

## **European Union Multisector Strategies to Enhance Health, Physical Education, and Physical Activities for Children and Youth**

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### **Abstract**

The purpose of the intervention project is to counteract the increase of obesity (BMI) and deficits in basic motor abilities by a four-year intervention study of children between the ages of 6 and 10. The intervention strategy includes four key lifestyle components: exercise, nutrition, the leisure-time consumption of media, and the social and geographical movement environment and by a community linked partnership of different stakeholders. The health enhanced school curriculum promotes 60 to 90 minutes of daily exercise. After one year of intervention the German cohort (n = 261) exhibit a slight decline in the prevalence values for overweight and obesity from 15% to 14.6% and the Dutch cohort (n = 296) from 12.8% to 12%. The results for both groups demonstrate a highly significant improvement for muscular endurance (sit-ups and push-ups), speed (20 m run) and aerobic endurance (6 minute run) and coordination skills. Differences in the performance level between the two cohorts may be associated with the fact that Dutch children attend a third, fourth, and fifth sport unit each week less than the German children. Nevertheless, the intervention approach and strategy document a decrease of obesity prevalence and an increase of motor abilities in overweight children in both groups.

**Keywords:** *Obesity, local intervention network, multicomponent program, development of motor abilities, EU-project*

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## Introduction

Different surveys and reports on children and adolescents health development are observing increasing prevalence of overweight and obesity, higher figures of postural deficiencies, and lack of coordination and stamina in most of the European countries (cf. Bös, 2003; Branca, Nikogosian, & Lobstein, 2007; Brettschneider & Naul, 2004, 2007; Currie et al., 2004; Kurth & Schaffrath-Rosario, 2007; Smith & Biddle, 2008). High blood pressure and well above average blood lipid and blood sugar levels place a strain even on children's cardiovascular systems and increasingly lead to type 2 diabetes even in youngsters. These health problems burden not only individuals but also parents and teachers, at home and in school, and financially, to a not inconsiderable extent, the health and social systems.

Lack of exercise not only leads to physiological impairment, but it also has a disadvantageous effect on cognitive learning: students suffer from an increasing lack of concentration and a decreasing willingness to learn. Conversely, those children in schools and education who lead active lives are better able to cooperate, to pay attention, and generally to exhibit a greater willingness to learn, coping successfully with their school life and with less strain on their health and physique (cf. Haberer, 2010; Zimmer, 2008).

There is general agreement across different academic disciplines that the problem of overweight and obesity can be simply explained by the fact that calorie intake and calorie expenditure do not balance. But against the simplicity of this explanation we have the difficulty of stating unequivocally which of the many possible factors together contribute to the causes, manifestations, and consequences of overweight and obesity, and by which mutual constellations and influences they are related. Individual factors are accorded different weightings by different specialist disciplines (e.g., genetic medicine, cardiology, epidemiology, food science, exercise and sport science, educational, social and environmental science), but these factors never occur for an individual and within a setting of his/her livelihood in isolation.

The underlying problem is that most of the reported diseases that are related to overweight and obesity are not caused by a single factor, for example, by physical inactivity or bad nutrition habits or by the physical environment. Instead, a “one factor—one intervention component” relationship did not really work to counteract the development of obesity in children and adolescents as reported in some review studies (cf. Ferreira et al., 2006; Gustafson & Rhodes, 2006; Sallis, Prochaska, & Taylor, 2000). Nevertheless, to date, in most of the European countries this intervention approach is still predominant. Very often, one stakeholder (e.g., the family, or the school, or a sport club) is targeted to intervene with only one program component by a short range of intervention time.

But as overweight and obesity are caused by a certain interaction of at least three main factors—eating disorders, physical inactivity, and sedentary lifestyle patterns—any intervention strategy must address this set of factors that necessarily does include a “multicomponent” intervention strategy implemented with linked partnerships of different stakeholders on the local level within an appropriate time frame of intervention.

## Concepts and Strategies of EU-based Health Enhanced Physical Activities

The majority of interventions for overweight and obese children still focus on these different “single component—single stakeholder” strategies which did not really reach their main target:

stabilization or reduction of an overweight body mass index (BMI) profile of the intervention group (for Germany, Braun, 2007; for the Netherlands, Bulk-Bunschoten, Laar, Hurk, van den Renders, & Hirasig, 2006). For example, in Finland, as in some other Scandinavian countries, physical education at school focuses on health-enhanced activities, but there exists no real partnership with extracurricular physical activities that really supports and extends school-based efforts. Another example is given by a German intervention project entitled “Schwer mobil” where sport club-based programs with physical activities and games are especially tailored for groups of overweight young people, but there exists vice versa no link to school-based physical education efforts. Another example is the Dutch project “lekker fit” where a school-based nutrition campaign with healthy food is not further linked with extended physical education at school and with a partner (e.g., sport club) out of school.

Of course, each intervention project is better than none, but to achieve an evidence-based outcome more than one component and more than one stakeholder of intervention is needed. There are also more examples in some EU-countries where “health enhanced physical activities” have been combined with nutrition lessons and information campaigns to parents; however, as long as a multicomponent intervention strategy is still restricted to only one setting by a single stakeholder, the outcome is poor. Essential is that all livelihoods of children and adolescents are covered by an intervention strategy and that the three most important lifestyle components that are related with overweight and obesity (nutrition intake, physical inactivity, sedentary screen time) are linked and targeted in a comprehensive intervention program.

But intervention projects should not only be addressed to special sample groups of children and youth (i.e., the overweight subgroups). There are far more young people across Europe today who grow up with sedentary behavior patterns and less physical activity time allocation than recommended for their age (cf. Brettschneider & Naul, 2004). This target group is much bigger in sample than the obese subgroup. In some EU countries, deficits in physical and motor development on school entry level are recorded by up to 70% of the respective population. National studies and European-wide surveys reveal that the number of children whose physical fitness and motor competencies are less developed and behind age and gender-related national reference norms is more than double as much as the number of overweight and obese children (cf. Bös, 2003; Bös, Worth, Opper, Oberger, & Woll, 2009; Brettschneider & Naul, 2007). This problem is even more important because physical inactivity has become a predictor for overweight in childhood (cf. Jebb & Moore, 1999).

The German-Dutch Interreg IV A project “Healthy Children in Healthy Communities” (HCSC or GKGK as the German and Dutch abbreviation) addresses these problems of EU-based overweight and obesity intervention studies. The project is designed as a four-year intervention study of children between the ages of 6 and 10. It looks at four key lifestyle components: exercise, nutrition, the leisure-time consumption of media, and the social and geographical movement environment.

## **The HCSC / GKGK Project’s Development Stages**

Among its other recommendations, the EU study “Young People’s Lifestyle and Sedentariness” (Brettschneider & Naul, 2004; Brettschneider, Naul, Bünemann, & Hoffmann, 2006; Brettschneider, Hoffmann, Naul, & Steinzen, 2009) already referred to the establishment of local networks to promote active lifestyles, because an individual setting (such as family, school, sports club, or community) cannot possibly provide sufficient facilities to ensure daily exercise periods for all school-aged children and adolescents. In 2005, the unofficial European

Sports Ministers Conference in Luxembourg took on this recommendation. In the same year, under the UK presidency, it resulted in the establishment of the first working group at the Sports Unit of DG EAC “Sports and Health” at the European Commission in Brussels. As part of their program activities for 2006, this group supported our project design for a comprehensive intervention study (diet, physical activity, media consumption, and the environment) for a planned joint local intervention involving a number of stakeholders (cf. Kornbeck, 2009). In February 2006, a launch event for the planned GKGK intervention study was held at Papendaal/Arnhem in the Netherlands, and several representatives of German and Dutch local authorities were invited to discuss the framework for the planned study. More detailed discussions were then held with the German municipality Velen (Borken), and by April 2006 a local network, in the form of a “round table” including local representatives from the municipality (mayor and administration), the principals of the two elementary schools, the chairmen and women of sports clubs, and the head of a local rehabilitation center, had been established with the support of the school district and county health department. At the beginning of the school year 2007/2008, after a year of planning by GKGK, a pilot project with two classes of third years and three classes of second years was implemented and evaluated over half a school year (cf. Hoffmann, 2008; Hoffman & Naul, 2009).

The results show that physical education that places the accent on health, with additional physical activity periods supplemented by informal sports (“school on the move”) plus an hour of instruction per week covering such topics as exercise and diet, is associated with overweight and obese students reducing their BMI values and improving their basal motor skills. In particular, the key motor data for those children in the lowest two performance quartiles (0–25% and 26–50%) showed a significant increase in motor skills.

While the planning and pilot study were being carried out in Velen, other municipalities in the Netherlands also signaled their interest in the project. In 2007 and 2008, contact with the Euregio Rhine-Waal, based in Kleve, led to the setting up of an expanded consortium of project partners for a major 2008 study. Interregional cooperation between provincial governments in the Netherlands and the North-Rhine Westphalian Ministry of Economic Affairs and Energy led to a joint Interreg IV A application for a lengthier project to set up local networks (round tables) in 12 selected municipalities in the border regions of Germany and the Netherlands to carry out a four-year GKGK intervention at local primary schools. The project’s other partners in NRW included BKK Northwest, the NRW’s Municipal Accident Association NRW, the NRW Ministry of the Interior and its Department of Sport, and the Sports Federation of the state of NRW.

At the beginning of school year 2008/2009 the project was launched with the entry-level classes of six elementary schools in three German cities (Moers, Rheinberg, Velen) (cohort 1, C 1). A year later they were joined by similarly aged children from 13 Dutch basisscholen in four cities in the Netherlands (Cuijk, Enschede, Rijnwaarden, and Winterswijk). Because compulsory education in the Netherlands begins at age 4, to ensure matching ages the project began here with group 3 (i.e., third years, aged 6). At the same time, a second German cohort (C 2) began with six more schools (in Moers and Bocholt) and their school beginners (first years). A final, third cohort (C 3) joined the GKGK project from the cities Oude IJsselstreek and Arnhem (NL) and Emmerich and Kleve (DE), with a total of 14 more elementary and basisscholen. Thus, a total of 12 cities with 39 schools are represented in the German–Dutch GKGK Interreg IV A project (2008–2012) (see Figure 1).



**Figure 1.** Overview of School Locations

The GKGK project gained a further European dimension in 2009, when a proposal submitted on behalf of the lead partner German Sports Youth and the European umbrella association “ENGSO Youth,” together with sports organizations and research institutions from five other EU countries (CZ, IT, NL, PL, and UK), was approved by the EC. As one of the “preparatory actions” successfully proposed to the sports unit of DG EAC in Brussels for 2010, the intervention project “Healthy Children in Sound Communities” (HCSC), broadly based on the GKGK project, was then implemented and evaluated from January 2010 for two age groups (7–8 years and 10–11 years) in 16 schools in 10 European cities (cf. Naul, 2011, p. 12). Two German cities (Osnabruck and Darmstadt) took part, with a total of six elementary schools (two in Darmstadt and four in Osnabrück).

## The Project’s Objectives

Within the Interreg IV A Euregio project “Healthy Children in Healthy Communities” (GKGK), cross-border trials are being carried out with local collaborations between family, school, sports club, and municipal offices for concerted action to provide children with age-appropriate education for a healthy lifestyle (i.e., balanced diet, daily exercise periods, and moderate media consumption).

The objectives of this pilot project are broadly in line with the numerous European-level recommendations of recent years from WHO Europe (cf. Branca, Nikogosian & Lobstein, 2007), EU commissions and committees (cf. EU, 2005; EU Platform on Diet, Physical Activity, and Health, 2008), as well as various federal and state ministries in Germany (and imperial ministries and provincial administrations in the Netherlands). The project’s objectives also concur with current attempts by the North Rhine-Westphalian Ministries of Education and Training, and Family, Children, Youth, Culture, and Sports to effectively promote physical activity and health in school sport and extracurricular sporting activities for children and adolescents.

The core elements of the GKGK project are essentially four key target areas for the protection and promotion of healthy lifestyles in children:

- The participating children should be motivated to sustain an active lifestyle. This applies not only to the problem group of overweight children, but explicitly to all children. In addition to encouraging 60 to 90 minutes of daily exercise and the wider development of basal motor skills for exercise, games, and sports, it should also be designed to promote balanced nutritional and media consumption patterns.

- The starting point for the promotion of these three areas of behavior (exercise, nutrition, media) is to link up the different spheres of these children's lives. Families, schools, sports clubs, and communities are especially significant contacts for this type of intervention measure, all of which need to closely cooperate within a local network on the project's round tables.
- The complex of measures provides for instruction and activities inside and outside the school and the classroom, and these are also linked together, for example, with three hours of physical education with the emphasis on the promotion of health, combined with an hour of interdisciplinary social studies covering topics such as "my body," "my nutrition," "my exercise habits," and "my media-free time." Isolated groups of students whose basal motor activity diagnosis calls for additional exercise are supported individually within the project by means of appropriate differentiated offers.
- The envisaged cooperation and joint coordination between the partners (such as family, school, sports club, community) is achieved by means of a local network. The key partners meet locally at regular intervals as a round table to plan and organize the project and its upcoming activities. In each participating municipality there is a "community moderator" who is responsible for agreeing local activities with the round table partners and then implementing them together with the schools, sports clubs, and local government departments.

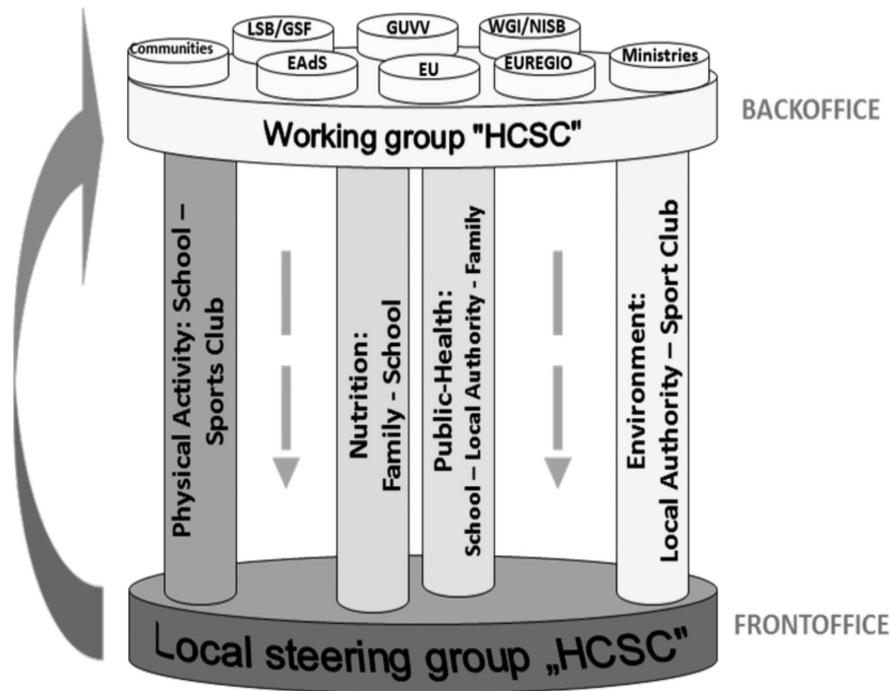
The phrase *healthy children* therefore implies the development of a healthy lifestyle among children, to whom we aim to give a successful and developmentally appropriate education, physical integrity (e.g., without motor deficits or overweight but with regular physical activity and a healthy, balanced diet), plus psychosocial integration into their life-world and the "active" development of age-appropriate, ethical, and moral behavior in dealing with their classmates and their adult caregivers.

## The Project Design

The proposed cooperation between the educational partners in a municipality is developed and coordinated by a "local network," the so-called "front office." In the GKGK project the front office is concerned with four core program areas:

- the promotion of additional weekly exercise periods by means of a joint action concept for daily exercise periods coordinated and agreed between schools and sports clubs;
- improved nutrition and the development of eating habits by means of practical measures, including relevant information in schools' general and social studies classes;
- community health care (public health) in which local authorities prioritize physical activity as a means for ensuring healthy growth and an active lifestyle in children and adolescents and facilitate interdepartmental measures with more cooperation between school, youth, health, and sports departments; and
- the improvement of the community infrastructure for movement, play, and sports, making children's and young people's everyday life settings (residential districts, school routes and school yards, play streets, etc.) safe, clean and attractive, allowing more modern, activity-friendly space for informal sports activity—a further motivation for children and young people to take more exercise.

In addition to the local front office and its round table, which is responsible for the jointly coordinated implementation of these four program areas, there is also a common regional “back office” for all the local networks. This back office is a steering group with responsibility for the entire development of the GKGK project. It is made up of representatives of the municipalities, government agencies, the project’s sponsors and partners, and the scientific support group (see Figure 2).



*Figure 2.* Program Points and Partners in the GKGK Network

Within the project, the term healthy community is understood to include the networking of those bodies and caregivers who constitute the round table in the community. As representatives of families, schools, sports clubs, and community, they (and the measures they take) are responsible for the children’s “healthy growth” within their life-worlds (“settings”), and they are also jointly accountable for this. Besides parents, educators, and various helpers and teachers in schools and sports clubs, these also indirectly include relevant local political representatives on boards and committees and in the administrative agencies responsible for, for example, the concerns of parents (employment and social security office) and children (health and youth welfare office). This also includes the responsibility of the school maintenance authority (school office) and partners of organized sports (sports administration).

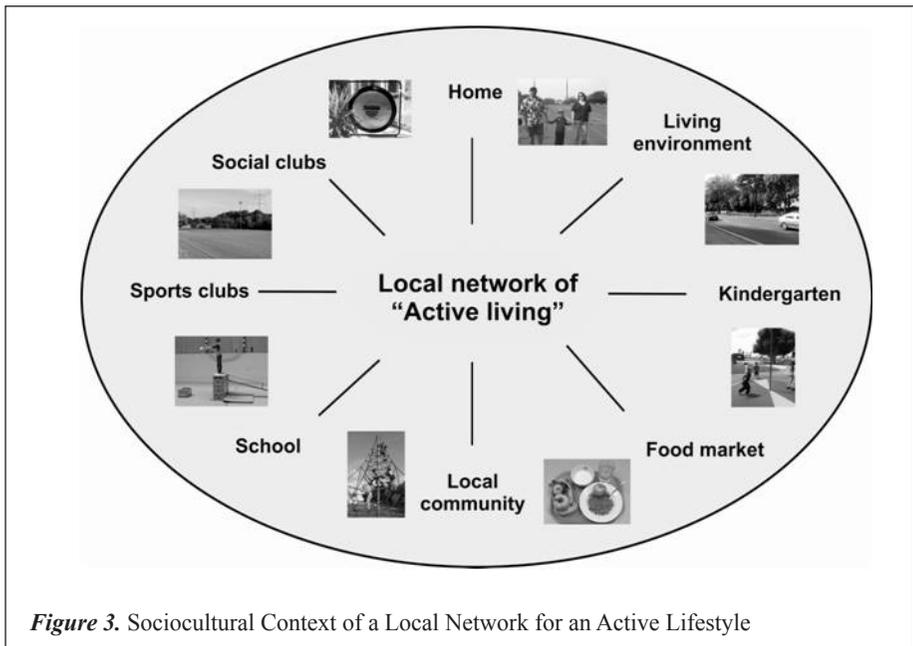
The design of the GKGK project depicts a networked, local educational landscape (cf. Berse, 2009; Bleckman & Durdel, 2009; Weiß, 2011), which in joint planning and responsibility over an intervention period lasting a number of years, implements the four program points

outlined above for the promotion of active lifestyles in children and adolescents, bringing together key stakeholders for education and youth welfare, health, and sports in the local community. The municipality is largely responsible for maintaining schools and youth services as well as being a key partner for preventive health care and the concerns of organized sport as regards the use of sport and exercise premises.

This therefore gives it a certain responsibility and steering function within this local network, because to a large extent it is the community that facilitates and determines the active exercise behavior of children and young people: what playgrounds, parks, or streets are available for children's informal, self-organized games and sports; what exercise and sports facilities are open or may be used; and whether these premises are in a sanitary and safe condition such that parents and other adults can recommend them for "healthy" and safe activities for their growing children.

In the past, spatial and urban planning authorities have increasingly disregarded key guidelines in favor of other goals and have thereby restricted the opportunities for active living. In view of the current widespread state of emergency in children's and adolescents' exercise habits, these guidelines and regulations urgently need reviewing and must be modified as appropriate for each locality to promote sustainable exercise behavior. For this reason, officials and decision makers responsible for these public sectors must also be partners in the local network that bring together different groups of people all making their contribution to create the conditions for a healthy community in which broadly "preventive" measures encourage "healthy children" in their various life settings (see Figure 3).

The partners in residential areas around schools also include providers of foodstuffs, whether in school kiosks, bakeries, or supermarkets. Those who forget that healthy nutrition is an essential part of promoting children's health and neglect this aspect of promoting an active



*Figure 3.* Sociocultural Context of a Local Network for an Active Lifestyle

lifestyle also overlook the physiological relationships that exist between children's diet and their exercise behavior. For this reason, each round table in a municipality should include at least one representative of the companies who supply food to schools and/or operate bakery or grocery stores in the locality.

## **The Community Moderator**

All 12 of the German and Dutch municipalities currently participating in the GKGK project already use what are termed *community moderators*. The function of these full-time facilitators is to poll members of the round table as to supply and demand and to coordinate and ensure appropriate implementation in schools and sports clubs. The needs and requirements of schools, sports clubs, and local authorities require careful analysis and liaison with all partners, so that the planned activities can be discussed at the site with the setting partners and implemented with due reference to the municipal authorities. On the one hand, the community moderator is a modern variant of a movement-oriented "public health manager," while on the other hand he/she is in a position to lend his or her social and sports-education expertise to schools and sports clubs in order to coordinate the school's need of physical education with offers from after-school sports clubs for (all-day) schools and to promote formal and informal learning as elements of an active lifestyle.

Community moderators receive inquiries from local schools and sports clubs, organize the work of the round tables in the GKGK communes and lead their discussions, always in cooperation with local government. They also make sure that the weekly school timetables can be implemented and that the schools have the necessary resources for the GKGK project. As a member of the front office, each such moderator has contact with somebody at the Willibald Gebhardt Institute (WGI). The community moderator (front office) at each location and his/her contact at the WGI (as part of the back office) work in tandem, for example, to plan training and continuing education for teachers and trainers as well as to coordinate with the schools on a schedule for the scientific evaluation of the project.

## **The Weekly Timetable for Curricular and Extracurricular Health Enhanced Learning**

The complex of measures provides for curricular, cocurricular, and extracurricular activities (integration), and the idea of integration will also be pursued within individual curricular and extracurricular activities. For example, one three-hour period of physical education (with the accent on the promotion of health) coordinated with one interdisciplinary hour within the general and social studies course (body – exercise – diet – media). At the beginning of the project, all the first year (or *group 3*) students involved are given a basal motoric diagnosis that scrutinizes their age-appropriate learning development and their weight status (BMI). Subsequently they all receive individually tailored support during the third school sport period. In addition, on two afternoons a week, all pupils are offered further differentiated courses provided by local sports clubs as a way of continuing to encourage individuals' exercise skills and healthy behaviors.

The basal motor test and BMI measurement is repeated in each subsequent school year, and the results are recorded as an individual learning development log and reported to parents at special PTA meetings. Teachers in charge of project classes are also permitted to see the health and motor development profile of the student body. Health promotion activities within physical education lessons are then planned on the basis of these results.

## Physical Education

Ordinary physical education in GKGK schools is allotted three hours per week in Germany and two hours per week in the Netherlands (*bewegingsonderwijs*):

- a first basic physical education lesson for all children in the class (training of basal motor skills, elementary physical education, promoting flexibility, coordination, endurance, and strength);
- a second basic sports lesson involving different types of games to extend these basal motor skills in games and sports; and
- a differentiated physical education lesson for all the students, given by additional teaching staff in small groups and separate rooms according to the children's individual development profile (BMI and motor development). In the Netherlands this new, differentiated third lesson will be introduced at the local project schools.

## General and Social Studies

The curriculum for general and social studies in North Rhine-Westphalia includes one hour per week on the topics body, diet, lifestyle, and health promotion, highlighting their joint contribution to healthy development.

In order to more effectively and more directly promote the raising of healthy children, our joint health project not only needs to monitor the motor and physical development of each of the participating children, but it also needs to reveal lifestyle components that either encourage or hinder that development, particularly those factors that influence their exercise habits, eating habits, and media consumption because all three of these have a lasting effect on lifestyle. From the second school year we therefore ask the children and their parents to each complete a questionnaire including questions about these three factors. The results are then used to interpret the motor tests.

In the Netherlands, this lesson is now being introduced using external nutrition experts as “voedingsonderwijs” (Lubben, Besnyöi, Schilstra, & Knol, 2011, p. 71).

## Extracurricular School Sport

For the GKGK project, each school is cooperating with at least one sports club in its municipality. Thanks to this cooperation, it is possible to offer all the students in the project two additional afternoon classes of movement and exercise to reinforce and broaden the improvement in their health and to supplement the three PE lessons they receive at school, specifically to bring their daily exercise periods up to 60 or 90 minutes.

## Active School Route and Sports During Break Times

The “walking bus” was introduced to provide an active route between school and home. This concept means that children walk to school along safe sidewalks accompanied by individual parents or other persons. On this route, there are “stops” near to the children's homes at which the walking bus will halt at prearranged times so that the individual children from each residential area can join it.

Other extracurricular activities include sport during breaks, play dates, sports, swimming parties, and so on. Such interschool games and swimming events have already been held twice between GKGK schools in Velen and Winterswijk, and other interschool partnerships with movement, games, and sports between German and Dutch schools are in preparation (Moers, Emmerich, Kleve–Cuijk, Rijnwaarden, Arnhem).

## Healthy Eating and Food Preparation

As part of the general and social studies class, and as additional events in the afternoon and early evening, there will also be separate and joint cookery courses and “school fruit events” for the schoolchildren and their parents. For example, the two GKGK basisscholen in Enschede already have a school vegetable garden with an adjoining medium-sized kitchen where the children can themselves grow, harvest, and learn to prepare the produce. Similarly, during break periods, many GKGK schools organize and prepare a “healthy breakfast” together with teachers. Most of the GKGK schools in NRW take part in the EU’s “school fruit project.”

All of these measures combine to produce an ideal GKGK timetable as exemplified below. The local networks incorporating teachers, community moderators, and other partners are all working toward the implementation of this weekly timetable in schools (see Figure 4).

| Time             | Monday                                  | Tuesday         | Wednesday                                | Thursday                           | Friday   |
|------------------|---|-----------------|--|------------------------------------|--|
| Active Commuting | Walking Bus                             |                 |  |                                    |  |
| 08:05 hrs        |   |                 |  |                                    | PE: separated subgroups to balance special needs |
| 08:55 hrs        | PE: basic motor skills development      |                 |  |                                    |  |
| 09:40 hrs        | BREAK: healthy breakfast, active school |                 |  |                                    |  |
| 10:05 hrs        |   |                 |  | Science: nutrition, my body, my PA |  |
| 10:55 hrs        |   |                 | PE: basic skills and techniques in games |                                    |  |
| 11:40 hrs        | BREAK: healthy breakfast, active school |                 |  |                                    |  |
| 11:55 hrs        |   |                 |  |                                    |  |
| 12:40 hrs        |   |                 |  |                                    |  |
| 13:20 hrs        |   |                 |  |                                    |  |
| Active Commuting | Walking Bus                             |                 |  |                                    |  |
| Afternoon        |   | PA: Sports Club |  | PA: Sports Club                    |  |

Figure 4. Weekly Timetable for a GKGK School Class

## Preliminary Results of the GKGK Evaluation Study

The main GKGK study has three participating groups (C 1, C 2, C 3 = cohorts) in Germany and two in the Netherlands. The following two tables illustrate these three cohorts together with their schools (Table 1a) and give the sample sizes of the three cohorts (Table 1b).

**Table 1a**

### *Participating German and Dutch Schools*

| Germany                |              |         | The Netherlands        |                   |         |
|------------------------|--------------|---------|------------------------|-------------------|---------|
| cohorts                | municipality | schools | cohorts                | municipality      | schools |
| <b>cohort 1 (2008)</b> |              |         | <b>cohort 2 (2009)</b> |                   |         |
|                        | Velen        | 2       |                        | Winterswijk       | 4       |
|                        | Moers        | 1       |                        | Enschede          | 2       |
|                        | Rheinberg    | 3       |                        | Cuijk             | 4       |
| <b>cohort 2 (2009)</b> |              |         |                        | Rijnwarden        | 3       |
|                        | Moers        | 2       | <b>cohort 3 (2010)</b> |                   |         |
|                        | Bocholt      | 4       |                        | Oude IJsselstreek | 2       |
| <b>cohort 3 (2010)</b> |              |         |                        | Arnhem            | 4       |
|                        | Emmerich     | 3       |                        |                   |         |
|                        | Kleve        | 4       |                        |                   |         |

**Table 1b**

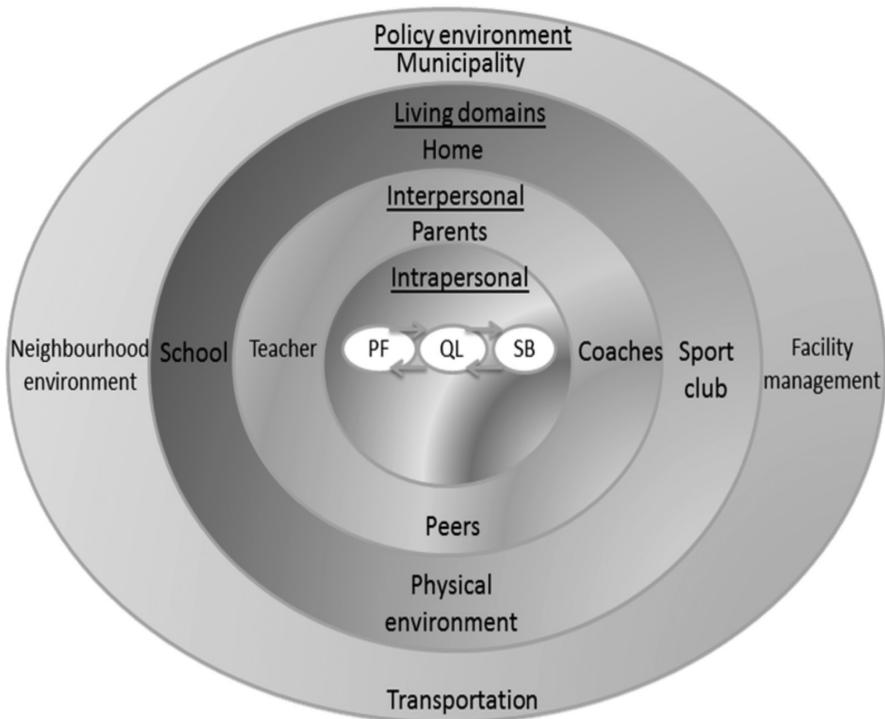
### *Cohorts and Sample Groups of Students*

| Germany         | K1 (2008) | K2 (2009) | K3 (2010) |
|-----------------|-----------|-----------|-----------|
| <b>N = 1046</b> | 364       | 346       | 336       |
| <b>Age</b>      | 7.1       | 6.6       | 6.7       |
| <b>BMI</b>      | 16.5      | 16.3      | 16.4      |

| Netherlands    | K1 (2008) | K2 (2009) | K3 (2010) |
|----------------|-----------|-----------|-----------|
| <b>N = 572</b> |           | 380       | 192       |
| <b>Age</b>     |           | 7.15      | 6.6       |
| <b>BMI</b>     |           | 16.3      | 16.1      |

The three German groups comprise a total of 1,047 students. The first group started school in the school year 2008/2009 and the other two each started one year later. In the Netherlands, the study did not begin until the school year 2009/2010 with group 3 as the second cohort, followed a year later in school year 2010/2011 by cohort 3. A total of 572 Dutch children are participating in the GKGK project. In the Netherlands, the corresponding GKGK school classes are smaller, and there are fewer parallel classes than in Germany. When the first measurements were taken, the ages and BMI readings of the German and Dutch groups differed hardly at all (e.g., C 1 DE vs. C 2 NL; C 2 DE vs. C 3 NL) ( $t$  1).

The evaluation design used for the scientific monitoring process is based on a socioecological, multilevel model (modified for GKGK; cf. Sallis, 2010, p. 94) (see Figure 5).



**Figure 5.** Socioecological Model of the Actor Levels

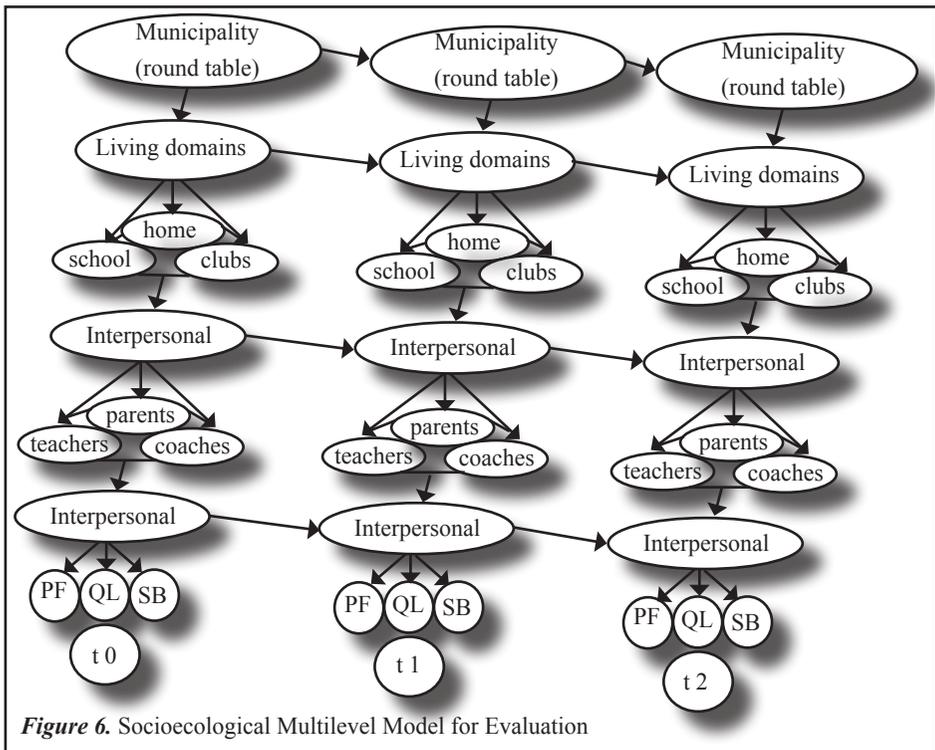
The first and core actor level is the participating children and their three *intrapersonal behavior areas*: physical and health development (PF) plus motor skills, including BMI; the qualitative aspects of their active or passive lifestyle (QL) that cover the social context of their leisure behavior (exercise, nutrition, and media) including their mental and emotional well-being; and aspects of their social integration into peer groups together with indicators of group climate, group cohesion, and physical self-concept (SB).

At the second actor level, we have the *interpersonal relationships* in the children's central life-worlds (i.e., the influence and interaction of children with their parents, teachers, trainers or coaches, and peers).

At the third level, we see their *physical-material life-world*, (i.e., the existing or constructed conditions of their residential area or their residential conditions, the infrastructure of schools and school grounds, and the structural characteristics of the participating sports clubs).

Finally, the level of *local political control* of the children's life-worlds and living conditions: the town's education, health and sports policies, sociospatial planning and development processes for their residential neighborhoods, the available sports facilities for their physical activity, and the means of transporting them to and from these life-worlds (schools, clubs, etc.) in the form of more or less motorized and nonmotorized segments of their daily physical activity.

On the basis of this socioecological model we can derive a corresponding multilevel model for the scientific evaluation of the GKGK project (see Figure 6).



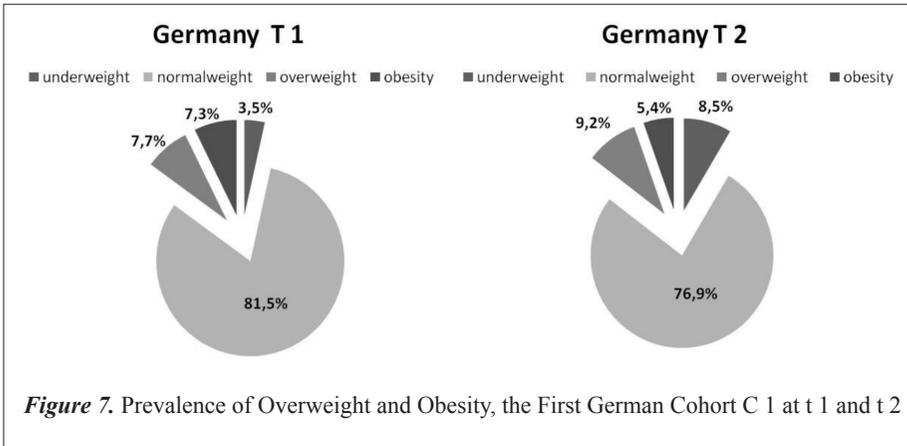
The four levels in Figure 6 distinguish the following:

- the intrapersonal level, which distinguishes three different areas of behavior for the students (basal motor skills and their development, including the BMI; the social context of exercise, nutrition, and media behavior in the student's leisure time; the individual social and psychological effects of physical activity and physical-motor development on the self-concept and the internal group climate between the students);
- the interpersonal level (i.e., the influence of parents, teachers, and trainers on the students' three areas of behavior);
- the life-world environmental conditions that are typical for the children's home, school, and sports club settings; and

- the general conditions in the community crucial to the local GKGK project via the round table, the associated stakeholder resources, and their control measures.

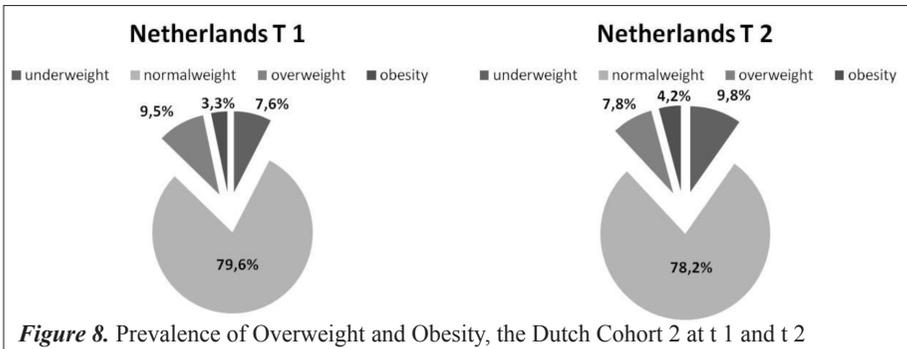
### Development of BMI Readings for the German and Dutch Cohorts

The following table shows the longitudinal development of the BMI development for the German (C 1) and Dutch (C 2) cohorts after one year at two times of measurement (t 1 and t 2). The reference values from Kromeyer-Hauschild (2001) were used to analyze both cohorts (see Figure 7).



After one year the German cohort exhibits a slight decline in the prevalence values for overweight and obesity from 15% to 14.6%, with the proportion of obese children declining most clearly (from 7.3% to 5.4%). Similarly, between the two measuring points, the proportion of children in the highest percentile for normal weight (P75-P90) drops from 13.8% to 11.9%. Over one year of their lives, the average BMI for the overall cohort increased only from 16.50 to 16.72. This means that the difference for these 8-year-old German children compared to German reference children of the same age (BMI M 50, plus 16.02 = +0.70) is lower than for the 7-year-old children at the first measuring point (BMI M 50, 15.64 = +0.86) (see Kromeyer-Hauschild et al., 2001, p. 812) (see Figure 8).

After one school year the Dutch cohort C 2 also exhibited a decline in their prevalence value for overweight and obesity, from 12.8% to 12%. This decrease is not significant, but their starting BMI value was markedly lower than that of their German peers. In the Dutch cohort,



however, the percentage in the highest percentile for normal weight is slightly higher at the second measuring point (from 15% at t 1 to 15.4% at t 2). The average BMI for the entire cohort increases from 16.06 to 16.36, which is less than the average rate of progression seen in the reference value for the age group.

It is striking that the proportion of underweight children in both cohorts increases markedly between the first and second measuring point.

## Development of the Motor Skills Profile for the German and Dutch Cohorts

We now consider the development of the motor skills profile between the first and second measuring points for the first (German) and second (Dutch) cohorts. There is slightly less than one school year between the two measuring points (see Table 2 and Table 3).

Of the 364 German children (C 1),  $n = 261$  took part in all the measurements taken at both measuring points (t 1 and t 2). The results for the German population demonstrate a highly significant improvement in eight of the nine items (all except forward-bend mobility)

**Table 2**

*Motor Development of the German Cohort (C 1) Between the Two Measuring Points*

| DE<br>N= 261 | sit-<br>ups | push-<br>up | sit &<br>reach | 20m<br>sprint | standing<br>broad<br>jump | rapid<br>alternation<br>jumps | balance<br>back-<br>wards | 6min<br>run | BMI  | age |
|--------------|-------------|-------------|----------------|---------------|---------------------------|-------------------------------|---------------------------|-------------|------|-----|
|              | n           | n           | cm             | sec           | cm                        | n                             | n                         | m           | n    | y   |
| T 1          | 14.0        | 12.0        | 3.5            | 4.6           | 107.9                     | 23.8                          | 24.1                      | 876.1       | 16.5 | 7.2 |
| T2           | 17.6        | 14.3        | 3.0            | 4.4           | 111.3                     | 30.4                          | 27.0                      | 944.4       | 16.7 | 8.2 |
| p.           | .001        | .001        | .105           | .001          | .001                      | .001                          | .001                      | .001        | .001 |     |
| $\eta_2$     | .329        | .214        |                | .414          | .041                      | .516                          | .174                      | .307        | .051 |     |

**Table 3**

*Motor Development in the Dutch Cohort (C 2) Between the Two Measuring Points*

| NL<br>N= 296 | sit-<br>ups | push-<br>up | sit &<br>reach | 20m<br>sprint | standing<br>broad<br>jump | rapid<br>alternation<br>jumps | balance<br>back-<br>wards | 6min<br>run | BMI  | age |
|--------------|-------------|-------------|----------------|---------------|---------------------------|-------------------------------|---------------------------|-------------|------|-----|
|              | n           | n           | cm             | sec           | cm                        | n                             | n                         | m           | n    | y   |
| T 1          | 15.0        | 10.2        | 4.6            | 4.8           | 103.9                     | 20.7                          | 22.4                      | 873.8       | 16.3 | 7.0 |
| T2           | 17.4        | 12.2        | 2.7            | 4.6           | 111.5                     | 26.4                          | 26.6                      | 914.4       | 16.6 | 7.8 |
| p.           | .001        | .001        | .001           | .001          | .001                      | .001                          | .001                      | .001        | .001 |     |
| $\eta_2$     | .224        | .137        | .066           | .126          | .159                      | .442                          | .148                      | .085        | .049 |     |

with sizeable effects for muscular endurance (sit-ups and push-ups), speed (20 m run) and aerobic endurance (6-minute run), and coordination skills (SHH). The results for forward-bend mobility (sit-and-reach) unsurprisingly show a slight regression.

Of the 380 Dutch children (C 2),  $n = 296$  took part in all the measurements taken at both measuring points (t 1 and t 2). The results for Dutch population in cohort 2 at the second measuring point also show a highly significant improvement, also in eight of the nine items (and again, all except forward-bend mobility), but there are fewer really sizeable effects. These are seen for endurance and explosive strength (sit-ups and standing long jump), and there are particularly high values for coordination (lateral jumping back and forth). The decrease in forward-bend mobility (sit-and-reach) is slightly more pronounced among the Dutch children than in the German cohort C 1. At the second measuring point, the Dutch cohort lost the slight lead over the Germans in agility and endurance (sit-ups) that they had had at t 1 (see Table 4).

**Table 4**

*Comparison of Motor Development in the DE and NL Cohorts (t 1)*

| GE<br>N=261<br>NL<br>N=296 | sit-ups | push-<br>up | sit &<br>reach | 20m<br>sprint | Stand-<br>ing<br>broad<br>jump | rapid<br>alter-<br>nation<br>jumps | balance<br>back-<br>wards | 6min<br>run | BMI   | age   |
|----------------------------|---------|-------------|----------------|---------------|--------------------------------|------------------------------------|---------------------------|-------------|-------|-------|
|                            | n       | n           | cm             | sec           | cm                             | n                                  | n                         | m           | n     | y     |
| T 1                        | -2.038  | 5.548       | -2.554         | -3.701        | 2.465                          | 5.303                              | 2.200                     | .230        | 1.096 | 5.837 |
| df.                        | 555     | 555         | 555            | 555           | 555                            | 555                                | 555                       | 554         | 555   | 555   |
| sig.                       | .042    | .000        | .011           | .000          | .014                           | .000                               | .028                      | n.s.        | n.s.  | .000  |
|                            | NL +    |             | NL +           |               |                                |                                    |                           |             |       |       |

There are a number of significant differences between the German and Dutch cohorts (C 1 and C 2) at the first measuring point. The Dutch children perform better than their German fellow students in mobility (sit-and-reach) and endurance for sit-ups, while the German students exhibit more endurance for push-ups. Otherwise, the German students perform slightly better only in speed (20 m run) and lateral jumping back and forth (coordination against the clock). They do not have significantly higher BMI values but are slightly older (by 0.2 years) than their Dutch fellows (see Table 5).

A number of differences have become apparent between the two cohorts in the interval between the first and second measuring point. The German children now perform better than their Dutch counterparts in all motor skills other than the standing long jump (111.3 cm DE, NL 111.5 cm, n.s.), but they are not always significantly better (e.g., not in sit-ups or sit-and-reach). BMI measurements show no significant difference between the two populations at t 2, although the German children are significantly older.

The largest differences observed at the second measuring point are in the average number of push-ups (14.3 vs. 12.2), the 20 m sprint (4.4 vs. 4.6 seconds), the lateral jumping back and forth (30.4 vs. 26.4 jumps) and, most markedly, in the 6-minute run (944.4 m vs. 914.4 m). As you see, the German children do show a certain developmental advantage, primarily in

**Table 5***Comparison of Motor Development in the DE and NL Cohorts (t 2)*

| GE<br>N=261<br>NL<br>N=296 | sit-ups | push-<br>up | sit &<br>reach | 20m<br>sprint | Stand-<br>ing<br>broad<br>jump | rapid<br>alter-<br>nation<br>jumps | balance<br>back-<br>wards | 6min<br>run | BMI   | age   |
|----------------------------|---------|-------------|----------------|---------------|--------------------------------|------------------------------------|---------------------------|-------------|-------|-------|
|                            | n       | n           | cm             | sec           | cm                             | n                                  | n                         | m           | n     | y     |
| T 2                        | -.482   | 5.928       | .577           | -6.240        | -.132                          | 7.004                              | 2.782                     | 2.885       | 1.020 | 6.648 |
| df                         | 554     | 554         | 522            | 555           | 554                            | 555                                | 555                       | 553         | 555   | 555   |
| Sig.                       | n.s.    | .000        | n.s.           | .000          | n.s.                           | .000                               | .006                      | .004        | n.s.  | .000  |

endurance, coordination against the clock, speed, and aerobic endurance, but this may be related to the fact that the first German cohort was 0.4 years older than the second Dutch cohort at the second measuring point. Of course, for both groups, we also need to take into account the fact that we may be observing group-specific effects, and the longitudinal results of other cohorts (C 2 and C 3 in Germany, and C 3 in the Netherlands) will therefore have to be examined at a later date.

## Conclusion

First results of the German cohort 1 (2008/09) and Dutch cohort 2 (2009/10) longitudinal measurements indicate the possibility to counteract obesity and to increase levels of physical fitness and motor development indifferent from natural growth by a multicomponent program and a multisector approach of intervention. Original values of motor ability tests show significant increase in aerobic endurance, coordination, velocity, and in force tasks. Also first changes for BMI distribution are explored after only one year intervention.

The present differences between the two cohorts (German C 1 and Dutch C 2) after one year of the project may also be associated with the fact that far fewer Dutch children attend a third, fourth, and fifth sport unit each week than is the case in German schools. This calls for a more detailed analysis of the implementation of the GKGK timetable and the students' rates of participation in the additional afternoon periods of exercise, games, and sports.

In the next two to four years, in which intervention goes on, analysis should be expanded. Parents' questionnaires and children's questionnaires should be analyzed to show factors for successful intervention. Factor analysis and HLM should take emphasis on the following question: Which are the important components and levels of the project, or is the whole construct of combined and networked action necessary? Results show that the project started successfully. In the future, the longitudinal design of the study gives the chance to have a look at long-term effects and reasons for the initial outcomes.

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## References

- Berse, C. (2009). *Mehrdimensionale Bildung im Kontext Kommunalen Bildungslandschaften*. Opladen/Farmington Hills: Budrich.
- Bleckmann, P., & Durdel, A. (Eds.) (2009). *Lokale Bildungslandschaften. Perspektiven für Ganztagschulen und Kommunen*. Wiesbaden: VS Verlag.
- Boere-Boonekamp, M. M., L'Hoir, M. P., Beltman, M., Bruil, J., Dijkstra, N., & Engelberts, A. C. (2008). Overgewicht en obesitas bij jonge kinderen (0-4 jaar): Gedrag en opvattingen van ouders. *Ned Tijdschr Geneesk* 152(6), 324–330.
- Bös, K. (2003). Motorische Leistungsfähigkeit von Kindern und Jugendlichen. In W. Schmidt, I. Hartmann-Tews, & W. D. Brettschneider (Eds.), *Erster deutscher Kinder- und Jugend-sportbericht* (pp. 85–108). Schorndorf: Hofmann.
- Bös, K., Worth, A., Opper, E., Oberger, J., & Woll, A. (Eds.) (2009). *Das Motorik-Modul: Motorische Leistungsfähigkeit und körperlich-sportliche Aktivität von Kindern und Jugendlichen in Deutschland*. Baden-Baden: Nomos.
- Branca, F., Nikogosian, H., & Lobstein, T. (Eds.). (2007). *The challenge of obesity in the WHO European Region and the strategies for response*. Copenhagen: WHO.
- Braun, B. (2007). Eine Bilanz der Interventionsstudien zum Übergewicht: Mehr Bescheidenheit in der Zielsetzung wäre angeraten. *Gesundheitsmonitor* (pp. 8–12). Retrieved from [http://www.bertelsmann-stiftung.de/cps/rde/xbcr/SID-BF2704E5-9DF1214F/bst/GemoHealth\\_SA\\_07\\_web.pdf](http://www.bertelsmann-stiftung.de/cps/rde/xbcr/SID-BF2704E5-9DF1214F/bst/GemoHealth_SA_07_web.pdf)
- Brettschneider, W. D., Hoffmann, D., Naul, R., & Steinzen, A. (2009). Von den Erkenntnissen aus dem EU-Bericht “Young people’s lifestyle and sedentariness” zur handlungsorientierten Umsetzung der Empfehlungen im Rahmen von zwei lokalen Präventionsstudien. In R. Naul, A. Krüger, & W. Schmidt (Eds.), *Kulturen des Jugendsports – Bildung, Erziehung, und Gesundheit* (pp. 67–104). Aachen: Meyer & Meyer.
- Brettschneider, W. D., & Naul, R. (2004). *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). Brussels: DG EAC.
- Brettschneider, W. D., & Naul, R. (Eds.). (2007). *Obesity in Europe: Young people’s physical activity and sedentary lifestyles*. Frankfurt/M.: Lang Verlag.
- Brettschneider, W. D., Naul, R., Bünemann, A., & Hoffmann, D. (2006). Übergewicht und Adipositas bei Kindern und Jugendlichen. *Spectrum der Sportwissenschaften*, 18(2), 25–45.
- Bulk-Bunschoten, A. M. W., Laar, A. M. W., Hurk, K., van den Renders, C. M., & Hirasing, R. A. (2006). Minimale Interventie Strategie (MIS) bij kinderen met overgewicht. *Tijdschrift voor Jeugdgezondheidszorg*, 95, 1–2.
- Currie, C., Roberts, C., Morgan, A., Smith, R., Settertobulte, W., Samdal, O., & Barnekow Rasmussen, V. (Eds.). (2004). *Young people’s health in context - Health Behaviour in School-aged Children (HBSC) study: International report from the 2001/2002 survey*. Copenhagen: World Health Organization Regional Office for Europe.
- EU (2008). *EU physical activity guidelines. Recommended policy actions in support of health-enhancing physical activity*. Brussels: DG EAC.
- EU-Platform on Diet, Physical Activity, and Health. (2005). Diet, physical activity, and health – A European platform for action. Retrieved from [http://ec.europa.eu/health/ph\\_determinants/life\\_style/nutrition/platform/docs/platform\\_charter.pdf](http://ec.europa.eu/health/ph_determinants/life_style/nutrition/platform/docs/platform_charter.pdf)
- Ferreira, I., van der Horst, K., Wendel-Vos, W., Kremers, S., van Lenthe, F. J., & Brug, J. (2006). Environmental correlates of physical activity in youth: A review and update. *Obesity Reviews*, 8(2), 129–154.
- Gustafson, S. L., & Rhodes, R. E. (2006). Parental correlates of physical activity in children and early adolescents. *Sport Medicine*, 36(1), 79–97.

- Haberer, E. (2010). *Active children – active schools. Zusammenhänge zwischen Motorik, Kognition und körperlicher Aktivität. Eine empirische Studie zu Effekten einer in den Schulalltag integrierten Bewegungsförderung in der Primarstufe* (Doctoral dissertation). Universität Osnabrück, Osnabrück.
- Hoffmann, D. (2008). *Gesunde Kinder in gesunden Kommunen – sozialräumliche Vernetzung zur Förderung des schulischen und außerschulischen Bewegungsverhaltens von Kindern am Beispiel der Kommune Velen* (Doctoral dissertation). Universität Duisburg-Essen, Essen.
- Hoffmann, D., & Naul, R. (2009). Die körperliche und motorische Entwicklung von Grundschulkindern in der Gemeinde Velen im Rahmen der Pilotstudie des Interventionsprojekts Gesunde Kinder in gesunden Kommunen (GKGK). In R. Naul, A. Krüger, & W. Schmidt (Eds.), *Kulturen des Jugendsports – Bildung, Erziehung, und Gesundheit* (pp. 105–128). Aachen: Meyer & Meyer.
- Jebb, S. A., & Moore, M. S. (1999). Contribution of a sedentary lifestyle and inactivity to the etiology of overweight and obesity: Current evidence and research issues. *Medicine & Science in Sports & Exercise*, 31(11), S534–541.
- Kornbeck, J. (2009). More than a nutrition issue: Assessing the capacity of the EU to use physical activity and sport to counteract obesity. In H. Westerbeek (Ed.), *Using sport to advance community health: An international perspective* (pp. 153–174). Nieuwegein: Arko Sports Media.
- Kromeyer-Hauschild, K., Wabitsch, M., Kunze, D., Geller, F., Geiß, H. C., Hesse, V., . . . Hebebrand, J. (2001). Perzentile für den body-mass-index für das Kindes- und Jugendalter unter Heranziehung verschiedener deutscher Stichproben. *Monatsschrift Kinderheilkunde*, 8, 807–818.
- Kurth, B. M., & Schaffrath Rosario, A., (2007). Die Verbreitung von Übergewicht und Adipositas bei Kindern und Jugendlichen in Deutschland. Ergebnisse des bundesweiten Kinder und Jugendgesundheits surveys (KiGGS). *Bundesgesundheitsblatt – Gesundheitsforschung – Gesundheitsschutz*, 50(5/6), 736–743.
- Lubben, L., Besnyöi, M., Schilstra, M., & Knol, A. (2011). *Evaluatie rapport van het GKGK-project. Is het GKGK-project een succesvol project?* Zwolle: Windesheim Hoogeschool.
- Naul, R. (2011). *HCSC: Final report*. Essen: WGI/dsj.
- Naul, R., Kornbeck, J., & L'Hoir, M. (2010). Multi-actor strategies of health-enhanced physical activities for children in local communities of the European Union. *Medicine & Science in Sports & Exercise*, 42(5), S253–S254.
- Naul, R., & Schmelt, D. (2011). Gesunde Kinder in gesunden Kommunen – ein europäisches Interventionsprojekt zur Förderung eines aktiven Lebensstils bei Grundschulkindern. In R. Zimmer (Ed.), *Bewegte Kindheit 2011* (in press). Schorndorf: Hofmann.
- Sallis, J. F. (2010). Effects of the built environment on physical activity level. In C. Bouchard & P. T. Katzmarzyk (Eds.), *Physical activity and obesity* (pp. 93–96). Champaign, IL: Human Kinetics.
- Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine & Science in Sports & Exercise*, 32(5), 963–975.
- Smith, A. L., & Biddle, S. J. H. (Eds.). (2008). *Youth physical activity and sedentary behaviour*. Champaign, IL: Human Kinetics.
- Weiß, W. W. (2011). *Kommunale Bildungslandschaften. Chancen, Risiken, und Perspektiven*. Weinheim/München: Juventa.
- Zimmer, R. (2008). Bildung durch Bewegung in der frühen Kindheit. In W. Schmidt, R. Zimmer, & K. Völker (Eds.), *Zweiter Kinder- und Jugendsportbericht* (pp. 211–236). Schorndorf: Hofmann.