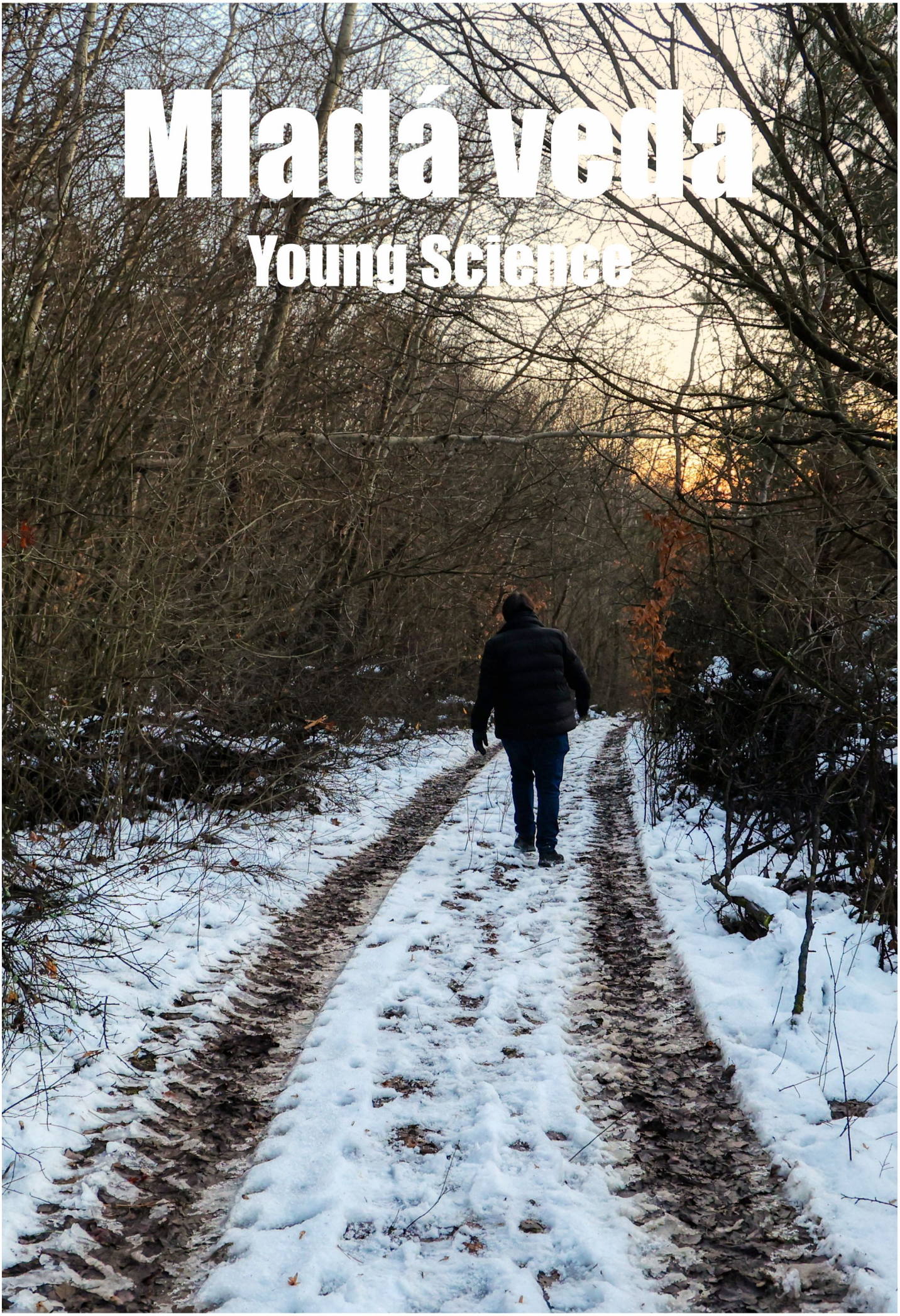
ISSN 1339-3189 5/2023

Mladá veda

Young Science



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MEDZINÁRODNÝ VEDECKÝ ČASOPIS MLADÁ VEDA / YOUNG SCIENCE

Číslo 5, ročník 11., vydané v decembri 2023
ISSN 1339-3189, EV 167/23/EPP
Kontakt: info@mladaveda.sk, tel.: +421 908 546 716, www.mladaveda.sk
Fotografia na obálke: Zimná prechádzka. © Branislav A. Švorc, foto.branisko.at

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Mladá veda
Young Science
ISSN 1339-3189

Vol. 11 (5), pp. 77-84

DIFFERENCES IN THE QUALITY OF SLEEP AMONGST PHYSICALLY ACTIVE AND INACTIVE ADOLESCENTS

ROZDIELY V KVALITE SPÁNKU MEDZI FYZICKY AKTÍVNYMI A NEAKTÍVNYMI DOSPIEVATEĽMI

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Abstrakt

Fyzický a psychický vývoj, ktorý prebieha v dospievaní, je silne ovplyvnený kvalitou a množstvom spánku. Spánok môže pozitívne a teda aj negatívne ovplyvniť mnohé faktory v bežnom živote, môže zmeniť reakcie nášho imunitného systému, jasne zmeniť spôsob myslenia, ale môže ovplyvniť aj hmotnosť a tým viesť k obezite. Cieľom našej štúdie bolo preskúmať rozsah a kvalitu spánku u adolescentov vo vzťahu k ich angažovanosti alebo nedostatočnej angažovanosti v športe. Ako hlavnú metódu zberu údajov v našej štúdii sme použili PSQI (Pittsburgh Sleep Quality Index Questionnaire). Našu výskumnú vzorku tvorilo 723 študentov študujúcich v strednom regióne Slovenska s priemerným vekom 16,86 rokov, ktorí boli rozdelení do dvoch skupín: a) aktívne športujú, b) aktívne nešportujú alebo športujú veľmi zriedka. Analyzovali sme výsledky, konkrétne sme zdôraznili rozdiely súvisiace s

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aktívnou účasťou v športe. Štatistické hodnotenie zahŕňalo využitie chí-kvadrát testu a Pearsonovho korelačného koeficientu. Zistili sme štatisticky významné rozdiely v otázkach týkajúcich sa latencie spánku, trvania spánku, porúch spánku, dennej dysfunkcie a pred spaním. Podľa globálneho skóre PSQI 37,43 % aktívne športujúcich adolescentov a 36,29 % neaktívnych adolescentov uviedlo, že majú zlú kvalitu spánku. 62,57 % aktívnych adolescentov a 63,71 % neaktívnych adolescentov uviedlo dobrú kvalitu spánku. Mnoho vedcov spája dobrú kvalitu spánku s rôznymi aspektmi fyzickej a duševnej pohody. Spánok ovplyvňuje spôsob, akým sa naše telo bráni proti chorobám, reguluje naše hormóny a chuť do jedla alebo dokonca prispieva k úrovni stresu. Pre dospievajúcich je veľmi dôležité mať kvalitný spánok, pretože súvisí s dennou produktivitou, rozhodovaním a schopnosťou učiť sa nové veci.
Kľúčové slová: adolescencia, PSQI, kvalita spánku

Abstract

Physical and psychological development occurring in adolescence is strongly affected by the quality and quantity of sleep. Sleep can positively and therefore also negatively affect many factors in everyday life, it can change the responses of our immunity system, change the way of thinking clearly, but it might as well affect the weight and therefore lead to obesity. Aim of our study was to examine the scope and quality of sleep among adolescents in relation to their engagement or lack of engagement in sports. As a main method of data collection in our study we've used PSQI (Pittsburgh Sleep Quality Index Questionnaire). Our study sample consisted of 723 students studying in the central region of Slovakia with mean age of 16.86 years, who were divided into two groups: a) actively sporting, b) not actively sporting or very rarely sporting. We analysed the results, specifically emphasizing differences related to active participation in sports. The statistical assessment involved the utilization of chi-square test and Pearson's correlation coefficient. We've found out statistically significant differences in questions regarding sleep latency, sleep duration, sleep disturbance, daytime dysfunction, and bedtime. According to the global score of PSQI, 37.43% of actively sporting adolescents and 36.29% of inactive adolescents reported having poor sleep quality. 62.57% of active adolescents and 63.71% of inactive adolescents reported having good sleep quality. Many scholars have linked good sleep quality to various aspects of physical and mental well-being. Sleep impacts the way our body defends itself against illnesses, regulates our hormones and appetite or even contributes to stress levels. For adolescents it is crucial to have good sleep quality as it is linked to daytime productivity, decision-making and ability to learn new stuff.
Key words: adolescence, PSQI, sleep quality

Introduction

Sleep, its duration and quality has become one of the biggest interests when talking about healthy lifestyle. Studies suggest that sleep is closely associated with various cognitive functions (Wong et al., 2013). Unhealthy sleep, wrong sleep patterns and in general worsening of sleep has been proven by many academics over the years (Ranum et al., 2020). Roughly 20% to 40% of infants and school-age children are believed to experience poor sleep health, encompassing issues like overnight awakenings, challenges in initiating sleep, and

reluctance to sleep alone [2, 4]. Furthermore, as many as 75% of high school students sleep less than the recommended eight hours per night and report compromised sleep quality (Liu et al., 2022). There is mounting evidence indicating a connection between disrupted sleep patterns and diminished academic achievement, compromised physical health, and compromised psychological well-being (Dewald et al., 2010). In an initial long-term study tracking adolescents annually from ages 10-12 to 15-18, it was discovered that, when provided with ten hours of sleep opportunity, adolescents consistently slept an average of around 9.25 hours, regardless of age or maturational stage. Additional support for the constancy of sleep requirements is offered by scholars, who observed a reduction in sleep duration on school days but no alteration on non-school days. This led the authors to infer that the decline in sleep during school days is influenced more by environmental factors than biological ones (Tarokh et al., 2016). Continued sleep difficulties in children are indicative of future psychosocial issues in adolescence, encompassing traits like aggression, attention deficits, social anxiety, and depression. Moreover, inadequate sleep and suboptimal sleep quality are associated with cardiometabolic risk factors, such as obesity, heightening the likelihood of cardiometabolic morbidity and mortality in adulthood. Thus, understanding the health implications of poor sleep and identifying evidence-supported sleep interventions will play a vital role in fostering health and well-being in children and adolescents. Researchers consider sleep as a vital part of everyday life of every human being regardless of their age but suggest that the need for healthy sleep in childhood and adolescence is a major factor for not just physical, but also mental development of every person (Hagman et al., 2016; Meltzer et al., 2021; Liang et al., 2015).

Materials and Methods

Participants. Aligned with the objectives of our study, our research group consisted of 723 students. At the time of responding to the questionnaire, these students were enrolled in either grammar school or secondary vocational school in the central regions of Slovakia (Banská Bystrica, Zvolen, Partizánske). Among the 723 students, 385 were females and 338 were males, with 82 females and 170 males actively participating in sports. The remaining 471 students out of the total 723 reported not being actively involved in sporting activities. Average age of our participants was 16.86 years (16.87 for participants reporting involvement in sporting and 16.86 for participants not engaging in sports activities). Enrollment of participants was facilitated through the utilization of a school information system (Edupage) and collaboration with physical education teachers

To assess the sleep quality of adolescent students, we employed the Pittsburgh Sleep Quality Index Questionnaire (PSQI), which was translated into Slovak language by Dudysová et al. (2017). The questionnaire was subsequently distributed to the students in its online format. PSQI comprises 19 distinct questions, categorized into 7 components that evaluate various aspects of sleep, including sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, sleep medication usage, and daytime dysfunction. Answering questions in PSQI results to a global score which translates into a measurement of sleep quality. Individuals with a global score exceeding 5 on the questionnaire are classified as having poor sleep quality. The higher the score, the lower the perceived sleep quality.

The study findings are presented through tables employing arithmetic mean and percentage interpretations. In terms of statistical analysis, we utilized the chi-square test, with significance levels set at .01 and 0.05. The strength of the linear relationship between the two variables (comprising 7 components) was assessed using Pearson's correlation coefficient (r). A correlation coefficient of less than 0.3 indicates a weak relationship, between 0.3 and 0.5 suggests a moderate relationship, and greater than 0.5 indicates a strong relationship.

Results

In alignment with the study objective, Table 1 illustrates the research instrument employed within the surveyed group, encompassing seven components including the global score, bedtime, and wake-up time. Statistically significant differences on the 0.01 and 0.05 scale when comparing the group of actively sporting adolescents (252, 34.86%) with the group of adolescents that doesn't sport actively or very rarely (471, 65.14%) have been found in these components: a) sleep latency (p = 5.626 E-05); b) sleep duration (p = 0.002); c) sleep disturbance (p = 1.045 E-06); d) daytime dysfunction (p = 0.0009); e) bedtime (p = 0.02). When we look at the PSQI global score, we can see that 37.43% (n = 94) of actively sporting adolescents and 36.29% (n = 71) of those, who weren't actively sporting report poor sleep quality or the global score from the PSQI >5. On the other hand, almost two thirds of active adolescents (62.57%, n = 158) and 63.71% (n = 400) of those, who didn't actively engage in sporting activities show a PSQI global score of ≤ 5, which can be translated into as having good sleep quality.

	Actively sporting adolescents	**Not actively sporting or very rarely sporting adolescents**	**Chi-square Test**
Sleep Quality			
Very good (0)	11.01%	11.44%	
Fairly good (1)	47.45%	51.27%	0.773 (p)
Fairly bad (2)	32.84%	29.64%	1.114 ($x^2_{(3)}$)
Very bad (3)	8.69%	7.66%	
Sleep Latency			
0 Σ (0)	17.63%	16.22%	
1 - 2 Σ (1)	47.71%	35.03%	5.626 E-05(p)
3 - 4 Σ (2)	23.57%	32.24%	22.308 ($x^2_{(3)}$)
5 - 6 Σ (3)	11.09%	16.51%	
Sleep Duration			
≥ 7 hours (0)	37.92%	33.5%	
6 - 7 hours (1)	47.55%	40.6%	0.002 (p)
5 - 6 hours (2)	11.75%	16.73%	13.964 ($x^2_{(3)}$)
≤ 5 hours (3)	2.78%	9.17%	
Sleep Efficiency			
≥ 85% (0)	90.39%	83.41%	0.284 (p)

85% - 75% (1)	4.06%	8.46%	3.795 ($x^2_{(3)}$)
75% - 65% (2)	2.8%	2.61%	
≤ 65% (3)	2.75%	5.51%	
Sleep Disturbance			
0 Σ (0)	6.76%	1.41%	
1 - 9 Σ (1)	73.13%	74.48%	1.045 E-06 (p)
10 - 18 Σ (2)	20.11%	16.19%	30.573 ($x^2_{(3)}$)
19 - 27 Σ (3)	0%	7.93%	
Sleep Medication			
0/ month (0)	90.19%	95.83%	
< 1/ week (1)	1.02%	2.58%	1.168 E-05 (p)
1 - 2/ week (2)	6.66%	1.03%	25.579 ($x^2_{(3)}$)
> 3/ week (3)	2.12%	0.55%	
Daytime Dysfunction			
0 Σ (0)	15.47%	5.88%	
1 - 2 Σ (1)	39.5%	38.69%	0.0009 (p)
3 - 4 Σ (2)	31.85%	38.38%	16.414 ($x^2_{(3)}$)
5 - 6 Σ (3)	13.19%	17.05%	
Global Score			
> 5	37.43%	36.29%	0.941(p)
≤ 5	62.57%	63.71%	0.005($x^2_{(2)}$)
Bedtime			
≤ 22:00	17.32 %	18.99%	
22:00 - 23:00	19.64%	30.02%	0.020(p)
23:00 - 24:00	42.17%	31.81%	9.791 ($x^2_{(3)}$)
≥ 24:00	20.87%	19.18%	
Wake-up Time			
≤ 6:00	41.34%	45.41%	
6:00 – 6:30	36.31%	38.15%	0.157 (p)
6:30 - 7:00	17.94%	13.27%	5.198 ($x^2_{(3)}$)
≥ 8:00	4.41%	3.16%	

Table 1 - Research instrument (PSQI) of survey group (n = 723)
Source: authors

Table 2 presents the linear correlation measurement between two variables (distribution; 7 components) within the survey group. In the group of actively sporting adolescents (n = 252) we recorded a moderately strong correlation (r < 0.30) relationship between the sleep duration and sleep quality (r = .450). In the group of not actively sporting or very rarely sporting adolescents (n = 471) we also recorded a moderately strong correlation (r < 0.30) between the sleep duration and sleep quality (r = .443) and subsequently between sleep disturbance and sleep quality (r = .407).

Actively sporting adolescents							
	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**
Sleep Quality (1.)	-						
Sleep Latency (2.)	.105	-					
Sleep Duration (3.)	.450*	.048	-				
Sleep Efficiency (4.)	.089	.180	.245	-			
Sleep Disturbance (5.)	.172	.219	.055	.056	-		
Sleep Medication (6.)	.122	.102	.064	.028	.188	-	
Daytime Dysfunction (7.)	.358	.192	.160	.002	.311	.023	-
Not actively sporting or very rarely sporting adolescents							
	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**
Sleep Quality (1.)	-						
Sleep Latency (2.)	.335	-					
Sleep Duration (3.)	.443*	.344	-				
Sleep Efficiency (4.)	.170	.174	.381	-			
Sleep Disturbance (5.)	.407*	.190	.308	.371	-		
Sleep Medication (6.)	.093	.072	.055	.044	.128	-	
Daytime Dysfunction (7.)	.355	.137	.329	.176	.283	.008	-

Table 2 - Pearson's r and research instrument (Pittsburgh Sleep Quality Index) of survey group (n= 723)
Source: authors

Discussion

Looking at the sleep quality from the perspective of a global score from PSQI, actively sporting adolescents mean global score was 6.39 (n = 252), mean global score in the group of not actively sporting or very rarely sporting adolescents was 7.13, suggesting that active adolescents sleep quality was much better. When compared to their peers from Australia, results are very similar, Australian adolescents mean global score from PSQI was 6.36 (Raniti et al., 2018). It is worth to mention that according to PSQI, all global score >5 is considered as having poor sleep quality. As our results suggest sleep duration of actively sporting adolescent was significantly higher. 76.67% of adolescents in Turkey slept for 7 or more hours a night and none of them slept for less than 5 hours a night, when we compare those results to our actively sporting adolescents, difference in ≥ 7 hours component is staggering 38.07%, for inactive adolescents it's even more, 43.17% (Şimşek et al., 2019). There are signs suggesting that the sleep patterns of adolescents differ based on geographical regions and cultural influences. A systematic review conducted in 2011by Gradisar et al. (2011), analysing 41 studies, revealed that bedtimes in Europe tended to be later than those in North America (22:46 vs. 22:06), the majority of our participants tends to go to bed even later, between 23:00 – 24:00 (42.17% of active and 31.81% of inactive adolescents. More than 90% of active and 95% of inactive adolescents from our study reported not using any sleep related medication. Canadian researchers suggest that 83% of adolescents identified melatonin as the primary treatment of choice when dealing with sleep disturbances, while 10% favoured trazodone. Additionally, 56% of respondents designated trazodone as the secondary treatment

of choice for addressing sleep disturbances in children and adolescents. From the point of use of sleep medication, we can see quite positive results as there was over 90% from both groups of our adolescents, who have not used any sleep medication at all.

Conclusion

According to the aim of our study we have distributed the Pittsburgh Sleep Quality Index Questionnaire (IPAQ) amongst 723 students, who at the time of answering the questions attended either grammar school or secondary vocational school in the central region of Slovakia. Study participants were then divided into two groups: a) actively sporting adolescents, b) not actively sporting or very rarely sporting adolescents.

Study points out the importance of sleep and its quality. Scholars from different parts of the world agree that sleep, its length, and quality is responsible for various physical and mental developments in all age groups even more so in kids and adolescents.

PSQI includes a subjective sleep quality question which in our results surprisingly showed that adolescents, who were physically inactive had edged a subjectively better sleep quality when compared to those, who were physically active. This finding is reverted in the global score from the PSQI as (even though slightly) more actively sporting adolescents scored >5, which translates into having better sleep than those who were not actively sporting or not sporting at all.

What we see as a positive of our study is its international comparability and its quite straight forward results that can be easily understood by masses when looking at them. On the other hand, there always are limitations as well, which in our case could be the focus on a group of adolescents from one part of Slovakia only.

To conclude our study, it is important to one more time mention the wide impact and importance of sleep on various factors of one's life, which can be easily underestimated.

This article was recommended for publication in the scientific journal Mladá veda by: prof. PaedDr. Pavol Bartík, PhD.

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ISSN 1339-3189