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## PHYSICAL ACTIVITY AS A FACTOR PROTECTING TEENAGE BOYS FROM TOBACCO AND MARIHUANA USE

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### ABSTRACT

**OBJECTIVE.** The aim of the study was to answer the question if physical activity protects teenagers from psychoactive substance use, and whether this relationship depends on gender and activity intensity and frequency.

**SUBJECTS AND METHODS.** The study was conducted in 2013/14 as part of the international HBSC study (*Health Behaviour in School-aged Children*), using the method of auditorium survey, conducted among a random sample of Polish teenagers. In the analysis, only answers of the oldest group of respondents (1484 students aged 14.6-16.5) were taken into consideration. Girls constituted 52.8% of the sample; 75.6% of pupils attended 3<sup>rd</sup> grade of lower secondary school. The research tool was an international questionnaire containing, among others, questions about physical activity (moderate and intense) and the use of psychoactive substances (tobacco, alcohol, marihuana) within 30 days prior to the survey.

**RESULTS.** In respect to both moderate and intense physical activity, boys were more active than girls ( $p < 0.001$ ). Within 30 days preceding the study, 39.0% of respondents drank alcohol, 23.5% smoked cigarettes, and 10.7% smoked marihuana. Among the group of boys, the more physical activity they undertook, the less they smoked tobacco and used marihuana. With regard to alcohol in boys and among girls, for all psychoactive substances, association with physical activity has not been confirmed. The chance of abstinence from cigarettes and marihuana rose about 2-4 times in boys who devoted at least one hour four times a week to moderate physical activity.

**CONCLUSION.** Physical activity protects boys from tobacco and marihuana use. Preventive programs designed to reduce these psychoactive substances use should engage teenagers in physical activity.

**Key words:** *physical activity, psychoactive substances use, adolescents, protective factors*

### INTRODUCTION

Adolescent smoking, drinking, and illicit drug use pose significant public health concerns (1). A majority of adolescents experiment with potentially addictive substances, which is treated as an integral element of this time in life, often called the “*storm and stress*”, “*normative turmoil*” or “*oscillations and oppositions*” period.

According to Jessor’s theory, using psychoactive substances is a risky behaviour that enables satisfying the most important psychological needs in adolescence (e.g. acceptance, belonging), realizing essential developmental goals (e.g. defining one’s identity, independence from adults), or dealing with life problems (stress and frustration reduction) (2). Taking risks is considered a way for teenagers to deal with normal developmental

tasks, such as aiming at autonomy or satisfying the needs of exploration and sensation seeking.

Either conventional behaviours (e.g. continuation of learning, pro-social and pro-healthy behaviours) or typically problematic/risky ones help teenagers in the realization of developmental tasks. The more problematic behaviours occur, the less conventional ones can be observed, which makes appropriate socialization more complicated (3). Taking risk behaviours, including the use and abuse of psychoactive substances by adolescents leads to numerous health and social consequences, including increased risk of diseases and disorders, accidents and injuries or conflicts with the law (4).

Many authors indicate that teenagers’ high physical activity and involvement in active ways of spending time can be essential to preventing addictions to some

psychoactive substance (5-7). It was showed that spending time passively strongly predisposes to psychoactive substance use, especially alcohol (8). Study results also indicate a protective influence of physical activity against smoking marihuana and its consequences (9).

However, a meta-analysis conducted by *Lish* and *Sussman* shows that some research results connected with the relationship between physical activity and psychoactive substances in adolescence are ambiguous (10). From the descriptions of research results about the link between physical activity and smoking, the majority (14 out of 15) indicated a negative connection. For alcohol, only 2 out of 34 studies found a negative correlation. For drugs (including marihuana) a negative correlation was indicated in 9 out of 15 study results. Potential, inconsistent with expectations, a positive relationship between adolescents participation in organized sports activities and the use or abuse of certain psychoactive substances (especially alcohol) confirms also a *Farb* and *Matjasko* review of studies (11) and the results of previous Polish studies (12).

It seems that in the interviewed age group, involvement in physical activity can become a healthy substitute for some risk behaviours, enabling the self-esteem development, acceptance among peers as well as mental well-being (13-14). Simultaneously, an international analysis indicated that increasing physical activity in not always linked with reduced psychoactive substance use (15). For that reason, the identification of factors modifying that connection is extremely important.

## OBJECTIVE

The aim of the paper was to answer three research questions:

1. Is physical activity a factor protecting teenagers from tobacco, alcohol and marihuana use?
2. Is the strength and direction of the relationship the same for moderate and intense physical activity?
3. Does the relationship between physical activity and different psychoactive substance use vary according to gender?

## SUBJECTS AND METHODS

The study was conducted in 2013/14 as part of the Health Behaviour in School-aged Children: A WHO Collaborative Cross-national survey (16). The method of auditorium survey, conducted at schools among a random sample of Polish teenagers, was applied. School-aged children in three age groups: 11, 13 and 15 comprised the study group. In total, 4 545 Polish teenagers participated.

In the current paper, only the oldest group's answers – 1 484 people aged 14.6-16.5 were taken into account. Girls constituted 52.8% of the sample; the majority of respondents (75.6%) attended 3rd year of lower-secondary school (gymnasium). The research tool was an international standard questionnaire elaborated by HBSC focus groups (16). It contained, among others, questions about:

1. **Physical activity.** Two indicators were used herein:
  - MVPA indicator (*moderate-to-vigorous physical activity*) – physical activity beginning from moderate to intensive (increases heart rate and causes lack of breath for some time); this indicator enables to define general physical activity, expressed as amount of days during last seven days when teenagers dedicated at least 60 minutes daily to it. Teenagers marked the appropriate number from 0 to 7 days. The question was adapted by HBSC network from a screening test developed by *Prochaska* and co-authors (17). It was preceded by a short definition of moderate physical activity with information that physical education (PE) lessons can be included.
  - VPA indicator - (*vigorous physical activity*) - intense physical activity (*causes lack of breath and sweating*) – it is usually an additional activity treated as a hobby, a way of spending free time, a relaxing technique. The question used in the paper was connected with frequency (the number of days) of intense physical activity undertaken outside school lessons. “Outside school hours, how often do you usually exercise in your free time so much that you get out of breath or sweat?”; answer categories: every day, 4-6 times a week, 2-3 times a week, once a week, once a month, less than once a month, never.
2. **Use of psychoactive substances.** Questions about smoking cigarettes, cannabis using and drinking alcohol within 30 days preceding the research were also analysed: “*On how many days (if any) have you smoked cigarettes/drunk alcohol/taken cannabis?*”, with 7 categories of answers from 0 (never) to 7 (in 30 days). Considering the fact that in Poland, the use by adolescents other than marihuana cannabis is very rare, in the article was used only the term “marihuana”.

Statistical analyses were performed using SPSS v. 14 statistical package. Using descriptive statistics, the percentage of teenagers involved in physical activity of varying intensity was presented. MVPA categories being in correspondence with VPA were applied. Logistic regression analysis was used to estimate the chance of abstinence from smoking, alcohol, and marihuana depending on frequency of involvement in various physical activities. The accepted level of statistical significance was  $p < 0.05$ .

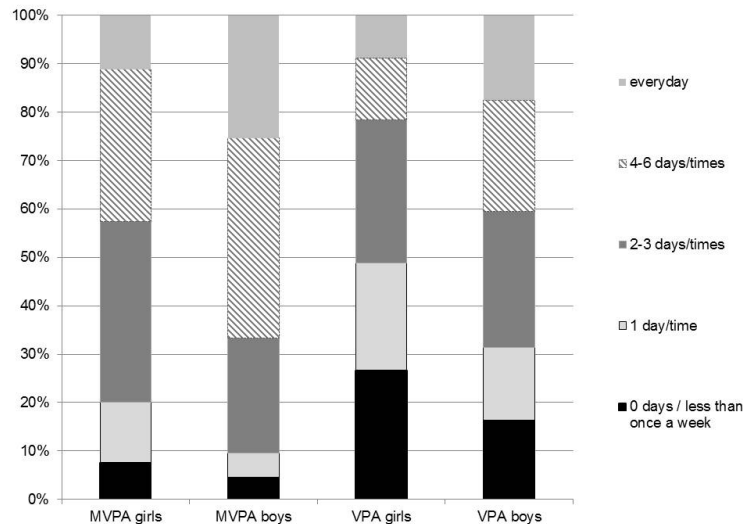


Fig. 1 Weekly frequency of taking up moderate (MVPA) or intensive (VPA) physical activity according to gender (%)

RESULTS

1. Physical activity

The average MVPA indicator was close to 4 days a week ( $M = 3.87$ ;  $SD = 2.13$ ), and was higher for boys than girls ( $M = 4.44$ ,  $SD = 2.09$ ;  $M = 3.36$ ,  $SD = 2.03$ , respectively;  $p < 0.001$ ). The highest percentage of examined boys (41.4%) devoted at least 60 minutes within 4-6 days to moderate physical activity; among girls, it was only 2-3 days (37.3%),  $p < 0.001$  (Fig. 1)

The answers to the question about VPA indicated that both girls and boys usually undertook intensive physical activity 2-3 times a week. However, a much higher percentage of girls than boys did not undertake such activity even once a week (26.7% girls vs. 16.4% boys;  $p < 0.001$ ).

2. Psychoactive substances use

A majority of the examined teenagers did not use these substances within 30 days preceding the research; however, 23.5% smoked, 39.0% drank alcohol, and 10.7% smoked marihuana (Fig. 2). Statistically important differences linked with gender were observed for smoking. Although the percentages of non-smoking teenagers of both genders were similar, the percentage of boys who smoked every day or almost every day (20-30 days a month) was higher than girls (10.8% vs. 7.5%, respectively;  $p = 0.015$ ). The percentages of alcohol abstainers were similar (60.3% boys and 61.6% girls), but more than once a week (6 or more days a month) alcohol was drunk by 10.3% of boys and 7.3% of girls ( $p = 0.004$ ).

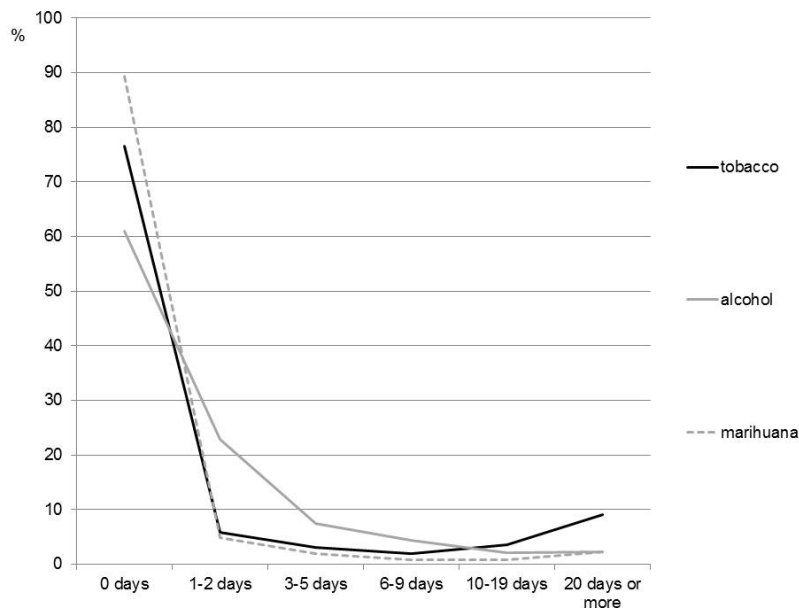


Fig. 2 The frequency of psychoactive substances use by teenagers within a month preceding the research (percentage)

### 3. Physical activity vs. psychoactive substances use

Analysis of logistic regression with the frequency of undertaken physical activity of varying intensity as a main independent variable, estimated separately for girls and boys, indicated that moderate activity was protective against psychoactive substances use. This was especially true for boys and in the case of tobacco smoking and marihuana use (Tab. I). The chance of remaining a non-smoker increased twice for boys devoting at least 1 hour 4-7 days a week to moderate physical activity (compared with boys devoting 0-1 day). In the case of marihuana use, the odds of remaining an abstainer were four times higher. A similar calculation based on intensive rather than moderate physical activity showed no significant relationship between variables. Also in the case of alcohol, both high levels of physical activity measured MVPA and VPA didn't increase the chance of abstinence.

## DISCUSSION

Taking risks in adolescence is perceived as a normal phenomenon, and is necessary for healthy psychosocial development (18). Because of potential health risks (physical, mental, social), researchers are still looking for aspects that can protect teenagers from such behaviours as psychoactive substance use. The results of the herein analysed survey show that during the month preceding the study more than 23% of respondents smoked, almost 40% of them drank alcohol, and about 11% used marihuana. Considering results of other Polish authors studies, these are similar levels of smoking cigarettes and marihuana. The results of the 2011 ESPAD study indicated that within 30 days before the research began, almost 30% of Polish 15-16-year-olds smoked, almost 60% of them drank alcohol, and 10% used marihuana (19).

Many studies on the association between physical activity and psychoactive substance use indicated that physically active teenagers rarely reach for psychoactive substances and more often get involved in various pro-health behaviours (20-22), although study results were not always clear (10-11). *Dunn's* analysis showed, for example, that undertaking recreational physical activity and participating in group sports can be the factor mitigating the risk of alcohol drinking among teenage boys (23). To similar conclusions also lead the findings of other authors (11,24).

Our research took into account moderators – gender and two intensity levels of physical activity – that could affect the direction and strength of correlations between physical activity and psychoactive substance use. Our results show that physical activity was a factor protecting from smoking cigarettes and using marihuana, but

Table I. The results of multivariate logistic regression for estimation the chance (odds ratio OR) of non-using the psychoactive substances by teenagers within 30 days prior to the study

Variables*	Boys			Girls		
	p	OR	95% IS	p	OR	95% IS
Non-smoking						
MVPA						
2-3 days	0.133	1.63	0.86-3.10	0.217	1.33	0.85-2.08
4-6 days	0.027	2.07	1.09-3.95	0.025	1.77	1.08-2.91
Daily	0.029	2.25	0.09-4.67	0.359	1.36	0.70-2.64
VPA						
2-3 days	0.997	0.99	0.61-1.64	0.598	0.89	0.60-1.35
4-6 days	0.925	1.03	0.59-1.78	0.118	0.65	0.38-1.12
Daily	0.590	0.84	0.46-1.56	0.092	0.58	0.31-1.09
Non-drinking alcohol						
MVPA						
2-3 days	0.072	1.75	0.95-3.21	0.514	1.15	0.76-1.72
4-6 days	0.138	1.57	0.86-2.87	0.234	1.31	0.84-2.03
Daily	0.194	1.55	0.80-2.99	0.924	1.03	0.57-1.87
VPA						
2-3 days	0.381	0.83	0.54-1.27	0.361	0.85	0.60-1.21
4-6 days	0.404	0.82	0.51-1.31	0.446	1.22	0.74-2.01
Daily	0.284	0.75	0.44-1.27	0.156	0.66	0.37-1.17
Marihuana non-using						
MVPA						
2-3 days	0.001	4.19	1.77-9.79	0.038	2.31	1.05-5.09
4-6 days	<0.001	4.38	1.93-9.90	0.352	1.45	0.67-3.15
Daily	0.006	3.60	1.44-9.00	0.329	0.63	0.24-1.61
VPA						
2-3 days	0.850	1.07	0.52-2.22	0.255	0.58	0.35-1.32
4-6 days	0.112	0.54	0.26-1.15	0.897	1.07	0.40-2.85
Daily	0.345	0.66	0.28-1.57	0.555	0.74	0.28-2.00

\* Reference category – never or once/1 day a week

substantially only for boys. In the case of alcohol, no significant correlation has been shown. *Moore* and *Werch* had similar results; depending on gender, various types of physical activity and different sports disciplines were factors protecting girls' and boys' health (25). *Fredrics* and *Eccles* also showed a protective effect of physical activity against the use of marijuana among boys only (26). The weaker (mostly statistically insignificant) cor-



relation for girls may be due to the fact that other than physical activity factors determine the use or non-use of psychoactive substances by girls or can be linked with their lower involvement in physical activity and the non-linear character of this correlation.

The results of logistic regression analysis lead to the conclusion that moderate physical activity connected with everyday exercise (walking to school, riding a bike, taking part in P.E.) is a factor protecting teenagers from tobacco and marihuana use. It can be the answer to the question why some of researchers indicate physical activity as a potential risk factor of using psychoactive substances (23-24). In these studies, mainly intensive organized free-time physical activity in relation to risky behaviours (curvilinear relationship) was taken into account. Study results indicate that participation in sports clubs, for example, can increase the risk of alcohol abuse because of higher peer pressure, modelling of problem behaviours or a strong rivalry (24, 27).

*Mazur* and colleagues defined some patterns of health behaviours based on international comparisons. They found that the relationship between beneficial for health behaviours (such as physical activity) and risky ones (using psychoactive substances) also depends on cultural factors (15). The main observation was that low physical activity was linked with low intensity of psychoactive substance use in Polish teenagers. Polish girls were mainly responsible for such a model, as they avoid physical activity. Quite different patterns were observed in neighbouring countries.

The results of our research clearly show that you cannot expect a simple linear relationship between physical activity and psychoactive substance use, nor a clear division between teenagers who consistently undertake beneficial and unbeneficial behaviours in both areas. Many possible patterns of behaviour can be observed, which seems to explain the huge discrepancy between the various study results on the direction and strength of the analysed relations (9). Future analyses of correlations between physical activity and psychoactive substance use by teenagers should take more variables modifying this relationship into consideration. It would be worth to take into account the motives of psychoactive substances use in adolescents representing different levels of physical activity and their perception of risks resulting from the use of psychoactive substances (28).

## SUMMARY AND CONCLUSIONS

Physical activity, especially everyday activity of moderate intensity, is a factor protecting teenage boys from tobacco and marihuana use. This means that in preventive programs designed to reduce these psychoactive substances use, directed at teenagers, promoting

physical activity ought to be taken into consideration. It is crucial to offer interesting sports and recreational physical activity that could encourage teenagers to get involved in such ways of spending their free time as well as to actively participate in P.E. at school.

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