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The Engagement of Schoolchildren Females in Extracurricular Sports Activities

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Abstract

One of the most important health problems of today's society is hypokinesia accompanied by obesity. The assumption is that reduced physical activity has a large negative impact on the school population. The problem of reduced commitment and involvement of pupils in extracurricular activities is increasingly evident in recent times, which results in a number of negative health effects on the human body of an individual. This study comprised a group of older school children from first to fourth year of high school in Pale. The total sample consisted of 127 female pupils aged 15 to 18 years. As a way of gathering the required information we used an anonymous questionnaire of open type in order to collect information about student involvement in extracurricular sports activities. The survey was conducted in November 2012 and all the pupils voluntarily participated in the study. Based on the survey results have been obtained the necessary information to reflect the relative lack of physical activity, of the studied population. Of the total sample of female pupils, the survey confirmed that only about 22% are physically active pupils. The alarming are the results which showed that with the increasing age of pupils they are less physically active, and in the higher years is evident negative trend in physical activity (sports).

Keywords: pupils, engagement, sports activities, risk factors

Introduction

Hypokinesia or disease of modern society, as it is often called, is on the rise among adolescents of both sexes. The consequences are numerous, in terms of damage to health of the individual and often the health of the wider population. To be able to fight the consequences, it is necessary to first identify and define the causes of hypokinesia. Hypokinesia is often more expressed in older than in younger school age. Younger children, unconsciously, mostly through the game, neutralize this problem, and with age this problem increases (Kohl & Hobbs, 1998). However, some studies show that this period is very sensitive on this issue. Even 13-14% of children in the U.S. are defined as obese, while in England is 10-17%. In 2001, researches about obesity, which included six countries (Brazil, United Kingdom, Hong Kong, Netherlands, Singapore and the United States) found that children aged 4-11 have overweight rate of 2-3%. Between 1984. and 1994. the number of obese children has increased to 50% (Jebb et al., 2003). As the best method to prevent and stop this rapid growth in obesity is a combination of regular physical exercise and a balanced nutrition (Nakeeb et al., 2007). Booth, et al. (2003) conducted a study in order to determine changes in the prevalence of overweight and obesity among young Australians (aged 7-15 years), 1969-1985. ended in 1997. year. Data from 5 independent population surveys were analyzed: Australian Youth Fitness Survey, 1969, Australian Health and Fitness Survey, 1985 South Australian Schools Fitness and Physical Activity Survey, 1997, New South Wales Schools Fitness and Physical Activity Survey, 1997 and Health young Victorians study 1997.

The results showed that between 1985 and 1997, the prevalence of overweight and obese population has increased by 60-70%, obesity 2-4 times and a combination of body weight and obesity has doubled. The findings were consistent for both sexes. For the period 1969 to 1985 there were no changes in the prevalence of overweight and obesity in girls but among boys the prevalence of overweight increased by 35%, the prevalence of obesity has tripled, and the prevalence of overweight and obesity combined has increased by 60%. Studies of some authors in addition to monitoring of body dimensions follow the trend of development of motor skills. The results of the six-year follow-up of 296 patients (aged 10 to 16 years in 2001 and 2007) by Ekblom et al. 2009 showed that there are no differences in BMI in sixteen year olds and low values of aerobic capacity and high BMI at age 10 years predicts obesity at the age of 16. There was no difference in the prevalence of overweight plus obesity between the sample 2001 and 2007. As a conclusion was stated that normal weight and good aerobic fitness at 10 years old children reduce the risk of elevated BMI in relation to 16-year olds.

Diagnostics of body weight is often the subject of research by which to gain a real insight into current status of a defined population and the possible negative trends of growth and development over a certain period of time (Sorensen et al. 2000a; Dopsaj, et al. 2005). Certain studies have investigated the problem of athletes and their parameters of anthropological status. In a study conducted in Turkey, on 153 men who have different levels of physical activity, BMI values were as follows: American footballers $27.76 \pm 5.18 \text{ kg/m}^2$, volleyball players $24.49 \pm 2.90 \text{ kg/m}^2$, basketball players $24.70 \pm 2.65 \text{ kg/m}^2$, footballers $23.37 \pm 2.78 \text{ kg/m}^2$, and for students who do not exercise regularly $23.42 \pm 3.62 \text{ kg/m}^2$ (Pelin et al. 2009) and percentages of body fat values were different with respect to gender and sport they do. Sınırkavak et al. in 2004 values obtained values of subcutaneous fat tissue in men pupils of physical education and sport from $11.80 \pm 0.55\%$. In a survey conducted by Akın et al. in 2004 in five different sports, including 100 male athletes, subcutaneous body fat values were as follows: 13.06% wrestling, football 15.1%, 18.2% weightlifting, handball 20.8% and 16.8% of taekwondo. This is significant, although there are a number of studies to estimate physical

fitness of anthropometric characteristics, there are not many studies on the physical proportions for a good physical condition.

An interesting study of physical abilities among adolescents was conducted by Heath, Pate, & Pratt, in 1993. and they came to the conclusion that with the age specific motor skills stagnate while in the younger population are on the rise, especially if they are involved in some form of physical activity. Helping children and adolescents to adopt physically active lifestyle is an integral part of health education and health promotion which services provide school nurses, family and community. Some authors (Pender, 1998, Fox &Riddoch, 2000) propose the motivational models and variables that can be identified, and which are required for further testing to determine their significance in the promotion of physical activity during childhood and adolescence. Heath, Pratt, Warren, &Kann (1994) either through the questionnaire assessed engagement in physical activity 11 631 high school pupils in America. Of all pupils in grades 9 through 12, 37% reported engaging in 20 minutes of vigorous physical activity three or more times per week. Participation in vigorous physical activity was higher among boys than girls ($P<.01$) and higher among white students than among those of other races and ethnic groups ($P<.01$). Overall, 43.7% of boys and 52% of girls reported that they were not enrolled in physical education classes. Of the students who reported attending physical education class during the past 2 weeks, 33.2% reported exercising 20 minutes or more in physical education class three to five times per week. In contrast, rates of participation in varsity and junior varsity sports remained constant across grade levels, but participation in recreational physical activity programs showed a lesser magnitude and also decreased with advancing grade. More than 70% of students reported spending at least 1 hour watching television each school day, and more than 35% reported watching television 3 hours or more each school day. Participation in vigorous physical activity and physical education class time devoted to physical activity are substantially below the goals set in Healthy People 2000. As students move toward graduation, we observed disturbing declines in participation in community recreation programs and overall vigorous activity. Students appear to spend considerably more time watching television than participating in physical activity. Public health efforts should focus on increasing the physical activity levels of our youth to enhance their current well-being and to reduce the risks of future chronic disease.

Merrick &Kandel(2003) are based on several studies of children and adolescents in the United States and Israel presented the engagement of children in school physical activities. They came to the conclusion that in adolescents and young adults are the benefits of physical activity, which should be continued later in life. Healthy habits in adolescence must continue into adulthood. It is also an activity of children and adolescents falling into adulthood.

Levin, Lowry, Brown, &Dietz (2003). To investigate associations of underweight and overweight with physical activity among high school students in the United States. A nationally representative sample of 15 349 US high school students participated in the 1999 Youth Risk Behavior Survey; 13 295 were included in these analyses. Five measures of physical activity were examined as dichotomous variables: (1) vigorous-intensity physical activity (≥ 3 vs < 3 sessions lasting at least 20 minutes each per week); (2) moderate-intensity physical activity (≥ 5 vs < 5 sessions lasting at least 30 minutes each per week); (3) strength training (≥ 3 vs < 3 sessions per week); (4) enrollment in physical education (yes or no); and (5) sports participation (yes or no). Using body mass indexes, students were categorized by percentiles as underweight (≤ 5 th percentile), at risk for underweight (> 5 th to ≤ 15 th percentiles), normal weight (> 15 th to < 85 th percentiles), at risk for overweight (≥ 85 th to < 95 th percentiles), or overweight (≥ 95 th percentile). Potential associations between

physical activity and body mass index were examined using logistic regression. On several measures, adolescent boys who were underweight or overweight were less likely to be physically active than boys of normal weight (eg, odds ratio [OR], 0.23; 95% confidence interval [CI], 0.12-0.45; and OR, 0.75; 95% CI, 0.61-0.93; for boys who were underweight and overweight, respectively, for strength training). Adolescent girls who were overweight or at risk for overweight were less likely (OR, 0.62; 95% CI, 0.50-0.78; and OR, 0.63; 95% CI, 0.46-0.85; respectively) to be involved with sports than girls of normal weight; and girls who were underweight were less likely (OR, 0.44; 95% CI, 0.22-0.91) to be enrolled in physical education. Authors have concluded weight status among high school students is correlated with selected physical activity behavior, especially among adolescent boys. Interventions to increase physical activity for high school students should target adolescents of all shapes and sizes, and may best be achieved by school policies requiring physical education or after-school sports.

Taking into account previous studies that treat similar issues at the same or different populations, related to the physical (in) activity of adolescents in activities outside school is derived and the problem of this research. The problem of this study was to determine the involvement of older school-age students female in extracurricular sports activities.

Method

The study covered a population of older school-age pupils from first to fourth year of high school in Pale (Tourism technician and Gymnasium). The total sample consisted of 127 female, aged 15 to 18 years. As a way of gathering the required information we used an anonymous questionnaire of open type in order to collect information about student involvement in extracurricular sports activities. The survey was conducted by a professor of physical education in November 2012. It is important to note that all the students voluntarily participated in the study.

Results and Discussion

Table 1. Quantitative indicators physical activity of pupils

SchoolClass	Total of female pupils	Some sport of training	Percentage (%)
I class	36	10	27,77
II class	26	7	26,92
III class	32	6	18,75
IV class	33	5	15,15
Total sample	127	28	22,14%

In the first class, of 36 female pupils 10 of them (27,77%), were involved in some sports (physical) activity. Most are engaged in sports games (10), and winter sports (2). In the second class of 26 pupils, 7 girls (26,92%) practice a sport, are actively involved in extracurricular activities, that is sports clubs. And in this age, the most dominant are sports games.

The third class is a notable by decline in physically active pupils. Only 6 of them 32 or 18,75% are active in a sports club. These are mostly sports games and basic sports. However, in general it can be concluded that there is a significant decline noticeable in physical activities in both samples female. In fourth year, which includes the age of about 18 years, a nearly identical result. Out of 33 female pupils, only 5 respondents (15,15%) were physically active and even more than 84% are physically inactive. In this age dominate dance.

In general, the results showed that it is observed negative trend of involvement in extracurricular physical activity from first to fourth year (Table 1). Playing sports, as a form of physical activity is in a significant decline. Of the total sample of 127 high school female pupils, 28 of them or 22,14% of the population is engaged in extracurricular physical activities, ie. are involved in sports clubs. Much larger number, 99 or even more than 77,95% are not physically active, you deal with some sports.

If we compare the male population, from the first to the fourth grade, it can be concluded that they are physically most active between 15 and 16 years (I and II year of high school). With age, this ratio is reduced (Fig.1,2). Older periods record a higher level of inactivity, which is a way to one of the diseases of modern life (diabetes, cardiovascular diseases, etc.). Some authors (Lotan, Merrick, & Carmeli, 2005) have proved in studies that the benefit from physical activity occurs at a later age, which to some extent exclude the possibility of health problems.

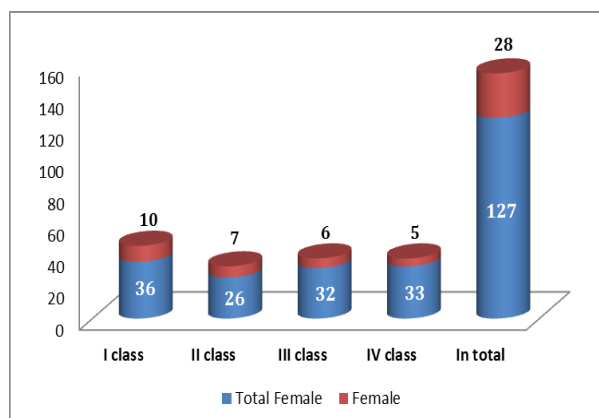


Figure 1. Quantitative indicators physical activity of pupils

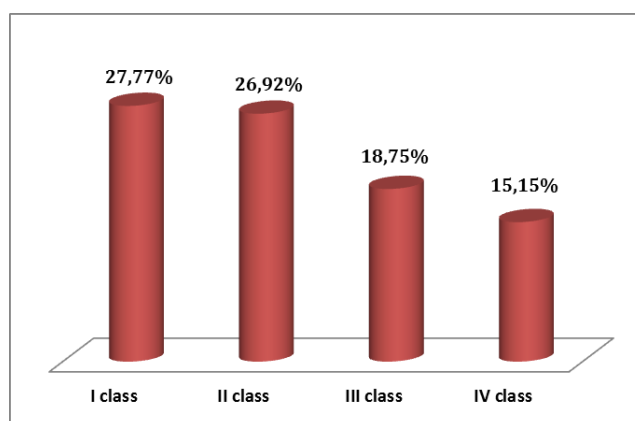


Figure 2. Percentage of physically active

Similar research has been conducted on a sample of 226 students from five high schools, aged 17 years. The attitude towards recreation and interest to recreational activities has been studied with five-point Likert scale, and awareness of the recreational training is obtained by using the test of awareness and involvement in recreational activities by intensity scale. Research has proven that there is a positive attitude, interest and involvement in recreational activities is expressed in a large scale and there is a significant correlation between them. Differences between boys and girls have been determined in all dependent variables and some differences in participation in recreation activities in relation to the success and type of school (Todoric, 1998).

Review of research on physical activity of adolescents conducted (Sallis, Prochaska, Taylor, 2000). A comprehensive review of correlates of physical activity was conducted, and semi-quantitative results were summarized separately for children (ages 3-12) and adolescents (ages 13-18). The 108 studies evaluated 40 variables for children and 48 variables for adolescents. About 60% of all reported associations with physical activity were statistically significant. Variables that were consistently associated with children's physical activity were sex (male), parental overweight status, physical activity preferences, intention to be active, perceived barriers (inverse), previous physical activity, healthy diet, program/facility access, and time spent outdoors.

Eisenmann, Barteel, Wang (2000) to examine the relationship between physical activity, TV watching, and weight in U.S. youth ages 14 to 18 years. Data from a nationally representative sample of 15,143 U.S. high-school students participating in the 1999 Centers for Disease Control and Prevention (CDC) Youth Risk Behavior Survey were examined. Prevalence rates of participation in moderate physical activity (MPA), vigorous physical activity (VPA), and television watching (TV) were determined. The association between MPA, VPA, TV and the body mass index (BMI) and overweight status (BMI \geq 85th percentile of age- and sex-specific CDC/National Center for Health Statistics reference values) were examined by analysis of covariance and logistic regression. Overall, 45% reported participating in MPA \geq 3 d/wk, 65% reported participating in VPA \geq 3 d/wk, and 25% reported watching TV \geq 4 h/school day. Boys reporting six to seven bouts of MPA had a significantly lower BMI compared with boys reporting three to five or less than two. The mean BMI differed significantly between the lowest and highest levels of MPA groups in girls. The mean BMI was significantly lower in the highest VPA group compared with the other two groups in both sexes. There was a significant graded response for BMI across all levels of TV. Decreased levels of MPA and 3 to 4 days of VPA were significantly associated with an increased risk of overweight in boys when compared with those engaging in 6 to 7 d/wk (odds ratio=1.26 to 1.37). A graded response existed between TV and overweight in both sexes. Boys and girls were approximately 20% to 25% less likely to be classified as overweight if they reported 2 to 3 hours of TV per day and approximately 40% less likely to be classified as overweight if they reported \leq 1 hour of TV per day compared with those who watched \geq 4 hours of TV. In general, youth who engaged in less physical activity watched more TV per week. watching and weight status is more pronounced.

On the sample 878 adolescents aged 11 to 15 years, 42% of whom were from minority backgrounds (Patrick, Norman, Calfas, & al. 2004) Centers for Disease Control and Prevention body mass index-for-age percentiles divided into 2 categories: normal weight ($<$ 85th percentile) and at risk for overweight plus overweight (AR+O) (\geq 85th percentile). Overall, 45.7% of the sample was classified as AR+O with a body mass index for age at the 85th percentile or higher. More girls from minority backgrounds (54.8%) were AR + O

compared with non-Hispanic white girls (42%) ($\chi^2(1) = 7.6$; $P = .006$). Bivariate analyses indicated that girls and boys in the AR + O group did fewer minutes per day of vigorous physical activity, consumed fewer total kilojoules per day, and had fewer total grams of fiber per day than those in the normal-weight group. Boys in the AR + O group also did fewer minutes per day of moderate physical activity and watched more minutes per day of television on nonschool days than normal-weight boys. Final multivariate models indicated that independent of socioeconomic status (as assessed by household education level), girls had a greater risk of being AR + O if they were Hispanic or from another minority background (odds ratio [OR] = 1.65; 95% confidence interval [CI], 1.09-2.49) and a reduced risk of being AR + O as minutes per day of vigorous physical activity increased (OR = 0.93; 95% CI, 0.89-0.97). A low level of vigorous physical activity was the only significant risk factor for boys being AR + O (OR = 0.92; 95% CI, 0.89-0.95). Analyses based on meeting behavioral guidelines supported these findings and showed that failing to meet the 60 min/d moderate to vigorous physical activity guideline was associated with overweight status for both girls and boys. In addition, boys who failed to meet sedentary behavior and dietary fiber guidelines were more likely to be overweight. Of the 7 dietary and physical activity variables examined in this cross-sectional study, insufficient vigorous physical activity was the only risk factor for higher body mass index for adolescent boys and girls. Prospective studies are needed to clarify the relative importance of dietary and physical activity behaviors on overweight in adolescence. In the majority of studies have a proven negative effects of a lack of physical activity of children and youth resulting disruption of homeostasis, leading to increasing BMI, which is the first indication of the potential of certain diseases, even in young children (Freedson, 1992; Aaron, Dearwater, Anderson, et al. 1995., Sirard & Pate, 2001).

Obese people die on average four years earlier than people who have normal weight, the researchers City University. The greatest increase in risk of premature death was observed in people who are obese in middle age, according to the American Journal of Public Health. The study was based on data collected since 1988. year, and it is proved that obesity is associated with at least a 20% increased risk of death from all causes. Scientists estimate that the total negative effect of obesity on health greater than believed, and in particular are concerned about the increasing number of overweight among children and teenagers. A recent Danish study has been published which claims that men who are obese in early twenties at two times greater risk than their peers of average weight to die before the age of 55 year. Otherwise, the American Medical Association in June 2013th officially included among the diseases obesity (Press RS, 2014).

That these conclusions are justified tells us the data of WHO. In 2006t the extensive research of the International Health Organization (WHO) was conducted, which included 22 countries, including 18,152 students (male: 8,115; female: 10,037). The following values of BMI were obtained: Belgium 22.1kg/m², England 22.7kg/m², France 21.9kg/m², Germany 22.8kg/m², U.S. 24.3kg/m², Bulgaria 23.1kg/m², Greece 23.1kg/m², Italy 22.1kg/m² (Wardle et al. 2006). In another study of 203 football players in Spain at the age of 19 years, BMI amounted to 22.96±1.2kg/m (Gil et al. 2010).

Consequences hypokinesia are numerous, and most refers to diseases of the cardiovascular system, the respiratory system's asteroid belt and the occurrence of diabetes. If you compare the results of this study with the results of previous studies that conclude that our sample is within the boundaries that have not yet alarming, but they are sensitive it can be a cause for alarm.

From the available evidences (Al-Hazaa, 2002) it appears that most Saudi children and adolescents do not meet the minimal weekly requirement of moderate to vigorous physical activity necessary for effectively functioning cardiorespiratory system. Furthermore, active Saudi boys tend to have favorable levels of serum triglycerides and high density lipoproteins-cholesterol compared with inactive boys. Sixteen percent of Saudi schoolboys are considered obese (fat content is above 25% of body mass). Body fat percent of Saudi boys seems to have increased over the past decade. Body fatness correlated significantly with several coronary artery disease risk factors. Based on the available evidences, promotion of physical activity among Saudi children and adolescents appears warranted and national policy encouraging active living is also needed.

Increased BMI, WHR and RPI are just some of the indicators of disease, such as heart diseases or diabetes mellitus. Although it has become customary to present high value of these criteria in modern societies, it is surprising to see an increase of these values in athletes. For example, research Hecth Joyce (2005) found that even $\frac{1}{4}$ of American players have the second degree of obesity. Results Ekblom et al. (2009) have shown the correlation of physical inactivity (low levels of aerobic capacity) with predict in of obesity in old age. The negative correlation of insufficient activity with functional abilities confirmed in the research Dyrstad, et al. (2005). Butler, et al. (2004) conducted a survey of 54 female students freshmen to investigate the effectiveness of diet, physical activity and weight change associated with travel from home to college for 5 months. The results showed that, although it was much reduced calorie intake, increased body weight parameters can be attributed to a significant reduction in overall physical activity. Some authors (Sınırkavak et al. 2004; Janković et al. 2008; Srdić et al. 2009) in studies received higher percentages of body fat values of students, which is an indicator of increased BMI values and reduced physical activity, although it is a relatively young and healthy population. Differences existed between female and male subjects, where the girls showed significant malnutrition and men in general, nutritional status.

Research conducted by Dopsaj et al. (2006) on a sample of 311 female students of the PoliceAcademy, aged 19 to 24 years, with the aim of diagnosing BMI as basic measure to assess the physical status and nutritional status noteworthy. The results showed that the average BMI of the sample female students was $21.59 \pm 2.29 \text{ kg/m}^2$, and the range of scores from 16.20 to 29.24 kg/m^2 . What is with the statistically significant reliability established, was that already during the study, 4.50% of the population belongs to the category of respondents with a BMI ranging from 26.38 to 29.24 kg/m^2 , or according to all current medical standards (or consensus) belongs to the category of overweight (medium degree obesity) females, or category of individuals with inadequate or professionally unacceptable physical status. What is surprising is that in the category of underweight is 11.58% (BMI below 19.1 kg/m^2), and in the anorexic category have as much as 1.61% of respondents of the tested female student population (BMI below 17.5 kg/m^2). If we take into account that it is about a well selected population for this occupational profile then these data are both unexpected and alarming, and it is necessary to look for the cause of this situation.

Sedentary behavior is marked by research conducted by Milanovic, 2012. In a sample of 375 obese children and adolescents aged 12-18 years, 47.9% males and 52.1% females used a questionnaire which examined time spent in sedentary behavior. Children's perception of time spent with the television and the computer is 4.9 hours and lower than the parents' perception of time spent with the television and the computer, which is 5.2 hours. Frequency analysis shows that 79.9% of respondents have no regular sports activities, and that only 30.7% of

respondents have hobbies, most of which supports sedentary behavior. By comparing the arithmetic means there were found gender differences in the use of television and computers, as well as the degree of physical involvement in sport and hobbies. The results are similar to our results in terms of physical engagement in accordance with the existing findings on share of sedentary behavior in obesity.

Previously mentioned studies have shown that adolescent age is in phase of turbulent psychosomatic changes that usually manifest in lack of interest in physical activity and sedentary more for sedentary way of "modern" life. The results of our sample were also confirmed by some studies that have confirmed the interest and participation in some form of physical activity decreases with age, and that the younger population is more physically involved than older who are in their preoccupation with modern technologies, primarily in watching TV, computer technology, etc. (Milanovic, 2012). Proposal of some authors (Pender, 1998, Fox &Riddoch, 2000), about finding a model of the variables that can be identified, and which are required for further testing to determine their significance in the promotion of physical activity during childhood and adolescence, can be entirely acceptable. PE teachers should also take a more active role in promoting a healthy lifestyle, and the benefits of practicing sports activities.

Conclusion

Current research is a good indicator of physical (in) activity and the current status of the population of high school female pupils in Pale. It may also be a signal of alarm, through which would be familiar with this situation all relevant factors, to which is physical education, sport and health in general, the subject of interest. The obtained results are a global indicator of student engagement in physical activity. In general, the results showed that it has been observed the negative trend of involvement in extracurricular physical activities, from first to fourth grade, where, playing sports as a form of exercise, is in a significant decline. Of the total sample of secondary school students 127 (about 22% females) are engaged in extracurricular physical activities, ie. are involved in sports clubs. This represents a very small percentage, which is worrying. Significantly more pupils, more than 77% are not physically active, is not involved in any sports activity. Female pupils are physically most active between 15 and 16 years (about 27%), and with age, this percentage decreases, which is particularly true of the female population. Older periods record a higher level of inactivity, which is a way into one of the diseases of modern life (diabetes, cardiovascular disease, etc.). To prevent potential negative consequences of reduced physical activity, it is necessary significantly greater engagement of pupils in sports activities, general physical activity, greater animation of pupils and knowledge of the negative consequences of hipokinetic lifestyle.

Conflict of Interest

The author has not declared any conflicts of interest.

REFERENCES

- Aaron DJ, Dearwater SR, Anderson R, Olsen T, Kriska AM, Laporte RE (1995). Physical activity and the initiation of high-risk health behaviors in adolescents. *Med Sci Sports Exerc.* 27, 1639-1645.
- Akin G, Özder A, Özet BK, Gültekin T (2004). Body composition values in elite male athletes. *Ankara University Journal of the faculty of letters*, 44 (1), 125-134.
- Al-Hazzaa HM (2002). Physical activity, fitness and fatness among Saudi children and adolescents: implications for cardiovascular health. *Saudi Med J.* 23 (2), 144-150.
- Al-Nakeeb Y, Duncan MJ, Lyons M, Woodfield L (2007). Body fatness and physical activity levels of young children. *Annals of human Biology*, 34 (1), 1-12.
- Chey T, Wake M, Norton K, Hesketh K, Dollman J, Robertson I (2003). Change in the prevalence of overweight and obesity among young Australians, 1969–1997. *Am J Clin Nutr.* 77(1), 29-36
- Butler SM, Black DR, Blue CL, Gretebeck RJ (2004). Change in Diet, Physical Activity, and Body Weight in Female College Freshman. *American Journal of Health Behavior*, 28 (1), 24-32.
- Dopsaj M, Milošević M, Vučković G, Blagojević M, Mudrić R (2005). Dijagnostika stanja indeksa telesne mase studenata Policijske akademije [Diagnostics of the body mass index of students of the Police Academy. In Serbian]. *Sportska Medicina*, 5 (4), 180-191.
- Dopsaj M, Milošević M, Vučković G, Blagojević M, Mudrić R (2006) Klasifikacioni kriterijumi za procenu indeksa mase tela kod studentkinja Kriminalističko-policijske akademije [Classification criteria for the assessment of body mass index of student Police Academy. In Serbian]. *Sportska Medicina*, 6 (4), 100-110.
- Dyrstad SA, Aandstad A, Hallén J (2005). Aerobic fitness in young Norwegian men: a comparison between 1980 and 2002. *Scandinavian Journal of Medicine & Science in Sports*, 15 (5), 298–303.
- Eisenmann JC, Bartee RT, Wang MQ. (2000). Physical activity, TV viewing, and weight in U.S. youth: 1999 Youth Risk Behavior Survey. *Obes Res.* 10 (5), 379-385.
- Ekblom BÖ, Ekblom BEA, Ekblom TB (2009). Trends in body mass in Swedish adolescents between 2001 and 2007. *Acta Paediatrica*, 9 (3), 519–522.
- Freedson PS (1992). Physical activity among children and youth. *Can J Sport Sci.* 17(4), 280-283.
- Fox KR, Riddoch C. (2000). Charting the physical activity patterns of contemporary children and adolescents. *Proc Nutr Soc.* 59 (4), 497-504.
- Gil SM, Gil J, Ruiz F, Irazusta A, Irazusta J (2010). Anthropometrical characteristics and somatotype of young soccer players and their comparison with the general population. *Biology of Sport*, 27 (1), 17-24.
- Heath GW, Pate RR, Pratt M (1993). Measuring physical activity among adolescents. *Public Health Rep.* 08 (Suppl 1), 42–46.

- Heath G, Pratt M, Warren C, Kann L (1994). Physical Activity Patterns in American High School Students. Results From the 1990 Youth Risk Behavior Survey. *Arch PediatrAdolesc Med.*148 (11), 1131-1136.
- Jebb SA, Rennie KL, Cole TJ (2003). Prevalence of overweight and obesity among young people in Great Britain. *Public Health Nutrition*, 7 (3), 461-465.
- Joyce B, Hecth LH (2005). Obesity in the National Football League. *JAMA*, 239 (9), 1061-1062.
- Janković R, Koropanovski N, Vučković G, Dimitrijević R, Atanasov D, Miljuš D, Marinković B, Ivanović J, Blagojević M, Dopsaj M (2008). Trend promene osnovnih antropometrijskih karakteristika studenata kriminalističko-policijske akademije u toku studija [The trend in basic anthropometric characteristics of students of Police Academy during the study. In Serbian]*Nauka, bezbednost, policija*, 13 (2), 137-152.
- Kohl HW 3rd, Hobbs KE (1998). Development of physical activity behaviors among children and adolescents. *Pediatrics*. 101(3 Pt 2), 549-554.
- Levin S, Lowry R, Brown DR, Dietz WH. (2003). Physical activity and body mass index among US adolescents: youth risk behavior survey, 1999. *Arch PediatrAdolesc Med.* 157 (8), 816-820.
- Lotan M, Merrick J, Carmeli E. (2005).Physical activity in adolescence. A review with clinical suggestions. *Int J Adolesc Med Health.*17(1), 13-21.
- Merrick J, Kandel I. (2003). Physical activity, children and adolescents. *Int J Adolesc Med Health*, 15(4), 369-370.
- Milanović, J. (2012).Sedentarnoponašanjekodgojaznedeceiomladine [Sedentary behavior in obese children and adolescents. In Serbian]*Medicinski glasnik*,17 (44), 89-111.
- Pender NJ (1998). Motivation for physical activity among children and adolescents. *Annu Rev Nurs Res.*16:139-172.
- Patrick K, Norman GJ, Calfas KJ, Sallis JF, Zabinski MF, Rupp J, Cella J (2004). Diet, physical activity, and sedentary behaviors as risk factors for overweight in adolescence. *Arch. PediatrAdolesc Med.*58 (4), 385-390.
- Pelin C, Kürkçüoğlu A, Özener B, Yazici CA (2009). Anthropometric characteristics of young Turkish male athletes. *Coll. Antropol.* 33 (4), 1057-1063.
- Sorensen L, Smolander J, Louhevaara V, Korhonene O, Oja P (2000). Physical activity, fitness and body composition of Finnish police officers: A 15-year follow-up study. *Occupational Medicine*, 50 (1), 3-10.
- Sallis JF, Prochaska JJ, Taylor WC (2000). A review of correlates of physical activity of children and adolescents. *Med Sci Sports Exerc.*32 (5), 963-975.
- Sirard JR, Pate RR (2001). Physical activity assessment in children and adolescents. *Sports Med.* 31 (6), 439-454.
- Sinirkavak G, Dal U, Çetinkaya Ö (2004). The relation between the body composition and maximal oxygen capacity in elite sportsmen. *Cumhuriyet medical Journal*, 26 (4), 171-176.
- Srdić B, Dimitrić G, Obradović B (2009). Antropološke karakteristike studenata Fakulteta sporta i fizičkog vaspitanja. [The trend in basic anthropometric characteristics of students of

Police Academy during the study. In Serbian] *Glasnik Antropološkog društva Srbije*, (44), 463-470.

Todorić G (1998). Odnosučenikasrednjih školapremarekreativnimaktivnostima [The relationship of high school students to recreational activities. In Serbian] *Fizičkakultura* 52, (2-4), 132-142

Wardle J, Haoue AM, Steptoe A (2006). Body image and weight control in young adults: International comparisons in university students from 22 countries. *International Journal of Obesity*. (30), 646-651.