# PHYSICAL ACTIVITY LEVELS OF THE STUDENTS ON SECONDARY SCHOOL OF GRAPHIC ARTS IN ZAGREB

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## Abstract

Physical inactivity is known to be a health threatening factor in modern society. The aim was to establish whether there were differences between physical activity (PA) levels of adolescent girls and boys. The sample of 202 students at the Zagreb Secondary School of Graphic Arts, attending the 1st, 2nd, 3rd and 4th classes, was explored using the International Physical Activity Questionnaire (IPAQ). Statistically significant differences were obtained in all the investigated variables in the levels of involvement in PA in favour of male adolescents. The greatest differrence, however, was obtained by means of independent sample t-test in the variable INTPA TOTAL, describing an entire week intensity of PA. Despite the obtained differences, the research revealed also that the young of both sexes spent almost nine hours per day being physically passive, that is, sitting or lying. The alarming situation indicatesit is high time for expert and society intervention. Also, a strategy should be developed that should include adequate kinesiological (sport and physical exercise) programmes.

**Key words:**adolescents; IPAQ; physical activity level;secondary school; strategy

## Introduction

Physical inactivity or insufficient physical activity (PA) has grown into a major global public health issue. Recent research has registered a high reduction rate of PA(PA) levels in all age groups. The growing hypokinesia has been marked as a leading risk factor for premature mortality in the world (2, Troiano et al. 2008, Kahn et al, 2008; Ruiz et al, 2010; Ćurković et al, 2010). Physical inactivity may be regarded from two perspectives: as a cause and/or a consequence of various noncontageous chronic diseases. It is particularly associated with incidence of coronary diseases, type 2 diabetes, obesity, certain types of cancers, colorectal cancer in particular, stroke, as well as with a number of other population health risks (Petrić, 2011; Bouchard & Katzmarzyk, 2010; US Department of Health and Human Services, 2008; Blair et al., 2004, Eyler et al., 2003). According to the World Health Organization (WHO) estimations, almost 3.2 billions of deaths every year can directly be associated with insufficient PA (WHO, 2012). Besides health benefits, a growing number of recent research studies underpin positive influence of PA on psychological, social, economical and ecological benefits (Hobin et al., 2013).

A vast body of scientific evidence has demonstrated that sedentary lifestyle and low levels of PA, the so called hypokinesia, being responsible for heart diseases, metabolic disorders and diabetes type 2, are present in technologically developed countries (Ostojić et al., 2011).Therefore, there is nodoubtPA (PA) is an importan factor of optimal health status (Jurakić, 2007). It is also a relevant intervention measure in obesity prevention as well as in prevention of other healt-related disorders (Bouchard & Després, 1995).

A positive effect of PA on the entire psycho-physical health is already well known, as well as is the fact that its everyday implementation has no either gender or age limitations (Petrić, 2011; Blair et al., 2004, Eyler et al., 2003, Lee and Paffenbarger, 2000).The following diseases are referred to most frequently as being caused by the insufficient PA levels: cardiovascular diseases (Kohl, 2001), obesety (Jakicic and Otto, 2005), hypertension (Hernelaht et al., 2004)  and type 2 diabetes (Meisinger et al., 2005). Apart from the health well-being and benefitial effects of the proper implementation of PA programmes at the level of an individual, values of PA are recognized in a wider context. These values are measurable with a sequence of direct and indirect socio-economic effects (Pratt et al., 2001). Due to the above-mentioned, not suprisingly, the developed countries devoted a considerable attention to the issue so that strategies and measures have been designed and implemented. These include, among various measures, the application of various kinds of sports-recreational activities (physical recreation and recreational sport) at many levels of society. Such strategies bring multiple benefits and have an positive effect on health promotion and preservance, which eventually has a positive effect on life quality and longvity. World Health Organization has adopted the Global Strategy on Nutrition, Physical Activity and Health (WHO, 2004). Its main purpose is to promote development of acceptable environment suitable for sustainable actions at personal, community, national and global levels to reduce morbidity and mortality rates linked with unhealthy nutritional habits and physical inactivity. Also, WHO has published Health Agenda for 21st Century, which has been adopted and

signed by allthe member countries. The main purpose of the document focuses on the achievemnt of the maximum possible health levels of each and every individual as well as on health promotion and protection of public health. Given the fact that PA is a pertinent component of healthy lifestyle and an indispensable preventive means of health protection, its health supporting potential has been ever more accentuated in modern society. In 2010 WHO has published the Global Physical Activity and Health Guidelines. (WHO, 2010) in which evidenced based guidelines are proposed for targeted PA programmes aimed at three age groups: 5-17 years, 18-64 years, and above 65 years. An important part of the Guidelines are instructions of how to implement these global reccomendations/guidelines on national and regional levels. Following guidelines of European Union have been published in 2011on PA and recommendations for political actions supporting health enhanced physical activity (EU Physical Activity Guidelines, 2011). Determination of PA levels (measures of PA) is regarded an avoidable component procedure in strategy designs (Jurakić, 2008). Numerous research studies on adolescents have indicated worldwide the increased levels of their physical inactivity (Hobin et al., 2013; Fuller et al., 2011; Ridgers et al., 2011; Ćurković, 2010; Gorely et al., 2009; Koezuka et al., 2006). The findings of these studies indicate that the predominance of insufficient PA of adolescent population prevails in in the European and north American countries, starting to present itself as a serious public health issue. The portion of physically inactive children varies across countries due mostly to the fact that monitoring has been conducted on a national base.

However, all research has a common feature: a comprehensive increase of low PA levels is specific to the primary-to-secondary school transition indicating older secondary-school students being more inactive than their younger colleagues. Also, gender differences are present as well indicating male adolescents being more active than their female peers. A research conducted in USA (Center for DiseaseControlandPrevention–CDC, 2011) with secondary-school students 13 to 18 years of agerevealed the 81.6% rate of insufficient PA. Further, the odds ratio of insufficient PA were larger in female students (88.6 %) than in male peers (75.2 %) and lower in the ninth grade, whereas it was the biggest in the 12th grade. A decrease in PA with age is apparent. Research by Horgan (2005) indicated that 39% of boys and 58% of girls in the age of 7 to 18 years do not reach the recommended level of physical exercise of at least one hour per day. Only 2.5% of children in England meet the recommendations regarding physical activities, whereas only 15% of children in the Netherlands, in the age of 12 to 17 godina, manage the same (National Institute for Health and Clinical Exellence, 2009; Hildebrandt et al., 2008). The present situation in the Republic of Croatia is no exception. Research conducted in the Republic of Croatia has generally indicated that almost 60% of adult population do not participate in any physical exercise. Among the age groups, the lowest level of PA has been registered in adolescents and young adults (15-24 years of age). An increased sedentary behaviour(s) has been observed in children as well (Heimer et al., 2011). Four comprehensive representative research have been conducted so far in Croatia with the samples of childrren and adolescents within the framework of the international project Health Behavior School Children (HBSC; Currie et al., 2012; Kuzman et al., 2004, 2008) as well as one independent research (Jureša et al., 2010). The HBSC projects research studies have demontrated a huge prevalence of physical inactivity in all age categories with a typical finding of the increased inactivity rates with years increase.

Last data, from the 2009/10 research, indicate inactivity prevalence data in 11-year-olds of 81% and 69% in girls and boys, respectively; the values in 13-year-olds were 85% and 69% in girls and boys, respectively; whereas in 15-year-olsa the values were 92% in girls and 78% in boys. Inclusion criteria for the group of physically inactive persons was a failure in reaching the minum of at least 60 minutes per day of moderate or vigurous PA. The recommendation of at least 60 min of moderate to vigurous exercise for children and adolescents (6-17 years of age) has been published by the US Department of Health and Human Services (2008), and it has been underpinned also by WHO and European Union. It is an amendation to the 2004 recommendations based on a systematic hard scientific evidence of a series of research and crtitical analysis of current status evidences. Jureša et al. (2010) investigated 2869 children and adolescents in Croatia. The subjects who had been vigourously physically active less than four times a week were regarded as insufficiently active. Prevalence of insufficient PA was as follows: in the primary school grade one 71.7% 49.9% in girls and boys, respectively; in primary school grade eight it was 78.3% in female pupils and 49.9% in male pupils; whereas the values in the secondary school grade three were 86.2% and 66.8% in female and male adolescents, respectively. An immense portion of physically insufficiently active children and adolescents thus has become appparent warranting and prompting the design and implementation of healt living strategy, in which PA will have a prominent role. Ćurković (2010) explored PA levels of 1651 university students (745 young men and 906 young women) enrolled on the University of Zagreb study programmes. Several variables regarded participation in recreational and competitive sports prior to university enrolment, in predadolescent and adolescent age. The findings indicated a high decrements in PA levels and competitive sport participation in years close to adult age. Most subjects had entered into sport about the age of 8-9(13.4%) or 10-11 years (9.4%). Their weekly engagement was from three days per week to every day, and training sessions lasted from one to two hours (18.8%) and 2-3 hours (10.7%).

However, research on dropping out of sport indicate that it usually starts at the age of 13-14 years (3.0%); at the age of 15-16 that odds ratio increases to 9.0%, aand at the age of 17 the ratio of young athletes who have drpped out of sports amounts 16.2%. In total, 28.2% of the investigated students have dropped out of active participation in competitive sports up to the entrance to the university level of education, demonstrating that not even 5% (4.2%) of students persisted in doing competitive sport following the enrolment on the university. The most frequent causes for drop-outs were the following: *difficulties in harmonizing schooling and sporting obligations*(9.2%), *injuries* (.1%) and *unacceptable sports training schedule*(6.4%). The consequences of changed lives of children and the young became obvious in the population-based research conducted in Croatia in the period 2006–2008. It embraced the sample of 11,683 scholl children, aged 6.5 to 18.5 years. The findings revealed 18.2% of boys and 15.2% of girls are overweighted, whereas 7.9% of boys and 15.2% of girls were obese (Jureša et al., 2013). According to the recent exploration hardly 40% of adolescents in Croatia meet the PA recommendations, which is the lowest odds ratio in the European Union (Petrić, 2011).

Insufficient level of PA together with excessive body mass takes annually 2.5 millions lives (World Health Organization, 2006). No surprise then that PA is recently among the most frequently researched issues and represents a challenge to many internationally acknowledge scholars (Wang and Lobestein, 2006). Extensive research of adolescents was performed by Ilišin (1999); she indicated a high level of physical inactivity accompanied by passive leisure time contents in the Croatian youngsters. Đuranović (2013) pointed out to the importance of adolescence and support from the significant others, primarily parents, as well as from the wider social context. The relevance of parental role is amphasized in the article by Anderson and Hugnes (2009), especially as the corner stone of quality growing and maturation. The mentioned implies acquisition of positive habits and responsibility taking for personal health status. Almost all recent research studieson the samples on the territory of Croatia demonstrated the similar status characterized by the tendency to reduced PA(Jurakić et al., 2009). As a consequence, the number of overweight and obese people is increasing in Croatia, so enhancing risk factors fot coronary diseases, type 2 diabetes, state of depression and socially unacceptable behaviour modes. Certain habits continue their existence in young adulthood, thus the reduced involvement in PAs is manifested also during further, higher education (university and college) (Andrijašević et al., 2009). The decreased interest trends are particularly obvious in the female population; women are more prone to drop outs from regular chronic physical exercise or sporting activitiy programmes. The consequences of the trend are manifested in young adult female students as the presence of general constant fatigue, exhaustion,

spine aches, low vitality, and similar (Andrijašević et al., 2005). Chronic PA in the period of adolescence is crucial for optimal growth and development. Versatility of PAs is benefitial to the development of a sequence of properties of future adults; apart from the physical attributes, it positively affects the development of social skills, mental, emotional, aesthetic, and many other attributes relevant to maturation and wholeness of a person. Various educational methods allow valuable aims to be met that are in a person manifested in a high level of self-assessment skill and personal integrity and identity (Ćurković et al., 2008). Properly implemented programmes of various PAs provide favourable conditions for the development of relationships with the environment, natural and social alike; these relationships are characterized by respect and tolerance to the social milleu as well as with recognition and preservance of natural settings' values. Positive, health-promoting habits are a guarantee to the future quality, civilized, human and healthy life of individuals and society. Further, educational system, more precisely the process of schooling, is known to be a considerable hypokinesia risk source due to many hours pupils and students spend sitting in their classrooms and lectrue rooms (Sulemana et al., 2006). That is why the physical and health-related education domain should be in focus of our interst. Namely, it is expected to act as a remedy for insufficient PA consequences through the implementation of mandatory classes of physical education (PE), elective courses and extracurricular kinesiological activities, that is, programmed physical exercises and sporting activities, to contribute to targeting the recommended PA levels (Petrić, 2011).PE instruction is the basic organizational, regular and mandatory form of work, acting as a foundation of other forms of work within the context of school. No other form of work can substitute it since it is implemented systematically and in a planned way. Also, it is a relevant component of education process the purpose and rationale of which is upbringing and education of individuals (Jensen, 2003).

During the classes of PE teaching students are subjected to a certain level of psycho-physical load measurable through heart rate per minute (Gomerčić et al., 2011). PE professionals have been advocating for almost decades that everyday physical exercise should be a component of preschool and classroom education, whereas later, from the fifth grade of the primary school onwards, three hours (180 min) of PE classes should be introduced in mandatory curriculum with the additional hour of any kind of physical exercise, which may be either extracurricular or even extramural activity (Hardman, 2008). For PE instruction to be quality enough, it should represent a kind of challenge for the students as well. Further, to facilitate students' actual eager participation in the PE instruction, we must offer various interesting contets to them and implement these contents by means of appealing methods.

Also, these contents must be adapted to students' actual needs and capacities. Only then each and every participant will have the opportunity to work, train, or exercise under the conditions that will allow full motor expression and optimal achievements (Findak&Neljak, 2006).Unfortunately, Neljak et al. (2012) indicated in their research that students were not getting even close to the recommended of at least 50% of total work time in within the moderate-to-vigorous zones of physical loads during three types of PE classes (skill acquisition, repetition, evaluation). The type of PE class that produced the highest level of activity was the class of repetition. During it the work load within the load zones from moderate to high was26% of the total time at disposal during a class, and that is far bellow the World Health Organization recommendations.

**Research Issue and Aims**

Interest to undertake the current research emerged from the insights into the state and needs of Croatian society that, in general, does not pay enough attention to the psycho-physical aspect of the young persons' development, thus neglecting to motivate ypingsters to develop into responsible and mature adults. Secondary school students hastly transform from their childhood into the adult age. Secular trends in growth, development and maturation, changes caused by the increased demands from the environment, personal attitudes and value system creation, as well as creation of personal behavioural style and identity indicate how important is this adolescent developmental period (Lebedina-Manzoni & Lotar, 2011). In that period formed personal hierarchy of values and priorities, related to the most diverse life contents, is extremely important, sometimes crucial to life goals setting (Prskalo, 2007).Therefore, it is vital to establish which leisure time contentsexist among childrrena nd the young, especially are there those pertaining to the domain of PA, and how much are they important in lives of the young. Gender differences are also interesting since many previous research studies indicated that girls and young women are far less eager to participate in diverse PA programmes of regular chronic nature. Namely, women's participation rate in the physically demanding programmes, which should be started as early in childhood as possible, is far bellowaverage (Markuš, Andrijaševićand Prskalo, 2008). The trend of not being physically active continues into the higher education period, despite the general, or just verbalized, positive attitudes towards PA. Physical activity is not ranked high on the list of leisure time activities or preferences (Andrijašević, Ciliga and Jurakić, 2009); it is bellow the so called passive contents of leisure time, like internet browsing/suring, coffe shop visits, TV programme watching or just being idle (Ilišin and Radin, 2002).The selected secondary school, theZagreb Secondary School of Graphic Arts, has similar characteristics of demand as have most of cognate secondary schools (technical schools, grammar schools, art schools).

The common attribute of the Secondary School of Graphic Arts and cognate schools is that the instruction is delivered to the seated students who spend many hours in that attitude; students also learn mainly sitting, as they do in front of computors. Such a paramount number of hours spent sitting and no compensatory PA programmes must consequently lead to negative effects. Young body that has not developed to its maximum, consequently to its optimum, can reach the peak of its optimal psycho-physical developmentonly by means of satisfactory amount of PA. Positive effects on certain functional abilities can not be compensated later in life after the phase of physical development has biologically finished. That is why adolescence, the last physical developmental phase, becomes so important for the whole future of an adult person; only in adulthood the differences between physically active and passive pupils/students become obvious (Kondrič, 2000).

Good health status and adaptation abilities to diverse conditions of life are consequences of permanent dynamic investments during earlier age and of education, nurture, immediate practice and research. Therefore the authors of the current research were interested in establishing the differences in PA levels between male and female students at the Zagreb Secondary School of Graphic Arts. The findings of the research may usefully be used in immediate planning and PE teaching programme designs not only in the School of Graphic Arts but in other cognate schools as well. Further, they would be beneficial to improvement implementation of extracurricular and extramural sporting activities. Leisure time planning is very important for students since it affects not only quality of life but it also has a direct influence on the quality of school instruction delivery (Ilišin, 2002).From the long-term prospective, the actions contribute to the quality improvements of students' obligations performance, to optimal psycho-physical status maintenance and health improvement in students. *Research aim* was to establish are there any differences in levels of both the partial and total PA levels between the male and female students of the Zagreb Secondary School of Graphic Arts.

**Research Methods**

*Data collection*
In order to provide a worldwide comparability of the results obtained in this research, a standardized measuring instrument was used. The *International Physical Activity Questionnaire* (IPAQ) is based on the self-assessment of the perceived PA levels. IPAQ assesses PA levels as the sumof time (in minutes) and frequency(in days) spent in certain activity, i.e. domain of PA, in the last seven days (IPAQ, 2005). Previous process of measurement properties (reliability and validity) verification has given satisfactory results (Craig et al., 2003, Deng et al., 2008). The concept of the research was approved by the governing body of in the Zagreb Secondary School of Graphic Arts.

The participation in the study was voluntary and each and every subject could have quit the questionnaire filling in at any moment. The subjects were informed on the procedure and purpose of the survey and the whole research prior to the research. Informed consent for participation was obtained either from the subjects who were of age, or from the parents or gardians of the underaged subjects. The poll was conducted in the premises of the Zagreb Secondary School of Graphic Arts, during May and June 2013, with the students of the first, second, third and fourth school class of the Zagreb Secondary School of Graphic Arts.

*Sample of subjects*
The sample of subjects consisted of 202 students of the 1st, 2nd, 3rd and 4th class at the Zagreb Secondary School of Graphic Arts. The ratio of male students was 46% (n=92 male subjects) and of the female students54% (n=110 female subjects). Boys were 177.05±7.49 cm high on average and their average body mass was 68.76±12.37 kg, which did not deviate from average values obtained in similar previous research. The average body height of girls was 166.81±5.82 cm,which is in line with average values of adolescent girls' body height, obtained in Cetinić et al. (2008). It can be seen that the average bheight of the freshman girls was 165.99 cm, whereas of the senior girls it was 167.84 cm. The average body mass of the female subjects was 61.21 kg with the standard deviation of 12.7 kg.

*Sample of variables*
The *International Physical Activity Questionnaire—* IPAQ was used as a measuring instrument in this research. The subjects were due to give their answers to the seven questionsregarding the frequency and intensity of their PA in the last seven days. The survey complied with the guidelines on the implementation of the IPAQ measuring instrument.The following variables were obtained from the answers to the IPAQ: * INTPA TOTAL, Intensive Physical Activityin the last seven days (on a week basis), expressed in minutes; * MODPA TOTAL, Moderate Physical Activity,in the last seven days (on a week basis), expressed in minutes; * H 10 min TOTAL, walking of minimum 10 minutes in the last seven days (on a week basis);in minutes; * SITTING AND LYING,the time spent sitting or lying in the last seven days (on a week basis); in minutes. The variables are products of two items; that is, the number of days on which the PA in question was done was multipliedwith the time of its duration (in minutes).

*Data processing methods*
Statistica 10 for Windows was utilized to process the raw data. The following was calculated: the measures of central tendency in the form of arithmetic means; the measures of dispersion in the form of standard deviations; the minimum and maximum values; the measures of distribution curve symmetry (skewness) and the measure of distribution curvature rate (kurtosis), that is, descriptive statistics was computed (Dizdar, 2006).

Significance of the differences in means of the variables between the female and male students of the Zagreb Secondary School of Graphic Arts was determined using *t*-test for  independent samples.

## Results and Discussion

In male students higher values were obtained in the first three variables (INTPA TOTAL, MODPA TOTAL andWALK min 10 TOTAL) and a lower value of the fourth variable (SITTING AND LYING TOTAL), which is reversly scaled (the lower value is the better value), thus indicating a higher leval of PA in male students than in their female counterparts of the Zagreb Secondary School of Graphic Arts. However, the *t*-test results suggest that the obtained differences would have been obtained if all the students would have been measured, except for the variable INTPA TOTAL.For the variableINTPA TOTAL the highest difference was obtained, which was also statistically significant.

## Discussion

Regular and chronic PA, its volume in particular, is an important factor of promotion and preservance of psycho-physical abilities and health status in adolescents, especially since it determines, to a great extent, the future psycho-physical status of adult persons. Numerous research studies have indicated the reduction of PA levels with age, which is particularly valid for the population of women (Hobin et al., 2013; Ruiz, 2010).Similar results were obtained in the current research as well.

The main aim was to establish whether such discrepancy between male and female students in PA levels can be established in various domains of life with our subjects. The statistically significant difference between the boys and girls of the Zagreb Secondary School of Graphic Arts in the levels of their PA was obtained only in the variableINTPA TOTAL, denoting the total number of days in a week on which intensive/vigorous PA is done. Further monitoring is indispensable as well as various kinds of interventions to change the devastating picture of PA levels in adolescents. Primarily awareness of adolescents should be addressed and enhanced to make them responsible for their health-related behaviour and habits.

Therefore, more information is needed on motivational structure to create exercise programmes interesting enough for this age category. School is an excellent environment in which education for many adolescents. Also, during schooling adolescents are in the period if intensive attitudes, system of values and behaviour formation. Unfortunately, the findings of our study also demonstrate that sedentary lifestyle has been already adopted in such a young age: both the girls and boys spend almost nine hours per day on average in passive activities, i.e. sitting or lying. If we add the average of eight hours of sleeping to this number, we get the number of 17 hours a day, that is, within a 24-hour cycle, without any PA.

Table 1 Descriptive statistical parameters and distribution normality of the variables assessing PA levels in the male students of the Zagreb Secondary School of Graphic Arts (n=92)

|  | n | Mean | Min | Max | SD | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| INTPA (number of days) | 92 | 2.73 | 0.00 | 7.00 | 2.11 | 0.28 | -0.89 |
| INTPA (duration in min) | 92 | 80.10 | 0.00 | 300.00 | 72.90 | 0.82 | 0.43 |
| MODPA (number of days) | 92 | 3.32 | 0.00 | 7.00 | 2.36 | 0.12 | -1.18 |
| MODPA (duration in min) | 92 | 80.04 | 0.00 | 490.00 | 81.72 | 2.24 | 8.53 |
| WALK min 10 (number of days) | 92 | 6.35 | 0.00 | 7.00 | 1.53 | -3.12 | 9.77 |
| WALK min 10 (duration in min) | 92 | 161.25 | 0.00 | 840.00 | 181.08 | 1.57 | 2.28 |
| SITTING AND LYING (duration in | 92 | 489.89 | 0.00 | 1440.00 | 271.80 | 1.08 | 3.55 |
| INTPA TOTAL | 92 | 298.40 | 0.00 | 1680.00 | 337.92 | 1.30 | 1.79 |
| MODPA TOTAL | 92 | 345.67 | 0.00 | 3430.00 | 514.07 | 3.92 | 19.95 |
| WALK min 10 TOTAL | 92 | 1094.07 | 0.00 | 5880.00 | 1261.71 | 1.61 | 2.47 |
| SITTING AND LYING TOTAL | 92 | 3429.23 | 0.00 | 10080.00 | 1902.66 | 1.08 | 3.55 |

(Mean – arithmetic mean; Min – minimum value; Max – maximum value; SD – standard deviation; Skewness – curve assymetry coefficient; Kurtosis – distribution curvature rate coefficient.)

Table 2 Descriptive statistical parameters and distribution normality of the variables assessing PA levels in the female students of the Zagreb Secondary School of Graphic Arts(n=110)

|  | n | Mean | Min | Max | SD | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| INTPA (number of days) | 110 | 1.61 | 0.00 | 7.00 | 1.86 | 1.05 | 0.38 |
| INTPA (duration in min) | 110 | 50.54 | 0.00 | 240.00 | 60.41 | 1.16 | 0.60 |
| MODPA (number of days) | 110 | 2.87 | 0.00 | 7.00 | 2.25 | 0.51 | -0.81 |
| MODPA (duration in min) | 110 | 76.00 | 0.00 | 360.00 | 79.36 | 1.41 | 2.06 |
| WALK min 10 (number of days) | 110 | 6.33 | 0.00 | 7.00 | 1.57 | -3.02 | 9.02 |
| WALK min 10 (duration in min) | 110 | 154.22 | 0.00 | 540.00 | 135.83 | 0.83 | -0.19 |
| SITTING AND LYING (duration in | 110 | 556.90 | 0.00 | 1200.00 | 235.99 | -0.04 | 0.87 |
| INTPA TOTAL | 110 | 154.77 | 0.00 | 1260.00 | 250.85 | 2.45 | 6.37 |
| MODPA TOTAL | 110 | 284.77 | 0.00 | 1680.00 | 361.38 | 1.65 | 2.39 |
| WALK min 10 TOTAL | 110 | 1043.45 | 0.00 | 3360.00 | 929.96 | 0.74 | -0.49 |
| SITTING AND LYING TOTAL | 110 | 3898.36 | 0.00 | 8400.00 | 1651.93 | -0.04 | 0.87 |

Table 3 Descriptive statistical parameters and distribution normality of the variables assessing PA levels in all students of the Zagreb Secondary School of Graphic Arts(n=202)

|  | n | Mean | Min | Max | SD | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| INTPA (number of days) | 202 | 2,12 | 0,00 | 7,00 | 2,05 | 0,66 | -0,54 |
| INTPA (duration in min) | 202 | 64,01 | 0,00 | 300,00 | 67,84 | 1,01 | 0,61 |
| MODPA (number of days) | 202 | 3,07 | 0,00 | 7,00 | 2,31 | 0,32 | -1,04 |
| MODPA (duration in min) | 202 | 77,84 | 0,00 | 490,00 | 80,27 | 1,79 | 5,07 |
| WALK min 10 (number of days) | 202 | 6,34 | 0,00 | 7,00 | 1,55 | -3,04 | 9,09 |
| WALK min 10 (duration in min) | 202 | 157,42 | 0,00 | 840,00 | 157,68 | 1,37 | 1,96 |
| SITTING AND LYING (duration in | 202 | 526,38 | 0,00 | 1440,00 | 254,49 | 0,51 | 2,04 |
| INTPA TOTAL | 202 | 220,18 | 0,00 | 1680,00 | 301,60 | 1,78 | 3,26 |
| MODPA TOTAL | 202 | 312,51 | 0,00 | 3430,00 | 437,48 | 3,42 | 18,28 |
| WALK min 10 TOTAL | 202 | 1066,51 | 0,00 | 5880,00 | 1091,02 | 1,38 | 2,13 |
| SITTING AND LYING TOTAL | 202 | 3684,70 | 0,00 | 10080,00 | 1781,47 | 0,51 | 2,04 |

Table 4 The result of *t*-test for independent samples that was used to define significance of the differences between means of the variables: INTPA TOTAL, MODPA TOTAL, WALK min 10 TOTAL and SITTING AND LYING TOTAL in male and female student.

|  | Mean | Mean | t-value | p | SD | SD | F-ratio |
|---|---|---|---|---|---|---|---|
| INTPA TOTAL | 298.40 | 154.77 | 3.46 | 0.00 | 337.92 | 250.85 | 1.81 |
| MODPA TOTAL | 345.67 | 284.77 | 0.98 | 0.32 | 514.07 | 361.38 | 2.02 |
| WALK min 10 TOTAL | 1094.07 | 1043.45 | 0.32 | 0.74 | 1261.71 | 929.96 | 1.84 |
| SITT. AND LYI. TOTAL | 3429.23 | 3898.36 | -1.87 | 0.06 | 1902.66 | 1651.93 | 1.32 |

(Mean – arithmetic mean; t-value – calculated t-value; p – proportion; SD– standard deviation; F-ratio Variances – F value.)

This alarming finding must be acknowledged seriously; much attention and corrective activities must be invested in transformation of habits that deteriorate health of the young. Besides education about the issue and recommendations to the students, immediate interventions are needed in terms of increased inclusion of students into extracurricular sporting activities and sports recreational programmes. To accomplish the goal, we must harmonize adolescents' needs and preferences for activity types. Boys prefer, much more than the female population, activities of the so called adrenalin-boosting type (Gošnik, Sedar and Bunjevac, 2007), then team sports, exercising for fitness and various combat events (Ćurković, 2010). Girls are more interested in dancing programmes and programmes with aesthetic component (Leslie et al.,2001, Keating et al.,2005).

The findings of this type can lead us in future programme development to make an offer that would satisfy interests of the young. It is our duty as educators to respect preferences for a particular type of PA because only in such a way we would be able to find solutions to reduced PA levels in both the regular PE programmes and occasionally organized outdoor activities (rafting, climbing, hiking, excursions, etc.). Organized forms and programmes of sports (physical) recreation should be suitable for the age of adolescents, their aptitudes and abilities, but for their interests as well.To accomplish consistent and quality approach to the implementation of adequate contents experts in physical exercise and sport should be engaged. These experts are kinesiologists who responsibly create and monitor implementation of kinesiological programmes in line with principles and criteria of the profession. Unfortunately, valid mandatory PE curricula in secondary schools cannot satisfy the needs of adolescents for PA. Further, sports clubs and societies are not oriented to activity planning and evaluation that would contribute to solutions of the social need for increasing PA of the young.

The current research is one indicator more that modern society, in which technology has taken over much of physically demanding work, must pay more attention to finding the solutions for this issue. Adolescents are the most vulnerable part of population. Investments in their psycho-physical development and health should be a priority of modern society if long-lasting progress is wanted.

**Conclusions**

Physical activity of adolescents is a complex behaviour influenced by numerous factors. Recognition of relations among these factors of behaviour and attitudes towards health and health-promoting lifestyle has an important role in positive public health climate. The findings of the current research and many others are stimuli for the creation of various ogramme kisnesiological programmes the target of which is augmentation of the number of the young who are meeting the WHO PA level recommendations for this age category (60 minutes of moderate to vigurous activity every day).

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## RAZLIKE U RAZINI TJELESNE AKTIVNOSTI UČENICA I UČENIKA SREDNJE GRAFIČKE ŠKOLE U ZAGREBU

**Sažetak**

*Na uzorku učenika srednje Grafičke škole u Zagrebu, koji se sastojao od ukupno 202 učenice i učenika prvog, drugog, trećeg i četvrtog razreda, utvrđena je statistički značajna razlika u razini bavljenja tjelesnom aktivnosti između učenica i učenika.Višu razinu tjelesne aktivnosti iskazali su učenici nego njihove vršnjakinje i to u svim promatranim varijablama. Za potrebe istraživanja koristio se mjerni instrument Upitnik razine tjelesne aktivnosti (International Physical Activity Questionnaire; IPAQ). Prema rezultatima t-testa za nezavisne uzorke varijablom INTPA TOTAL koja opisuje ukupni, tjedni intenzitet tjelesne aktivnosti, iskazuje se najveća razlika u korist učenika. Neovisno o dobivenoj razlici, istraživanje je pokazalo da učenici i učenice, u prosjeku, provedu gotovo devet sati dnevno u pasivnim aktivnostima, u sjedećem ili ležećem položaju. Takvo stanje upućuje na neophodnu intervenciju stručnjaka i društva, na nužnost razvijanja strategije i uključivanja primjerenih kinezioloških programa u praksu.*

***Ključne riječi:*** *adolescent, IPAQ upitnik, srednja škola, strategija, zastupljenost tjelesne aktivnosti*