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Objectively Determined Physical Activity Levels in German Primary School Children after a One Year School-based Health Promoting Intervention

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Abstract

Beneficial effects of regular physical activity (PA) during childhood have widely been recognised. In spite of this many are not sufficiently physically active; therefore, health promotion has to start early. The programme "Join the Healthy Boat" promotes– amongst other aspects – an increase of daily PA in primary school children. In order to evaluate the effectiveness of the programme, this study investigated children's PA behaviours objectively.

During one school year, teachers delivered lessons and action alternatives in order to promote daily PA. A sub-sample of 318 children participated in the cluster-randomised study; at follow-up, 167 of them (8.0 ± 0.6 years, male: 46.1%) were assessed again. Children's height and weight were measured on site; PA was assessed on six consecutive days using multi-sensor accelerometry (Actiheart©, CamNtech). PA was defined as the amount of energy expended. All other parameters were assessed using a parental questionnaire.

At follow-up, significant effects were found for moderate to vigorous PA (MVPA) and gender as well as MVPA and weight status, with boys being more active than girls and overweight/obese children being more active than normal weight children (T-5.646 $p<0.01$; T-3.998 $p<0.01$, respectively). Further, more overweight/obese children as well as children in the intervention group reached the recommended activity guidelines of 60 minutes daily in MVPA; yet no statistical significance was reached. However, comparing control and intervention group, no significant intervention effects were found after one year.

A multi-dimensional intervention for one year does not seem to achieve significant increases in children's objectively assessed PA. Maybe a longer lasting, more intense intervention with extra lessons would show more positive effects. Also, assessing PA directly after seven weeks of summer holidays (with no intervention) might have led to lower PA levels than straight after the intervention at the end of the previous school year.

Keywords: Childhood physical activity; Overweight; Intervention school-based

Introduction

Beneficial effects of regular physical activity during childhood have widely been recognised, on both a healthy development as well as on the reduction of risk factors of chronic diseases [1]. On the other hand, insufficient physical activity has been associated with an increased risk of obesity [2,3] as well as related co-morbidities [4-6]. In spite of this knowledge, many children are not sufficiently physically active to benefit their health [7]. Additionally, it has been shown that physical activity habits are established at a young age [8] and are often carried into adulthood [9]. Therefore, physical activity promotion has to start at a young age.

The World Health Organisation (WHO) advocates that children should spend at least 60 minutes daily in moderate to vigorous physical activity (MVPA) [10]. Still, numerous studies show that not even half of children reach this goal [11,12]. In Germany, less than a fifth of school children between the ages of 7 and 10 years engage in sufficient MVPA [13,14]. Yet, these data are based on self-report, but even with objectively derived data, children hardly meet the WHO physical activity recommendations [15-19]. This has been shown to especially vary between gender and countries. In a British study, 69% of 9 and 10 years old children achieve this goal [20], whereas in the US 42% of 6 to 11 year olds engage in 60 minutes of daily MVPA [21] and a recent Estonian study showed that only 11% of 7 to 9 year old children meet these recommendations [22]. Also, assessing physical activity levels in a large European cohort of 2 to 10 year olds, values of children meeting the recommended 60 minutes MVPA per day ranged from 2% for Cypriot girls to 34% in Belgian boys [23].

Low levels of MVPA such as those have been shown to be associated with higher rates of adiposity in children [20]. Since healthcare professionals and numerous governments have recognised childhood obesity as an increasing health problem, various programmes targeting sedentary behaviour and inappropriate weight gain in children have been developed and implemented [24-27]. In order to reach all children at an age where health behaviours can still easily be introduced, schools have been identified as an ideal environment for the promotion of physical activity [28]. It has been shown that successful interventions should be integrated into the regular school curriculum as well as supported by parents and teachers [29]. Further, theory-based interventions and programmes lasting one year and longer have been shown to be more promising to increase knowledge and behaviours which contribute to a healthy lifestyle [30].

The programme "Join the Healthy Boat" is one of those interventions, aiming (amongst other aspects) to increase physical activity using materials integrated into the primary school curriculum, delivered on a regular basis by the classroom teacher with no extra lessons (for more detailed information see [31]). "Join the Healthy Boat" started in 2009 and is still implemented in currently more than 1,000 primary schools in south-west Germany. To evaluate whether the programme influences children's physical activity behaviours a one-year large-scale intervention study was carried out. The present study reports secondary outcomes of objectively assessed physical activity of primary school children after a one-year school-based multi-component intervention. Moreover, differences in physical activity patterns between weekdays and weekends, as well as gender differences and differences in weight status were examined.

Materials and Methods

Join the healthy boat intervention

"Join the Healthy Boat" is a programme promoting a healthy lifestyle in primary school children in Baden-Württemberg, south-west Germany (for more detailed information see) [31]. The Intervention was based on Bandura's [32] social cognitive theory and developed by the means of the intervention mapping approach [33]. The contents and materials of this school-based, teacher-centred programme are integrated into the primary school curriculum focusing on health promoting behaviour change towards more physical activity, less time spent with screen media and a more healthy diet. All materials were developed in collaboration with experienced primary school teachers to be delivered by the classroom teacher on a weekly basis with no extra lessons. Main focus was to promote healthy and active alternatives, which children were offered to choose in order to lead a healthier and more active lifestyle. The teaching units include 20 lessons that increase awareness, teach health-relevant topics such as "why does my body need physical activity?" and offer ideas and alternatives for leisure activities children can engage in without the use of screen media. In addition, to the 13 lessons which focus on physical activity promotion (which can be held several times), two short activity games, lasting five to ten minutes each, were introduced into the children's daily school routine. Further, to involve parents so-called family homework was introduced, where children solve exercises actively with their parents (further details: see) [34].

Study protocol and participants

"Join the Healthy Boat" was designed as a prospective, stratified, cluster-randomised, and longitudinal study with an intervention group and a control group. More details on the intervention's design and development as well as recruitment can be found elsewhere [31,35]. The study was approved by the University's Ethics Committee (application no. 126/10), the Ministry of Culture and Education and was conducted in accordance with the declaration of Helsinki. The study is also registered at the German Clinical Trials Register (DRKS-ID: DRKS00000494).

Parents of all participating children provided written informed consent to take part in the study as well as a separate consent for their children to wear a multi-sensor device assessing physical activity objectively for six consecutive days. At baseline, a sample of 1,947 primary school children aged 5 to 8 year-old was recruited, a sub-sample of those children who agreed to wear an accelerometer was selected to measure their physical activity objectively (n=433). The sample of children with valid data of at least three days of more than 10 hours of recorded data per day at baseline included 318 first and second graders (7.1 ± 0.6 years; 50% male; intervention n=179; control n=139; 16% of the whole cohort). More details on recruitment and study population are given by Dreyhaupt et al. [31] and Kettner et al. [16]. Of the sample included in baseline analyses, 167 children provided valid physical activity data one year later at follow-up (8.0 ± 0.6 years; 46.1% male; intervention n=106; control n=61; 52.5% of the baseline sub-sample).

The intervention started after baseline measurements had been taken in the intervention group only, whereas the control group followed the regular school curriculum. Follow-up measurements were taken one year later at the beginning of the following school year after a six week summer break with no intervention.

The here reported results were assessed as a secondary outcome of the programme. Primary outcomes as well as other secondary aspects of the intervention are reported elsewhere [36-38].

Measurements

Anthropometric measurements such as children's height (cm) and body mass (kg) were taken by trained staff to ISAK-standards [39] using calibrated electronic scales and a stadiometer (Seca 862 and Seca 213, respectively, Seca Weighing and Measuring Systems, Hamburg, Germany). Children's BMI was calculated and converted to BMI percentiles using German reference data [40]. Overweight children were defined as BMI percentiles above the 90th percentile; obese children above the 97th percentile.

Those children who agreed to take part in objective physical activity measurement were fitted with a multi-sensor device (Actiheart©, CamNtech Ltd., Cambridge, UK) which assessed acceleration and heart rate in order to determine physical activity [41]. Participants kept the chest-worn device for six consecutive days and nights (for further details see) [16]. Recording interval was set to 15 sec and to be included in analyses, at least three days (including at least one weekend day) of valid data of more than 10 hours were required. First and last recording days were excluded from the analysis to antagonise a novelty factor on the first day, whereas the last day never showed 10 hours of recording.

Physical activity levels were defined using children's energy expenditure (MET) predicted by Actiheart©'s captive software (Version 4.0.109), taking into account participant's age, height, body weight and gender in addition to the assessed heart rate and movement counts. Physical activity levels were classified as sedentary (<1.5 MET), light (1.5-3 MET), moderate (>3-6 MET), and vigorous (>6 MET) as well as MVPA (>3 MET) [42]. Validity of the device's prediction of energy expenditure in children has previously been shown [43]. In order to determine whether participants met the physical activity guideline of 60 minutes of MVPA every single day, the available days were extrapolated to a full week, using a ratio of 5:2 for weekdays and weekend days. Socio-demographic data such as parental education level, household income and migration background were collected using a parental questionnaire. Parental education level was determined based on the highest school education of either one parent or the single parent; net household income as dichotomised above and below 1,750€ per month; and children were classified as having a migration background if at least one parent was born abroad or the child was spoken to in foreign language during the first three years of life.

Data analysis

All statistical analysis was performed using SPSS Statistics 21 (SPSS Inc., Chicago, IL, US) with a significance level set to $\alpha<0.05$. Descriptive statistics are displayed in mean values and standard deviations. Group differences between means were analysed with independent t-test and logistic regressions were used to analyse group differences with categorical variables, respectively. Repeated measures ANOVA was used to examine differences between weekdays and weekend days. Furthermore, gender differences and differences by weight status were examined using ANCOVA adjusting for age and BMI percentiles and gender and age, respectively. Intervention effects were analysed using logistic and linear regressions, controlling for age, gender, BMI percentiles and baseline measurements.

Results

Participant's characteristics

Participant's descriptive data can be found in **Table 1**. There was no difference regarding age, body weight and height, BMI percentiles, migration background and parental education level between either sub-sample, who agreed to objective activity assessment and total sample, nor between control and intervention group in the here analysed sub-sample. There was however, a significant gender difference between control and intervention group with significantly more boys in the intervention group ($p<0.05$). 6.6% (n=11) of children were classified as overweight or obese, according to German reference data [40].

Table 1: Descriptive characteristics of total sample, control and intervention group at follow-up; Values are mean (m) ± SD or numbers (n) and percentages (%).

	Total sample (n=167)	Control (n=61)	Intervention (n=106)
Gender (male); n (%)	77 (49.1)*	22 (36.1)	55 (51.9)
Age (years) m ± SD	8.0 ± 0.6	8.0 ± 0.6	7.9 ± 0.6
Height (cm) m ± SD	129.2 ± 6.3	129.4 ± 6.6	129.0 ± 6.1
Weight (kg) m ± SD	26.9 ± 5.3	26.7 ± 5.2	27.0 ± 5.4
BMI percentiles m ± SD	44.3 ± 26.3	42.3 ± 25.2	45.4 ± 27.0
Weight status			
Overweight n (%)	5 (3.0)	1 (1.6)	4 (3.8)
Obese n (%)	6 (3.6)	1 (1.6)	5 (4.7)
Migration background; n (%)	34 (23.4)	10 (18.2)	24 (26.7)
High family education level n (%)	52 (36.4)	18 (34.0)	34 (37.8)

Overweight=BMI percentiles >90-97; Obese=BMI percentiles >97; Migration Background=At least one parent was born abroad or the child was spoken to in foreign language during the first three years of life; High family education level=at least one parent has a high school degree.

(*) significant difference between control and intervention group ($p<0.05$)

Total moderate to vigorous physical activity

As shown in **Table 2**, at follow-up, children spent 132 (± 57) min daily in MVPA with no significant difference between control and intervention group. This amount of MVPA decreased significantly to 118 (± 69) min per day on weekends (T 22.189; p<0.01), with no difference between intervention and control group.

Table 2: Time (in rounded min) spent in different intensities and percentage of children meeting PA guidelines at follow-up; Values are mean ± SD.

	Total Sample (n=167)	Control (n=61)	Intervention (n=106)
Total week			
MPA (min/day)	124 ± 51	120 ± 49	126 ± 52
VPA (min/day)	8 ± 9	8 ± 10	8 ± 12
MVPA (min/day)	132 ± 57	129 ± 57	134 ± 57
Weekend			
MPA (min/day)	111 ± 61	106 ± 65	113 ± 60
VPA (min/day)	7 ± 12	7 ± 13	7 ± 12
MVPA (min/day)	118 ± 69	113 ± 74	120 ± 66
Weekdays			
MPA (min/day)	130 ± 56	126 ± 52	132 ± 59
VPA (min/day)	9 ± 10	9 ± 12	8 ± 9
MVPA (min/day)	138 ± 63	135 ± 61	140 ± 64
≥ 60 min MVPA per day			
Meeting recommendations (%)	50.9	44.3	54.7
MPA=moderate physical activity; VPA = vigorous physical activity; MVPA=moderate to vigorous physical activity.			

Physical activity guideline

Moreover, there was a tendency towards children in the intervention group reaching 60 minutes of daily MVPA more often (control:44.3% *vs*. intervention: 54.7%); however, statistical significance could not be reached.

Similarly, compared to the control group, after one year in the intervention group more children, who have not reached the physical activity guideline at baseline, have reached it at follow-up (intervention: 19.8%, control: 16.4%), whereas less children stopped achieving 60 minutes of MVPA daily at follow-up (intervention: 12.3%, control: 14.8%); yet, statistical significance could not be reached, either.

Weekday *vs.* weekend

MVPA levels increased slightly in one year, in total and on weekdays but especially on weekend days. Whereas at baseline, children spent a total of 128 (± 58) min per day in MVPA, at follow-up, this amount increased slightly by 4 min. Considering weekends only, at baseline, children spent 109 (± 62) min daily in MVPA and at follow-up 118 (± 69) min Table 3.

Table 3: Changes in time (follow-up – baseline) spent in different intensities and percentages of changes in children meeting PA guidelines at follow-up; Values are mean ± SD.

	Total Sample (n=167)	Control (n=61)	Intervention (n=106)
Total week			
MPA (min/day)	3 ± 51	6 ± 40	2 ± 57
VPA (min/day)	1 ± 10	3 ± 8	0 ± 10
MVPA (min/day)	4 ± 58	8 ± 44	2 ± 64

Weekend			
MPA (min/day)	7 ± 64	5 ± 64	8 ± 64
VPA (min/day)	2 ± 12	4 ± 14	2 ± 10
MVPA (min/day)	9 ± 70	8 ± 48	9 ± 69
Weekdays			
MPA (min/day)	2 ± 59	6 ± 44	-1 ± 66
VPA (min/day)	1 ± 12	2 ± 10	0 ± 13
MVPA (min/day)	3 ± 66	8 ± 73	-1 ± 75
≥ 60 min MVPA per day			
No change in meeting recommendations at baseline and follow-up (%)	68.3	68.9	67.9
Meeting recommendations at baseline but not follow-up (%)	13.2	14.8	12.3
Meeting recommendations at follow-up but not baseline (%)	18.6	16.4	19.8
MPA=moderate physical activity; VPA=vigorous physical activity; MVPA=moderate to vigorous physical activity.			

Weight status

Comparable to baseline results and as shown in **Figure 1**, at follow-up, overweight and obese children spent significantly more time in MVPA than their normal weight counterparts (196 ± 82 min daily and 128 ± 52 min daily, respectively; T -3.998; p<0.01) and reached the physical activity recommendations significantly more often than normal weight children (81.8% *vs.* 48.7%, respectively; T -2.578; p=0.02).

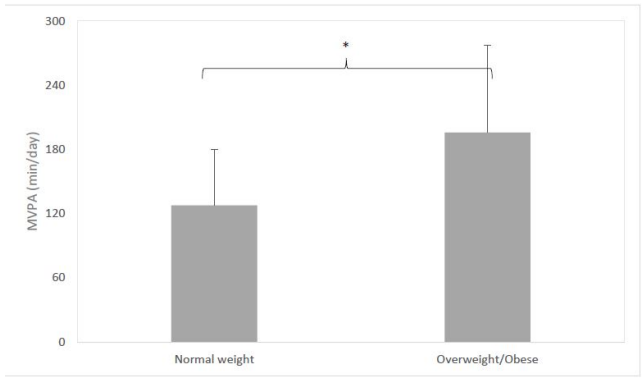

Figure 1: Moderate to vigorous physical activity (MVPA) levels in minutes per day for normal weight and overweight/obese children. (*) significant difference between normal weight and overweight/obese children (p<0.01)

Gender differences

At follow-up, boys were significantly more active than girls (T 5.646; p<0.01), especially when considering vigorous physical activity with boys spending 12 (± 9) min daily in that intensity whereas girls averaged 3 (± 7) min daily in vigorous physical activity. Boys also reached the guideline of 60 minutes of MVPA per day more often than girls (OR 0.310 [0.164, 0.585]; p<0.01).

Discussion

This study investigated the effect of a multi-component intervention on objectively assessed physical activity in German primary school children. The teacher-centred intervention aimed at children eating and drinking healthily, using less screen media as well as being more physically active. Although some of these aims were achieved [36], physical activity objectively assessed in a sub-sample showed no positive intervention effects. The "Join the Healthy Boat" intervention targeted children's physical activity by offering and getting to know action alternatives for their leisure time, in addition to family homework and short exercise breaks during the school day. Teachers were provided with teaching units and suggestions for a more active school day which aimed to increase physical activity levels at school, without additional (PE) lessons.

Total moderate to vigorous physical activity

Yet, neither an increase of MVPA levels nor an increase in children reaching the current physical activity recommendations of daily 60 minutes of MVPA could be achieved, in either girls or boys. This situation is consistent with previous research [44,45] as well as numerous reviews and meta-analyses [46-50], demonstrating the difficulty of successful interventions to promote physical activity in children. Nonetheless, multi-component interventions in adolescents and pre-school children seem to be more promising [49,51,52], which might also be due to the interventions' intensity. "Join the Healthy Boat" concentrates on teachers delivering alternatives in order to motivate children to be more active and less sedentary. Even though teacher encouragement has been positively associated to children's physical activity [53,54] it has been suggested that a more intense intervention over a longer period of time might have led to more positive effects [29,55]. Further, the lack of effect on objectively assessed physical activity might partly be due to the fact that follow-up measurements took place

immediately after a six week summer break with no intervention which might have lessened potential effects.

Physical activity guideline

However, even if not statistically significant, MVPA levels as well as the percentage of children reaching the recommended amount of daily MVPA increased slightly after one year (in control and intervention group), compared to baseline measurements. Therefore, the tendency towards an often reported age-related decline in physical activity levels [56-60] could at least be prevented in the short-term. This increase in physical activity level was especially true for weekend days, where the greatest rise could be observed.

Also, the tendency towards more children in the intervention group reaching the WHO recommendations of 60 minutes MVPA per day (control: 44.3% *vs*. intervention: 54.7%) can be viewed in favour of the here described multi-component intervention. Supporting that, is the fact that – although not statistically significant – after one year more children in the intervention group, who have not reached the physical activity guideline at baseline, have reached it at follow-up, whereas compared to the control group less children stopped achieving 60 minutes of MVPA daily at follow-up. Nonetheless, only half of the children in this sample engaged in one hour of MVPA every day which leaves room for improvement but is comparable with physical activity levels of other European children of that age group, whether assessed objectively or subjectively [14,61]. Still, it is also considerably higher than the 11% of 7- to 8-year olds reaching one hour of MVPA every day, as reported by Riso et al. [22]. On the other hand, in a sample of slightly older children from Scandinavia, more than three quarters of participating children achieved the goal the WHO [10] has set for children's physical activity levels [62]. Apart from cultural and environmental influences which could influence children's physical activity levels, these differences might potentially be due to the diversity of assessment methods as well as the use of varying cut-off points to determine different physical activity levels if those were assessed objectively [11,63]. An American study for instance has investigated physical activity levels of pre-school children depending on varying interpretations of guidelines and the use of different cut-off points with the result that either hardly any (7%) of participating children met recommended physical activity levels or nearly all (96%) of them [64].

Weekday *vs.* weekend

Nonetheless, in absence of intervention effects on objectively assessed physical activity in the present study, children's physical activity levels were also investigated with regards to differences between weekday and weekends, boys and girls as well as between normal weight and overweight/obese children. Considering total physical activity levels, it could be shown that although, children averaged more than two hours of daily MVPA, only half of the children achieved sufficient MVPA on every day of the week in order to reach the recommended guideline suggesting to be moderately to vigorously physically active for at least 60 minutes daily [10]. This is possibly due to the children's weekend activities; since comparing physical activity levels on weekend days and weekdays, it became obvious that children were significantly less active at the weekend than during the week. Even though weekends would offer children more spare time for physical activity, this is in line with previous research of German pre-school children as well as European and Canadian schoolchildren [22,65-67]. Then again, this might not only be due to the children themselves – parents have the opportunity as well as the responsibility to be physically active with their children (especially at the weekend). Parents should therefore, firstly be made more aware of their children's physical activity levels at weekends and should secondly be given ideas, methods, strategies, and opportunities to engage in physical activity together with their children. This is particularly relevant when considering the design of effective interventions to promote physical activity in children. An intense parental involvement seems to be key in health and physical activity promotion, especially when bearing in mind that parents are supposed to have a crucial influence on their children's physical activity [68] and that children of more active parents are more likely to be physically active [69-71].

Weight status

Furthermore, it has also been highlighted that time at weekends which is spent outdoors is not only associated with higher levels of MVPA but also with a lower incidence of overweight [72]. In this study, overweight children spent significantly more time in MVPA as well as reached the physical activity recommendations significantly more often than their normal weight counterparts. Very early findings have also shown higher levels of physical activity in overweight or obese children [73,74] whilst most of the recent studies [75-77] found the opposite and others [22,78] did not report any association between weight status and MVPA. However, in this sample only a very small proportion of children were classified as overweight or obese (3 and 3.6%, respectively) which is considerably less than the incidence of overweight and obesity in a representative national sample of 7 to 10 year old children (9 and 6.4%, respectively [79]). Further, since in this study physical activity was determined via energy expenditure, which was calculated on the basis of acceleration and heart rate, it might be possible, that particularly overweight children had higher heart rates, which could have led to misclassifications of physical activity levels.

Gender differences

Moreover, not only differences between weight status and MVPA were investigated in this study but also gender differences. Findings of boys being significantly more active than girls, which have been reported numerous times before [22,23,62,80,] can also be confirmed in this study. This is especially noticeable for vigorous intensities, where boys achieved nearly three or four times (at follow-up and baseline, respectively) as much time in vigorous physical activity than girls, which has been shown previously as well [81]. Yet, not only total physical activity levels were significantly higher in boys compared to girls, but correspondingly, boys reached the

guideline of 60 minutes of daily MVPA significantly more often than girls, which could also be shown before [16,23]. Yet, this may offer the possibility that girls are more susceptible to well-planned and specifically designed interventions, targeting girls only, offering activities girls prefer in their own space, which then might lead to an increase in physical activity levels.

Summary

To summarise, a multi-dimensional intervention lasting one year did not achieve significant increases in children's objectively assessed physical activity levels, although tendencies especially regarding the achievement of recommended daily MVPA [10] were identifiable. Further, physical activity levels with regards to differences between weekday and weekends, boys and girls as well as between normal weight and overweight/obese children showed that boys were more active than girls, as well as overweight/obese children more active than normal weight children, whereas children displayed higher physical activity levels during weekdays compared to weekends.

Strengths and Limitations

However, despite the absence of intervention effects, this study could show physical activity patterns of primary school children in south-west Germany by the means of objectively assessed data, which provide an insight that is necessary in order to design more effective health promotion programmes. Maybe a longer lasting, more intense intervention with extra lessons, directly focussing on an increase of physical activity would have shown more positive effects. Furthermore, the lack of intervention effects on children's physical activity could also been affected by other health promoting activities in the control schools. Due to the study design, the voluntary participation, and the randomisation into intervention and control group, schools in the control group were susceptible for any other health or physical activity promotion, which may have caused positive changes in children's physical activity in the control group.

Nevertheless, there are some limitations to this study, which should be considered when interpreting these results. Firstly, physical activity was – although assessed objectively over a longer period of time – calculated on the basis of energy expenditure which might have led to a misinterpretation of some intensities in some children and therefore, the total outcome. Secondly, recording epochs were set to 15 seconds, which – at least for some activities – might have been too long in order to capture all of the children's activities. Furthermore, as mentioned above, due to the voluntary participation in this study (on school as well as on parent's and children's level) a selection bias cannot be ruled out. Moreover, although the sample was spread over a relatively large area, the results are not representative, which is also shown in the comparably low prevalence of overweight and obesity. However, a strength of this study is its randomisation into control and intervention group with – still – a relatively large sample size and the intervention period of one year. Further, follow-up took place directly after the summer holidays, which meant the children have not had any intervention for at least seven weeks, which might have led to the lack of intervention effects.

Conclusions

This school-based, teacher-centred health promotion programme showed – as a secondary outcome – after a one year intervention with no extra (PE) lessons no significant increases in children's objectively assessed physical activity levels. A more intense or more specific intervention providing more time and opportunity for physical activity at school and a better transfer to their homes might have led to positive intervention effects and should be considered for the future.

However, physical activity was higher in boys, children who are overweight, and on weekdays compared to weekends. Especially the latter calls for a greater parental involvement, which should be part of any well-planned health promotion programme. Moreover, girls are consistently less active than boys which should be targeted specifically in order to avoid a potential development of health inequalities.

This intervention was designed as a multi-dimensional study, but particularly in this age group, health behaviours need to be changed in more detail and with a greater intensity, especially at the family level, where the delivery of action alternatives and indirect offers for physical activity may not take effect.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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