girls (n = 327)

Tab. 30: Results Motor Activity for 7 to 8 year old children

	Sit Ups	Sit and Reach	20m-Run	Standing Broad Jump	6min-Run
t1	3,90	2,56	2,33	2,92	3,00
t2	4,31	2,64	2,02	2,41	2,64

For the younger age group three motor abilities increased between t1 and t2, two items (standing broad jump and 6min Run) did not. The strongest increase was measured for sit ups (endurance power) and the 20 m Run (agility/speed).

Some differences occurred between the intervention and control group in this age. The intervention group developed their flexibility better than the control group (sit and reach). For the item of standing broad (explosive strength/power) and in aerobic endurance capacity (6min run) the decrease between t1 and t2 was higher for the control group than for the intervention group (see Appendix B 4, Tab. 52).

Subsample 10-11 year old boys and girls (n = 358)

For the children of the older sample group a continuous development of all physical fitness and motor developments including all three motor ability indices can be documented.

Tab. 31: Results for Physical Fitness and Motor Development (10/11 year old)

	Sit Ups	Sit and Reach	20m-Run	Standing Broad Jump	6min-Run
t1	3,53	2,31	1,60	2,46	2,27
t2	3,87	2,60	1,65	2,62	2,99

Tab. 32: Results for Motor Ability Indices (10/11 year old).

	Motor Ability Index	Motor Ability Power	Motor Ability Endurance
t1	2,43	2,99	2,27
t2	2,47	3,25	2,99

There are some significant changes between t 1 and t2, particularly for the motor ability endurance index ($F (1,357) = 85,58$, $p < .001$, partial $\eta^2 = .193$).

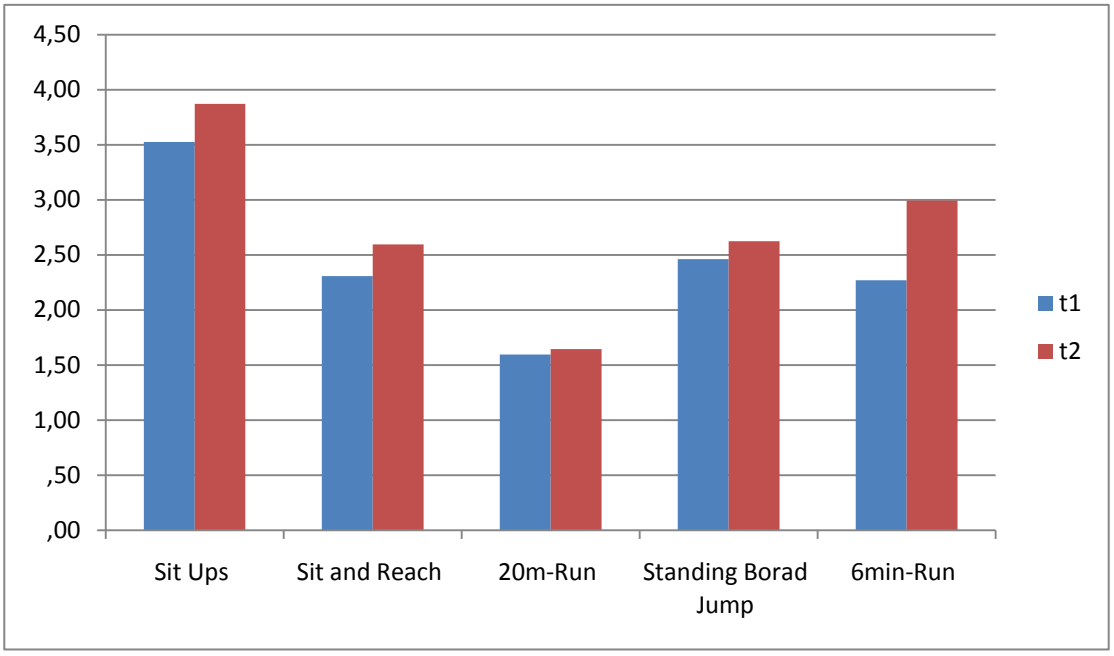


Fig. 15: Results for Motor Items for 10 to 11 year old pupils.

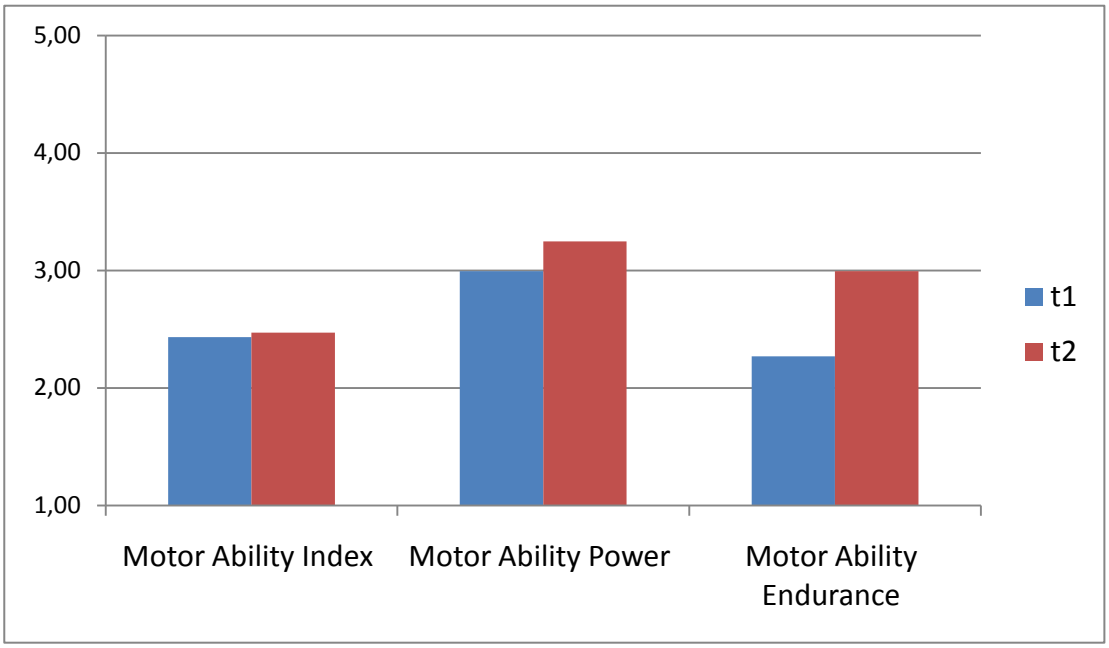


Fig. 16: Results for Motor Ability Indices

Some differences occurred between the intervention and control group in this age group as well. The intervention group developed much better than the control group their aerobic performance (+0.85 vs. +0.53) measured in the 6min run between t1 and t2 ($F (1,357) = 85,58$, $p < .001$, part. $\eta^2 = .193$). Explosive strength/power (+0.23 vs. +0.06) measured with the standing broad jump increased also more in the intervention group than in the control group. Only minor developments were measured between the two groups for the 20m Run, however, slightly better for the intervention group (see appendix B 4, Tables 55).

Gender differences

Results based on data of 685 children (n= 359 boys; n= 326 girls).

Tab. 33: Indices of Motor Ability for gender.

	Motor Ability Index t1	Motor Ability Index t2	Motor Ability Power t1	Motor Ability Power t2	Motor Ability Endurance t1	Motor Ability Endurance t2
male	2,70	2,88	3,27	3,36	2,67	2,94
female	2,63	2,82	3,11	3,24	2,54	2,71

Both gender increased their indices between t1 and t 2. Not surprisingly, boys performed better than girls on an average level, in particular in the older age goup. Nevertheless, girls compared to boys could increase their level of performance in the motor ability indices and motor power index higher than boys in their motor ability index; however, boys could increase higher than girls their motor ability endurance index (+0.27 vs. .+0.17).

5.4.3 Results for the overweight and obesity sub –sample

The subsample p90-100 is based on data of 115 children who were at measuring time t1 inside the percentiles p7 and p8 of Kromeyer-Hauschild's BMI percentile scale. In both motor ability measurements (t 1 and t 2) n = 113 of these children were involved.

Tab. 34: Physical Fitness and Motor development items for the sub-sample

	Sit Ups	Sit and Reach	20m-Run	Standing Broad Jump	6min-Run
t1	3,49	2,24	1,63	2,22	2,00
t2	3,90	2,59	1,63	2,04	2,15

Tab. 35: Motor Ability Indices for the sub-sample

	Motor Ability Index	Motor Ability Power	Motor Ability Endurance
t1	2,32	2,86	2,00
t2	2,53	2,97	2,15

The mean for the overweight and obese children of the sample group increased both between t1 and t2 for three physical fitness and motor development items, except for standing broad jump (decrease) and for the 20m Run (stable). However, all three motor ability indices increased between t1 and t2.

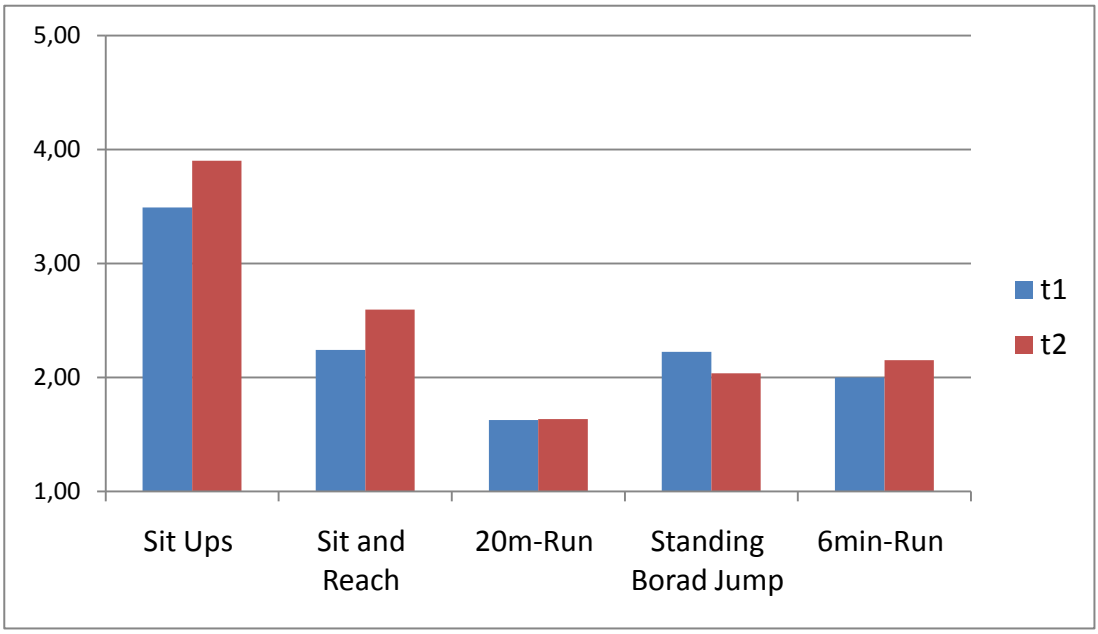


Fig. 17: Motor Ability results for sub-sample.

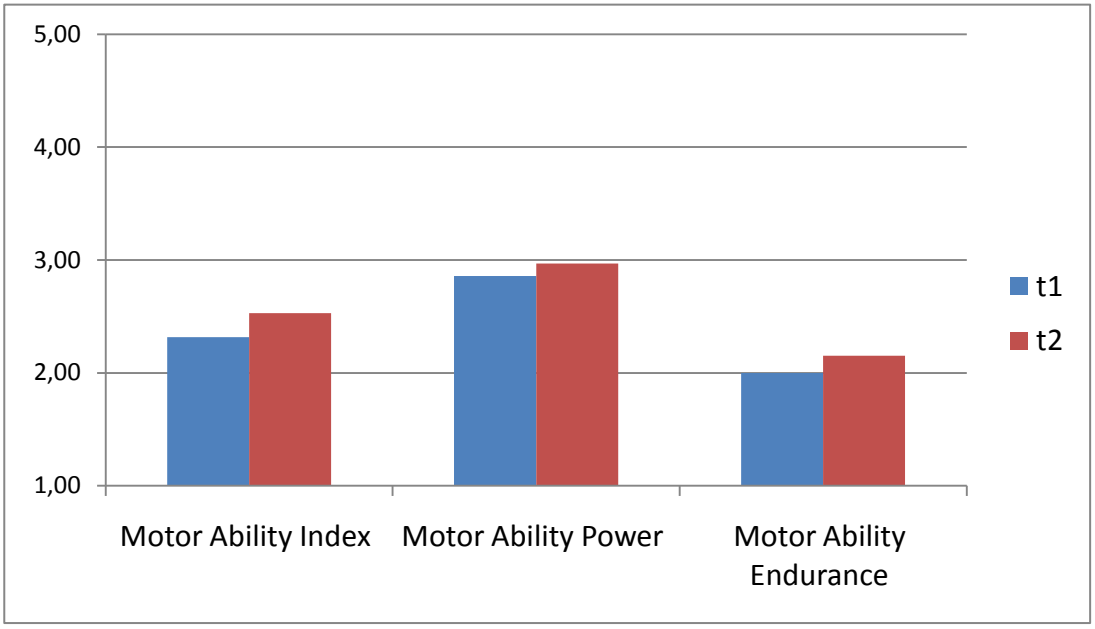


Fig. 18: Motor Indices for sub-sample

The increase of the motor ability index from t1 to t2 is significant: ($F(1,110) = 7.179$, $p = .009$ partial $\eta^2 = .061$) but only with a small effect.

The target group of the overweight and obese children was supported/treated both in their intervention and respective control groups. Positive developments do not fairly split this sub-sample group. In some countries (Poland, UK) the intervention groups were based at the same school than the control groups.

5.5 BMI Development and Comparison between Motor Ability Results of the total Sample Group and the Sub-sample of overweight and obese children

Tab. 36 a: Motor Ability results for sample and sub-sample.

	Situps		Sit and Reach		20m-Run	
	All	90+	All	90+	All	90+
t1	3,72	3,52	2,40	2,26	1,94	1,63
t2	4,10	3,90	2,62	2,62	1,81	1,64

Tab. 36 b: MA results for sample and subsample

	Standing Broad Jump		6min-Run	
	All	90+	All	90+
t1	2,68	2,25	2,61	1,99
t2	2,52	2,04	2,84	2,13

Of course the motor ability level between the two sample groups is quite different at t1. But at t2 the performance differences of some items became closer (e.g. sit and reach, 20m run). In the sit and reach test the overweight and obese children of the sub-sample extended their flexibility far more than their counterpart and reached at t2 even the same level (+2,62 cm).

Tab. 37: Motor Ability indices results for sample and subsample

	Motor Ability Index		Motor Ability Power		Motor Ability Endurance	
	All	P90+	All	P90+	All	P90+
t1	2,67	2,32	3,20	2,87	2,61	1,99
t2	2,78	2,47	3,31	2,96	2,84	2,13

Finally, the three different motor ability indices document for both sample groups an increase between t1 and t2 and the differences between the two sample groups for the general MAI even became a little bit closer for the P90+ group: MAI - 0.35 at t1 vs. - 0.31 at t2. The most important outcome, however, is that overweight and obese children can improve their physical fitness status and motor development even in the short run of 20 weeks, particularly if it coincides with a reduction of their BMI (see chapter 5.3.2).

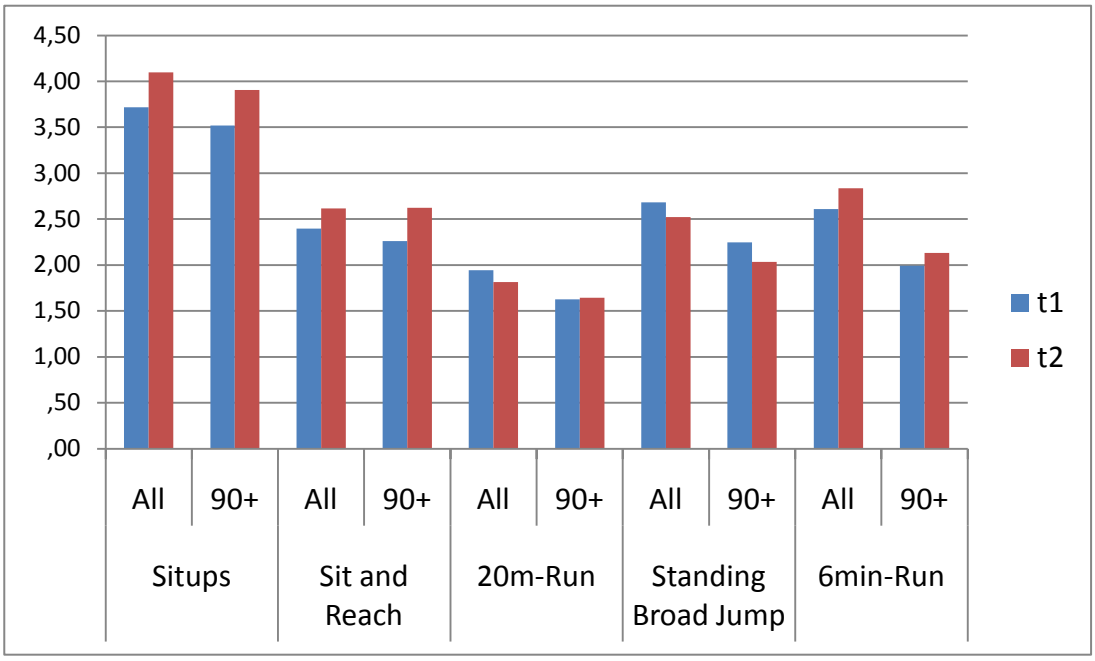


Fig. 19: Results of sample and subsample in Motor Ability Items

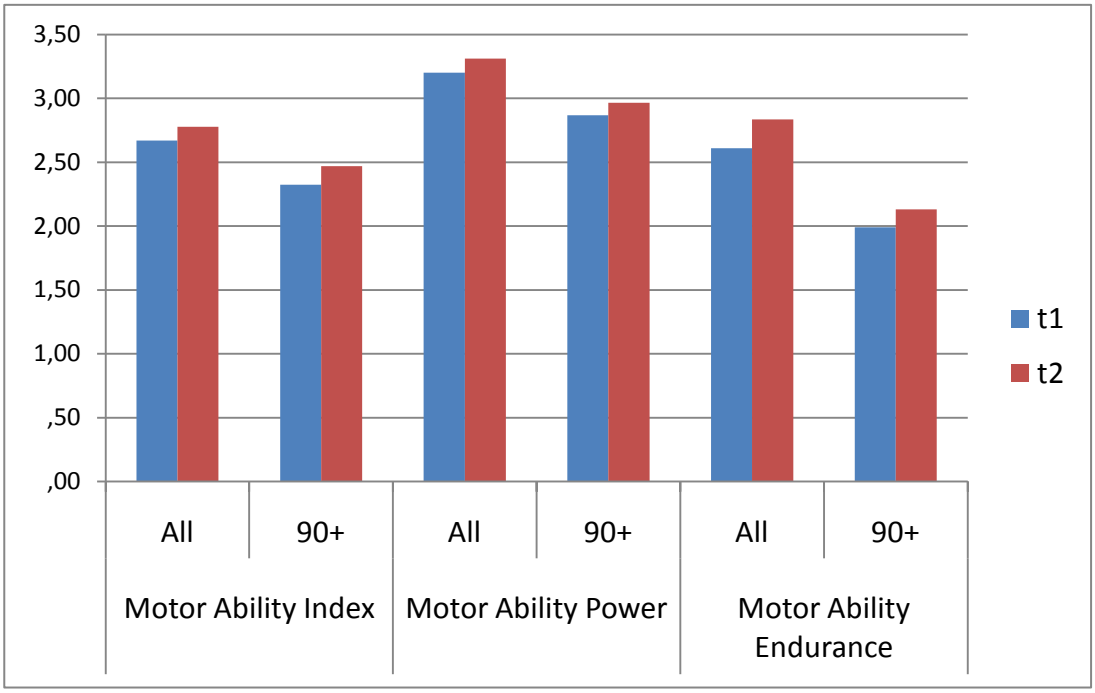


Fig. 20: Results of sample and subsample in Motor Ability indices.

Results of the physical fitness and motor development of the two sample groups between t1 and t2 lead to the question, whether there might be a correlation between their status of BMI development at t2 and their status of physical fitness/motor development at t2.

5.6 *Correlations of BMI development and motor ability indices*

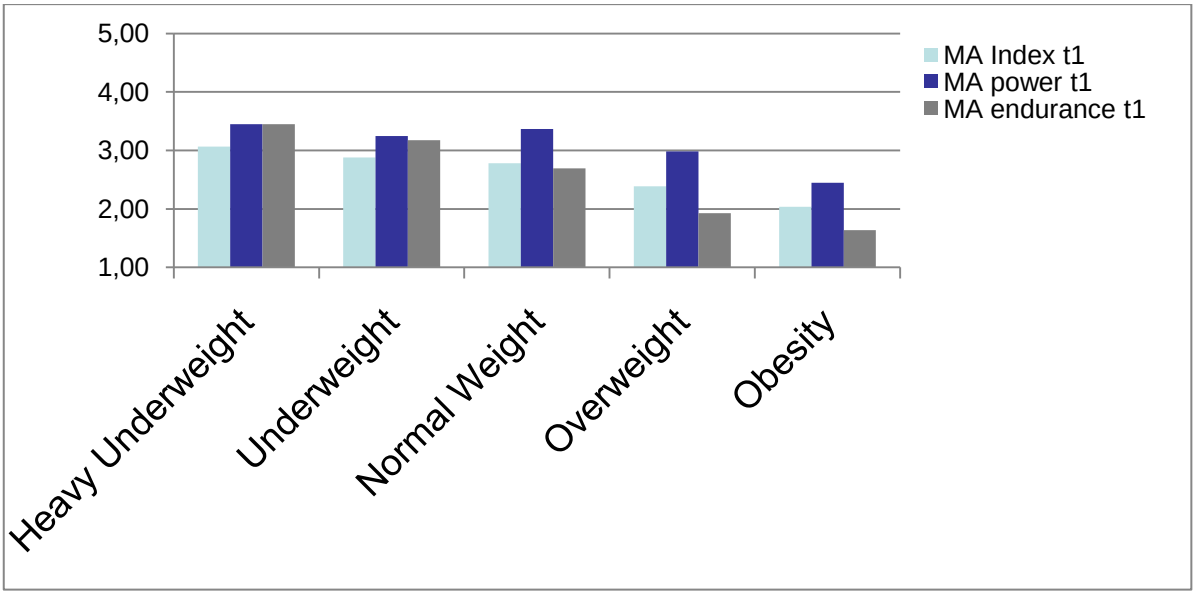


Fig. 21: Correlation between BMI and Motor Indices at t 1

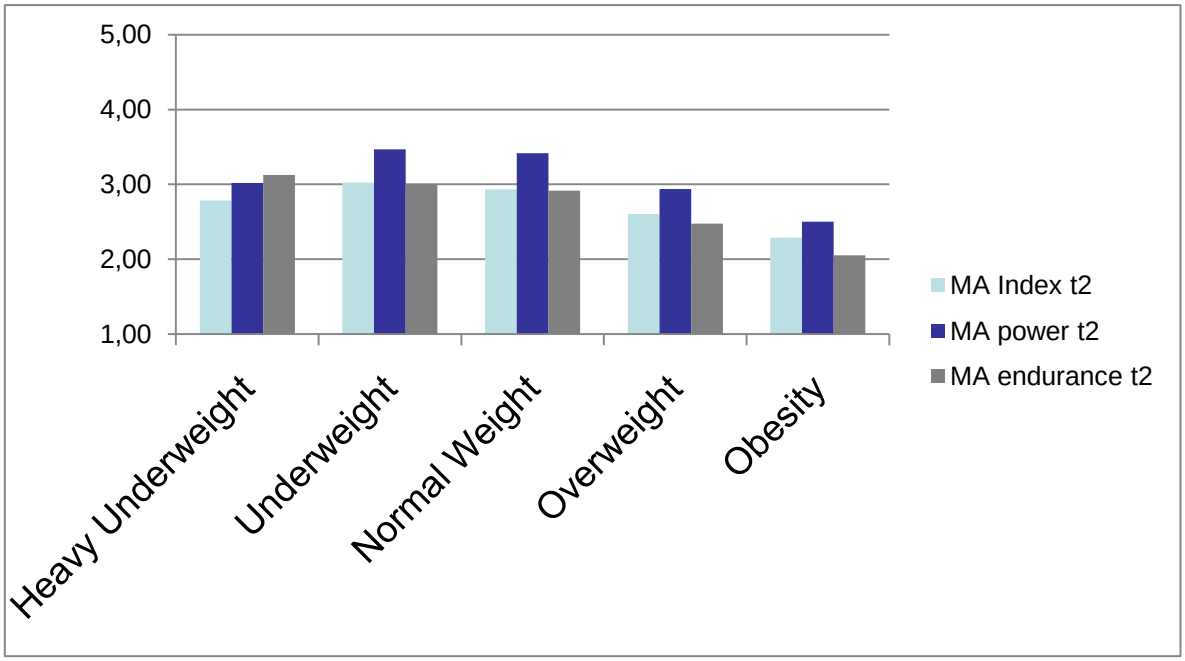
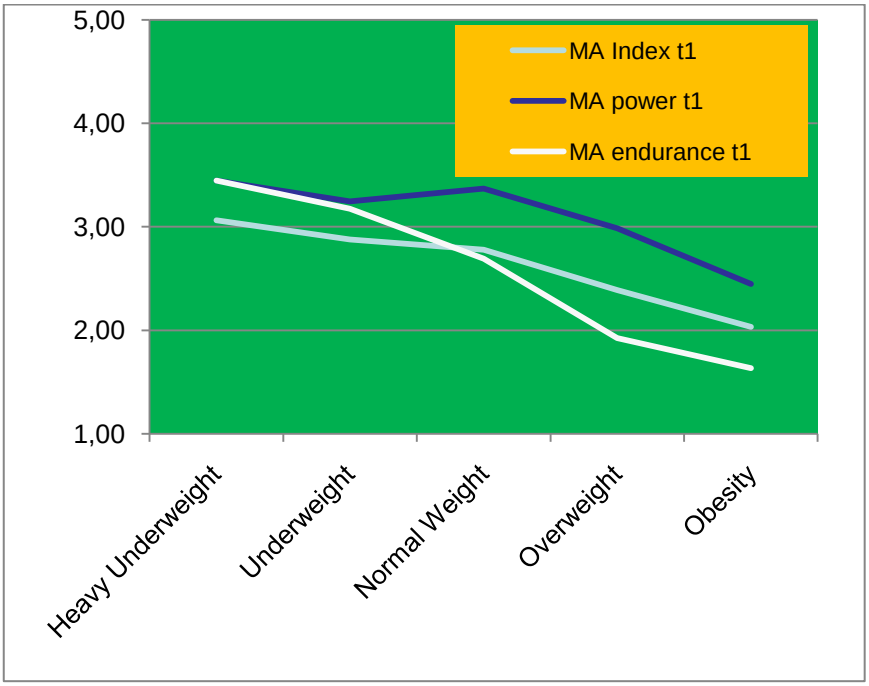


Fig. 22: Correlation between BMI and Motor Indices at t 2



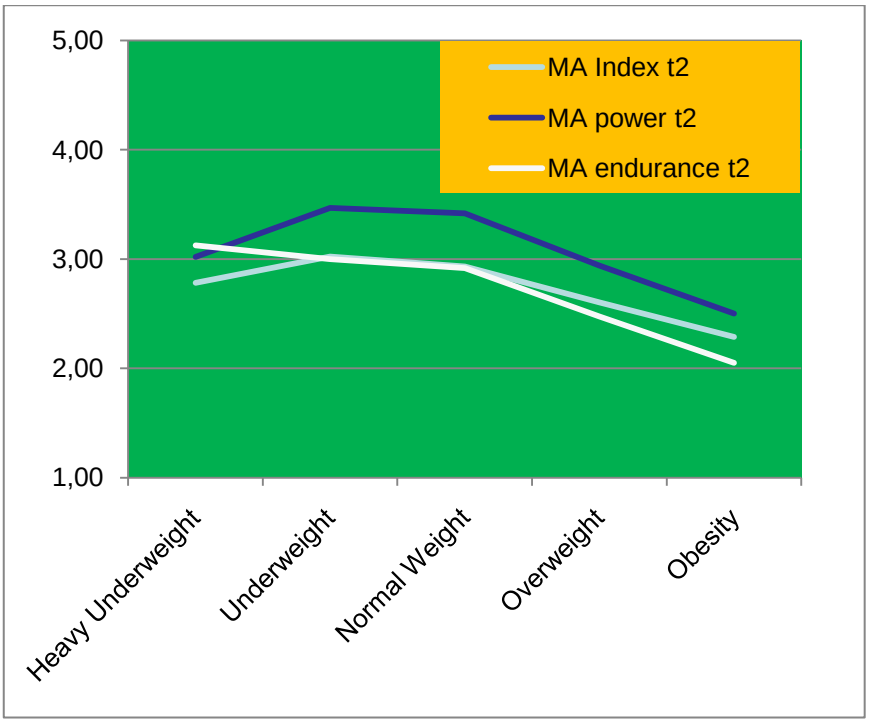


Fig. 23 a, b: Correlation between BMI and Motor Indices at t1 and t 2

The development of BMI and Motor Ability indices documents for the (all inclusive motor items) Motor Ability Index (MAI) and particularly for the index of MA endurance capacity a correlation: overweight and obese children perform better after 20 weeks of the HCSC intervention (t 2) than at the beginning (t1) and could slightly reduce their average of BMI until t2 (see

table 24 and 25 in this report). The differences between the performance levels of the three MA indices at t1 became also more homogenous at t2 for the overweight and obese sub-sample. Results also document for the small sample of underweight children a better development of their MA power index at t2. The differences are all significant:

Motor Ability Index: F (1,86) = 21,691.p <.001 η^2 = .201

Motor Ability Power Index: F (1,86) = 4,642. P = .034 η^2 = .051

Motor Ability Endurance Index: F (1,86) = 9,425.p < .003 η^2 = .099

6. Parents' Questionnaire

The English version of the parents' questionnaire (see appendix D 2) was translated into six languages (Czech, Dutch, German Italian, Polish and Turkish) and applied in each of the six HCSC countries via the schools to the pupils' parents of the project. In Italy, the Netherlands and the United Kingdom no questionnaires were either completely filled in or pupils of the parents did not participate in both times of measurement. Some parents also refused to link and to identify their questionnaire with the students' BMI and motor development profile. In all cases the means of the parents' results were also checked with the means of the pupils' results. Therefore, we only considered for further data analysis a total sample of n=281 parents' questionnaires (n=113 from Czech Republic; n=61 from Germany, and n=107 from Poland). For this number of parents data entries and results of investigation can be linked to their respective children's BMI profile and physical fitness/motor development results.

6.1 Socio-demographic data of the parents

About 15% of mothers and fathers of the sample group are non-native born parents. Slightly more than 70% of mothers and fathers of the pupils are married. About 80% of the parents have two children or more, 16% one child. Only 121 parents answered the questions about their employment.

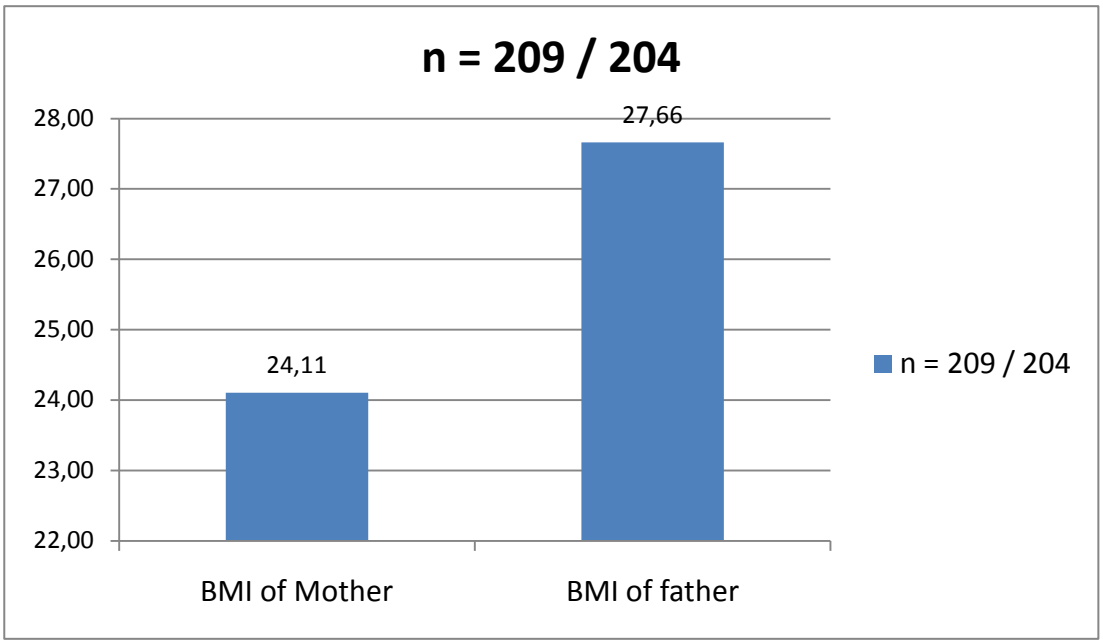


Fig. 24: BMI means of parents.

Self reported BMI of the parents lead to a BMI mean of 24,11 for mothers and 27,66 for fathers. About 23% of the mothers are overweight or obese; fathers are self-reported with a prevalence of 62% of overweight and obesity.

6.2 Criteria, items and clusters/ factors of the questionnaire

The questionnaire includes 36 items. Items 5, 7, 8, 16, 25, 30, 31 were clusters of 4 to 8 lower items, which were summarized.
BMI was summed by Question 33.
The answers of items 32, 35 and 36 were excluded for clustering. All other items were recorded into a 2-point-scale (1 = negative, 2 = positive).
Means were built and summarized into six different clusters (factors):

Cluster 1: Parents view on physical activity lifestyle of their children:

- No. 3: way to school
- No. 4: Membership sports club
- No. 5a-k: weekly sports activity
- No. 6: play outside
- No.7d-f free time with friends
- No 8e-g: free time alone

Cluster 2: Parents view on media consume lifestyle of their children

- No. 7a-b: free time with friends
- No. 8a-b: free time alone
- No. 9: TV/DVD/VIDEO watch time
- No. 10: PC time
- No. 11: TV/PC in room
- No. 23: TV/PC before bed

Cluster 3: Parents view on nutrition lifestyle of their children

- No. 13: meals a day
- No. 16a-m eat in meantime
- No. 17: drink behavior
- No. 18: drink behavior II
- No. 24: eat before bed

Cluster 4: attitudes of parents towards physical activity

- No 30b-c: importance of sport
- No 31a: positive effects of sport

Cluster 5: attitudes of parents towards media consume

- No. 19: when does child go to bed
- No. 25a-d: limitation of media consume
- No. 30d: overweight and media consume
- No. 31c: positive effects of limitation of media consume

Cluster 6: attitudes of parents towards nutrition

- No. 14: meals with the family
- No. 25e-h: deal with children about snacks
- No. 25j-k: limitation of snacks
- No. 30e: importance of healthy nutrition
- No. 30f and g: overweight, sweets and nutrition
- No. 31b: effects of positive nutrition

All these items had each an impact of 1. The mean of cluster 1, for instance, was built by the results of all seven items counting up to the number of 7. Results were only clustered if all questions of the respective cluster were answered.

All questions that were not clustered or were not a factor by its own (e.g. homeland, question 32) were not included for analysis of the results.

6.3 Parents' assessment of their children's realized lifestyle factors

Results are means of categorized answers summed into three different items of parents' assessments of their children's lifestyle behavior factors. Means are calculated between 1 and 2.
A mean between 1 to 1,25 stands for negative lifestyle behavior, a mean between 1,26-1,50 is a more negative than a positive behavior. A mean between 1,51-1,75 is more positive than negative and a mean between 1,76-2,00 is a positive lifestyle behavior in the view of the parents.

Tab. 38: Means of lifestyle factors of pupils assessed by their parents

Parents' view Lifestyle and Activtiy	Parents' view Media Consume	Parent's view Nutrition
1,60	1,58	1,69

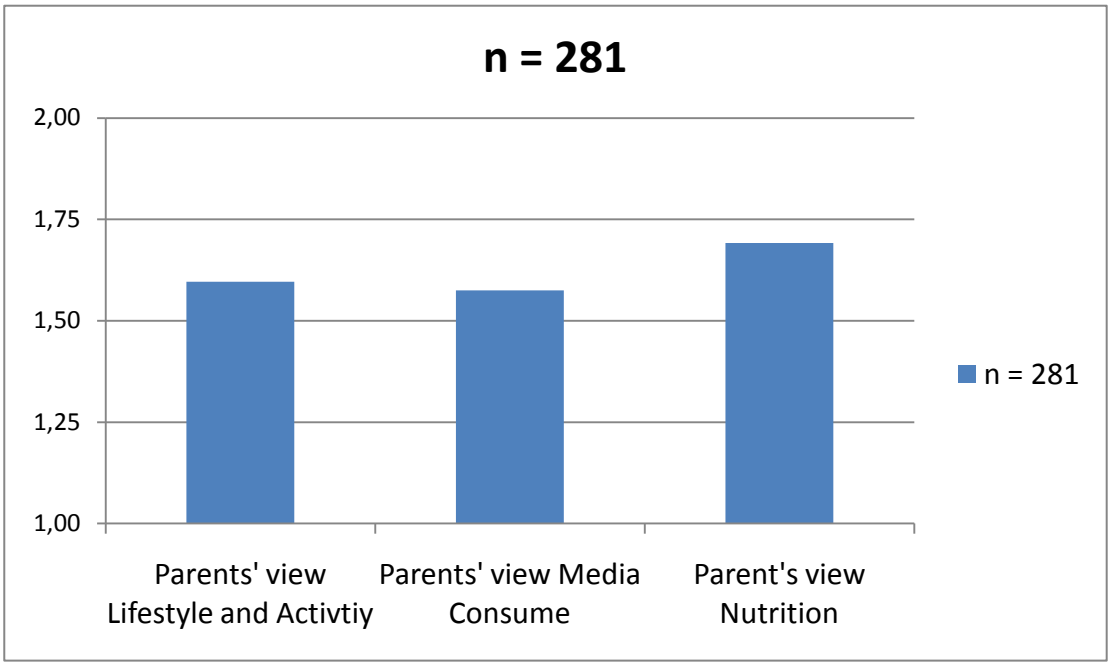


Fig. 25: Means of lifestyle factors of pupils assed by their parents

All lifestyle factors (physical activity, media consumption and nutrition behavior patterns) are assessed more positive than negative. The nutrition factor is ranked highest compared to the two other factors.

6.4 Parents' attitudes towards their personal lifestyle factors

Results are the means of categorized answers summarized into three different factors of parents' attitudes towards their personal lifestyle factors. Means are in between 1 and 2.

A mean between 1-1,25 documents a negative lifestyle attitude, A mean from 1,26 to1,50 shows a more negative than a positive attitude. A mean between 1,51 – 1,75 stands for a more positive than a negative attitude, Means between 1,76 and 2,00 clearly supports a positive lifestyle attitude of the parents to this factor.

Tab. 39: Means of attitudes for parents' personal lifestyle factor

Parents' Attitude tw. Physical activity	Parents' attitude tw. Media Consume	Parents' attitude tw. Nutrition
1,77	1,59	1,69

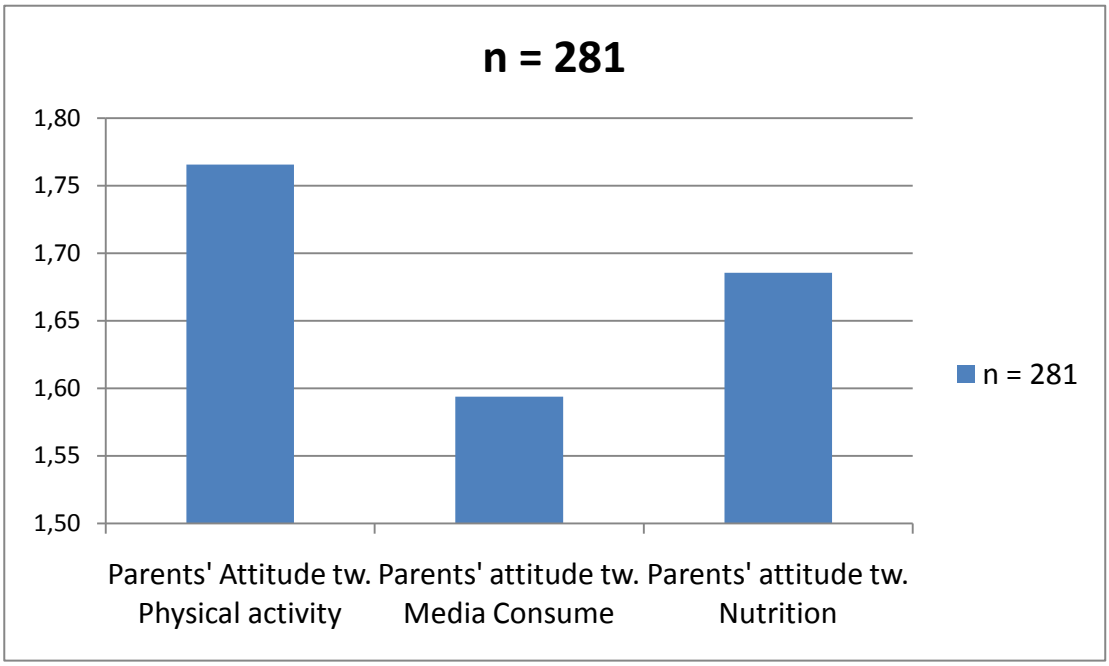


Fig. 26: Means of attitudes for parents` personal lifestyle factor

There exist no differences between the assessment of the parents for their children's lifestyle factors compared with their own attitudes to these lifestyle factors, but with a single exception: parents significantly assess their children's physical activity lifestyle factor on a far lower level (1.60) than their own attitude to physical activities as a lifestyle factor (1,77).

7. Discussion

7.1 Concept and strategy

The HCSC-concept (combined components of physical activity, nutrition and electronic media behavior patterns) and the HCSC strategy ("round table" of multi-sector stakeholders of sport, health and education build a local community network) was successfully implemented in 10 EU municipalities of six EU-countries (Czech Republic, Germany, Italy, the Netherlands, Poland and the UK) serving for 16 local elementary schools. Concept and strategy proved by successful implementation that the recommended actions in the EU-Guidelines for Physical Activity (EU 2008, see Guidelines No. 9-13, 21-24 and 26,27 and 384) really document an EU-added value for national partners representing (youth) sport organizations and sport science institutions. The steering committee of the project included "back offices" in each of the six countries which serve for implementation and evaluation at local level in close cooperation with local "third parties" (schools, sport clubs and community offices). Selection of municipalities and establishment of the local network of multi-sector stakeholders was successfully implemented until stage 2 of the project, except for the municipality of Arnhem (Netherland). However, this status of development was reached at Arnhem in October 2010.

Implementation of daily physical activity by a sound combination of (curricular) health enhanced physical education (HEPE) and (extra-curricular) health enhanced physical activity (HEPA) was realized up to 4/5 times a week for 852 pupils representing their age group of 7/8 years old (n=422) and 10/11 year old (n=430) school children. HEPE/HEPA activities were supplemented by regular nutrition education in different school subjects.

7.2 Design and methods of evaluation measurements

At the beginning of a 20 weeks (5 months) intervention time (stage 3 of the HCSC project – start September/October 2010) BMI and selected motor abilities/ physical fitness items of the pupils (see manual in appendix C 1) were measured (t 1) and summarized to three "Motor Ability Indices". Re-test was conducted at the end of the intervention at t2 (January/February 2011). At t2 a "Parent Questionnaire" (see questionnaire in appendix C 2) was voluntarily added to the project (not considered in the contract) in order to compare three lifestyle factors of the pupils' sample group (physical activity, nutrition and electronic media patterns) assessed by their parents and compared to their parents respective attitudes of these lifestyle factors.
Data analysis used WHO (2007) cut-off criteria for age and gender related BMI development (5 profiles) as well as Kromeyer-Hauschild et.al. (2001) cut-off criteria for age and gender related BMI development (8 profiles). A longitudinal sub-sample of 115 overweight and obese pupils (profile 7 and 8)

representing both age groups were analyzed in more detail about their BMI and physical fitness and motor development. Results of data analysis were compared for four country sample groups (Czech Republic, Italy, Poland and UK) between intervention and control groups. Results of all (six) national, intervention and control groups were also compared with EU-based age and gender related reference/interval norms for the test items of “6min run”, “Sit ups”, “Standing broad jump”, “20m run” and “Sit and reach”. EU-based criteria were build for BMI levels (1= heavy underweight up to 5=obesity) and for motor ability categories (1=heavy underperformance up to 5=heavy overperformance) (see for more details chapter 5.2).

Results show ambivalent developments between t1 and t2 regarding national sample groups as well as between EU-based data for age, gender, intervention and control groups.

7.3 Results of BMI development

Results of BMI development of the total sample group decreased within 5 months only very slightly, mean=3,08 to 3,07 according to WHO-BMI references, whereas it decreased from 4,91 down to 4,81 according to KRH-BMI. But it has to be considered that during this intervention time of 5 months the BMI standards of the pupils instead increases regularly by chronological age. A decrease of the BMI was also measured for the intervention group (t1 mean=4,98 KRH-BMI; t 2 mean=4,86 KRH-BMI) compared to the control group (t1 mean 4,79 KRH-BMI; t 2 mean=4,73 KRH-BMI). With the less precise cut-off criteria of WHO (5 profiles) an indifferent status was measured for t1 and t2 (mean=3,09). Again, an indifferent mean finally proofs after 5 months of biological growth no increase of the mean for the total sample group.

Results of BMI development for the two different age groups are different. According to the WHO-BMI cut off criteria the 7/8 year old pupils (n=347) reduced their BMI at t1 (mean=3,03) down to t2 (mean=2,98), whereas the 10/11 year old pupils (n=292) slightly increased their mean of WHO-BMI form 3,14 (t/1) up to 3,17 (t2). Again, this increase is on average far less for normal weight than the WHO reference norms document for about 6 months of BMI development in this age group.

The longitudinal sub-sample of the 115 children who were overweight (n=70) and obese (n=45) at t1 changed its BMI-profile at t2: only 51 pupils of the former 70 stayed as overweight, 22 of them changed into the normal weight profile; 39 pupils of the former 45 stayed in the obesity profile, 9 pupils of the former 45 obese children changed into the overweight profile (KRH-BMI). There were also some new entries in both profiles, however, the BMI mean of this target group of intervention dropped down according to WHO-BMI cut-off criteria form t1 (mean=22,55) to t2 (mean=22,46).

Finally, the local network intervention of the HCSC project with an increase of almost daily physical activities up of 60 minutes, combined with rising awareness about nutrition habits and given information about nutrition at school, leads within 5 months to a reduction in BMI development of overweight and obese children and stopped further unhealthy BMI increase of the total sample group.

7.4 Results of motor development and physical fitness

For data analysis and evaluation assessment only pupils were included (n=685) who participated in both times of measurement (t 1 and t2, longitudinal sample). Except for explosive strength/ power measured with the item of "standing broad jump" all performance levels of the four other motor ability items increased, some significantly (sit ups, 20m run, 6min run).

Comparisons between the intervention group and control group reveal for the total intervention group of four countries (CZ, IT, Pl, UK) only a significant higher development at t2 for endurance capacity (6min run).

However, there are more significant developments for intervention groups compared to their national control groups in selected EU countries of the study. In Czech Republic the total Motor Ability Index (MAI) increased better for the intervention group than for the control group. The Motor Ability Endurance Index (MAE) for the Czech control group significantly increased (mean t1=3,41; mean t2=3,63), but for the control group the index slightly decreased (mean t1= 2,80; mean t2=2,72). In the UK all three Motor Ability Indices increased significantly for the intervention group ($F (1,255) = 98,842$, $p<.001, \eta^2= .279$), but for the control group as well, however, Motor Ability Endurance index (MAE) progressed between t1 and t2 a little bit higher for the UK intervention group than for the UK control group (see Figure 14 in chapter 5.4).

Different results of development exist for the two age groups. The younger group of 7 to 8 year old pupils could increase their motor abilities only for sit ups, sit and reach and for agility/ speed (20m run) on an EU-level (n=327). But the older group of 10/ 11 year old pupils increased on EU-level (n=358) all five physical fitness items, except for agility/ speed (20m run), but significantly for sit ups (endurance power) and the 6min endurance run**. On an EU-level the intervention group of the 10/ 11 year old pupils developed much better compared to the control group their aerobic capacity (6min run) and their explosive strength/ power (standing broad jump).** Girls of both age groups (n=326) accelerated their Motor Ability Index (MAI) between t1 and t2 as good as their male counterparts (n=359) and better compared to the boys group in Motor Ability Power (MAP).

The sub-sample of the 115 overweight and obese children increased their physical fitness and motor development for three items, except for agility/ speed (20 m run) which remained on the same level and for standing broad jump (regression). **But all three Motor Ability Indices increased for the overweight and obese children in both groups of intervention and control.** One reason for that must be seen in the purpose of some of the control groups to support overweight and obese children in particular and were also based at the same school of the intervention groups.

7.5 Results of Parents' assessments of their children's lifestyle factors

Lifestyle items for children and their parents (n=281) were clustered into three different factors: physical activity, media consumption, nutrition habits (see chapter 6.2).In parents' assessment of their children's lifestyle for physical activity, media consumption and nutrition habits there are only minor differences between the factors. All three means are assessed between 1,58 (lowest for media consumption) and 1,69 (highest for nutrition habits). But all three means stand for a more positive than negative assessment, which means the media lifestyle of their children is a little more critically observed than their nutrition habits. The assessment of the physical activity lifestyle (mean=1,60) of their children is closer to the mean for their media consumption.
Surprisingly, the assessment of overweight and obese parents (n=183) about their children's lifestyle factors do not really differ from the total sample group of parents. They are even less critical with their assessment of their children's nutrition habits.

However, a significant difference is given, when parents of the overweight and obesity sub-group of pupils assessed their children's lifestyles: the majority of this parents group vote negatively on their children's media consumption lifestyle and promote much more a physical activity lifestyle than the two other parent's sub-groups did (total sample, obese parents).

7.6 Results of Parents' attitudes to their personal lifestyle factors

Parents` attitudes to their own lifestyle factors show some parallel results compared with their assessment of their children's lifestyle factors, but with one exception: parents view their own physical activity lifestyle less negatively and more positively than their children's lifestyle of physical activity.
In principle, the attitudes of the obese parents to their lifestyle factors do not differ from their assessments of their children's lifestyle behavior patterns. But the attitudes of their own lifestyle factors are less critical/ negative about physical activity and nutrition habits compared with their assessments for their children. One could assume that obese parents are more critical about

less sport activities and bad nutrition habits of their children than about their own respective habits.

Parents of obese children show somewhat similar attitudes to their personal lifestyle factors compared to their assessment of their children's lifestyle factors: they are more concerned about their children's doing but view their personal lifestyle less critical and more positive about physical activities and nutrition intake. It seems to be that they have a more positive attitude to physical activity and a less critical attitude to their own media consumption than compared to their assessment about their children's behavior patterns. Whether this proofs a cognitive ambiguity in the role model of this parents' group must be further investigated for child obesity prevention programmes.

8. Recommendations

The recommendations refer to results of this HCSC study but are also supported by evaluation studies and outcomes of a 6-month previous pilot study of the Dutch-German gkgk-project (cf. Hofmann, 2008; Kloeze, 2009; Naul&Hofmann, 2009) and the ongoing longitudinal cross-border Euregio gkgk-project (cf. Naul et.al. 2011).

1. Concept and strategy of the HCSC project should be disseminated and further implemented on *three levels:*

   (1) There will be an EU-added value to transfer the concept and strategy of HCSC to other countries building partnerships between old, new and non-members of the EU (e.g. border regions of Finland, Russia, Estonia or Austria, Slovenia, Croatia, Serbia).
   (2) There will be a national-wide benefit in the six countries of this study, when the concept and strategy will be transferred by the established "back offices" to other municipalities of their countries, building national HCSC networks like it is in progress in Poland, Germany and the Netherlands.
   (3) There will be a local benefit for the 10 municipalities of this study when the HCSC intervention programme will be implemented into other schools and sport clubs of the city to extent local partnership between sport, health and education for an active lifestyle. Delegates of the "round table" at Arnhem, Darmstadt and Osnabrück, Rome and Poznan are already involved with their local public health and education offices to continue and to extend the HCSC project locally.

2. The time frame of the HCSC project was limited according to the "call for preparatory actions" up to 15 months (January 2010 to March 2011). After the selection of municipalities with schools and sport clubs and the establishment of the local multi-sector network with different stakeholders of sport, health, and education only about 5 months were left to implement and evaluate the HCSC intervention programme. Although this is a very short time to change BMI and to extend physical fitness and the performance level of motor development some evidence based results were achieved for the total sample and sub-sample group (overweight and obese children).
   Nevertheless, the EC EAC Sport Unit should establish a long term and permanent monitoring system where national "back offices" in each EU country should cooperate within an EU-Network in order to investigate the progress of counteracting the increase of overweight and obesity by multi-purpose EU-programmes which should include at least three essential lifestyle factors: physical activity, media consumption and nutrition habits.

3. Special attention is needed in such monitoring systems to reach parents of obese children at their local schools for communication and child-parents events. Courses organized by teachers/ coaches should include information about age and gender related physical ability development, BMI tracking and how to change parents' and children's nutrition and media consumption lifestyle patterns.

4. There exist some divergences in Europe about cut-off criteria for BMI measurement and standard reference norms/intervals for health related physical fitness and motor ability development. Gender related differences for means and for under- and over-performance levels in motor abilities seems to become less valid in primary school aged children – divergences regarding age occur more frequently today than in any decade before. In order to have a more common and differentiated system of BMI cut-off criteria for normal weight and overweight and obese children and youth across the EU, a new system of reference norms and cut-off intervals should be set up. This new tool for comparison and evaluation would become a highly appreciated EU-added value.

5. Alongside with the renewal of cut-off criteria and new manuals for assessment and evaluation of BMI, physical fitness and motor development for children and youth, the EUROFIT test battery of the 1980s should be reviewed. Some items of the test battery and their measurement tools document their origin from former "lab research". To make a European wide physical fitness test battery more applicable at schools and within sport clubs (field test) a delete of old items as well as an implementation of new test items are overdue which both in total should also reduce the amount of all test items of the present EUROFIT manual.

6. EU-based stakeholders of physical education (EUPEA) and Youth Sport (ENGSO) should merge for a joint venture, supported by DG EAC Sport Unit, to further spread and implement the HCSC-concept and strategy on local grass-root level for school-based PE and sport club-based PA assisted both by their national member organizations.

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