*Journal of Physical Education and Sport* ® (JPES), 17(3), Art.183, pp. 1186 - 1891, 2017
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

**Original Article**

# Psychosocial aspects of improving physical activity of children with chronic diseases

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*Published online: September 30, 2017*
*(*Accepted for publication September 03, 2017
**DOI:10.7752/jpes.2017.03183**

**Abstract:**
The study involved 558 girls and 526 boys, 8-9 grade students; including 328 girls and 312 boys with chronic diseases of the cardiovascular system or musculoskeletal system; the remaining 230 girls and 214 boys had no health abnormalities. The attitude towards the physical activity were studied in these respondents including their interest and willingness to carry out such activities in daily life systematically. For this purpose, the method of questioning was used. The study was performed during the academic years 2014-16. Closed format questionnaire was used. The differences in the responses were examined as follows: between the girls and boys with chronic diseases; between the girls and between the boys with and without health abnormalities.
It was established that only a small number of adolescents from both groups studied practice physical activities systematically in daily life. The girls prefer gymnastics and physical exercise accompanied by music, whereas the boys like sport games better. These and other findings demonstrate the need to improve motivation for physical activity in adolescents with chronic diseases. In order to successfully complete learning tasks associated with physical activity, it is necessary to increase the number of exercises they will perform together during their joint physical activities with healthy peers and to take into account the preferences for physical activities and priorities of girls and boys as well as their strong interest in spending time on the computer at home.
**Key words:** teenagers, chronic diseases, physical activity, motivation increasing factors.

## Introduction

Social institutions around the world have marked an annual increase in the number of children and adolescents who have "chronic health conditions" (Riner, Sellhorst, 2013) or "chronic diseases", according to other researchers (Bar-Or, Rowland, 2004). This actualizes the issues related to their physical activity, because most of them are physically active at levels much lower than the minimum recommended amount (Iedynak, Mytskan, Galamandjuk, 2011; Jürimäe, 2017; Takken, 2017). Furthermore, Longmuir & Bar-Or (1994) indicate that physical activity levels of Canadian children with different chronic disorders or impairments reach a maximum at the age of 12 years and then begin to decline showing the highest decline between the ages of 15 and 17 years of age. The trend is very similar to that detected in healthy children and adolescents with the exception of the following: the category of "active" (high level of daily physical activity) includes 70% of healthy children and only 40% of their peers with chronic diseases and disorders. Accordingly, "moderately active" category includes 24% and 30% of the respondents and "sedentary" category includes 6% and 30% of the children from the correspondent groups. The current year data of the American College of Sports Medicine (ACSM: Physical Activity in Children and Adolescents, 2017) suggest that, at the time of starting high school, 41% of American students spend three or more hours every day playing video or computer games, and 32% of them are watching TV during this time. Only 27% of these students perform physical activity for 60 minutes daily and 29% of them perform physical exercise every day.

Hypoactivity is the second (after hereditary factor) leading cause of chronic diseases, especially obesity and cardiovascular diseases, in children and adolescents. Furthermore, low physical activity results in further deterioration of health, reduced physical condition and functional capacities of children and teenagers who already have a chronic disease (Iedynak, 2007; Tsos, Sushchenko, Bielikova, Indyka, 2016). Thus, a vicious circle is formed: hypoactivity causes a chronic disease that affects the health, physical condition, and functional


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capacities of a child; and this in turn may lead to further reduction in physical activity (Anneke, Stuart, 2017; Rowlands, 2017; Takken, 2017).

Regardless of etiology and progression of disease, the teacher's attention to such children during physical education classes should be increased (Mazur, Iedynak, 2014; D'isanto, Di Tore, 2016). First of all, this concerns the adequacy of physical activity parameters: they should be lower than those used for healthy children. It is also necessary to take into account the diagnosis (Green, Spence, & Thijssen, 2011; Cai, Wu, & Wang, 2014; Machado-Rodrigues, Leite, Coelho-e-Silva, 2014) and potential negative effects of certain exercises. For example, high impact exercise (such as jumping) are generally not suitable for people with diseases of the musculoskeletal system or internal organs (Bar-Or, Rowland, 2004; Iedynak, 2016; Riner, Sellhorst, 2013). In Ukraine, according to the current Decree of the Ministry of Education and science, the adequacy of physical activity is ensured by dividing all school students into the primary, preparatory, and special medical groups. The students from the latter one are supposed to be involved in physical education classes and are allowed to perform only certain exercises. They are also expected to participate in special physical activity at school in the afternoon separately from other students. It is also important to identify and to take into account psychosocial aspects of physical activity of adolescents with various chronic diseases (Ivashchenko, 2006; Kipp, 2017). Engagement in physical activity should be promoted by taking into account the interests and demands of adolescents (Sherrill, Hutzler, 2010) and evaluating their achievements during physical activity (Mazur, Iedynak, 2011), including the testing of physical fitness (American College of Sports Medicine, 2010) and functional capacities (Svietlova, Kovalenko, Rybalko, 2016). Besides, it is also important to search for effective programs to promote healthy lifestyle habits among adolescents with various chronic diseases (Takken, 2017). However, the effectiveness of such programs largely depends on the interests, demands and satisfaction of basic psychological needs (Winnick, Porretta, 2017). Due to the lack of knowledge in this field we have conducted our study.

## Material & methods

*Participants*

Inasmuch as schools have adopted the concept of inclusive education, the study involved two groups of adolescents: the primary medical group (PMG), which included students who have no limitations in physical activity due to health conditions, and the special medical group (SMG), which included adolescents with chronic diseases of the cardiovascular system and musculoskeletal system. In total, the study involved 558 girls and 526 boys. SMG included 328 girls and 312 boys, and MMG included 230 girls and 214 boys. All of them were 8-9 grades students studying in Kamianets-Podilsky, Ternopil, and Chernivtsi schools. The average age of each group was 14.6 years. Information about the group to which a student was assigned was obtained from the physical education teacher. He received it from a school nurse at the beginning of an academic year. The research was conducted in compliance with the WMA declaration of Helsinki: Ethical principles for medical research involving human subjects, 2013. The study protocol was approved by the Ethical committee of the Kamianets-Podilsky Ivan Ohienko national university.

*Procedures*

Students were surveyed at the end of each of the two academic years 2014-16. The answers were provided during a physical education class for 35-40 minutes. To get the true answers to all questions, closed questions were used. Furthermore, before surveying, the teacher explained to the students the purpose of the survey and provided instructions on how to complete the questionnaire in a proper way. The questionnaire was designed according to the guidelines of Adamčák, Nemec, Bartík (2017), Bardus, Blake, Lloyd, Suggs (2014), Marcus, Williams, & Claytor (2006), Suggs, & McIntyre (2011). The questionnaire included 8 questions and was provided in a printed format.

*Data analysis*

For each question, the number of responses for each answer option was calculated. The data obtained were analysed separately for girls and boys from the PMG and SMG. The gender of the students in the SMG and assignment to the SMG or PMG were considered in the data analysis. All statistical analyses were performed using SPSS Version 21. Results of descriptive statistics in this study were presented as percentages. Statistical significance was determined at the 0.05, 0.01 and 0.001 probability levels (Vincent, 2005).

## Results

The results of the survey showed that almost the same amount of the girls and boys from both groups (SMG and PMG) like to perform exercises together in physical education classes. This response was provided by 62.8 ± 2.67% of girls and 60.3 ± 2.77% of boys from the SMG, and by 51.3 ± 3.3% of girls and 45.3 ± 3.4% of boys from the PMG. On other hand, 4.9 ± 1.19% of girls and 6.4 ± 1.39% of boys from the SMG and 6.5 ±1.62% of girls and 8.9 ± 1.95% of boys from the PMG do not like such classes. With regard to the special physical activity classes only for students assigned to the SMG that takes place in school in afternoon, the results showed the following: only 31.1 ± 2.56% of girls and 32.7 ± 2.66% of boys like the organization and content of

the special classes, while 12.2 ± 1.81% of girls and 15.4 ± 2.02% of boys do not like them. Comparing of these data indicates that respondents from the SMG like physical education classes more than the special physical activity in the afternoon, because the t-values are 8.57 for girls and 7.13 for boys ($p < 0.001$).

Another results were obtained when comparing the responses concerning the physical activity of the students at home in leisure time. The answers to the question "What physical activity do you prefer to spend your leisure time at home?" showed that only 14.1 ± 1.92% of girls and 16.7 ± 2.11% of boys from the SMG prefer to exercise with parents, friends or individually. In contrast, outside playing with other children, which can validly be considered as physical activity, occupies the first position among the other options by the number of girls and boys preferring it (28.4 ± 2.49% and 31.1 ± 2.62%, respectively). Taken into consideration the above, in total 42.5 ± 2.73% of girls and 47.8 ± 2.83% of boys prefer to do physical activity at home. This is significantly higher than the number of those who liked the special physical activity classes at school in the afternoon, because the t-values equal 3.04 for girls and 3.89 for boys ($p < 0.01$). The second most-popular activity is spending time on the computer: the number of girls and boys who prefer this activity is 18.1 ± 2.13% and 24.4 ± 2.43%, respectively. In the third position are reading for girls (15.8 ± 2.01%) and physical activity with parents, friends or individually for boys (16.7 ± 2.11%).

There were not found any significant differences between the respondents from the PMG and SMG in the preferences for physical activity in leisure time at home. This was evidenced from the following data: 50.5 ± 3.27% of girls and 56.2 ± 3.18% of boys from the PMG regularly exercise at home in leisure time. In the SMG these numbers were, respectively, 42.5 ± 2.72% ($t = 1.88$; $p > 0.05$) and 47.8 ± 2.83% ($t = 1.97$; $p > 0.05$).

These figures were subsequently used in assessment, because they represent responses to the control question for the following questions: "Do you exercise at home?", "Do you prefer individual exercise or workouts with parents?" Comparison of the answers to these questions revealed the discrepancies in the results. So, for example, 21.3 ± 2.32% of girls and 27.6 ± 2.53% of boys from the SMG exercise at home regularly and, respectively, 73.8 ± 2.43% and 65.4 ± 2.69% of them exercise occasionally. Furthermore, the majority of respondents, i.e. 70.7 ± 2.51% of girls and 69.2 ± 2.61% of boys, prefer individual workouts, and, respectively, 7.9 ± 1.49% and 9.6 ± 1.67% prefer to exercise with their parents, while the others may exercise individually or with the parents.

In the PMG, 56.5 ± 3.27% of girls and 68.2 ± 3.18% of boys do regularly physical activity at home. These figures far exceed those in the SMG, because the t-values are 8.78 and 10.0 for girls and boys, respectively ($p < 0.001$). In contrast, in the PMG, only 29.6 ± 3.01% of girls and 17.8 ± 2.62% of boys exercise occasionally, that is significantly less than the in the SMG, because the t-values are 11.42 and 12.69, respectively ($p < 0.001$).

Moreover, it was found that in the SMG, the highest percentage of girls (20.9 ± 2.24%) like gymnastics. The other 10.4 ± 1.69% of girls from this group prefer physical exercise accompanied by music. Skiing and skating are the favourite activities of 9.4 ± 1.61% of the girls, sports games and jogging are preferred, respectively, by 8.1 ± 1.51% and 7.9 ± 1.49% of the girls. In the PMG, 23.5 ± 2.79% of girls like fitness, 15.7 ± 2.4% like physical exercises accompanied by music, 27 ± 2.93% prefer sports games, and 6.1 ± 1.58% like jogging. The sport games popular among the girls include basketball, volleyball, soccer, and handball, with the first two sports being preferred by 11.3 ± 1.75% of girls from the SMG and by 9.6 ± 1.94% girls from the PMG. Apparently, the healthy girls and the girls with chronic diseases do not differ significantly in the preferences for physical activities. This is confirmed by the t-values that range from 0.1 to 1.95 ($p > 0.05$). The exception was sport games, as the healthy girls preferred them much more than those with chronic diseases.

In the SMG, 24.2 ± 2.42% of boys like most of all to play sports games, 11.5 ± 1.81% like active games, and 9.9 ± 1.69% prefer skiing and skating. The lower percentage of boys prefer jogging (7.7 ± 1.51%), tourism (7.4 ± 1.48%), gymnastic (6.6 ± 1.41%), and throwing (5.8 ± 1.32%). In the PMG, the largest number of boys prefer sports game such as football (22.4 ± 2.85%), basketball (15.0 ± 2.44%), volleyball (6.5 ± 1.69%), and handball (5.6 ± 1.57%). Other boys prefer weight training (10.3 ± 2.08%) and jogging (5.6 ± 1.57%). As the data above show, there is a common trend in the two groups: the largest number of the boys from them like sports games. On the other hand, another quite large group of the boys with chronic diseases prefers the other types of physical activities. The number of healthy boys with such preferences is lower. But the difference is insignificant, because the t-value ranges from 0.1 to 1.95 ($p > 0.05$). Nevertheless, the revealed features should be considered when planning the content of physical activity for teenagers.

**Discussion**

Since the object of the study was associated with the students who have a chronic disease, the emphasis was made on the data of these respondents. It was established that they prefer to exercise along with the healthy peers. This may result from the self-assertive ambitions expressed by the girls and boys with chronic diseases. In particular, they wanted to demonstrate to classmates the ability to exercise with them at the same level. The above is consistent with the data of Bar-Or, Rowland (2004), Duncan, Posny, Musgrove (2011), D'isanto, Di Tore (2016), that, while performing various tasks of physical education, children with chronic diseases exhibit a high willingness to assert themselves among the healthy peers. However, the actualization of this desire is

impossible without joint physical activity. It should be mentioned, however, that this was considered as one of the reasons for other results of the study. For example, students with chronic diseases prefer physical education classes, rather than special physical activity classes at school in the afternoon. At home at their leisure time, they like to play with other children.

Considering the above will contribute to some extent to addressing the problem that was confirmed by other data of our study: only a small number of adolescents with chronic diseases are regularly engaged in physical activity in daily life. However, this activity is a crucial condition for eliminating hypoactivity and, thus, negative changes in their health and functional capacities leading to a further reduction in physical activity and, in general, to low social engagement of a teenager (Anneke, Stuart, 2017; Delas, Lafrenične, Fenouillet, Martin-Krumm, 2017; Rowlands, 2017; Takken, 2017).

The data, which demonstrated the strong interest of the majority of teenagers with chronic diseases in spending time on the computer, will contribute to addressing the abovementioned problem as well. In particular, this interest can be redirected to increasing knowledge about the impact of physical activity on health and functional capacities, and its crucial role in completing other tasks. The importance of knowledge related to physical activity and the need for its development in adolescents is indisputable (Iedynak, 2007; Mazur, Iedynak, 2014; Di Tore, Schiavo, D'isanto, 2016). The effectiveness of this recommendation is confirmed by the conclusion of Subrahmanyam, Kraut, Greenfield, Gross (2000). Despite the fragmentary and ambiguous nature of the data, it is possible to delineate the ways in which positive effects of using computers at home by children can be achieved: cognitive and academic skill development, social development and relationships, and perceptions of reality. However, activities of adolescents should be directed to achieve only positive impact on their lives from the use of computers at home.

To develop knowledge related to physical activity in adolescents and to improve the content of joint and separated physical activity for healthy students and those with chronic diseases, it is necessary to take into account the following research data. The following trends were identified: the girls from both groups most of all like to perform exercises accompanied by music, the boys prefer to play sports games. This finding is consistent to some extent with the data of Biddle, Asare (2011), Larsen, Troelsen, Kirkegaard, Riiskjær, Krølner, and other (2016) on the preferences of adolescent girls and boys for the types of exercises that make up the content of physical activity in leisure time. Taking this into consideration, it is reasonable to give priority to the above-mentioned types of exercise when planning joint physical activity classes for healthy adolescents and adolescents with chronic diseases. When planning special physical activity classes at school in the afternoon, in addition to the above, the teacher should include the other activities preferred by the adolescents such as tourism and running.

Taking into account the above information when planning and implementing physical activity for students with chronic diseases will improve its effectiveness in completing both primary and secondary tasks (Riner, Sellhorst, 2013; Mazur, Iedynak, 2014). These include improving and enhancing students' motivation to make physical activity a regular part of their daily life (Sherrill, Hutzler, 2010), and, thereby, implementing of psycho-pedagogic and humanistic approaches (Duncan, Posny, Musgrove, 2011; Bangsbo, Krustrup, Duda, Hillman, Andersen, and others, 2017). The first approach involves taking into account the student's potential during the classes to enhance their understanding of the motivation behind their behaviour, consequences of the behaviour, and a potential need to search for alternative behaviours in particular circumstances. The humanistic approach involves self-actualisation of adolescent's needs such as needs in self-affirmation and recognition (Sherrill, Hutzler, 2010). It is almost impossible to achieve the last level of self-actualization during high school, especially, for children with serious health problems (Winnick, Porretta, 2017). This is because self-actualization involves the most complete fulfilment of the highest potential of an individual and its features are unselfconsciousness, realisticness, self-containment, the ability to understand other people, spirituality, emotionality, deep inner world, willingness to help, simpleness and openness in communication, creativeness, and ability to decide what is good or bad.

**Conclusions**

Only a small number of teenagers with chronic diseases are regularly engaged in physical activity in daily life. This problem can be solved by focusing teacher's attention on developing proper motivation of such students. One of the most effective is the way that takes into account the principles of the humanistic and psycho-pedagogic approaches to teaching and the recommendations provided here that are based on the data obtained. The latter involve an increase in the number of exercises that students with chronic diseases and their healthy peers will perform during joint physical activity. To improve the performance of such exercises in both groups it is necessary to increase the amount of gymnastic exercises accompanied by music for girls and amount of sports games for boys. Furthermore, it is necessary to include tourism and running in the program of special physical activity classes for girls and boys with chronic diseases at school in the afternoon. The content of education related to physical activity should be expanded at the expense of theoretical tasks that involve the use of the computer.

**Acknowledgements**

This study was conducted within the framework of the research project "Theoretical and methodological principles of health and recreational physical activity of different population groups", which is included in the scientific research plan for 2016-2020 of the Ministry of Education and Science of Ukraine.

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