

Young people's lifestyle and frequency of physical activity – an original study

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ABSTRACT

Introduction: A healthy lifestyle, including healthy eating, frequent physical activity, abstention from recreational substances, appropriate amounts of sleep and restricted amounts of television and computer time have a positive impact on the development and health of adolescents.

The aim of the study was to assess selected aspects of adolescent lifestyle with a focus on rates of physical activity.

Materials and methods: The study material included a questionnaire completed by 304 secondary school students. The answers were analysed with respect to the physical activity of the respondents and then grouped accordingly: group 1 consisted of respondents with a low rate of physical activity, group 2 with a moderate rate of physical activity and group 3 with a high rate of physical activity. Differences in the percentages of healthy behaviour the groups engaged in was assessed using the Kruskal-Wallis ANOVA on ranks test. *Post hoc*, a 2-way test with Bonferroni correction was performed. A p value of <0.05 was considered statistically significant for all analyses.

Results: The recommended number of 4–5 meals a day is consumed mostly by individuals from group 2 (52.94%) and to the least extent by those in group 1 (47.17%). The recommended daily consumption of fruit is mostly reported by respondents from group 3 (39.34%) and the least, by those from group 1 (26.42%). Subjects from group 2 are least likely to drink alcohol, which is harmful for one's health (26.47%); this group also includes the largest number of individuals who do not smoke cigarettes (69.12%). The most favorable behaviour with regards to sleep is displayed by subjects from group 3, in which 10.38% of participants slept for the recommended 8–10 h a day.

Conclusions: The majority of adolescents, regardless of the frequency of physical activity they undertook, had an unhealthy lifestyle. The most favourable lifestyle was led by subjects who performed physical activity between once a week and a few times a month.

Keywords: eating habits; sports; health behaviour; adolescents.

INTRODUCTION

A healthy lifestyle, including healthy eating, frequent physical activity, abstention from recreational substances, appropriate amounts of sleep, and restricted amounts of television and computer time have a positive impact on the development and health of adolescents [1, 2]. Maintaining a healthy body weight is also important as overweight and ultimately obesity are predisposing factors for the development of many conditions, including metabolic and cardiovascular diseases [3].

In order to maintain a healthy body weight, ensure good energy levels, consume appropriate amounts of nutrients and preserve physical and mental health, one should consume the recommended 4–5 meals a day in 3–4 h intervals [4]. Water is essential for maintaining homeostasis in that it contributes to thermoregulation and normal biological processes. Water provides necessary trace elements such as manganese, bromine and zinc, which are used in processes such as osteogenesis [5]. Adolescence is a time of intensive development of the skeleton. Calcium, which is found in milk and dairy products, is required for the normal development of bones [6]. A diet rich in fruit and vegetables has a prebiotic effect, improving bowel function and digestion. Fruit and vegetables also increase the antioxidative

capacity of the body [7, 8]. Polyunsaturated fatty acids such as omega-3 have antioxidant effects and are found in fish. As they also decrease this risk of inflammatory diseases [9], it is recommended that fish be consumed at least 2 times a week.

Fast food should be excluded from the diet of adolescents due to harmful trans fats and excessive calorie and salt content [10]. Particular attention should be paid to snacks consumed in between meals as they can supply excessive amounts of energy to the body and consequently, contribute to weight gain. Therefore, unhealthy snacks, both sweet and savoury, should be replaced with healthy products such as fruits, vegetables and unsalted nuts [11]. Reducing the consumption of salt is recommended to ensure cardiovascular stability. Consuming 3–5 g of salt daily decreases the risk of cardiovascular diseases [12]. It is also necessary to eliminate sweet products, including drinks, from the diet as they have a negative impact on blood glucose levels. This also reduces energy intake which contributes to maintaining a healthy weight [13].

Alcohol consumption can lead to addiction. Young people who consume alcohol are observed to be more likely to experience a deterioration in social relations and to engage in risky sexual behaviour [14]. Tobacco smoking exposes a young body to approx. 40 substances with proven carcinogenic effects, including toluene,

pyrene and tar. In addition, smoking is a cause of fertility problems and of lung and gastrointestinal disorders [15].

The regeneration of the body during sleep is important. Insufficient amounts of sleep can result in metabolic and mental health disorders, which can lead to the development of depression and an abnormal body weight [16]. It is also necessary to limit the amount of time spent in front of electronic screens to a max. of 2 h a day. Excessive amounts of time in front of a television or a computer screen is associated with significant exposure to blue light, which can disrupt the circadian cycle. In addition, prolonged exposure to the screens of electronic devices can contribute to accommodative disorders and be the cause of eye dryness [17].

The aim of the study was to assess selected aspects of adolescent lifestyle with a focus on the frequency of physical activity.

MATERIALS AND METHODS

A survey was conducted among 355 secondary school students in the Silesian Province of Poland. Based upon the analysis of the collected material, the questionnaires completed by 304 individuals, including 160 females (52.63%) and 144 males (47.37%).

The research tool was an original questionnaire consisting of a number of sections. Students provided answers on selected dietary behaviours, including how frequently various types of food were consumed, physical activity, use of recreational substances and time spent on electronic devices. Responses to 17 questions were analysed. The selection of a healthy behaviour was given 1 point and the selection of an unhealthy behaviour did not earn any points. An additional point was given for a normal body weight determined by the BMI, in line with the WHO guidelines. The max. score was 18 points.

Selected aspects of the students lifestyles were assessed with regard to 2 levels: unfavourable (0–60%) and favourable (>60–100%).

The answers were analysed with respect to physical activity, with the study population divided into 3 groups:

- group 1 – low level of physical activity; students who do not engage in any physical activity or do so less than once a month (n = 53; 17.43%),
- group 2 – moderate level of physical activity; students who engage in physical activity between once a week and a few times a month (n = 68; 22.37%),
- group 3 – high level of physical activity; students who engage in physical activity a few times a week and/or every day (n = 183; 60.20%).

The results were analysed using Microsoft Excel 2010 and Statistica 13.1. (TIBCO Inc.). Quantitative variables were checked for normality using the Shapiro–Wilk *W* test and normality graphs. The differences between the percentages of healthy behaviour in the participants of the 3 groups was assessed using the Kruskal–Wallis ANOVA on ranks test. *Post hoc*, a 2-way test with Bonferroni correction was performed. A *p* value of <0.05 was considered statistically significant for all analyses.

RESULTS

Figure 1 presents the body weight of the study population, expressed using the BMI, with respect to physical activity.

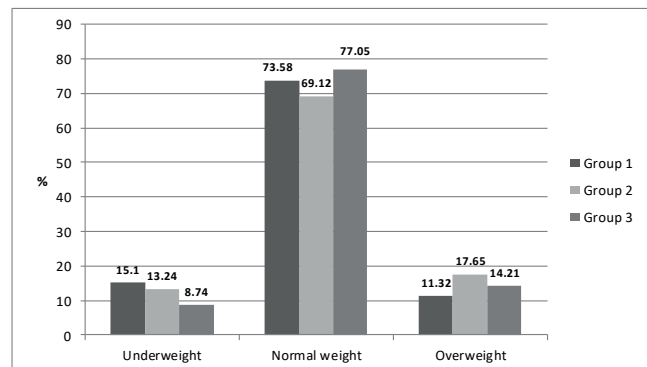


FIGURE 1. Body weight of adolescents

The majority of subjects had a normal body weight, including 73.58% of group 1, 69.11% of students in group 2 and 77.05% in group 3. Underweight was most common in group 1 (15.1%), while overweight in group 2 (17.65%).

Tables 1 and 2 present the assessment of body weight, dietary behaviour and how frequently selected foods and drinks are consumed by the study population.

The recommended number of 4–5 meals a day were mostly consumed by individuals from group 2 (52.94%) and to the least extent by those from group 1 (47.17%). The recommended 3–4 hour-intervals between meals was mostly observed by subjects from group 2 (60.29%) and to the least extent by those from group 3 (50.27%). Snacking on unhealthy foods was reported by 45.28% of individuals from group 1, 41.18% from group 2 and 45.90% from group 3. The subjects who drank sufficient amounts of water were mainly those from group 2 (45.49%). The respondents declaring a healthy amount of water consumption between groups 1 and 3 were similar (37.74% and 37.70%, respectively).

The recommended daily consumption of vegetables was reported mostly by individuals from group 1 (50.94%) and to the least extent by those from group 3 (46.99%). Contradictorily, students from group 3 indicated that they ate fruit daily the most (39.34%) and students in group 1, the least (26.42%). The recommended daily consumption of milk and dairy products was reported by 9.43% of respondents from group 1, 10.29% from group 2 and 10.38% from group 3. The subjects who consumed a healthy amount of fish were mainly those from group 2 (7.35%) and to the least extent, those from group 1 (3.77%). A more than occasional consumption of sweets was reported by 79.23% of individuals from group 3. Groups 1 and 2 (77.36% and 77.94%, respectively) shared similar percentages. Sweetened carbonated drinks were consumed occasionally or were not consumed at all by 52.94% of students from group 2 and to the least extent by those from group 3 (40.44%). More students from groups 1 and 3 (30.19% and 31.15%, respectively) indicated energy drinks were consumed more than occasionally, whereas only 25% of those from group 2 indicated the same.

TABLE 1. Assessment of body weight and chosen dietary behaviour

| Chosen behaviour | Group 1 | | Group 2 | | Group 3 | |
|---|---------|-------|---------|-------|---------|-------|
| | n | % | n | % | n | % |
| 1. Healthy body weight | | | | | | |
| yes | 39 | 73.58 | 47 | 69.12 | 141 | 77.05 |
| no | 14 | 26.42 | 21 | 30.88 | 42 | 22.95 |
| 2. Number of meals during the day | | | | | | |
| 4–5 meals | 25 | 47.17 | 36 | 52.94 | 92 | 50.27 |
| less than 4 meals | 28 | 52.83 | 32 | 47.06 | 91 | 49.73 |
| 3. Breaks between meals | | | | | | |
| 3–4 h | 30 | 56.60 | 41 | 60.29 | 92 | 50.27 |
| less than 3 h and/or longer than 4 h | 23 | 43.40 | 27 | 39.71 | 91 | 49.73 |
| 4. Snacks between meals | | | | | | |
| eating healthy snacks or not eating between meals | 29 | 54.72 | 40 | 58.82 | 99 | 54.10 |
| eating unhealthy snacks | 24 | 45.28 | 28 | 41.18 | 84 | 45.90 |
| 5. The amount of water consumed per day | | | | | | |
| ≥6 glasses a day | 20 | 37.74 | 31 | 45.59 | 69 | 37.70 |
| <6 glasses a day | 33 | 62.26 | 37 | 54.41 | 114 | 62.30 |
| 6. Adding salt to food | | | | | | |
| no | 22 | 41.51 | 31 | 45.59 | 70 | 38.25 |
| yes | 31 | 58.49 | 37 | 54.41 | 113 | 61.75 |

TABLE 2. Frequency of consumption of selected products

| Chosen behaviour | Group 1 | | Group 2 | | Group 3 | |
|---|---------|-------|---------|-------|---------|-------|
| | n | % | n | % | n | % |
| 1. The frequency of vegetable consumption | | | | | | |
| daily | 27 | 50.94 | 32 | 47.06 | 86 | 46.99 |
| less often than daily or do not consume | 26 | 49.06 | 36 | 52.94 | 97 | 53.01 |
| 2. The frequency of fruit consumption | | | | | | |
| daily | 14 | 26.42 | 25 | 36.76 | 72 | 39.34 |
| less often than daily or do not consume | 39 | 73.58 | 43 | 63.24 | 111 | 60.66 |
| 3. The frequency of milk and milk product consumption | | | | | | |
| daily | 5 | 9.43 | 7 | 10.29 | 19 | 10.38 |
| less often than daily or do not consume | 48 | 90.57 | 61 | 89.71 | 164 | 89.62 |
| 4. Frequency of fish consumption | | | | | | |
| at least twice a week | 2 | 3.77 | 5 | 7.35 | 13 | 7.10 |
| less often than twice a week or do not consume | 51 | 96.23 | 63 | 92.65 | 170 | 92.90 |
| 5. Frequency of fast-food consumption | | | | | | |
| occasionally or do not consume | 25 | 47.17 | 40 | 58.82 | 107 | 58.47 |
| more often than occasionally | 28 | 52.83 | 28 | 41.18 | 76 | 41.53 |
| 6. Frequency of eating sweets | | | | | | |
| occasionally or do not consume | 12 | 22.64 | 15 | 22.06 | 38 | 20.77 |
| more often than occasionally | 41 | 77.36 | 53 | 77.94 | 145 | 79.23 |
| 7. Frequency of consumption of sweetened carbonated drinks | | | | | | |
| occasionally or do not consume | 22 | 41.51 | 36 | 52.94 | 74 | 40.44 |
| more often than occasionally | 31 | 58.49 | 32 | 47.06 | 109 | 59.56 |
| 8. Frequency of energy drink consumption | | | | | | |
| occasionally or do not consume | 37 | 69.81 | 51 | 75.00 | 126 | 68.85 |
| more often than occasionally | 16 | 30.19 | 17 | 25.00 | 57 | 31.15 |

Data on recreational substance use, sleeping time and the use of electronic devices are presented in Table 3.

It was mostly subjects from groups 1 and 2 that did not drink alcohol (26.42% and 26.47%, respectively). Group 3 included the lowest number of students who did not drink (22.40%). Smoking was reported by 41.17% of individuals from group 1, 30.88% from group 2 and 38.80% from group 3. Subjects from group 3 had the most respondents who slept the recommended number of hours (10.38%). Groups 1 and 2 had a similar percentage (5.66% and 5.88%, respectively). The students who were most likely to limit the amount of time spent watching TV or working with a computer were those from group 2 (19.12%) and the smallest number belonged to group 1 (11.32%).

The frequency of healthy behaviour in the study population is presented in Figure 2.

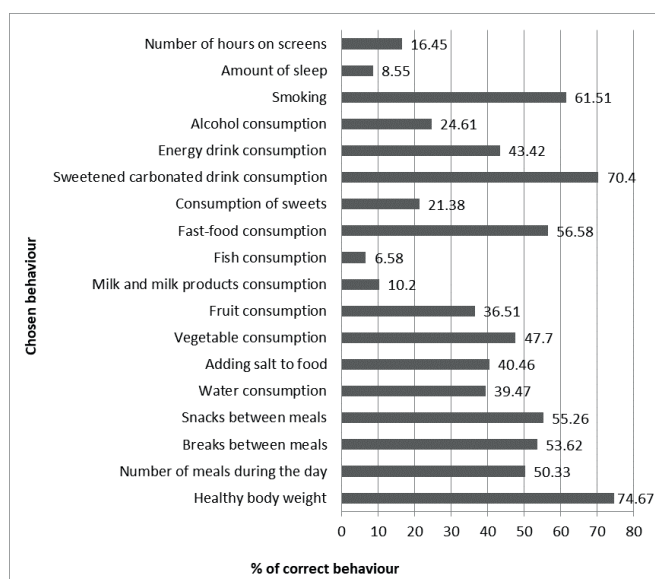


FIGURE 2. Frequency of healthy behaviour in the study population

Maintaining a normal body weight (74.67% of subjects), abstaining from sweetened carbonated drinks (70.4%) and being a non-smoker (61.51%) were the most common healthy behaviours in the adolescents.

The average results of healthy behaviour among the adolescents are presented in Table 4.

No statistically significant differences were found between the rates of healthy behaviour in groups 1, 2 and 3.

The levels of healthy behaviour are presented in Figure 3.

Group 1 were found to have the highest level of unfavourable behaviour (90.57%) and group 2 were determined to have the most favourable behaviour (82.35%).

Self-rating of dietary behaviour and physical activity of the studied adolescents are presented in Figures 4 and 5.

The majority of subjects who rated their dietary behaviour as good belonged to group 2 (47.06%) and the smallest number were those from group 1 (37.74%). The majority of subjects who rated their physical activity as good belonged to group 2 (47.06%) and the smallest number were from group 3 (38.8%).

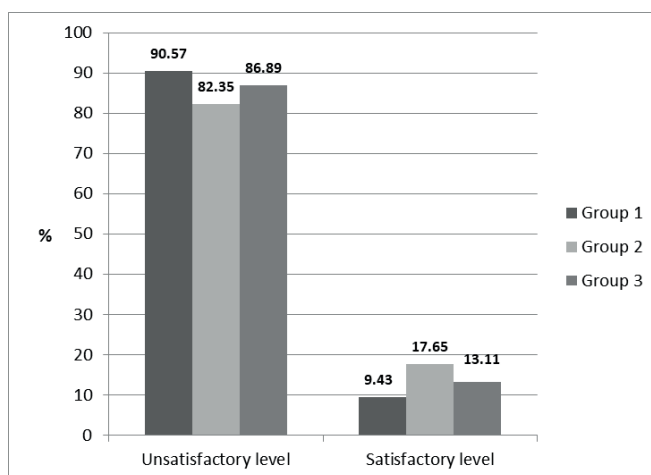


FIGURE 3. Percentage of adolescents with healthy lifestyle

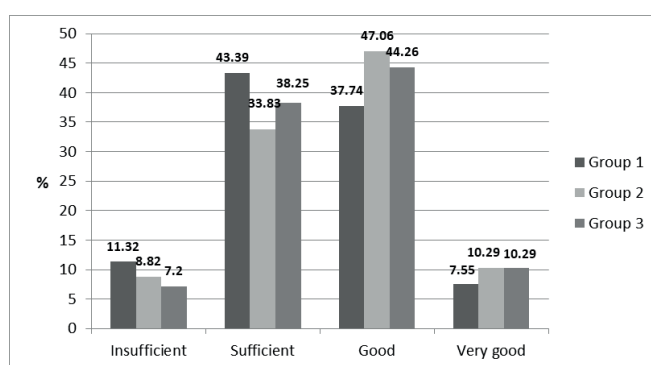


FIGURE 4. Self-assessment of eating habits in the adolescent population, depending on physical activity levels

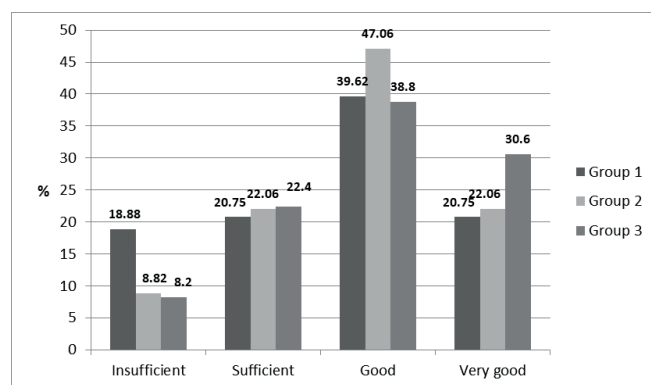


FIGURE 5. Self-assessment of physical activity in the adolescent population, depending on activity levels

DISCUSSION

According to the results of the present study, the most physically active group has the highest number of individuals with a normal body weight. Similar results were obtained by Boniecka and Liberska, who studied physical activity, dietary behaviour and the bodies of girls in the 2nd stage of puberty. Their study shows that participating in healthy behaviour, including physical activity, is associated with a lower BMI [18].

TABLE 3. Assessment of body weight and chosen dietary behaviour

| Chosen behaviour | Group 1 | | Group 2 | | Group 3 | |
|---|---------|-------|---------|-------|---------|-------|
| | n | % | n | % | n | % |
| 1. Alcohol consumption | | | | | | |
| no | 14 | 26.42 | 18 | 26.47 | 41 | 22.40 |
| yes | 39 | 73.58 | 50 | 73.53 | 142 | 77.60 |
| 2. Smoking | | | | | | |
| no | 28 | 52.83 | 47 | 69.12 | 112 | 61.20 |
| yes | 25 | 41.17 | 21 | 30.88 | 71 | 38.80 |
| 3. Amount of sleep | | | | | | |
| 8–10 h | 3 | 5.66 | 4 | 5.88 | 19 | 10.38 |
| less than 8 h | 50 | 94.34 | 64 | 94.12 | 164 | 89.62 |
| 4. Number of hours spent on watching TV and/or working on computer | | | | | | |
| ≤2 h | 6 | 11.32 | 13 | 19.12 | 31 | 16.94 |
| >2 h | 47 | 88.68 | 55 | 80.88 | 152 | 83.06 |

TABLE 4. Assessment of body weight and chosen dietary behaviour

| Frequency of physical activity | Minimum | Maximum | Mean | Standard deviation | Name and test result |
|--------------------------------|---------|---------|-------|--------------------|--|
| Group 1 (n = 53) | 5.56 | 77.78 | 37.74 | 15.88 | Kruskal–Wallis ANOVA ranks test p = 0.311 |
| Group 2 (n = 68) | 11.11 | 83.33 | 42.40 | 15.89 | |
| Group 3 (n = 183) | 0.00 | 77.77 | 39.50 | 15.82 | |

According to numerous studies, a normal body weight, which is the result of adhering to the principles of healthy eating and engaging in physical activity, reduces the risk of metabolic diseases including type 2 diabetes, hypertension and dyslipidemia [19, 20, 21]. The WHO recommends that adolescents exercise for a min. of 60 min every day [22]. Unfortunately, as research on the physical activity of young people shows, over 50% of young Europeans do not meet these recommendations [23]. Alarming research findings were also presented in a report prepared by the Institute of Mother and Child in Poland regarding the level of physical activity in children and adolescents aged 3–19 years. Only 15.6% of the Polish adolescents who took part in the study participated in physical activity for the recommended 60 min a day. Low levels of activity may be associated with an unhealthy body weight, and consequently, lead to the development of metabolic diseases [24].

Maintaining a healthy blood glucose level is possible if one consumes an appropriate number of meals, among other things [4]. The recommended number of 4–5 meals a day is consumed mainly by individuals who undertake physical activity between once a week and a few times a month. In their study, Gajda et al. assessed the number and composition of meals consumed by women depending on their physical activity. They demonstrated that a statistically significantly higher number of women with a high level of physical activity had 4 meals a day than those with a low or moderate level of activity. A reverse relationship was demonstrated for the consumption of 5 or more meals a day: a significantly higher

number of women with low or moderate physical activity had this quantity of meals [25].

A diet rich in fruit and vegetables is a source of antioxidants, which have anti-inflammatory effects and thus reduce the risk of many diseases and accelerate body regeneration [8]. In this study, students with the lowest level of physical activity reported a daily consumption of vegetables most frequently, while those with the highest level of activity reported this behaviour to the least extent. The opposite is true for fruit, which is consumed mostly by individuals with the highest level of activity. The authors of a study investigating the relationship between the level of physical activity and the consumption of fruits and vegetables among Brazilian teenagers, noted that students who consumed fewer portions of fruits and vegetables during the day were less physically active when compared to adolescents who consumed more portions [26].

Milk and dairy products, rich in calcium and nutrients necessary for the skeletal system, are particularly necessary in the diet of adolescents and as such, it is recommended milk be drunk every day. The results of the present study demonstrated that participants engaging in physical activity a few times a week or every day are more likely to consume milk as recommended. Similar results were obtained by Dmitruk et al., who investigated the relationship between diet and the level of physical activity among post-secondary school students aged 16–19 years. According to the authors, more students with a high level of physical activity reported daily milk consumption than those with a moderate level of activity [27].

In the present study, fast food products are consumed to the least extent by the group with the lowest level of physical activity. Contrasting results were obtained in a study by Santaliestra-Pasías et al., who investigated the consumption of food depending on the level of physical activity among European children. According to this study, a higher level of physical activity is associated with less frequent consumption of high-energy foods, which include fast food, among others [28].

Reducing the consumption of sweets decreases the risk of cardiovascular diseases and type 2 diabetes [29]. There is a similar tendency for eating sweets among subjects from groups 1 and 2. Group 3, which includes the most physically active students, tend to consume sweet products to the highest extent. Such behaviour could be due to the higher energy demand of these individuals, who choose sweet snacks to satisfy their hunger. Similar results were obtained by Dmitruk et al.: a higher number of people with moderate physical activity abstained from eating sweets or ate them more rarely than those with high physical activity [27].

The present study shows that the lowest number of subjects who drink alcoholic beverages, which are prohibited for underage students, belong to the group with the highest physical activity. However, Niedermeier et al., who investigated alcohol consumption and the physical activity of Austrian students, did not demonstrate any significant relationship between these 2 behaviours [30].

The main goal of sleep is body regeneration. More sleep is required depending on the level of exertion during the day. Sleep strengthens one's immune system and improves concentration and memory. Sleep allows one to maintain a positive attitude, which helps to combat stress [16]. The majority of the studied population sleep for an insufficient number of hours a day. The majority of subjects who sleep 8–10 h a day are those who engage in physical activity every day or a few times a week. Similar results were obtained by Rögnvaldsdóttir et al., who studied physical activity and the sleep patterns of adolescents from 6 schools in Reykjavík. Young Icelanders also do not sleep a sufficient number of hours a day; however, no relationship between the subjects' level of physical activity and length of sleep was observed [31].

CONCLUSIONS

1. The majority of adolescents, regardless of the frequency of physical activity they undertook, had an unhealthy lifestyle.
2. The most favourable lifestyle was reported by subjects who performed physical activity between once a week and a few times a month.
3. Adolescents should be encouraged to introduce beneficial lifestyle changes, especially in eating behaviour, including increasing the amount of fruit and fish consumption, and reducing the amount of sweets. These activities should be promoted by nutritional education at schools.

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