

## Healthy Children in Sound Communities (HCSC) – a German-Dutch intervention project to develop an active lifestyle for children in primary schools

### Background

The project is based on a network of four essential settings (family, school, sport club and community) for the development of children. The HCSC project targets to counteract physical inactivity and obesity of children and to support a healthy lifestyle with motor abilities and psycho-social well-being at the age of primary school. The promotion of HCSC focuses not only on overweight children, instead all children groups are addressed because the amount of physical inactivity rises much higher than the prevalence rate of obesity within the last years. The project concept includes central components of the lifeworld of children: nutrition, physical activity, screen time in leisure, social and geographical environment to reach the aims. The project strategy is built on different local stakeholders as partners of a network which is responsible for development and education of children in the community.

The design of the project links different stakeholders to achieve 60 to 90 minutes of daily physical activity for all participating children. HCSC is a four-year longitudinal intervention study which has been implemented in six Dutch (Arnhem, Cuijk, Enschede, Oude IJsselstreek, Rijnwarden, Winterswijk) and six German municipalities (Bocholt, Emmerich, Kleve, Moers, Rheinberg, Ve-



Figure 1: HCSC children enjoy daily physical activities.

len) with in total 37 primary schools and 1,252 children at the age of 6 to 10 years. Five more municipalities in the Netherlands and Germany joined this project meanwhile. The study was

given. More units of physical activity are added at school via active breaks between regular school lessons and active commuting to school either by walking (walking bus) in the first grades or bik-

based programme on physical activity, health, nutrition and social media time (3+2+1) the formula "5 plus 1" was created for collaboration and partnership with local sport clubs, public health offices, education and sport authorities of the municipality and other stakeholders who built the local network (called in German and Dutch language: Round Table).

In recent years different national and international review studies on children's obesity and physical activity intervention projects (cf. Kriemler et al., 2011; Kumanyika et al., 2013; Naul et al., 2012a,b; Wang et al., 2013) proved that only a single component intervention (physical activity or diet nutrition) but also both components together if the in-

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### Implementation

Children who participate receive daily physical activities through 3 hrs of teaching health enhanced physical education three times a week in the morning and 2 hrs of special physical activity courses offered by sport clubs in the afternoon on school days when PE is not

ing to school and back home in higher grades. Each week one hour is given as a cross-curricular "lifestyle lesson" at school which includes theory and practice of topics like "Physical activity and body development", "Nutrition and physical activity" "Leisure and screen time" to raise awareness and pass knowledge and skills for a healthy lifestyle (e.g. to taste and to prepare vegetables and fruits and how to cook). For this complete school

intervention focuses only on a single setting or sector (e.g. only home or school or sport club) did not work much and effectively. That is the reason why in the HCSC project a multi-component concept and a multi-sectoral intervention strategy was implemented already at the beginning of 2008/9 after a pilot study of the design. The multi-sector strategy was implemented with local municipality network in which representatives of the health, education, nutrition and sport sector participate, supported for cooperation and guided by a local "community moderator" who has become the manager of the "Round Table".

### BMI and motor development – to monitor and to support

Considering three different cohorts of primary school children in Germany (n= 775) the total sample group achieved in six out of seven basic motor skills higher levels of motor skill development after four years of intervention compared to age and gender related national reference norms (cf. Figure 4).

The figure shows all test items which have been applied from grade 1 (t1) up to grade 4 (t4) four times. The results are documented in five quintiles which rank from 1 (very below under average norm) up to 5 (very high above average norm). A rank 3 documents the average reference norm. For each child the raw data of motor performance were measured (amounts of conduct e.g. in push-ups; amount of meters, cm, and seconds), compared with the respective age and gender



**Figure 2: HCSC children keep on moving.**

related reference norms of amounts and documented as quintile value accordingly. It means: if there is an increase of the quintile value year by year, there is an effect not based on biological growth and development but by exercise and training. If the quintile value is between two years of measurement more or less stable and identical, it means: there is a progress of motor skills in terms of amounts of meters, cm etc. or reduction of seconds, however, this development could also be caused without any impact of exercise and training. If there is a reduction of the quintile value between two times of measurement, the development remains below the expected progress of reference norms and eventually there is even a regression of the raw data for this test item (e.g. performed less cm or meters than the year before).

The results of the study show a positive development for all items on raw data level with significant effects for six of the seven items (except 6 min. run). Five of the seven motor skill items progressed year by year on a higher quintile level compared with the respective reference norms. However, the items "Sit-ups" (endurance strength) and "standing broad jump"



**Figure 3: HCSC children's breakfast with fruits and vegetables.**

(agility power) remain after four years of intervention still a little bit below the average quintile value (3).

### Successful combat against obesity

After four years of intervention the total sample of the German cohort group achieved a reduction of prevalence in the overweight and obesity profile groups (cf. Table 1). For analysis and documentation of overweight and obesity prevalence the international reference norms of WHO were taken (cf. Cole & Lobstein, 2012). At the beginning in grade 1 (t1) 79 children of 502 were overweight and another 27 obese (in total: 21%). After four years 19 children of the overweight subgroup No.3 changed into the normal weight subgroup No.2 (about 25%) whereas 9 children changed into the obese subgroup No.4 (about 11%). Three children of 27 children who were obese in t1 changed into the lower overweight subgroup. Another 11 % of children changed from their normal weight group No.2 into the overweight subgroup, but in the Netherlands only 6.6% got overweight out of this group. For the Dutch cohort group (n= 477) BMI development was even more successful after 3 years of intervention: 34 % of children

changed from the overweight subgroup into the normal weight subgroup and 37,5 % of the obesity group at t1 changed into the overweight subgroup.

### Parents' Questionnaire – cooperation is needed

The Parents' Questionnaire (n= 364) was executed twice (t2, t4) in Germany and the Netherlands. Two central targets should be achieved: to identify socio-demographic data of parents (social-economic strata, migration background, etc.) which may support and hinder good health (e.g. BMI) of their children; to identify lifestyle behavior patterns of the family which may influence the development of health and motor development. Another part of the questionnaire investigated attitudes of the parents about physical activity and nutrition intake. With the application of an additional Children's Questionnaire at the same time (t2, t4) also comparisons between parents' and children's statements were possible because both questionnaires focus on physical activities and media consumption behavior of the children.

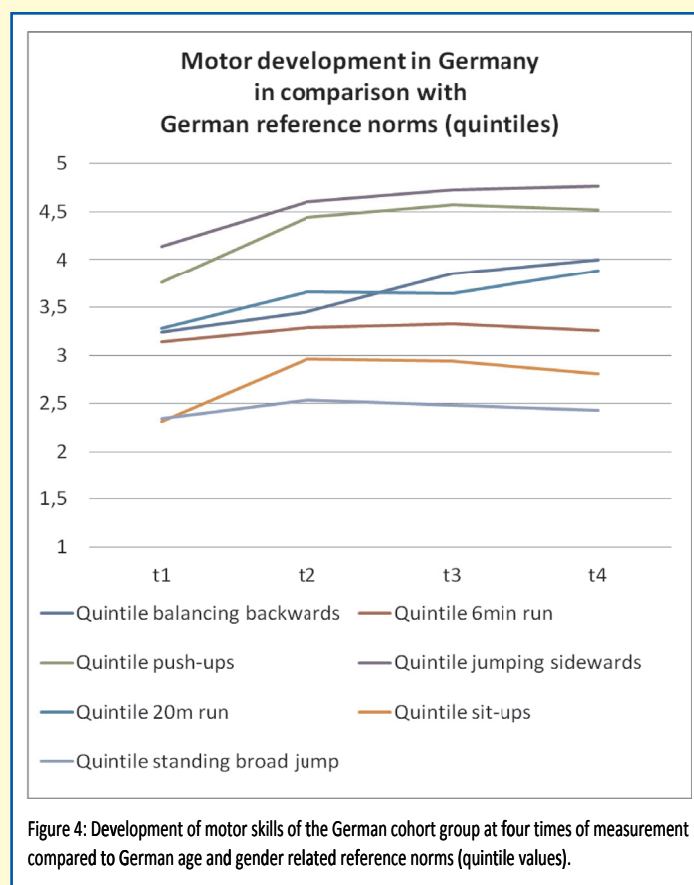
Results show that migration background, level of education, vocational and family status have been insignificant for BMI and motor performance level of the German children. This outcome is important and encouraging for further intervention studies in other parts of NRW and in other German states. The essential predictor, however, is the BMI value of the mother which correlates significantly with the BMI value of the child. This result underpins the demanding

necessity to develop a comprehensive approach with a social network in which parents are included as the most important role models for their children because there is also a high level of convergency between children's and parents' statements about physical activity and modern media behaviour patterns and related parents' personal attitudes about these items.

Furthermore, it was analyzed whether parental nutrition control or limitation of food intake like sweets and unhealthy food correlates with the BMI value of their children. The conclusion is: parental nutrition control which means parents know about the range and types of food intake of their children has a positive effect on the BMI value of their children. It exists a negative correlation: the higher the control, the lower the weight of the child and the lower the risk of becoming overweight. Limitation of food intake, and the restraint of food consumption has a more negative effect on children's weight and BMI. Our explanation for this result is: if parents limit and forbid further food intake, their children have no opportunity to learn a self-guided and independent nutrition behaviour apart from their parents control. There are no significant differences about the results of German and Dutch parents' questionnaires in our study.

#### Reduction of modern media screen time – social improvements of self-concept and class-climate

Daily and weekly sedentary screen time have been continuously reduced after im-



	DE	SD	NL	SD	SUM	SD
t1	2,19	0,62	2,17	0,63	2,19	0,63
t2	2,19	0,65	2,15	0,63	2,17	0,64
t3	2,20	0,65	2,15	0,62	2,19	0,64

Table 1: BMI development of German and Dutch cohort groups according cut-off norms of Cole & Lobstein (2012).

plementation of the HCSC project (t2, t3, t4) in both countries. Complementary, higher scores have been achieved for daily physical activity throughout the week. Active commuting to school had an important impact on this change: at the start of the project many children went to school by motorized transportation (school bus and private car of the parents), however, at the final stage (t4) about 80% of the children approached school either as pedestrians

or with their bike. High and stable average means were measured for the Physical Self-Concept (PSC) of the children. PSC values correlate modestly with the motor development which means: the better the motor development the stronger the physical self-concept. Group climate in school forms remained stable, but two indicators increased significantly on a higher level for children during intervention time: "social integration" and "individual

acceptance", particularly for children who live in communities and town quarters with a higher population of parents with a migration background (cf. Figure 5).

#### Correlates between BMI, motor performance and other social factors

A high BMI of the total HCSC sample group (n= 805) of German and Dutch children correlates significantly negative with all motor test items ( $-.54 \leq r \leq -.27$ ) and a high sedentary media screen time index correlates also negatively with all motor items ( $-.30 \leq r \leq -.13$ ). The Physical Self-Concept of the children is negatively connected with a high BMI ( $-.12 \leq r \leq -.32$ ) like the value for social integration ( $r = -.15$ ) and social class climate ( $r = -.16$ ) do. All these results document important reference criteria which are connected with an high BMI (load of physical activity and screen time, influence of parental lifestyle) and other individual psycho-social problems (self-concept, social integration into the school form) of overweight children. These correlates of social context and psycho-social problems of overweight children have to be taken into further consideration for future obesity intervention studies.

#### Discussion

The results of the HCSC study underpin the necessity to implement a multi-component concept and to establish a cross-sectoral network of different stakeholders on community level. Both criteria document an evidence-based positive outcome of effects, if an adequate time frame over several school years is granted



for changes in the environment of children's live settings and for their individual lifestyle behavior.

Integrated health intervention studies like HCSC can successfully reduce overweight, increase physical fitness, and develop psychosocial well-being of former overweight children.

The strategy documents how important the inclusion of parents, schools, sport clubs and community offices are. The results of the multi-component approach document a reduce of overweight and obesity, combined with an increase of motor performances, a decrease of sedentary screen time and an increase of all-day physical activities.

An important factor is the inclusion of parents into multi-sectoral networks. It has been documented that the development of BMI, motor abilities and physical fitness of children and psycho-social benefits are closely connected with parental attitudes and family life.

Therefore, daily physical activities as early as possible are an important factor to educate healthy children. Finally, it should be emphasized that the effects of this study are supported by a Dutch control study at the community of Cuijk. In summary: HCSC-children reduced their weight, developed their motor skills and physical fitness better and became stronger in their psycho-social qualities.

### Development of freetime behavior, physical self-concept and group climate (4-point-Likert-scale)

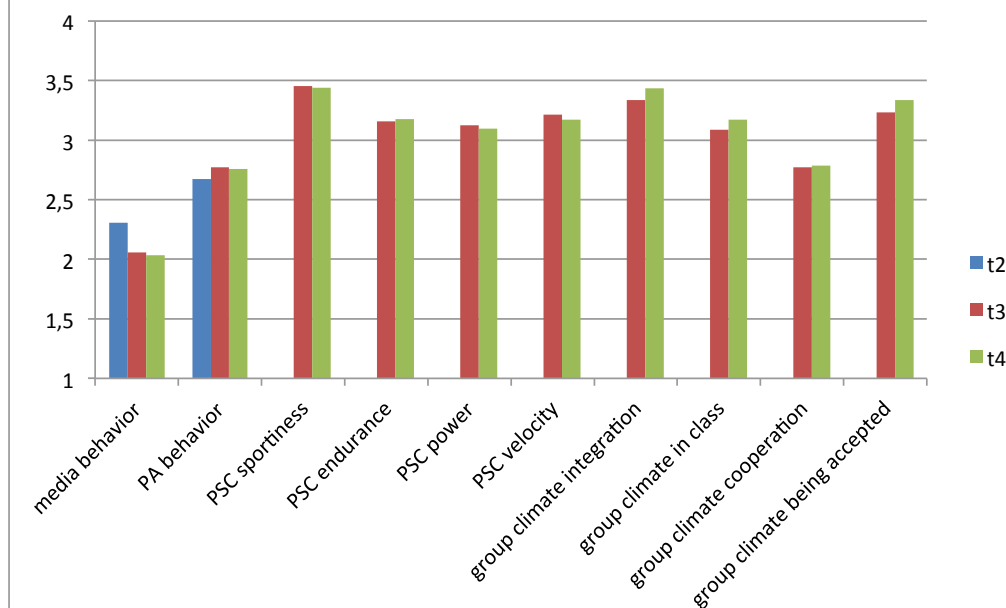


Figure 5: Development of physical activity, media behavior, physical self-concept and school form climate of the German cohort group at two respectively three times of measurement.

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