

Article

Sport and Physical Activity Participation by Weight Groups in School-Aged Hungarian Children

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Abstract: The aim of this study was to compare physical activity and organized sport participation survey data between different weight classifications in children. In the cross-sectional online data collection, 677 parents (42.8 ± 6.4 years old) provided information about 677 children (10.9 ± 2.5 years old). On average, 77% of the children achieved 60 min of MVPA/day and 63% participated in a club or organized sport. Most of them (63%) were in the healthy weight category, 14% of the children were underweight, and 22% of the children were overweight or obese. The parental support for physical activity was 83%. Club or organized sport participation (OR = 0.56 CI: 0.34–0.91; $p < 0.02$) and a parent with a higher educational level (OR = 0.25 CI: 0.14–0.43; $p < 0.01$) were found to be preventive for obesity. Football was the most popular and highly chosen sport activity. Regarding sport activities with parents, cycling, walking, and football were the most popular, independently of the weight classification of the child. The overweight and obese children had almost the same participation rate in sport activities than others. Increased physical activity might be explained by the daily physical education in schools and governmental support. Further studies and measures are needed to prevent overweight and obesity in children of parents with a lower educational level.

Keywords: physical activity; children; organized sport; obesity; healthy lifestyle



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1. Introduction

The increased prevalence of obesity in children and youth in many developed and developing countries is a serious public health concern. The obesity problem is more dramatic in boys than in girls [1]. According to a Health Behaviour in School-aged Children (HBSC) study in Hungary, the prevalence of overweight children is higher than the international average [2]. While the cause of obesity is a multifactorial complex interaction between environmental, genetic, behavioural, and socioeconomic factors, it is often considered to be a result of increased energy intake and less energy expenditure. Interestingly, in some countries, energy intake has not increased significantly in recent decades, but there has been a worldwide decline in energy expenditure due to a reduction in physical activity [3–5]. An increase in physical inactivity associated with increased screen time is an important and likely contributing factor for obesity. Therefore, limiting screen time is an important general recommendation [6]. It is generally accepted that a healthy diet and increased physical activity are the main factors that can prevent overweight and obesity. Increased levels of physical activity has several beneficial effects on the health and well-being of children and adolescents [6,7].

Preventive programs and strategies are needed to reduce the prevalence of childhood obesity, including greater support for physical activity-based programs in government policies, families, and sport clubs and organizations [5,8]. The most popular tool for health promotion worldwide is participation in organized sports [9]. Sports club membership is associated with higher levels of moderate-to-vigorous physical activity (MVPA) and less daily physical inactivity. Sport club participation or organized sport activities can

successfully increase physical activity and fitness and reduce adiposity [10,11]. Sports club membership during adolescence generally leads to high levels of leisure-time physical activity in adulthood [12,13]. Therefore, involving children and youth in an organized sport can increase the number of people living a healthy lifestyle. Changing building environments and school environments to support active transportation is also generally recommended, but this strategy requires high financial and governmental support [14,15].

Previous studies showed positive associations between parental and child overweight in all countries. Positive and negative correlations were found between parental education and the child's weight classification [16]. The parental factors associated with child overweight were reported in a 12-country study where in countries like Colombia or Kenya, the parental education was negatively associated with the weight status of the child. In Western countries such as the UK, Finland, Australia, or Canada, the odds ratios were lower than 1, but only in the USA and Brazil was parental education indicated as a significant preventive factor [3]. A cross-sectional study based on data from 123,487 6-to-9-year-old children from 24 countries in the WHO European Region has generally found an inverse relationship between the prevalence of childhood overweight/obesity and parental education in high-income countries [17]. The relationship between maternal and paternal education and the child's weight classification and physical activity appear to be related to the developmental stage of different countries [3]. Parental support for children's physical activity is essential. The parental role in promoting children's healthy behaviour and parental involvement in youth sports have been investigated in many countries [18–20].

There is a lack of information about children's physical activity or sport participation based on the weight classification of children. There is a discrepancy between the BMI and PA results reported by the HBSC research group. The overall PA in children is lower than expected despite the introduced daily PE in schools. The aim of this study was to collect survey data about the overall physical activity levels and participation in an organized sport and active transportation and compare the results between the different weight classifications of school-aged children. The second aim was to identify significant factors that could be used in obesity prevention programs targeted at Hungarian children to achieve healthier lifestyles.

2. Materials and Methods

Prior to any data collection, ethical approval was received from the Hungarian University of Sports Science (MTSE-OKE KEB/08/2023). This study was a cross-sectional survey study. The data were collected in spring 2023 using social media platforms and internet correspondence. The research project and survey were sent to 1247 principals of primary schools and were shared in parental online groups. The survey started with an introduction for parents in which the inclusion criteria were written. Inclusion was being a parent of a school-age child (6–15 years old). To avoid bias, an increased sample size and the diversity of residency were targeted. After data cleaning the online data collection, 677 parents (42.8 ± 6.4 years old) provided information about 677 children (10.9 ± 2.5 years old). The 677 results (345 boys and 332 girls) were achieved from 611 different IP addresses. The identical IP addresses might be explained by family membership, meaning a parent filled in the questionnaire for more than one child. Informed consent was the first part of the questionnaire that was obtained from all participants prior to answering the questionnaire.

Our questionnaire was completed with the Qualtrics program and contained 37 questions. Parents completed this self-report questionnaire that captured the parent's age, sex, education, and residency and their child's sex, age, body height, weight, and physical activity behaviour.

In this report, we analyse the demographic variables and nine questions connected to physical activity. The questionnaire was compiled using the global matrix (GM) 4.0 indicators, definitions, and benchmarks [12]. The GM methods and physical activity indicator benchmarks for children and adolescents were published by Aubert et al. (2022) [10]. The global matrix on PA for children is an initiative launched under the leadership of the

Active Healthy Kids Global Alliance (AHKGA) to achieve a comprehensive understanding of the global variation in child and adolescent PA, related indicators, and key sources of influence. As an overall physical activity indicator, we wanted to know what percentage of children and youth meet the global health-related physical activity recommendation. The question was “Do you think your child accumulates at least 60 min of moderate-vigorous physical activity per day on average?” “Yes/No”. We used recommended questions for the organized sport, physical activity, active transportation, and family and peers indicators. The questions for club sport were “Does your child participate in club sport?”, “Yes/No”, “If yes, what kind of sport?”; “Does your child participate in organized sport but not in a sport club? (in school or afterschool)”, “Yes/No”, “If yes, what kind of organized sport?”; “Does your child use active transportation to get to and from places? (walk, cycling, scooter, or other)”, “Yes/No”; “Do you do physical activity together with your child?”, “Yes/No”, “If yes, what kind of activity?”; “Do you facilitate physical activity and sport opportunities for your child? (driving, volunteering, cheering, paying membership fees)”, “Yes/No”.

The weight status categories (underweight, healthy, overweight, obese) were determined by the World Health Organization (WHO)’s age- and gender-specific reference using the calculated body mass index [21].

For the odds ratio calculation, we needed two categories in which Yes/No questions were obvious, but in parental education or residency, we had to separate the results into two main groups. Those who reported attaining some college degree or postgraduate degree became part of a higher-educated group, and those who reported completing high school, some high school, or less than a high school education, remained in the other group. Two categories were created from all residency locations based on type: The capital of Hungary, county seats, and towns comprised one group. The municipalities, villages, and farms comprised the second group.

Data were analysed using TIBCO 14.00.15. Statistics and IBM SPSS Statistics 29.0. Descriptive statistics and frequency tables were used to describe the demographic characteristics of the children and parents. Means and standard deviations were calculated for continuous variables and frequencies, and percentages were reported for categorical variables. Chi-square tests were used to compare different participation rates of groups. Crosstabs were used to analyse the associations between obesity and different factors affecting physical activity, the odds ratios (OR), and 95% confidence intervals (CI). A bivariate regression model was also used for the equation of associations and for the assessment of the significance level.

3. Results

The characteristics of the children who participated in the study and their parents are presented in Table 1. On average, the parents were 42.8 ± 6.4 years old. Most (84%) of the parent respondents were mothers, and more than half (54%) had a higher education degree. A majority (68%) of the families lived in large population centres (towns, county seats, or in the capital of Hungary). Half (51%) of the children were male with a mean age of 10.98 ± 2.53 years. According to the BMI percentile cut-offs published by the WHO, most (63%) of the children were in the healthy weight category, 14% of the children were underweight, and 22% of the children were overweight or obese.

The participation rates of the children in physical activity categorized by weight status are presented in Table 2. On average, more than two-thirds of all the children achieved 60 min MVPA/day. The highest rate of participation in physical activity was in the underweight children group, and the lowest rate of participation in physical activity was found in overweight children. The difference between the two groups was significant ($p < 0.01$). On average, more than half of all the children participated in a sport club or organized sport or activity. The highest rate of participation was found in the healthy weight group, and the lowest rate of participation was in obese children. The difference between the two groups was also significant ($p < 0.02$). Using active transportation was similar for every group. Interestingly, the overweight and obese children’s rates of using

active transportation were slightly higher than the other weight classifications. Performing physical activity with their parents was the most common in healthy weight children and the least common characteristic in obese children, but this difference was not statistically significant. The parental support of physical activity was also generally high with the highest rate in underweight children and the lowest in overweight children.

Table 1. Characteristics of participants.

Children	
Total sample	677
Males	345 (51%)
Females	332 (49%)
Mean Age (years)	10.9 ± 2.5
Body Height (cm)	152.5 ± 15.0
Body Mass (kg)	43.1 ± 15.2
BMI (kg/m ²)	18.1 ± 4.1
Underweight	93 (14%)
Healthy	424 (63%)
Overweight	81 (12%)
Obese	69 (10%)
Parents	
Mother	572 (84%)
Father	76 (11%)
Other (grandparent)	24 (4%)
Mean Age (years)	42.8 ± 6.4
Education	
Primary and secondary school education	283 (42%)
Higher education	363 (54%)
Residency	
Capital, county seat or town	464 (68%)
Municipality, village or farm	213 (32%)

Table 2. Participation rate of children in physical activity in total sample and different weight classifications.

	Achieving MVPA > 60 min/day	Sport Club or Organized Sport	Active Transport	Activity with Parents	Parental Support
Total	77%	63%	80%	70%	83%
Underweight	81%	61%	79%	67%	88%
Healthy	79%	67%	80%	73%	85%
Overweight	63% ^a	55%	81%	69%	78%
Obese	74%	51% ^b	81%	63%	83%
	a	b	NS	NS	NS

a = significantly ($p < 0.05$) less than the underweight group, b = significantly ($p < 0.05$) less than the healthy group.

In Table 3, we report the odds ratios for obesity in different factors affecting physical activity. Achieving a minimum of 60 min of moderate-to-vigorous-intensity physical activity per day is a general recommendation from the WHO. This and participation in clubs or organized sport are frequently investigated factors. A preventive factor may include the use of active transportation and the parental behaviour of supporting physical activity in some way or carrying out an activity together with the child. We also analysed two demographic factors: the parental level of education and the residency of the family. In the first column, all the odds ratios were less than 1 ($OR < 1$) and seemed to be preventive factors for obesity, but only two associations were significant. Only the club sport or

organized sport participation ($p < 0.02$) and the higher educational level of the parent ($p < 0.01$) were real preventive factors for obesity.

Table 3. Odds ratios for obesity in different factors affecting physical activity.

	Odds Ratio for Obesity	CI (95%)	<i>p</i>
Achieving MVPA > 60 min/day	0.74	0.40–1.37	0.34
Club sport or organized sport	0.56	0.34–0.91	<0.02
Active transport	0.97	0.46–2.05	0.95
Activity with parents	0.67	0.37–1.20	0.18
Parental support	0.75	0.28–1.98	0.56
Higher education of parents	0.25	0.14–0.43	<0.01
Residency (capital, county seat, or town)	0.83	0.48–1.39	0.48

Significance was calculated with binary logistic regression.

The order of chosen or preferred sports and the physical activity types by weight status are shown in Table 4. We separated participation in club sport from participation in organized sport, and we also present the types of activity performed together with a parent. The first three most preferred forms of activity are presented in Table 4. In club sports, football is the most preferred sport activity, even in the obese children. Only the overweight group preferred a different type of activity, namely martial arts. Martial arts were also in the top three most preferred choices of activity for obese and healthy weight children. Handball, dance, kayaking, and canoeing were also popular club sport activities.

Table 4. Order of preferred sports and physical activities and ratios in different weight status.

	Underweight	Healthy	Overweight	Obese
Club sport	Football (36%)	Football (21%)	Martial arts (31%)	Football (31%)
	Kayaking & Canoeing (13%)	Dance (15%)	Handball (17%)	Martial arts (19%)
	Martial arts (13%)	Martial arts (13%)	Football (10%)	Handball (15%)
Organized sport	Football (26%)	Dancing (14%)	Swimming (15%)	Football (36%)
	Swimming (14%)	Football (10%)	Football (15%)	Working out in gym (14%)
	Basketball (14%)	Swimming (8%)	Basketball (15%)	Gymnastics (9%)
Activity with parents	Cycling (59%)	Cycling (52%)	Cycling (51%)	Cycling (50%)
	Walking (31%)	Walking (32%)	Walking (42%)	Walking (30%)
	Football (23%)	Football (8%)	Football (13%)	Football (18%)

Football was also the most preferred organized sport activity in two groups. Interestingly, football demonstrated the highest participation rate in the obese group. The preferred activities of the obese children were different from those of children in the other weight classifications. For example, working out in a gym and gymnastics were not mentioned by children in other weight classifications. Swimming was popular in three groups and basketball in two.

Regarding activities with parents, we found that the same three activities were popular in the same order in all weight classifications. These were, in order from the most popular to the third most popular, as follows: cycling with a parent, then walking together, and finally playing football together.

4. Discussion

The aims of this study were to collect data about school children's overall physical activity and their participation in organized sport and active transportation, and then

compare the results between the different weight classifications. We also tried to identify significant factors that could be used in obesity prevention interventions for Hungarian children. To our knowledge, this is the first study that reports children's sport and physical activity participation rates and the joint activity of parents and children based on weight status in Hungary.

Hungary has the highest obesity rate in Europe and the fifth highest prevalence of obesity in the world. In Hungary, as in other countries with relatively high proportions of overweight and obese adults, the rates have increased by about 1% annually. According to the Organization for Economic Co-operation and Development [22], 33% of Hungarian adults are obese and 67% are obese or overweight. The prevalence (22%) of overweight and obese children and youth in our study was higher than previously published (20%) in the Health Behaviour in School-aged Children (HBSC) study but closer to another Hungarian study in which the prevalence was 23% [2,23].

The rate of children and adolescents who achieved the minimum 60 min of daily moderate-to-vigorous physical activity in our study was 77%, which is much higher than published in the HBSC global report earlier or in Polish adolescents (17%) [24]. In the Global Matrix 4.0 report, the average of 57 countries was lower (27–33%) [9]. Our results are in agreement with those of a study conducted in Slovakia where 66% of adolescents met the PA recommendation [25]. An explanation might be that in Hungary, a national physical education curriculum including five sessions of 45 min per week (1 per weekday) and recommendations for extracurricular PA as well as school sports programs were gradually introduced in 2012 in all Hungarian schools. A recent study found that after the introduction of daily physical education in Hungarian schools, leisure time spent in sports and exercise increased significantly, regardless of gender and age group [26]. Another explanation might be that in the HBSC data collection, children fill in the questionnaires in an online form, and they often underestimate their own physical activity. According to a previous study using objectively measured PA in 9–12-year-old children living in Budapest, more than 90% of them achieved the 60 min recommendation on weekdays [27].

We have found that 63% of children participate in a club sport or organized sport, which is higher than in countries with similar economic and social environments. In Hungary, participation in a club sport means a higher level of sport activity with highly educated coaches and better facilities. Organized sport might be any kind of sport or leisure time activity that generally takes place at schools and is led by a physical education teacher or a coach who is not necessarily a member of any sport federations. In an earlier report, the participation in organized sport was 40% lower [28], but in the HBSC study, it was published that two-thirds of the children reported vigorous physical activity twice a week that was related to organized sport participation [2]. Similar results were found in Slovakia with 41% overall participation and 54% overall participation in Poland [24,25].

Despite the health benefits of active traveling, active travel to school has declined or stabilized at a relatively low level. European active travel to school data were relatively higher than in USA or Australia [29]. In our study, using active travel was reported by 80% of the participants, which is higher than previously reported in Slovakia (49%) or Poland (45%). Interestingly, active traveling declined more than 10% in Poland and Slovakia compared to an earlier HBSC publication where the overall rate of active traveling in four European countries (Poland, Slovakia, Czechia, and Germany) was 59% [30]. The question that was used in our study was the same as that used in those reports [24,25].

Parent–child joint physical activity in our study was 70% in general, which is higher than in the Slovak report (46%) or in Poland where the average was 40%. The parental support in our study, which meant the facilitation of physical activity and sport opportunities, was 83% in general, which was higher than expected. We did not find comparable results from Hungary, Poland, or Slovakia.

Our findings indicate that the higher education of parents is beneficial, which concurs with results from high-income or Western countries [3,16]. There is a lack of information

about lower-educated parental health behaviours and parental involvement or support in youth sports.

Gender differences in physical activity are often reported in this field. A cross-sectional study in Serbia involving 301 children reported that more boys than girls played sports and that sport choice depended on gender. Boys preferred team sports, while girls were oriented more towards individual sports. The most popular sports for boys were football (28.3%), basketball (24.4%), volleyball (16.1%), and water polo (16.1%). The girls preferred to participate in gymnastics (37.8%), volleyball (21.8%), swimming (19.3%), and water polo (17.6%) [31]. Hebert et al. investigated the organized sport participation in Danish primary school children with parental help. According to their results, football was the most popular (20.7%), then handball (11.2%), gymnastics (8.3%), basketball (1.1%), and volleyball (0.8%). They found that children participating in football were less sedentary, performed more MVPA, and were more likely to achieve the recommended level of physical activity than children not participating in organized sport [32]. Our findings that football is the most popular type of activity in clubs and in organized sport concur with previous studies. Interestingly, martial arts have not previously been mentioned among popular activities, so they may be unique to Hungary. Hungary has several Olympic medals in martial arts like boxing and wrestling.

According to the WHO, walking, cycling, and other forms of active non-motorized transport are accessible and safe for everyone [21]. There is also a lack of information about parent–child joint activities. In general, the physical activity of the Hungarian population is mainly based on their work and housework activities. Physical activity achieved by transport or leisure time is not common, but a cross-sectional study found that walking or cycling is common in Hungarians living in county seats or towns and villages [33].

In our opinion, these results report the striving for a healthier lifestyle based on parental support and motivation.

The present study has several limitations. First, this study was cross-sectional rather than longitudinal, and the data might report only a short period of physical activity behaviour in school children. Second, the data were collected online, which might have also limited the accuracy of the data. There are many factors that can increase or decrease a child's participation in physical activity and sport, which were not measured in this study. The frequency and duration of sport or organized physical activity were not analysed. Eating habits and sedentary behaviour were not investigated in our study.

5. Conclusions

Based on our results, the physical activity and club and organized sport participation of children increased in Hungary. The overweight and obese children had almost the same participation rates in sport activities as children in other weight classifications. Higher education of parents and club sport or organized sport participation were preventive in childhood obesity. Football was the most popular type of club or organized sport activity and the third among joint activities with parents. The increased physical activity might be explained by the daily PE in schools and the governmental support of sport. Our results suggest that besides the introduced daily PE, other lifestyle interventions are needed to maintain or decrease the prevalence of overweight and obesity. Further studies and measures are needed to prevent overweight and obesity in children of parents with a lower educational level.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data is contained within the article.

Conflicts of Interest: The authors declare no conflicts of interest.

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