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PHYSICAL ACTIVITY OF SCHOOL-AGED CHILDREN AND ADOLESCENTS IN LIECHTENSTEIN

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Abstract

This paper analyses the frequency and extent of physical activity (PA) among school-aged children and adolescents in Liechtenstein by regarding selected socio-demographic factors (gender, age and parents' sports activity). The cross-sectional study is based on an online survey conducted in 2015 among 11-, 13- and 15-year-old pupils (N = 448). According to our findings, children and adolescents do sports in their leisure time 3 ½ days a week, resulting in 6 hours per week on average; the percentage of pupils who do not participate in any sport is less than 5 % in total. Despite high sport participation, only a quarter achieved the WHO recommendation of at least 60 min of moderate-to-vigorous physical activity (MVPA) per day. However, a significant decrease in physical and sport activities together with increasing resignation from sport clubs is shown in secondary schools. As a result of this inadequacy, at the end of the compulsory school period, adolescents should be considered as one of the important target groups for health promotion programs. In addition, the relation discovered between the activity level of adolescents and the sport status of their parents emphasizes the high relevance of parents for their childrens' PA socialisation.

The ***Key words:*** *physical activity, sports participation, school-aged children, Liechtenstein.*

Introduction

Physical activity (PA) is essential for healthy development in school-aged children and their long-term well-being [29]. Regular and various exercise stimuli promote motor skills, strengthening the cardiovascular system along with the musculoskeletal structure [9, 12]. Together with the improvement of physical parameters among physically active children and adolescents, positive effects on mental health, school performance and cognitive achievement can also be detected [1, 4, 8, 23]. Due to the fact that PA habits are formed at a young age and transferred with a high probability to later periods of life, childhood is regarded as a key period for health promotion [27, 28]. Current WHO-recommendations suggest that children and adolescents should achieve at least 60 minutes of moderate-to-vigorous physical activity (MVPA) daily [29].

Adolescents' interest and involvement in sports, as in other areas of their lives, are significantly affected by sociodemographic factors such as gender, age, nationality, social-economic status, and socialization of parents [3, 6, 11, 13, 14, 15, 20, 24]. There is consistent evidence which shows that boys and younger children show a higher involvement. Moreover, children from socially disadvantaged groups with a migration background (especially girls), and with parents who have a low sport-affinity, have a clearly lower sports participation than children from privileged and sport-active families. For the majority of children, sport activities seem to play an important role within their leisure time settings [6, 14, 20, 25]. Many adolescents, however, do not reach health-enhancing activity levels. According to findings of the current HBSC survey

[11], on average only a minority of 25 % of 11-year-olds, 20 % of 13-year-olds and 15 % of 15-year-olds in Europe and North America achieve the WHO recommendation [29]. With this background in mind, the purpose of this paper was to clarify the following research issues: a) How many schoolchildren in Liechtenstein do actually achieve the WHO activity guidelines and b) which differences of childrens‘ PA can be shown depending on gender, age, and in relation to the parents’ sports activity?

Methods

Sample, inclusion and exclusion criteria

On behalf of the Liechtenstein Government the Liechtenstein Institute has designed a system of indicators titled ‘‘Sport Monitoring Liechtenstein’’ (SPOMOL) allowing the collection, the analysis, and publication of data on key aspects of sports and PA, which has to be periodically revised [5]. Within the framework of this designing process, an online survey (SoSciSurvey) was also conducted among students in 5th, 7th and 9th grades between April and June 2015 on their sports habits and physical activities. The participation of the selected classes (cluster sampling) and pupils was voluntary, but presupposed the written consent of their parents. Only fully completed questionnaires (N = 448; 46 % boys, 54 % girls) were accepted for analysis, which corresponds to a participation rate of 67 %. Regarding the representative nature of the sample, no statistical differences within the reference characteristics of gender and age in comparison to the national school statistics could be detected.

Documentation and analysis of the physical and sports activities

The young peoples’ PA was determined (following the German KiGGS-study [21]) with the question, “On how many days during a regular week are you physically active for a total of at least 60 minutes?”. The question was introduced by giving some examples of activity and defining MVPA (i.e. any physical activity which temporarly increases your heart rate or gets you out of breath). Frequency and duration of sport during leisure time were asked based on the Swiss HBSC study [16] as follows: ‘‘On how many days and for how many hours a week do you practise sport during your free time (outside school), so that you sweat or get out of breath?’’. pThe level of Parental interest in sport was established through the following two questions: ‘‘Do your parents do sport on a regular basis (i.e. minimally once a week)?’’ and ‘‘Are your parents members of a sports club?’’ using dichotomous answers (father/mother: yes/no). Data analysis was performed using SPSS (version 21) and Chi-Square Test and non-parametric methods (Mann-Whitney-U and Kruskall-Wallis-Test), drawn at significant level of $p < 0.05$.

Results

Sport involvement

Sports are considered to be one of the main leisure-time activities for children and adolescents in Liechtenstein, and are excercised on average for 6 hours and on 3 ½ days per week (table 1). About a quarter of respondents (23.8 %) has a high extent of more than 7 hrs./week; the proportion of adolescent 11- and 13-year-olds who fail to participate in any sport activity is below 3 %; for 15-year-olds it is below 8 %.

Generally, as well as in the age groups 11- and 13-year-olds, boys practise significantly more sports than girls. In addition, there is a significant decrease during school age. Along with gender and age, engagement in sports also varies depending on the parental sport affinity (table 1). Children from sport-active parents are more likely to practise sports than children from inactive parents. This parental role model effect is independent of childrens’ gender.

Table 1. Amount of weekly sport involvement (outside school time) of 11-to15-year-olds in Liechtenstein

	sports activity/week					**mean±sd/week**	
variables	> 10 hrs.	> 7-10 hrs.	> 3-7 hrs.	≤ 3 hrs.	0 hrs.	hours	days
11-year-olds[b*]	**18.3 %**	**10.1 %**	**43.1 %**	**27.5 %**	**0.9 %**	**6.8±5.1**[b**]	**4.3±1.7**
boys[a*]	29.8 %	10.6 %	42.6 %	17.0 %	0 %	8.8±6.2[a***]	4.8±1.7
girls	9.7 %	9.7 %	43.5 %	35.5 %	1.6 %	5.2±3.5	3.9+1.7
13-year-olds	**13.5 %**	**12.1 %**	**50.4 %**	**21.3 %**	**2.8 %**	**6.6±4.9**	**3.8±2.0**
boys[a*]	20.8 %	13.9 %	50.0 %	12.5 %	2.8 %	7.9±5.7[a**]	4.1±1.9
girls	5.8 %	10.1 %	50.7 %	30.4 %	2.9 %	5.2±3.5	3.5±2.0
15-year-olds	**7.7 %**	**12.3 %**	**41.0 %**	**31.8 %**	**7.2 %**	**5.2±4.3**	**3.1±1.8**
boys	8.3 %	14.3 %	44.0 %	23.8 %	9.5 %	5.4±3.9	3.0±1.8
girls	7.2 %	10.8 %	38.7 %	37.8 %	5.4 %	5.1±4.5	3.1±1.8
all (n = 445)	**12.1 %**	**11.7 %**	**44.5 %**	**27.4 %**	**4.3 %**	**6.0±4.7**	**3.6±1.9**
boys[a***]	17.7 %	13.3 %	45.8 %	18.2 %	4.9 %	7.1±5.3[a***]	3.8±1.8[a]
girls	7.4 %	10.3 %	43.4 %	35.1 %	3.7 %	5.1±4.0	3.4±1.8
parents' sports affinity	**12.1 %**	**11.7 %**	**44.5 %**	**27.4 %**	**4.3 %**	**6.0±4.7**	**3.6±1.9**
no sports	6.8 %	11.9 %	44.1 %	23.7 %	13.6 %	5.0+4.7	2.7±1.9
one parent active[1]	8.9 %	12.2 %	38.2 %	38.2 %	2.4 %	5.5+4.5	3.5±1.9
both active[2]	9.0 %	12.9 %	47.2 %	27.0 %	3.9 %	5.8+4.5	3.5±1.7
both active[3c***]	27.1 %	8.2 %	48.2 %	15.3 %	1.2 %	7.9+5.3[c**]	4.5±1.8[c]

significant differences by sex[a], age[b] and in relation to parents' sports-affinity[c]; * p < .05, ** p < .01, *** p < .001

[1]in or without sports club, [2]without or only one parent being member in sports club; [3]both members in sports club

Participation in sports clubs

Across all age groups, on average 72.5 % are active in at least one sports club; of which 25.6 % are even active in several sports clubs. The highest rate of membership (84.7 %) is found in primary schools (11-year-olds). At 81 %, membership among 13-year-olds is still at a high level, before revealing a significant decrease to 59.5 % by the end of compulsory schooling (9th grade, 15-year-olds). No gender difference in sports participation could be detected. However, an essential factor influencing the membership in sports clubs can be seen in the sportiness of parents: children of active and sports clubs attending families (i.e. both parents are members) are significantly more often active in sports clubs than children from parents without membership ($p < .001$).

Physical activity

Table 2 shows on how many days per week the survey participants were active according to the WHO guideline [29]. 62.1 % of 11-year-olds, 53.6 % of 13-year-olds and 42.1 % of 15-year-olds are physically active in the manner recommended for a minimum of five days a week; however only 22.8 % of all the children and adolescents are active every day of the week. There is a continous decline through adolescence: whereas a third of 11-year-olds achieve the MVPA guideline, it is only 14 % of

15-year-olds; on the other hand, there is an increase in the proportion with a relative low PA level (0 – 2 days) from 11.7 % to 22.6 %. In other words, primary school children (5th grades) are twice as active as adolescents (9th grades) at the end of secondary school.

In all age groups, boys reported more often at least 60 minutes of MVPA/day, but only reached statistical significance among 13-year-olds ($p = 0.012$). In addition, membership in a sports club and sport-active parents are positively associated with the level of childrens' activity (table 2): members of sports clubs and children of parents with a high sports affinity (i.e. both active and members in sports clubs) are almost twice as active in the recommended manner as non-members or children of inactive parents. Figure 1 displays a comparison of our results with the findings of the recent HBSC study [11], especially with our neighbouring countries, Switzerland [15] and Austria [2].

Table 2. Proportion of 11- to 15-year-olds, who achieved the WHO guideline (≥ 60 min. of MVPA/day)

	complying the WHO-guideline [29]				**activity days**
variables	7 days/week	5-6 days	3-4 days	0-2 days	mean±sd
11-year-olds	**34.2 %**[b***]	**27.9 %**	**26.1 %**	**11.7 %**	**5.1±1.8** [b***]
boys	38.8 %	26.5 %	30.6 %	4.1 %	5.3±1.6
girls	30.6 %	29.0 %	22.6 %	17.7 %	4.8±1.9
13-year-olds	**25.4 %**	**28.2 %**	**34.5 %**	**12.0 %**	**4.7±1.8**
boys	34.2 %[a*]	26.0 %	30.1 %	9.6 %	5.1±1.8[a*]
girls	15.9 %	30.4 %	39.1 %	14.5 %	4.4±1.8
15-year-olds	**14.4 %**	**27.7 %**	**35.4 %**	**22.6 %**	**4.1±1.9**
boys	16.2 %	25.2 %	34.2 %	24.3 %	4.1±1.8
girls	11.9 %	31.0 %	36.9 %	20.2 %	4.1±1.9
all (n = 448)	**22.8 %**	**27.9 %**	**32.8 %**	**16.5 %**	**4.5±1.9**
boys	26.2 %	28.2 %	33.0 %	12.6 %	4.7±1.8
girls	19.8 %	27.7 %	32.6 %	19.8 %	4.4±1.9
sports club membership					
yes	26.2 %[c**]	30.5 %	34.2 %	9.2 %	4.9±1.7[c***]
no	13.8 %	21.1 %	29.3 %	35.8 %	3.7±2.0
parents' sports-affinity					
no sports	16.9 %	18.6 %	39.0 %	25.4 %	4.0±1.9
one parent active[1]	21.6 %	23.2 %	30.4 %	24.8 %	4.2±2.0
both active[2]	21.3 %	35.4 %	30.3 %	12.9 %	4.7±1.8
both active[3d**]	31.4 %	25.6 %	37.2 %	5.8 %	5.0±1.7[d**]

significant differences by sex[a], age [b], sports club membership[c] and in relation to parents' sports affinity[d]; * $p < .05$, ** $p < .01$, *** $p < .001$

[1]in or without sports club, [2]without or only one parent being member in sports club; [3]both members in sports club

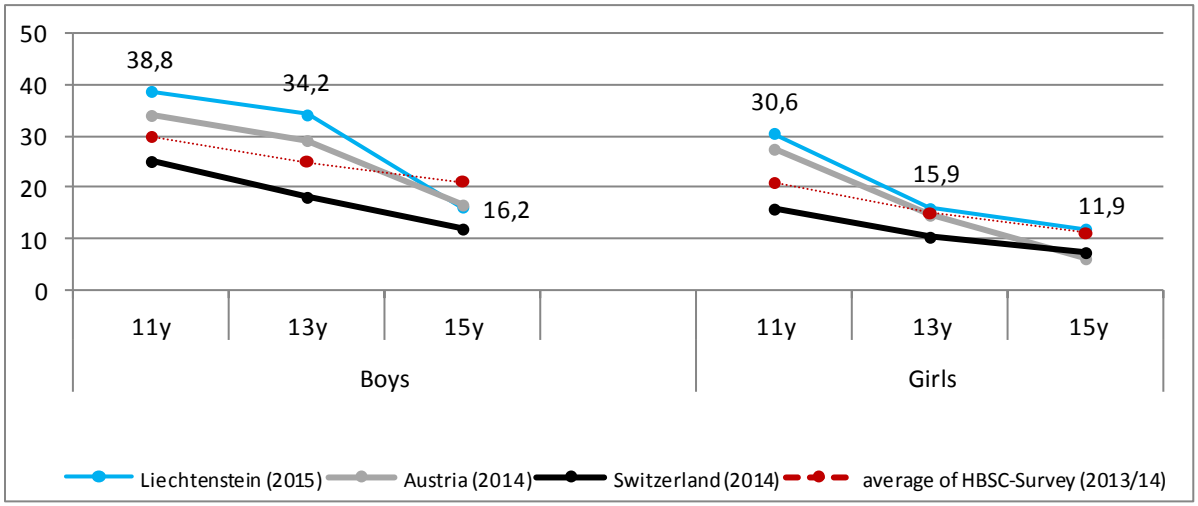

Figure 1. Percentage of children and adolescents who achieved the WHO guideline [29] compared with current data from our neighbouring states Switzerland [16] and Austria [2] as well as average of HBSC-survey [11].

Discussion

The majority of young people in Liechtenstein are active in sports. 44.5 % of all 11-, 13- and 15-year-olds practise sports for 3 to 7 hrs./week, and almost a quarter with a high level of more than 7 hrs./week (table 1). The total proportion of a complete lack of participation in sports is below 5 %. Current findings in the Swiss HBSC study 2014 [16] show that 14.2 % of 11- to 15-year-olds in our neighbouring countries are active for 7 hrs./week and more than 5.6 % do no sports at all.

Confirming findings from other studies [6, 14, 20, 25] our survey demonstrates a higher sports commitment amongst boys together with a continuous decline during adolescence. Besides this well-known disparity, our data also indicates a lack of classic gender differences [22] in sports club membership. No significant gender differences could be detected. As previously documented in earlier surveys [17, 18], the leveling tendency became even stronger in the year 2015. Obviously, sport activities organized by clubs in Liechtenstein seem to equally satisfy the needs of today's girls and boys. Furthermore, in comparison with these older studies, the current data 2015 show an increase of 10 % in the participation in sports clubs among 11- and 13-year-olds and an unchanged/stable development among 15-year-olds over the last 12 years. The next evaluation will clarify whether this encouraging trend is sustainable.

The peak of sports club membership is at the age of 11 years (5th grade). In Switzerland, the highest percentage of membership [20] is at the age of 11-12; among adolescents in West Germany it is around the age of 12 [7]. The membership quota of 11- to 13-year-olds in Liechtenstein with percentages of 85 % and 81 % respectively are about 20 % higher than in current data from Switzerland [20]; among 15-year-olds the findings (FL: 59 % and CH: 52 %) are similar. This high proportion of sport club memberships could be explained, on the one hand, by the peculiarity of the sport landscape in Liechtenstein, and on the other hand, by the obviously successful efforts of the sports associations and clubs in attracting the attention of as many adolescents as possible (regardless of gender and nationality). Despite its small area of merely 160 km2 and population of 37,000 inhabitants, the country presents a high number of associations and sports clubs, together with a

remarkable variety of well-equipped sports facilities within short distance. Due to this high density of sports clubs, which is probably unique in Europe, the population of Liechtenstein has access to a wide range of sport disciplines.

Despite high sports participation, only a quarter of Liechtenstein's school children achieved the WHO recommendations of at least 60 min. of MVPA per day (table 2). Although the proportion of sufficiently active children and adolescents (figure 1) is generally above national reference levels for our neighbouring states, Switzerland [16] and Austria [2] – particulary with regard to the age group of 11-year-olds – there is a need for action. As shown in the engagement in sports and in accordance with other studies [6, 11, 16], the level of PA shows a significant decline during adolescence ($p < .001$). This decline in PA and sports participation could be explained due to biological changes in adolescence, along with rising study requirements (mainly during the transition to apprenticeship), as well as by a growing sense of autonomy in combination with changes in social networks [6, 11]. These changes of living conditions also influence health-related behaviour, and the general reduction of PA in daily life contributes to an increased prevalence of weight increase at this critical stage of life [10]. According to current findings, 16.6 % of all children and adolescents aged 5, 10 and 14 years in Liechtenstein are overweight (incl. obese); whereas the prevalence of 24.6. % among 14-year-olds (secondary school) is 2.2 times higher than in kindergarten [19]. This trend is also found in a recent Swiss study [26], showing 12.3 % of children at primary level (mean 5.9 years) and 20.5 % at secondary school (mean 14.8 years) to be overweight (incl. obese). Due to the obvious decline in sports activities, the increased rejection of club sports and the higher prevalence of weight increase towards the end of obligatory schooling, adolescents should therefore be an important target group in the focus of health promotion.

The demonstrated association between sport involvement, the level of PA of school-aged children, and the sport affinity of their parents underline the importance of parents as an area of socialisation. In accordance with other studies [15, 20], children of active parents practice significantly more sports than those from inactive parents. Based on this important model function and the “inheritance of sport enthusiasm” [20], awareness-raising measures for parents should be enhanced. A further essential area of action, which influences the health awareness and movement behaviour of adolescents is the school [11, 29]. In this major biographic setting, all children and adolescents can be addressed regardless of their social and cultural background. Although there are currently a number of projects for PA promotion in schools (cf. www.bfschule.ch, www.schulebewegt.ch, www.schoolsforhealth.eu), it seems that this offer is being insufficiently implemented, especially in secondary schools.

This study is a first inventory for Liechtenstein, and the cross-sectional design does not permit causal conclusions. Furthermore, it must be considered that our data is derived from a rural region with only 37,000 inhabitants and represents specific local circumstances, and therefore cannot be generalized for other European regions.

Conclusion

Our analysis allows for the first time a differentiated insight into the PA patterns of school-aged children in Liechtenstein in the important transition period from primary to secondary school. In order to solidify today`s knowledge and to analyse trends, continuous monitoring (ideally including more age groups, i.e. 5- to 10- and 16- to 20-year-olds) would be desirable.

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