

Sport participation, spontaneous physical activity and sleep in 11-13 years old children

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ABSTRACT

Background. Sport can be a regulator of sleep. Sleep norms have been suggested by experts to improve children's health. Aims: 1) to assess how much sleep have the children practicing and not practicing sport outside the school and if there is a relationship between sleep and spontaneous PA levels; 2) if there the types of sport practiced influence sleep duration, 3) to assess if differences exist between normal level of physical activity in children taking part at sport outside school. Material and Methods. 166 male children (mean age $11\pm 0,6$ years) answered to a physical activity questionnaire. 139 were involved in sport practice outside school (PS group) and 27 of them not practiced any sport outside school but only take part in physical education classes (NS group). Results. 52,5% of children in S group and 81,4% in the NS group showed a shortening in sleep duration. Sport practiced didn't influenced the sleep duration. Conclusions. A large percent of children non practicing sport sleeps less than the recommended standard for their age. Sport and sleep length are correlated, but any difference was found between the type of sport in influencing sleep hours. Level of spontaneous PA is not connected with sleep hours. **Key words:** BEHAVIOUR, GROWTH, SLEEP HYGIENE.

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INTRODUCTION

Sleep is a major concern in adolescence health. The transition from childhood to adolescence is a critical stage for learning healthy sleep habits (Tso et al. 2015). In a large study involving 6025 children from 12 countries in the age 9-11 years, sleep duration was one of the variables mostly associated with obesity development (Katzmarzyk et al. 2015) both in males (odd ratio 0.79) than in females (odd ratio 0.71) coming immediately after poor physical activity, (PA) (0.52 for males) and preceding TV time and diet. The relationship between physical activity and sleep duration in children in connection with obesity was studied (Hense et al. 2011 for a review), and few studies investigate the association of the type of physical activity with sleep duration. A recent study found an association between the aerobic sports versus anaerobic in improving sleep duration and quality (Maculano- Esteves et al. 2014). Studies on children/adolescents sport and sleep in children considered mostly overtraining (Winsley & Matos 2011) immune response and injuries (Spector & Kelly 2005, Milewski et al. 2014) and physical activity as a mean to improve nocturnal sleep (Lang et al. 2015).

Milewski found a strong association of injuries rate with sleep shortening in adolescent athletes (Milewski et al. 2014) and some evidences exist on the influences of aerobic activities on the sleep of sleep-disturbed populations, for example in improving sleep in autistic children (Brand et al. 2015, Spector & Kelly 2005) and this results are supported by other findings about the detrimental effect of poor sleep on aerobic activities (Damianidou et al. 2013). It has been proposed (Maculano-Esteves et al. 2014, Lang et al. 2015) the type of sport training influences selectively sleep duration. The U.S. National Sleep Foundation, (NSF, 2015) recommended 9 to 13 hours of sleep for children 6 to 13 years old. Our objectives were : 1) to assess if differences exist between sleep hours and level of spontaneous physical activity in children taking part at sport outside school compared with those who does not, 2) to assess how much sleep have the children practicing sport outside the school and if there is a relationship between sleep and spontaneous PA levels; 3) if there are differences between the types of sport practiced in influencing sleep duration, and 4) compare sleep duration in a sample of 10-13 year old male children with the recommended norms of sleep hygiene.

MATERIALS AND METHODS

Subjects

A sample of 166 male children aged 10-13 years of Tartu County (Estonia) participated in the study.

Table 1. Subjects participating in the study

Groups	PS	NS
	(n = 139)	(n = 27)
	Mean±sd	Mean±sd
Age (years)	11±0,6	10,9±0,6
Height (cm)	149,1±6,9	147,35±8,2
Weight (kg)	41,49±11,05	43,3±13
BMI	18,50±3,91	19,7±5,3

PS = practicing sport, NS = non practicing sport outside school.

Table 2. Sport practiced

SPORT	n.
Football	39
Swimming	20
Dancing	17
Basketball and Volleyball	15
Karate, Judo and Tkw	12
Dodgeball	8
Athletics and Orienteering	8
Badminton	7
Hockey, ice hockey and Floorball	6
Trampoline & Acrobatics	3
Skating and Ski	2
Ball training	1
Horse Riding	1
Any sport	27
Total	166

PS (practicing sport outside school group). (Tkw = Tae-kwon-do).

The University of Tartu ethical committee granted ethical approval and informed consent was obtained by parents. *Measures.* The subjects reported their physical activity level using a shortened version of the Estonian Children Personality (Tab. 3), Behavioral and Health Study questionnaire (Harro et al. 2001). Questionnaires remains a reliable and noninvasive way to assess sleep duration in young people (de La Vega et al. 2015) albeit electronic activity monitors have been used in previous studies to assess sleep duration (O'Brian et al. 2015), even if has been shown to have significant drawbacks (Pollock et al. 2001). Children had a normal BMI according to Cole (Cole et al. 2000) to exclude possible influences of obesity or underweight on sleep duration. *Procedures.* Inclusion criteria were, for PS group, the children participated in regular competitive physical activity, in addition to school physical activity lessons, at least two times per week for two hours. Children in the NS group didn't practice any competitive sport outside the school. They only take part in physical education classes at school. *Statistical analysis.* Kolmogorov-Smirnoff test for assessing the normality of the distribution of the sleep hours in the sample, nonparametric Wilcoxon test to compare PS and NS groups and correlation of sleep hours with the questionnaire items were performed with SPSS-PC v. 20.0 software. Significance level was set at 0,5.

RESULTS

The questionnaire and the answers are reported in Table 3.

Subjects in the PS group were 139 and subjects in NS were 27. Subjects practiced different sports as reported in table II with a prevalence of team sports. Any statistically significant difference was found between PS and NS groups ($p = .05$) in reported daily life physical activity habits, except for number of times in a week of sport activity. Interestingly, NS children reported to have a good physical fitness as the PS group. Training outside school, seems does not influences the normal PA behavior of children. Specifically, all children are active more than 30 min for 3,9 (PS) and 3,3 (NS) days per week and walk to the school for the same amount of days per month and for the same time. They are active every day, and perceive themselves as active as their classmates and to have a good physical fitness.

Table 3. Physical activity behavioral Questionnaire (short version)

Items	PS	NS
1- How many days last month You was active more than 30 min (except training)?	3,9±1,4	3,3±1,5
2 - How many days last month You walk to school?	11±6,8	12,8±5,8
3 -How long You walk to school (min)?	13,2±8,3	13,6±5,5
3 - How many times in last month was you active? (1-every day; 2- couple of times in a week; 3-couple of times in a month; 4-never)	1,9±1,6	2±0,7
4 - Compared to class friends you are (1- much less; 2-little bit less; 3-same; 4-little bit more; 5-much more) active	3,4±0,9	2,88±0,6
5 - Are You >=5 times in a week and in one time >=30 min moderate active (1- yes; 2-No, nr. of cases)	1 = 103	2 = 17
6 - Are You >=3 times in a week and in one time >=20 min moderate active (1- yes; 2-No, nr. of cases)	1 = 131	2 = 25
7- How good is Your physical fitness? (1- very good; 2-good; 3-middle; 4- bad; 5-very bad)	2,4±0,7	2,4±0,6

PS = subjects practicing sport outside school, NS = subjects non practicing sport outside school

Table 4. Number of subjects in the 5 sleep categories

How many hours You sleep in a night	PS	NS
1 - Less than 7 hours	11	6
2 - 7 to 8 hours	62	16
3 - 9 to 10 hours	58	4
4 - 11 to 12 hours	5	1
5 - More than 12 hours	3	0
Total	139	27

Table 4 shows the answers to the question: "How many hours do you sleep in a night" in PS and in NS groups. Sample was not normally distributed for sleep hours, with mostly answers falling in categories 2 (7-8 hours of sleep) and 3 (8-9 hours of sleep). The answers were not in agreement with sleep recommendation for children aged 6 to 13 (9 to 13 hours of night sleep - US National Sleep Foundation). A large number of children (73 in PS group, 52, 5%, and 22, 81, 4%, in the NS group), reported sleep below 9 hours. Any significant difference was found between sports practiced in sleep duration. Any correlation was found between items of spontaneous PA (table 3) and sleep length (table 4).

DISCUSSION AND CONCLUSION

Lack of proper sleep in children is a major issue in modern society, and some studies recommend to increase sleep hours in children or to shift school hours (Tso et al. 2015, Damianidou et al. 2013). In our study, the percentage who slept less than 9 hours was considerable higher in subjects who not practiced any sport outside school in comparison to subjects who take part in a sport outside school, albeit both groups show a

poor sleep length. Recommended standard for the age is 9 to 13 hours (U.S. National Sleep Foundation, 2015). There are evidences that training affect sleep quality, increasing the rem sleep compared to other stages of sleep in adults (Fogel et al. 2015) albeit there is any study in children. It has been proposed (Maculano-Esteves et al. 2014, Lang et al. 2015) the type of sport training influences selectively sleep duration. We didn't find such a difference between sports in our sample. We didn't observe any difference in the level of spontaneous PA between children practicing regular intense PA outside school and those who doesn't. Sport participation increase sleep duration even if the % of children with too short sleep in sport children remain high. Sport participation, besides the type of sport practiced, can be a natural way to improve sleep in children. A limitation of the present study is the lack of a concurrent measure of sleep duration and of sleep quality. Further studies are needed to clarify the direction of the influence, e.g. if sport participation causes sleep disruption, or if children with more SNC arousal (less sleep) have a higher tendency to practice more sport. Further study should concentrate on the sleep quality in children practicing intensive sport.

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