

**PhD doctoral dissertation thesis**

**Modelling the economic effects associated with  
physical activity in different generations**

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## 1. INTRODUCTION, OBJECTIVES

Physical inactivity has become one of the central topics of both domestic (ÁCS, 2020) and international scientific life, due to its complex and extensive system of effects. A sedentary lifestyle is the fourth leading risk factor for mortality in the world, accounting for 6% of deaths (WHO, 2015). Inactive lifestyles are associated with the likelihood of developing various types of chronic diseases (colorectal cancer, breast cancer, heart disease, stroke, high blood pressure, type 2 diabetes, osteoporosis) and with an increase in the number of people struggling with overweight and obesity (GILL – COOPER, 2008; PFAU et al., 2019). The increase in sitting time poses a civilisation challenge to health preservation and health promotion (SOÓS et al., 2009). Increasing the level of physical activity may reduce the likelihood of developing many chronic diseases (cardiovascular, metabolic disorders, psychological, tumour, musculoskeletal diseases) (BERLIN – COLDITZ, 1990; WINZER et al, 2011; PETRIKA, 2012; LAMPEK-KIVÉS, 2014; PAVLIK, 2015; LÉVAI et al., 2018).

My dissertation focuses on theoretical knowledge about physical activity, practical possibilities of increasing activity, and the health social and economic aspects of all these; using my research results conducted on a gender-representative sample of the population of the town of Hajdúböszörmény.

In my work, I examined four groups, which can mostly be distinguished from each other based on age. I analyzed the exercising motives and opportunities of high school students, university students, adult workers and elderly groups, in respect of their sociocultural and socioeconomic background, exploring gender differences and similarities. The horizontal and vertical dimensions of my study provide a comprehensive picture of the physical activity characteristics of the population of Hajdúböszörmény, which is suitable for identifying the key factors that make it easier for individuals, local political decision-makers and businesses connected to local social life to set long-term strategic goals and create the personal and material environment necessary for their realization.

***The main objective of this research is to explore the general characteristics of the physical activity of the population of Hajdúböszörmény, both qualitatively and quantitatively, in relation to age and gender.***

During the research, I was interested in the extent of physical activity of the studied population, comparing my results to national and international data, using the methodology of IPAQ questionnaires (work, transport, sports, household chores), using MET (metabolic equivalent) values.

***My further objectives are:***

**O1:** I intend to explore the differences in the level of physical activities in terms of age among the inhabitants of a Hungarian town, Hajdúböszörmény.

**O2:** I intend to explore the differences among the studied population of a Hungarian town, Hajdúböszörmény, when focusing on physical activity by gender.

**O3:** My objective is to explore the motivational background of the given age groups in the studied population.

**O4:** My thesis also explores the correlation between current levels of physical activity and the objective and subjective health status of the studied groups.

**O5:** One of my research objectives is to examine what types of physical activities are more attractive to the population of Hajdúböszörmény.

**O6:** Another objective is to identify differences between physical activity types in different age groups.

**O7:** I carry out research into the relationship between one's disease(s) and the level and type of physical activity chosen.

**O8:** Finally, I want to explore the relationship between physical activity and performance at work and school.

***The fundamental hypothesis of my doctoral dissertation is that the physical activity of the population of Hajdúböszörmény varies according to national studies in terms of age groups and genders.***

***My further hypotheses are:***

**H1:** I hypothesise that with the increase of age there is a significant decrease in the level of physical activity in the population of Hajdúböszörmény.

**H2:** According to my hypothesis, the level of physical activity of boys and men is higher than that of women in the population of Hajdúböszörmény.

**H3:** I hypothesise that the motives of physical activity at different generational levels differ in the sample studied, and for younger people it is extrinsic motives, while for older people it is intrinsic motives that are more important.

**H4:** I believe that higher levels of physical activity are associated with better health indicators and health perception for members of all age groups, compared to inactive members of the same age group in the sample studied.

**H5:** I hypothesise that, due to the geographical and economic characteristics of the settlement, getting around by cycling, light physical work around the house, and non-strenuous leisure sports activities appear to the greatest extent among the residents of Hajdúböszörmény.

**H6:** I believe that in the case of different types of physical activity (work, transport, household-related, leisure sports) there is a significant difference between the activity levels of different age groups.

**H7:** I hypothesise that while greater physical activity is associated with lower individual health expenditures, expenditure related to active sports consumption shows higher amounts.

**H8:** According to my hypothesis, higher levels of physical activity have a positive effect on school and work performance in the sample studied.

## **2. PRECEDENTS, APPLIED METHODS**

After formulating the research questions related to this dissertation and the hypotheses arising from them, it was necessary to determine the type and composition of the measuring tools considered most suitable for the success of the research process. Planning the research process is key to effective work. The longer the process, the greater the chance of having to react to unplanned effects. As in so many areas of life, adaptation to the changing conditions played a major role in this research, especially the effects triggered by the COVID-19 pandemic. Of the age groups I involved, it was the elderly group most difficult to reach, because they were the most at risk due to the pandemic. Paper-based data collection was made significantly more complicated by the lack of personal contact and the fear of questionnaires being contaminated; therefore, data collection took much longer in case of the elderly than of other age groups.

Based on the type of study (locality-level, representative, large number of items), I decided on quantitative data collection, and I used questionnaires as a measuring tool, which is the most common study method (MALHOTRA, 2008; BONCZ, 2015). The descriptive part of the research made it possible to assess the situation regarding physical activity as accurately as possible for each age group. With causal research, I was looking for logical connections between the different variables (SAJTOS – MITEV, 2012).

Data from questionnaires on their own cannot provide completely objective and unbiased answers to my questions (SAJTOS – MITEV, 2012), but a scientifically based research process can bring us closer to a more thorough understanding of the problem under scrutiny, to draw appropriate conclusions and to give adequate answers connected to them.

To ensure the reliability of the results, a large population was involved, and the analysis of the collected (mostly quantifiable) data was carried out relatively quickly, using the appropriate statistical analysis program and statistical tests. (HUNYADI et al., 2001; BABBIE, 2008; ÁCS, 2014; VEAL, 2018).

Since during the research I examined the characteristics and mechanism of action related to physical activity, I compiled a questionnaire that I could apply to other age groups, without items irrelevant to the given age group. I prepared my questionnaire using the results and applied methods of previous scientific research. I tried to include items in the questionnaire exclusively related to my research questions, so that the respondents could concentrate as much as possible on the problem at the heart of the study.

The final questionnaire consists of 22 questions (Appendix 1), which was compiled using internationally validated questionnaires (IPAQ - International Physical Activity Questionnaire Long Form, PALMS - Physical Activity and Leisure Motivation Scale, EQ-5D - EuroQoL scale - European Quality of Life, SF-36 - 36-item Short Form Health Survey) as well as self-formulated questions.

My questionnaire can be divided into five main parts. In addition to sociodemographic data (gender, age, income status) that I asked about in the first part of the questions, I examined in the second part the health status of the individual's and its changes. After posing a yes/no question about possible diseases occurring in the year before filling out the questionnaire, I asked about changes in health status (deteriorated – didn't change – improved). Using the EQ-5D to EuroQoL scale, respondents were able to indicate their current health status on a scale of 1-100. Using the questions of the SF-36 questionnaire, I was able to get an accurate picture of the physical and mental state of the respondents (exhilaration, happiness, energy level, fatigue, sadness, exhaustion, nervousness, depressive symptoms). These factors made it possible for us to find a link between an increase in exercise volume and a more positive subjective health status, compared to the components of the individual's physical activity.

The third part included questions about the individual's motivations for exercising. I could map their intrinsic motivational factors (individual development, physical state, mental state, social relationships, appearance, others' expectations, enjoyment, competition) with the help of the PALMS questionnaire. Examining extrinsic factors, I asked about the current effects (home conditions, infrastructural conditions of residence, effects of social environment, income conditions, amount of leisure time and health status) and long-term effects (parental model, childhood sports activity, primary and secondary school physical education classes).

The physical activity section (fourth part) I asked questions aimed at the components of physical activity related to work, transport, household chores and leisure activities, displaying the weekly frequency of the given activity and the amount of exercise performed a day (minutes/day). At the end of the chapter is the self-assessment of school/work performance on a three-grade scale – *underachievement*, *as expected* and *overachievement*.

After methodological and professional consideration, I chose the long version of the IPAQ (International Physical Activity Questionnaire) questionnaire to examine the components of physical activity, as this measurement tool was also used for most of the relevant contemporary scientific research. This simplifies comparative studies that include different variables.

Both short and long form versions of the IPAQ questionnaires can be used. The validation of the short version of the questionnaire was carried out by the staff members of the Faculty of Health Sciences of the University of Pécs, led by Pongrác Ács. The long version of the questionnaire was interpreted by the staff members of the Faculty of Economics and Business of the University of Debrecen, under the direction of Éva Bácsné Bába, in 2015. Questionnaires were completed independently online or offline, or by telephone queries. The unit of measurement of energy release is the MET value, the application of which is based on the updated Compendium of Physical Activity study (AINSWORTH, 2011). The IPAQ - long form questionnaire consists of 27 items related to work, household chores (indoor and outdoor), leisure activities, type of transport and time spent sitting (sitting time). Physical activity can be evaluated in two ways, either by the cumulative results of activities per minute/week or by multiplying them by the corresponding MET value in MET units (MET/min/week).

Questions include both open-ended and closed-ended questions. In the case of ordinal variables, respondents could usually enter their values on a five-step Likert scale. From the statistical point of view, the data extracted from the questionnaire, some parts of the data I was able to metricise while others were left non-metric. The aforementioned had to be considered in the methods to be chosen for the analysis.

The scene of my study is Hajdúböszörmény, which is the second most populous settlement in Hajdú-Bihar County, the fourth in the Northern Great Plain region, and the 33rd most populous settlement nationwide. The town is one of those Great Plain settlements which have vast surrounding fields and significant historical roots. Hajdúböszörmény has many ties to Debrecen. A large number of pupils, students and employees commute daily from its area to Debrecen. Agriculture is decisive in the economy of Hajdúböszörmény. Most of the administrative area (69%) is agricultural and arable land. Nearly 60% of businesses registered in the city are engaged in agricultural activities. The industry of the settlement is characterised by a higher proportion of mechanical and light industry enterprises. The urban structure of Hajdúböszörmény can be traced back to the historical past, and its most important feature is the two-plot or garden layout. On these, residential buildings and scenes of economic activity are separated.

I started the questionnaire research in May 2019 among students of the Faculty of Child and Special Needs Education of the University of Debrecen. During the pilot research, I evaluated the reliability of my questionnaire (Cronbach-alpha=0.879), compared the first and second halves of the questionnaire, during which I found a strong relationship ( $r=0.633$ ), and the Cronbach-alpha value was above 0.7 for both parts.

I questioned the 14-18-year-old age group with the consent of their parents and of the heads of institutions of secondary schools (grammar school, technical school, and vocational school). I organised and implemented the involvement of the adult and elderly residential population with the support of the city government.

During the sampling, my discrete population was based on the population of the town of Hajdúböszörmény. My goal was to make the sample representative of the population. I was able to ensure representativeness (RUDAS, 1998) according to gender, i.e., the distribution of characteristics of the population and the sample shows similarity. The sampling unit is the population of Hajdúböszörmény, and the observation unit is the individual.

Among the non-random sampling techniques, quota sampling was used, in which gender and age were the control categories of the population. I selected the respondents from the distinct sets based on my judgement. Of course, based on the provisions of the legislation in force (Regulation (EU) 2016/679 of the European Parliament and of the Council on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC), I did not have access to the contact details of the inhabitants of the city of Hajdúböszörmény, therefore I did not have the full sampling frame at my disposal. The public data of the HCSO (Hungarian Central Statistical Office) were informative in terms of age and gender. I tried to counteract the biasing effects of the sampling method by including heterogeneity (type of education, level of education, income) within homogeneous groups in both aspects (age and gender). For example, when examining young people, I addressed students studying both in vocational training and in the types of institutions leading to GCSE (technical school, grammar school). In the case of adults and elderly people, I also considered the wide range of educational attainments and different income conditions. Though the research cannot be considered representative according to these criteria, I was able to gain valuable information about the determination of physical activity by these factors.

Since two genders (female, male) and three age groups (young, adult and elderly) form the basis of the study, I formed six groups so that each group contains 100-150 individuals. This number was determined arbitrarily, based on the consideration of the number of respondents I can personally reach, and the number of respondents I can check the authenticity of the completion

by filling out the questionnaire in paper form or by filling it in online. This number per group allowed the normality test to be reliably carried out.

Regarding the size of the sample, I developed a preliminary idea, according to which the ratio of the members of the heterogeneous groups belonging to my sample should be the same as the proportions within the population of the settlement. The number of items in my sample is 878, of which 454 are women (51.7%) and 424 are men (48.3%). All respondents live in Hajdúböszörmény. In terms of age, I examined three main age groups, following the HCSO's division into age groups. The number of young and adult age groups shows a consistent decreasing trend, while the number of elderly people is increasing.

The category of young individuals included respondents aged 14-18. A total of 302 respondents, 137 women (46%) and 165 men (54%). 16-18-year-olds made up the majority of the sample (75.6% in total). The average age of the sample of young people is 16.9 years. Among adults (19-65 years), 313 individuals participated in the study, 154 women (49%) and 159 men (51%). They range in age from 21 to 64, with an average age of 41.3 years. The elderly (over 65) were represented by 263 individuals, 163 women (62%) and 100 men (38%). The average age of respondents aged between 65 and 92 is 75.9 years. Within each age group these proportions correspond to the population distribution by gender characteristic of Hajdúböszörmény.

The data obtained during the questionnaire surveys were processed with the help of the IBM SPSS Statistics 26 program (SZÉKELYI – BARNA, 2008). In my study, dependency relationships were most often examined, for which I used crosstab analysis, variance analysis and correlation analysis.

With the analysis program, I first performed descriptive statistical analyses (mean and standard deviation values, frequency distributions) and crosstab analysis. Crosstab analysis is a statistical procedure that describes two or more variables with a table that shows the combined distribution of two or more categorised or value-taking variables (GYULAVÁRI et al., 2017). In order to show the significant relationship, a chi-squared test was performed, then the strength of the relationship between the variables was examined. When examining nominal variables, Cramer's V coefficient was evaluated at the significance level  $p < 0.05$ . "The Cramer coefficient is one of the most popular and reliable chi-square-based indicators applicable to almost all crosstabs" (ÁCS, 2014, pp. 206-207). For ordinal variables, the gamma coefficient was considered with the significance level  $p < 0.05$ .

During the research, Kruskal-Wallis test and variance analysis were used to identify the difference between the mean values of independent samples. The discriminant analysis was applied when exploring the relationships between non-metrically dependent and metric

independent variables, considering the Pearson correlation coefficient, which refers to the importance of the independent variable (SAJTOS – MITEV, 2012).

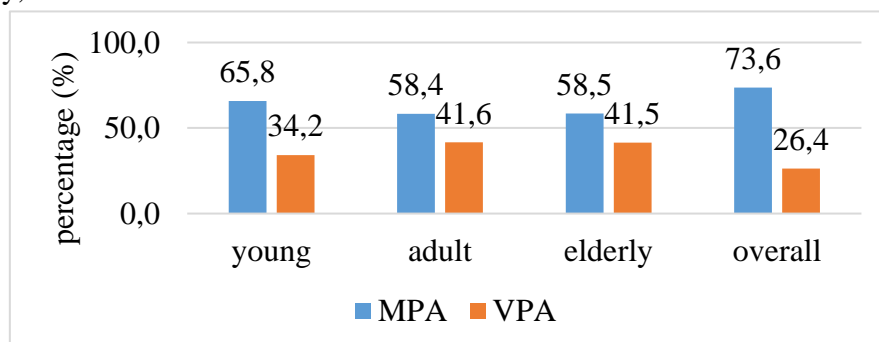
When examining interdependence relationships, I used cluster analysis (SZÜLE, 2019), which is suitable for grouping elements that are similar in some respect. With the help of this method, I was able to form groups with distinct characters based on the components of physical activity, the motives for exercising, and the economic components of physical activity.

### 3. MAJOR CONCLUSIONS OF THE DISSERTATION

#### 3.1. Results in reference to physical activity

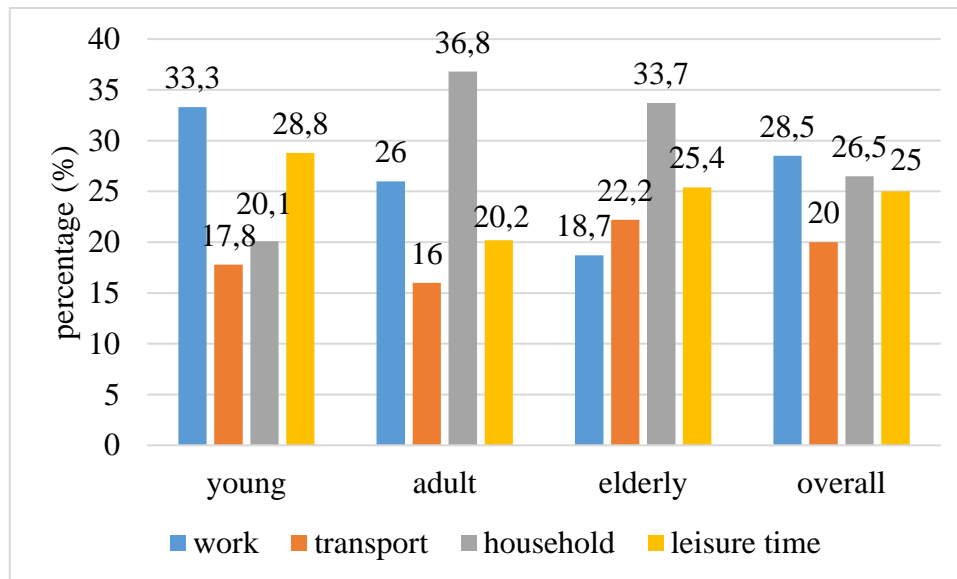
During the research, I intended to learn what characteristic features can be used to describe the physical activity of the studied population (a small town – Hajdúböszörmény). I used the national and international research results for comparative analysis, using the methodology of IPAQ questionnaires (work, transport, sports, household chores), using MET (metabolic equivalent) values (MET/min/week), introducing auxiliary variables for the successful performance of hypothesis tests. During the analysis of the results obtained, I considered the natural and economic geographical features of the settlement, which can fundamentally influence the physical activity of the inhabitants and give a special character to their physical activities.

Figure 1 well illustrates the distribution of moderate (MPA) and high intensity (VPA) activities across age groups. (The value of motor vehicle transport is not included in any of these categories, because its value is 1.3 MET (MET<3).) Young people and adults are characterized by moderate to high-intensity physical activity in approximately 2/3 to 1/3 ratio. In the elderly age group (somewhat surprisingly) the ratio shifts, and more emphasis is placed on VPA forms of exercise, which is mainly due to the high rate of intensive outdoor (household) work typical of the elderly, which is related to the characteristics of the settlement.



**Figure 1: The ratio of components of physical activity for different age groups and the overall sample, based on the intensity of activity (N=878)**

Source: own compilation



**Figure 2: Distribution of different types of physical activity for different age groups and the overall sample (N=878)**

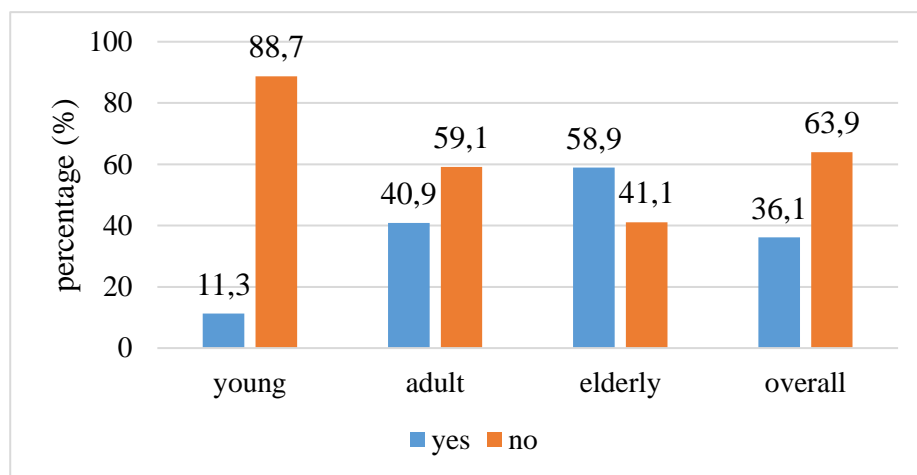
Source: own compilation

Figure 2 shows how the ratio of physical activity components changes by age. Work-related activity decreases with age. In terms of transport, adults were expected to show the lowest activity (greater role of motor transport) and elderly people (also due to underdeveloped public transport) prefer walking and cycling. Household-related activity is most important for adults and the elderly, while leisure activities are most important for young and elderly people. These results meet prior expectations.

Looking at sitting time, it can be concluded that young people of secondary school age spend most of their time sitting, which can clearly be explained by the time spent at school, but I also have to consider the negative effects of the "homo sedens" lifestyle described earlier. This is verified by the data on weekends, as members of the younger age group spend the most time sitting during this period as well. This fact can have a long term negative impact on students' fitness status. The time adults spend sitting is lower, which can be explained by the nature of work and lifestyle factors (ways of spending leisure time). The lowest sitting value for elderly people is seemingly contradictory, but if I compare it with the level of household related activity (indoor and outdoor) (33.6% of total activity) and the characteristics of the settlement (mostly houses with gardens), it turns out that elderly people spend a significant part of their free time in the household, which reduces the time spent sitting.

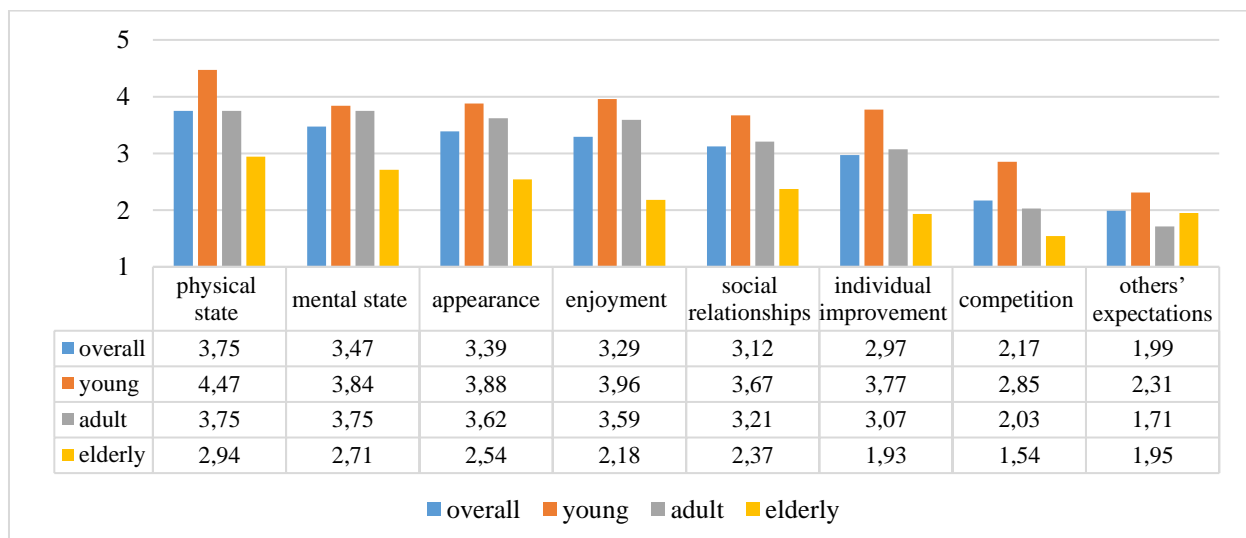
If I compare the responses of the three age groups (Figure 3) to the question of whether they had been ill in the past year, it is clear that young people have the highest proportion of those who were not ill in the previous year. For the adults, this ratio becomes more even, and in the case of the elderly, the trend is reversed, i.e., more people were sick than those who did not have any disease.

Crosstab analysis identified a significant association between different age groups and changes in health status ( $p < 0.05$ ). Increasing age is associated with a significantly higher rate (Figure 3) of deteriorating health status ( $\gamma = 0.492$ ).



**Figure 3: The development of diseases in different age groups in the year before the survey, in Hajdúböszörmény (N=878)**

Source: own compilation



**Figure 4: The strength of intrinsic motivational factors for sport and leisure activities in different age groups, in Hajdúböszörmény (N=878)**

Source: own compilation

In the case of physical activity types, recreational sports are of paramount importance, as they have the strongest health-protecting effect. I was able to identify statistically remarkable relationships for all eight motivational factors (Figure 4). For each factor, inverse proportionality characterised the relationship between the increase in age and the influence of certain motives. In the case of individual development, there is a strong negative relationship ( $\gamma=-0.624$ ), i.e., this factor becomes less motivating with age. Ageing has a strong influence on the need to develop individual skills and abilities. According to these, a significant part of the elderly in Hajdúböszörmény do not see the point in acquiring new competences related to exercising. In the case of enjoyment/experience ( $\gamma=-0.556$ ), competition/rivalry ( $\gamma=-0.515$ ), appearance ( $\gamma=-0.487$ ), social relationships ( $\gamma=-0.436$ ) and improvement of physical state ( $\gamma=-0.423$ ), moderately strong negative relationships can be identified, although this last motif plays an important role in all three age groups. The motivating power of the psychological state also decreases among the elderly compared to other age groups ( $\gamma=-0.320$ ). The weakest negative relationship is characteristic of the others' expectation factor ( $\gamma = -0.169$ ), which can be explained by the fact that both the oldest and the youngest feel a similarly strong desire to conform to extrinsic influences.

Our **first objective** was to explore the differences between the physical activity of different age groups among the inhabitants of a small Hungarian town, Hajdúböszörmény.

**H1:** *With increasing age, the amount of physical activity decreases in the population of Hajdúböszörmény.*

In order to prove the first hypothesis, the strength of the linear relationship was investigated as a function of age and physical activity MET/week. I identified a significant relationship between MET/min/week and age ( $p<0.05$ ), the value of the Pearson correlation coefficient ( $r=-0.07$ ) indicates a weak negative relationship, i.e., the amount of physical activity decreases with age. If the components of physical activity are examined separately, the strongest negative relationship is characteristic in the field of work ( $r=-0.156$ ) and the weakest negative relationship in the case of household-related activity ( $r=-0.005$ ). It may seem surprising at first that there is a weak positive relationship in the case of transport ( $r=0.078$ ). There is also a weak positive relationship for household chores ( $r=0.05$ ). So, **my first hypothesis has been confirmed**, i.e., increasing age is associated with lower levels of physical activity.

Our **second objective** is to explore the differences between the inhabitants of a Hungarian town, Hajdúböszörmény, when examining physical activity by gender.

**H2:** *The level of physical activity of boys and men is higher than that of women in the population of Hajdúböszörmény.*

Comparing the averages of MET/min/week, women achieved higher activity levels (M=4040 MET/min/week) than men (M=3400 MET/week). In terms of types of physical activity, only in the field of work do men have a higher average than that of women. With the help of variance analysis, the differences between the averages of MET/min/week in men and women were examined. A significant relationship ( $p < 0.05$ ) was identified between the overall MET/min/week values and gender. Also among all activity components except work. The impact magnitude indicator indicates a weak positive relationship, which is strongest for overall and transport ( $\eta^2 = 0.012$ ). Our **second hypothesis** regarding overall physical activity **has not been confirmed**, i.e., women's activity levels are significantly higher than men's. Among the components of physical activity, however, men are more active than women when it comes to work, which may explain lower activity levels in other areas.

My **third objective** was to explore the motivational background of each age group in the sample examined.

**H3:** *The motives for physical activity at different generational levels differ in the sample studied, and extrinsic motives are more important for younger people, while intrinsic motives are more important for elderly people.*

In this case, rank correlation calculation was required, which belongs to nonparametric procedures. For each of the eight motives examined (individual development, physical state, mental state, social relationships, appearance, others' expectations, enjoyment/experience, competition/rivalry), I obtained results suggesting a significant relationship. The Spearman correlation coefficient shows exclusively negative values ( $r = -0.525$  to  $-0.160$ ), that is, with increasing age, the overall motivation level associated with movement decreases. The strongest negative relationship is typical for individual development (learning new forms of movement, perfecting known forms of movement) ( $r = -0.525$ ), while the weakest negative relationship is characteristic of the others' expectations ( $r = -0.160$ ), i.e. extrinsic feedback plays a relatively important role even in older age. It seems logical that the role of competition/rivalry is low ( $r = -0.432$ ), which is a negative phenomenon, that enjoyment/experience indicates an even stronger negative relationship between age and motivating force ( $r = -0.494$ ), i.e., with increasing age, the essence of exercising (experience, pleasure) loses its significance to a great extent. In the case of appearance, the strong negative relationship is not taken for granted ( $r = -0.423$ ), but it can rather be explained by the previously fixed – and difficult to change – approach.

It is also worth analysing the interaction of motivational factors with the help of rank correlation calculation, which always indicated a significant relationship. In all cases, the performance of the test showed a positive relationship, of which the improvement of physical state and improvement of the mental state showed outstanding values ( $r = 0.676$ ). This suggests that the majority of respondents think about the importance of exercising in a complex way and have adopted the "sound mind in a sound body" approach. There is also a strong relationship between the importance of individual development and the improvement of physical state ( $r = 0.583$ ), i.e. proper physical preparation of the body is essential for motor development. The motivating power of individual development is also positively related to enjoyment/experience ( $r=0.555$ ) and the motivating power of competition/rivalry ( $r=0.481$ ). According to them, an important condition of the process of individual development is to bring enjoyment to the individual exercising, and according to the respondents, comparison with others is considered a measure of development. For those who find compliance with others motivating, competition ( $r=0.419$ ) and appearance ( $r=0.324$ ) are also motivating. These categories can clearly be classified as elements of extrinsic determination. All but one of the enjoyment/experience factors have a moderately strong positive relationship with the other factors ( $r=0.509$  to  $0.555$ ), except for compliance with others ( $r=0.283$ ), i.e., exercise is not performed for the sake of extrinsic factors, but for the enjoyment of physical activity. I performed cluster analysis (Table 1) on my sample to form distinct groups based on the motivations of physical activity.

**Table 1: Clusters formed based on the influencing power of motivational factors of physical activity, regarding the population of Hajdúböszörmény (N=878)**

motivational factors (value of strength: between 1-5, where 1=not at all motivational, 5=fully motivational)	<b>„moderately motivated – functionality- preserving, autonomous individuals”</b>  (N=396)	<b>„having strong intrinsic and extrinsic motivation – adventurous individuals”</b>  (N=265)	<b>„barely motivated – functionality- salvaging individuals”</b>  (N=217)
individual improvement	3,08	4,06	1,40
physical state	3,86	4,44	2,25
mental state	3,68	4,20	1,91
social relationships	3,32	4,08	1,56
appearance	3,50	4,35	1,79
others' expectations	1,75	2,87	1,36
enjoyment/experience	3,39	4,49	1,64
competition/rivalry	1,85	3,49	1,12

Source: own compilation

The three clusters have specific characteristics. Members of the first cluster ("moderately motivated – functionality-preserving, autonomous individuals") are characterized by medium or stronger motivational values, except for competition/rivalry and others' expectations. This suggests that extrinsic determination (expectations, comparison with others) is rejected by the members of the category, preserving their autonomy. The fact that the highest value was achieved in improving physical and mental state suggests that the members of the group are most motivated to exercise by maintaining their health and thus physical and mental functions. Members of the second cluster ("individuals with strong intrinsic and extrinsic motivation - seeking experience") generally have a high level of motivation, among which the importance of enjoyment/experience, improvement of physical state and appearance stand out. The others' expectations and the competition/rivalry are lower in this case as well, but these factors are still the most decisive in this category. Members of the third cluster ("barely-motivated – functionality-salvaging") have generally low motivation levels. In their case, the main motive of physical activity was the improvement/preservation of physical state, while the second highest value was taken by the improvement/preservation of the psychological state. These results clearly suggest that the individuals belonging to the cluster only strive to maintain physical and mental functions at a lower level.

A significant relationship between the formed clusters and age was identified after performing the crosstab analysis ( $p < 0.05$ , Cramer's  $V = 0.386$ ). In the first cluster, adults (45.4%), young people (61.6%) in the second cluster, and elderly people (66.3%) in the third cluster are of higher proportion than expected, so in the case of the second and third clusters, the role of age is clearly the most important; but adults are also overrepresented in the first cluster.

**Table 2: Strength of motivational factors for sports and leisure activities for different age groups (N=878)**

	Age group	N	Mean Rank
<b>Individual development</b>	young	302	586,64
	adult	313	457,46
	elderly	263	249,17
<b>Physical state</b>	young	300	529,32
	adult	313	453,71
	elderly	263	316,80
<b>Mental state</b>	young	300	482,44
	adult	313	502,11
	elderly	263	312,68
	young	302	540,68

<b>Social relationships</b>	adult	313	452,54
	elderly	263	307,80
<b>Appearance</b>	young	302	538,70
	adult	313	480,17
	elderly	262	274,89
<b>Other's expectations</b>	young	302	505,83
	adult	313	381,22
	elderly	263	432,69
<b>Enjoyment/experience</b>	young	302	555,72
	adult	313	485,52
	elderly	263	251,28
<b>Competition/rivalry</b>	young	302	567,38
	adult	313	418,23
	elderly	263	317,98

Source: own compilation

Table 2 shows the results of the Kruskal-Wallis test, which showed a significant relationship ( $p < 0.05$ ) for all factors. It is clear that members of the elderly generally have lower motivation levels compared to other age groups, whose members have the lowest values for all eight factors. It is also apparent that adults achieve a higher mean rank than young people only when improving their mental state. In the case of young people, individual development, improvement of the mental state in adults, and others' expectations in the case of the elderly reached the highest mean rank. It is clear from this that future goals are decisive for young people, balanced functioning (body-mind harmony) is most important for adults, and extrinsic determination is most important for the elderly.

So my **third hypothesis was partially confirmed**, because I identified a significant relationship between age and motivation level. However, I did not find a significant relationship between age and types of motivation (extrinsic, intrinsic).

In my **fourth objective**, I examined how the current level of physical activity affects the objective and subjective health status of the groups studied.

**H4:** *Higher levels of physical activity are associated with better health indicators and health perception in all age groups, compared to inactive members of the same age group in the sample studied.*

As for the fourth hypothesis, it was necessary to examine the answers to several questions in the questionnaire. The respondents' answers to the *yes/no* question asked about their diseases developed in the past year and the MET/min/week values were compared with a crosstab analysis, during which a significant relationship was found ( $p < 0.05$ ). The strength and direction of the relationship were identified by association coefficient (Cramer's  $V = 0.965$ ), which turned

out to be a very strong positive relationship, i.e., higher activity levels clearly mean lower morbidity rates.

A surprising result occurred when comparing the findings on health perception (better, unchanged, worse) and the MET/min/week values. There is a significant relationship ( $p < 0.02$ ) between these factors, which is weak positive ( $r = 0.047$ ,  $\text{Gamma} = 0.052$ ). Based on these, it can be stated that higher MET/min/week values are associated with unchanged or deteriorating health status. The results are nuanced if I also consider that 64.7% of respondents said that their health status had not changed. Health status could be selected on a scale of 1-100. Comparing the responses with the MET/min/week values, I found a significant relationship ( $p < 0.05$ ), of which the strength and direction is very strong positive ( $\eta^2 = 0.944$ ), i.e., higher activity level is associated with a higher health perception. The paradox between the previous two questions can be resolved by considering that in one case the question concerned an interval of one year, while in the other case the question concerned the current health status. The response over a longer period of time may have been influenced by a myriad of objective (developed diseases) and subjective (long time distance, changes in emotional state) factors. When I examined the components of activity separately in relation to the current health perception, I concluded that the positive relationship between the MET/min/week value of transport and subjective health status is strongest ( $\eta^2 = 0.811$ ), the MET/min/week value of work and leisure activities indicates a moderately strong positive relationship ( $\eta^2 = 0.574$  and  $0.554$ , respectively), while the increase in the value of MET/min/week of household-related physical activity has the least influence, though positive on health perception ( $\eta^2 = 0.382$ ). These results also show that regular physical activity (walking, cycling) increases the individual's health perception, which interacts with objective health status. Moreover, the household chores provide respondents with the least recreational surplus. Thus, the **fourth hypothesis has been partially confirmed**, since there is a very strong positive relationship between the short-term assessment of health status and the level of physical activity, but in the case of long-term evaluation, a significant positive relationship cannot be verified.

My **fifth objective** was to examine which types of physical activity are more attractive to the individuals belonging in the sample.

**H5:** *Non-strenuous work-related activities, cycling around in the town, light physical work around the house, and non-strenuous leisure sports activities appear to the greatest extent among the residents of Hajdúböszörmény*

I looked at time (minutes) respondents spent on each activity on a weekly basis. Among work-related activities, walking to work reached the highest value (156.2 minutes/week – 468.6 MET/min/week), in the case of non-strenuous work this value was 89.3 minutes/week – 357.1 MET/min/week, while in the case of strenuous work it was 39.5 minutes/week – 237.1 MET/min/week. In the case of transport, walking reached the highest value (110.3 min/week – 386 MET/min/week), but in this case the standard deviation is also the highest (SD=239.7), while cycling is only the second most popular mode of transport (33.8 min/week – 229.9 MET/min/week), coupled with the lowest standard deviation (SD=105.69). The values of the median are also informative, because in several cases the deviations from the average are quite large. Regarding cycling, there are a lot of people who do not use this form of transport at all (48.6% of respondents). Meanwhile, cycling is only the second mode of transport (Me=15 minutes/week). In the case of household-related activities, working indoors (99.3 minutes/week - 397.3 MET/week) and light outdoor work (80 minutes/week – 320.3 MET/min/week) reached the highest values. Strenuous household related work is characterized by 44.8 min/week – 269 MET/min/week. Among leisure activities, walking is 76 min/week – 227.8 MET/min/week, strenuous exercise is 56.6 min/week – 453.1 MET/min/week, and light exercise is 49.9 min/week – 249.5 MET/min/week.

The **fifth hypothesis was not confirmed**, as the results did not verify my expectations.

The **sixth objective** was to investigate the different significance of physical activity components from age to age.

**H6:** *I hypothesise that for different types of physical activity (work, transport, household-related, leisure sports) there is a significant difference between the activity levels of different age groups.*

**Table 3: The importance of physical activity components for each age group (N=878)**

MET/min/week	Age group	N	Mean Rank
<b>overall</b>	young	302	531,04
	adult	313	333,46
	elderly	263	460,59
<b>work</b>	young	302	585,78
	adult	313	370,47
	elderly	263	353,68
<b>transport</b>	young	302	522,87
	adult	313	292,58
	elderly	263	518,61
<b>household</b>	young	302	460,99
	adult	313	354,92
	elderly	263	515,49

leisure-time	young	302	538,53
	adult	313	323,00
	elderly	263	464,44

Source: own compilation

In order to verify my hypothesis, I looked for significant associations between the MET/min/week values of the components of physical activity and the three age groups. The statistical test performed (Kruskal-Wallis test) showed a significant relationship in all cases ( $p < 0.05$ ).

The overall results show (Table 3) that, according to preliminary expectations, members of the young age group have the highest mean rank of MET/min/week values. This is followed by mean rank for the elderly and not for adults. If I look at the components of physical activity individually, the mean rank of young people in the case of work is higher than that of the other two age groups. The mean ranks of adults and the elderly are converging. In this case, it is also worth considering that labour market needs have opened up employment opportunities for both the young and the elderly. In the case of transport, young and elderly individuals dominate, which is due to the use of cars by adults. In terms of household related activities, elderly people achieved the highest mean rank, followed by young people and adults. In the case of leisure activities, the elderly come after the young. Adults come in last place, which is an unfavourable result for adults.

The **seventh objective** was to demonstrate that higher levels of physical activity are associated with lower individual health expenditures, i.e., inactivity is associated with an increasing burden of disease, and higher activity levels also have a positive effect on active sports consumption habits.

**H7:** *Greater physical activity is associated with lower individual health expenditures, costs related to active sports consumption is associated with higher amounts.*

As for the basis of health expenditure, I used the cost of prescription medicines. The discriminant analysis did not show a significant relationship between physical activity (MET/min/week) and medication costs.

There is also no significant relationship between MET/week values and the amount of sports expenditure. The variance analysis also revealed that sports expenditure does not affect weekly physical activity either.

A cluster analysis was performed involving four variables (monthly income, monthly medication costs, type of sports activity and belonging to an age group) (Table 4), examining

the adult and elderly groups (N=576). Income status was indicated on a scale of 1 to 6, and medication costs on a scale of 1 to 4. Two age groups were included in the analysis: adults and the elderly. And for the types of sports activities, the three choices were competitive sports, leisure sports and avoidance of sports activities.

**Table 4: Groups formed based on relationships between income, medication cost, type of sports activity and age (N=576)**

	<b>partially health-conscious – mature adults needing medical care (N=126)</b>	<b>partially health-conscious – healthy young adults (N=201)</b>	<b>inactive elderly needing medical care (N=182)</b>	<b>health conscious – healthy adults (N=67)</b>
<b>Income</b>	3,76	2,67	1,54	5,75
<b>Medication costs</b>	3,56	1,48	3,81	1,19
<b>Age group</b>	1,38	1,30	1,85	1,00
<b>Type of sports activity</b>	2,36	2,41	2,80	2,15

Source: own compilation

Four distinct groups emerged (Table 4), the first of which includes individuals with average incomes but high medication expenditure, mostly adult and doing partly recreational exercise. They form the group of "partially health-conscious mature adults". The second group included individuals with lower incomes but low medication expenditure, who mostly belong to the adult age group and are partly characterized by leisure sporting. The age group and sports habits are almost the same for the first two groups, but income as well as medication costs are much lower for the second group. I examined whether there was a significant difference between the two groups. According to the results of the study conducted within the age groups, the first group typically includes people over 40 years of age, while the second group includes adults in their 20-30s. The latter can be called "partially health-conscious young adults". In the third group, there is a clear predominance of the elderly, who have the lowest incomes and the highest medication expenditure. This group is almost entirely made up of individuals who are not engaged in any sports activities. Their group can be called "inactive elderly needing medical care." The fourth group includes the "health-conscious". Those with the highest incomes and

the lowest medication costs belong here, who do the highest proportion of recreational exercise and belong exclusively to the adult age group.

In the case of adults and the elderly, after crosstab analysis, I found a significant relationship between sporting habits and medication costs ( $p < 0.05$ ), with a moderately strong positive relationship ( $\text{Gamma} = 0.382$ ), i.e., the medication expenditure of those not exercising at all is higher than that of the residents' doing sports (competition or leisure). 70.3% of those with the highest medication costs are the non-exercising individuals.

Looking at adults and the elderly, a significant relationship between income and sporting habits can also be identified ( $p < 0.05$ ), which is moderately strong negative ( $r = -0.385$ ), which means that those who do not exercise at all have significantly lower incomes. The link between income and sport is even stronger for those doing recreational sport. It is logical, since in the case of competitive athletes it is common for the sports club to bear the entry fee, equipment and travel costs. The conditions for leisure sport must be created exclusively by the individual.

One of the questions in my questionnaire made positive and negative statements about an individual's health perception. The values of responses to negative statements were converted to form a health perception index using responses to positive statements. This index is 3.4 for the whole sample, which is in the upper third of the five-grade scale. Examining the relationship between the individual's health perception index and the degree of physical activity, I can identify a significant relationship that is weak positive ( $\eta^2 = 0.110$ ), i.e., higher activity level is associated with higher health perception.

The relationship between income and the health perception index is significant ( $p < 0.05$ ), moderately positive ( $\text{Gamma} = 0.335$ ), so higher income can contribute to an increase in subjective health perception.

In my **eighth objective**, I investigated the relationship between physical activity levels and school/work performance.

**H8:** *I hypothesise that higher levels of physical activity have a positive effect on school and work performance in the sample studied.*

The crosstab analysis showed no significant relationship ( $p < 0.05$ ) between the type of sports activity and school/work performance. As a result of variance analysis performed ( $p < 0.05$ ), there is no significant relationship between performance and total MET/min/week. In addition to the overall values, the relationships between the components of physical activity and school/work performance were examined separately, but the results of the whole sample are characterized by values above the significance level, except for work-related activity ( $p < 0.05$ ).

and  $\eta^2 = 0.026$ ). This means that the (physical) energy invested in the workplace is translated into higher workplace performance. When I did the analysis by age group, however, I could not find significant relationships. In the case of young people, the type of sports activities influences school performance ( $p < 0.05$  and  $\gamma = -0.269$ ), implying that those who do not engage in any sporting activity have lower levels of performance at school. According to the analysis carried out for MET/min/week values ( $p < 0.05$ ), there is a significant relationship between MET/min/week values for work and school performance ( $\eta^2 = 0.022$ ), as well as between MET/min/week for household chores and performance ( $\eta^2 = 0.020$ ). It is worth recalling here that vocational school students are in daily contact with the world of work, but the proportion of young people attending other types of secondary schools is high as well. Students who demonstrate diligence and perseverance at work (work, household) are likely to be able to use these qualities at school. In the case of adults, similar results were found for the type of sports activity and performance at work, although the relationship was not significant here ( $p = 0.06$ ). Overall MET/min/week values are significantly associated ( $p < 0.05$ ) with workplace performance, indicating a weak positive relationship ( $\eta^2 = 0.020$ ), i.e., higher activity levels are associated with higher work performance. When the analysis is carried out according to the components of physical activity, only for leisure activity can a significant relationship be identified ( $p < 0.05$  and  $\eta^2 = 0.019$ ). This proves that the performance of the adult population at work is influenced by leisure activities (with a recreative surplus). It is noteworthy that adults alone do not show a positive relationship between work-related activity and performance at work. It is likely that the type of work of the sample of adults (e.g., white-collar work) differs from that of the elderly and younger age groups (manual work), so leisure activities may play a greater role in increasing work performance for adults. For elderly people, the type of sporting activity does not affect how performance at work has been assessed during their employment. The variance analysis showed a significant relationship in only one case ( $p < 0.05$ ). There is a weak positive relationship between MET/min/week for household chores and performance at work ( $\eta^2 = 0.020$ ). In this case, I can draw a similar conclusion as in the case of young people, i.e., a strong commitment to work affects all spheres (household, workplace, school). **This hypothesis was confirmed**, as I found a significant (positive) relationship between school/work performance and physical activity levels for the whole sample and for each age group.

### 3.2. Economic dimension of physical activity studies

I also looked at respondents' sport-related expenditures (question 16), and on a five-grade scale, higher values were associated with higher spending willingness. Basically, people in the sample are characterised by a low willingness to spend (N=878). It is clear that respondents prefer to purchase season tickets when using different forms of exercise, which reflects economic considerations on the one hand, and on the other hand, the purchased season ticket can also act as an extrinsic motivational force for the individual. In connection with gym, "fashionable workout forms" (Zumba, aerobics, CrossFit, spinning), hiking, swimming, extreme sports, and team sports (football, basketball, handball, and volleyball), I examined the extent to which respondents would spend on these forms of exercise. The most popular form of exercise among respondents is hiking (M=2.36), while the least popular is buying a gym daily ticket (M=1.27). The latter option is completely rejected, with the highest proportion (82.8%), while the purchase of gym season tickets and hiking are supported the most (8.2%). Sports expenditure is most likely to be spent on sports equipment (M=2.36) and it has the highest overall support as well (10.3%). The average monthly expenditure related to sport (M=3.82) is between HUF 10,000-15,000 (question 15). There is no significant gender difference in active sports consumption. In all cases, there is a significant relationship ( $p < 0.05$ ) between age and active sports consumption categories, all of which are negative. The strength of the connection ranges from moderately strong to very strong. I can highlight the relationship between expenses related to team sports and age, which can be considered a logical result, since interest in team sports weakens in old age, giving way to inactivity or, in more fortunate cases, individual sports activities. Lower spending on sports equipment can be explained by decreasing income with age.

Using cluster analysis, I grouped respondents according to their sport-related expenditures. The three clusters show large differences in spending willingness (Table 5).

The extent of consumption could be indicated on a scale of 1-5, where the lowest value equalled with the lowest consumption.

It is apparent that the first category includes "zero consumers", which includes the majority of respondents (52.2%), who have the highest average age (M=52.8 years,  $SD \pm 24.9$ ) who only have expenses related to hiking and sports equipment. The latter two do not contribute to a regular increase in physical activity, since hiking is rarely done on a weekly basis. Expenditure on sports equipment (mainly clothing) only creates the conditions for active exercising, but it should also be accompanied by a sporting activity, i.e., sports equipment should be purchased for sporting activities and not exclusively as fashionable clothing.

**Table 5: Clusters based on spending willingness related to active sports consumption, for the whole sample (N=878)**

Type of active sports consumption	„zero consumers” (N=459)	„all-consumers” (N=95)	„minimal consumers” (N=324)
Gym day ticket	1,03	2,19	1,37
Gym season ticket	1,07	2,99	1,98
Fashionable workout forms day ticket	1,08	3,20	1,86
Fashionable workout forms season ticket	1,09	3,33	1,98
Swimming pool day ticket	1,15	3,22	1,62
Swimming pool season ticket	1,04	2,93	1,52
Extreme sports	1,12	3,32	1,50
Team sports expenses	1,06	3,26	1,70
Hiking	1,36	3,85	2,67
Sports equipment	1,33	4,16	3,30

Source: own compilation

The second category, "all-consumers", includes 10.9% of respondents (M=31.5 years, SD±23.1), which constitutes a significant minority within the study population. In their case, hiking and "fashionable workout forms" season ticket purchases reach the highest value, but apart from buying daily tickets for the gym, members of the group spend at a similar rate on all types. The high willingness to spend on sports equipment can be attributed to two reasons. On the one hand, they ensure comfortable and safe conditions for sports activities, and on the other hand, sports equipment is also considered as fashionable clothing. The lower value of the gym day ticket is clearly due to a rational decision made by consumers. Like other forms of exercise, gym workouts only have a positive effect in the long run, so it is worth buying a season ticket. People probably prefer to "experiment" with other activities, and they are also happy to try out one session at different training courses. In the case of swimming pools, age may explain why day tickets are more "popular" than season tickets. The purchase of swimming pool season tickets is primarily related to elderly people, i.e. they do not belong to this group. However, this assumption was not supported by the crosstab analysis. The identified significant relationship ( $p < 0.05$ ) is a moderately strong negative relationship, i.e., a higher age is associated with a lower willingness to buy swimming pool season tickets. However, by comparing the averages within the categories of season ticket and day ticket purchases, it can be shown that the highest willingness to spend is typical for those with the highest age. All these results should be interpreted in the light of the fact that the majority of respondents do not spend at all on such activities (daily ticket: 74.7%, season ticket: 81.7%).

The third group was "minimal consumers" (N=324) (M=33.2 years, SD±18.8), 36.9% of respondents. Members of this group are more willing to spend than "zero-consumers". Hiking and sports equipment are spent on the most. Among the costs of regular sports activities, expenses related to season tickets for "gym" and "fashionable workout forms" appear the most, which indicates a greater degree of financial awareness on the part of the individual.

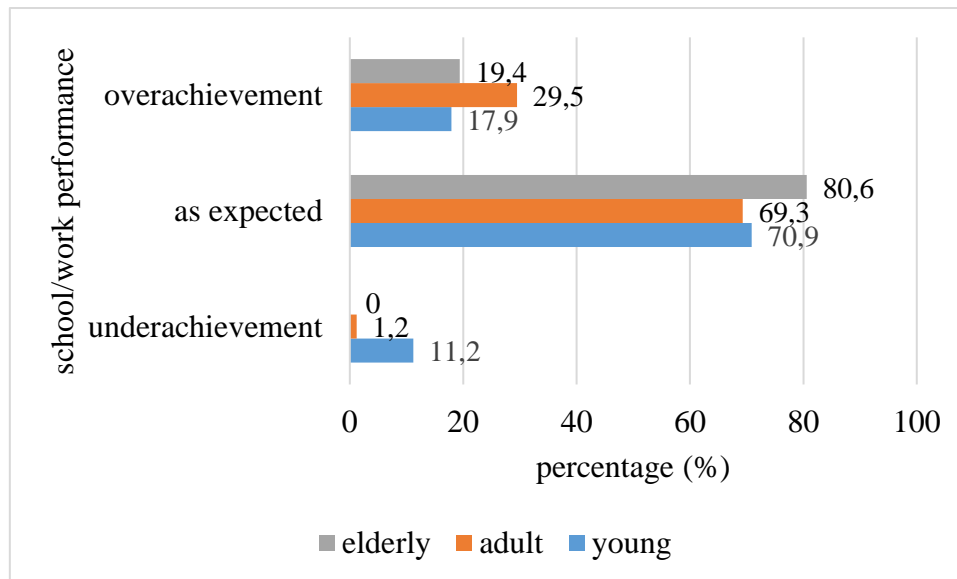
Respondents' sport-related expenses were also examined by age group. Basically, *young* people in my sample are characterized by a low willingness to spend (N=302). Respondents preferred to buy season tickets only when visiting the gym, which indicates a lack of economic consideration and uncertain sources of income. The season ticket purchased is unlikely to act as an extrinsic motivational force for young people. In connection with gym, "fashionable workout forms" (Zumba, aerobics, CrossFit, spinning), hiking, swimming, extreme sports, and team sports (football, basketball, handball, and volleyball), I examined the extent to which young respondents would spend on these forms of exercise. The most popular form of exercise among young people was hiking (M=2.34) and team sports (M=2), while the least popular was buying a gym day ticket (M=1.4). The latter option is completely rejected by the largest proportion (74.2%), while the purchase of gym season tickets (M=15.9%) and team sports as well are supported the most (15.2%). Among sports-related expenditures, sports equipment is the most likely to be spent on (M=2.99), which plays an important role in young people's lives not only because of sporting activities, but also functions as a status symbol. Full support is also highest for sports equipment (17.9%). The sports consumption expenses of this group can be estimated between HUF 5,000-10,000 per month on average (M=2).

I also looked at sport-related expenses for *adults* (N=313). In this case as well, a low willingness to spend is characteristic. Adult respondents mostly preferred to buy season tickets, which indicates economic considerations and the extrinsic motivating force of the season ticket purchased. In relation to the gym, "fashionable workout forms" (Zumba, aerobics, CrossFit, spinning), swimming, extreme sports, team sports (football, basketball, handball, and volleyball) and hiking, I examined the extent to which respondents would spend on these forms of exercise. The most popular forms of exercise among respondents were hiking (M=2.25) and "fashionable workout forms" (M=1.93), while expenses related to gym day tickets (M=1.21) and team sports (M=1.28) were the least popular. The majority of adults completely reject the purchase of swimming pool season tickets (87.5%), team sports (84.3%) and gym day tickets (83.7%). The purchase of a season ticket for "fashionable workout forms" (M=10.9%) is the most supported. Among sports-related expenditures, they prefer to spend on sports equipment (M=2.59), which plays an important role in the lives of adults not only because of sports

activities, but also partly functions as a status symbol. Sports consumption expenses are estimated at an average of HUF 10,000-15,000 per month ( $M=3.41$ ) in this group.

After examining the sport-related expenditure of *elderly* people ( $N=263$ ), it can be concluded that individuals belonging to the sample of elderly people are characterized by the lowest willingness to spend. Elderly respondents do not prefer to buy season tickets, probably due to the validity of pensioner discounts that apply to day tickets, too, and the low extrinsic motivating force of the purchased season ticket. The most popular forms of exercise among the elderly are hiking ( $M=1.67$ ) and swimming pool day ticket ( $M=1.4$ ), the average of all other forms of exercise shows a value between 1.2-1.22. The rate of rejection is over 90% for gym day tickets, "fashionable workout forms" day tickets, swimming pool season tickets, extreme sports and team sports. Among sport-related expenditure, interest in sports equipment ( $M=1.36$ ) is showing significant decline compared to other age groups. On average, sports consumption expenditures per month ( $M = 1.57$ ) are in the range below HUF 5000. I also assessed the medication expenditure of adults and elderly participants in the research (question 10) to examine the relationship between physical activity and individual spending and different types of expenditure. 41% of respondents have a medication expenditure above HUF 20,000, while 28% have a cost below HUF 5,000. I also looked at the relationship between age and income, as well as age and medication expenditure. In both cases, I found a significant relationship ( $p<0.05$ ), but while the negative relationship is moderately strong for income ( $r=-0.494$ ), it is moderately strong positive for medication expenditure ( $r=0.437$ ). In practice, this means that elderly people spend more on prescription drugs in Hajdúböszörmény while having lower incomes.

There is a significant, moderately strong negative relationship ( $\gamma=-0.426$ ) between medication expenditure and income, i.e., expenditure on prescription drugs is associated with lower income. There is a significant correlation between gender and medication costs, a weak positive, i.e., men spend more ( $\eta^2=0.07$ ) on prescription drugs, which result should be linked with the physical activity rate that women have higher activity levels than men. There is no significant relationship between gender and income.



**Table 5: Self-assessment of school/work performance for the whole sample (N=878)**

Source: own compilation

I was also interested to see how respondents judge their own school/work performance (question 22). Figure 5 clearly shows that the category of underachievement is characterised by extreme values. The youngest have the worst perception of their own performance (11.2%), while none of the elderly people thought they had underachieved at work (0%). The highest proportion of performance as expected was performed by elderly individuals (80.6%), young people (70.9%) and adults (69.3%). However, adults (29.5%) achieved the highest rates of overachievement at work, ahead of the elderly (19.4%) and young people (17.9%). This result is likely to reflect the opinion of the active, working ability layer, which may also be affected by the difficulties associated with working in the present. In crosstab analysis, I identified a significant ( $p < 0.05$ ) weak positive relationship ( $\gamma = 0.174$ ), i.e., age increase is associated with more positive performance self-assessment. These results are evaluated depending on the degree and components of physical activity.

### 3.3. Recommendations

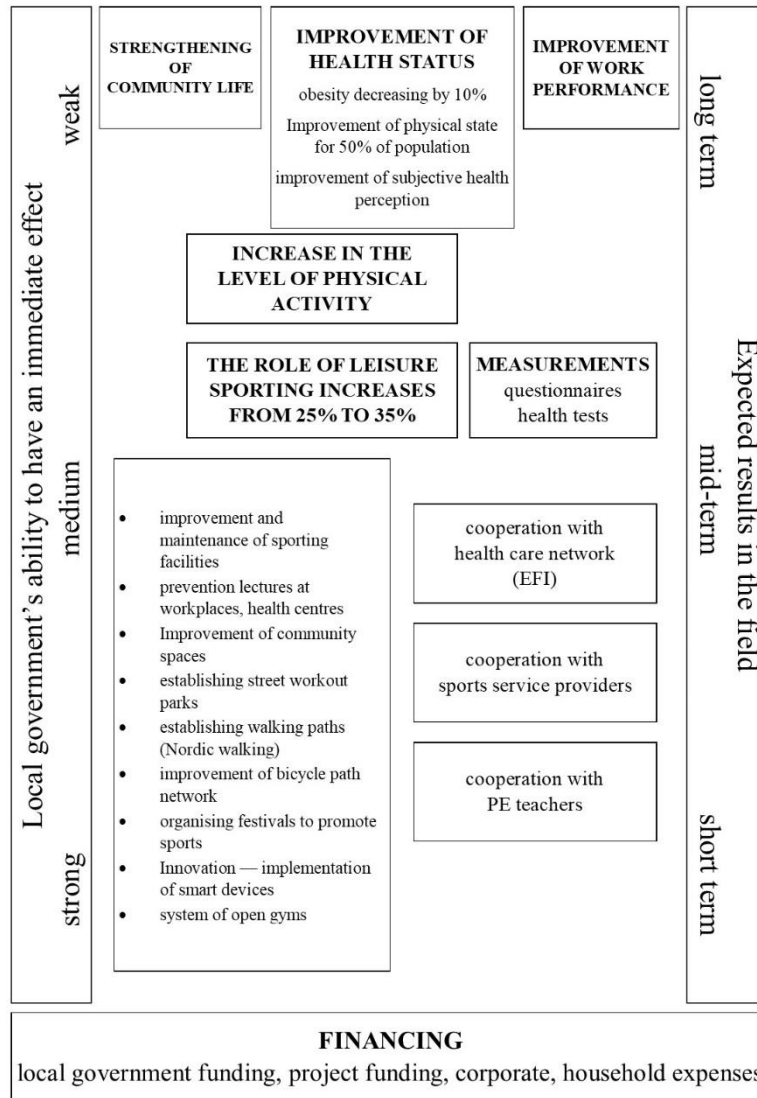
#### 3.3.1. Enumerated summary of my recommendations

1. Review and revise the urban sports concept adopted in 2009 as soon as possible, emphasising the importance of leisure sport and "lifelong physical activity".
2. Organization of urban sports services into a unified system, effective local government support for the marketing activities of sports enterprises, involving employees of the health care system and educational institutions in prevention activities.

3. Increase recreational sports facilities for all age groups, both qualitatively and quantitatively, with particular emphasis on encouraging outdoor activities.
4. Consider the characteristics of all age groups in relation to physical activity when developing measures to increase physical activity, with special attention to adults with the lowest levels of physical activity. Due to the general demographic processes, which are characteristic of Hajdúböszörmény as well, it is also crucial to preserve and improve the health status of the working-age population, one of the decisive pillars of which is to increase physical activity that provides a recreative surplus.
5. Familiarization of the existing sports infrastructure with the local population (Open Courts Day) with the involvement of professionals. Expansion of sports infrastructure, taking into consideration the natural geographical features of the settlement (development of bicycle path network, construction of hiking trails, extension of spa services).
6. Organizing tradition-creating sports festivals and joining national events.
7. Encouraging greater responsibility on the part of employers in order to improve the health status of employees (development of best practice).

### 3.3.2. Recommended solution – developing a sports strategy for the town of Hajdúböszörmény

Using strategic management methods, I prepared a sports strategy for Hajdúböszörmény, which I present in summary form with Figure 6 due to the limitations of length.



**Figure 6: A strategic plan for increasing physical activity in Hajdúböszörmény**

*Source: own compilation*

#### **4. THE MOST IMPORTANT FINDINGS, NEW AND NOVEL RESULTS OF THE DISSERTATION**

I consider the following to be the new findings of this dissertation:

1. With the help of a (gender) representative research on a settlement, I mapped the components of physical activity of the population in relation to a town characterised mainly by agricultural activity.
2. The study was carried out involving the natural geography (plain, lacking rivers) and economic geography (agricultural character, great importance of horticulture) features of the settlement.
3. I demonstrated a significant positive correlation between physical activity levels and work/school performance.
4. Based on my research results, I created a sports strategy for the decision-makers of the town of Hajdúböszörmény.

I consider the following to be my most important findings:

1. I examined the physical activity of different age groups separately and with the help of comparative analysis.
2. The intrinsic and extrinsic motivational background of physical activity was mapped both in the case of the whole sample and the age groups studied.
3. I mapped the expenditures of different age groups on active sports consumption, sports equipment and medication.

#### **LIST OF PUBLICATIONS ON THE TOPIC**

Szerdahelyi, Z. - Laoues-Czibalmos N. (2022): A fizikai aktivitást befolyásoló tényezők elemzése Hajdúböszörmény 65 év feletti lakosságának körében. *KÜLÖNLEGES BÁNÁSMÓD*, 8:3, pp. 67–76. <http://doi.org/10.18458/KB.2022.3.67>

Szerdahelyi Z. - Bácsné, B. É. (2022): Fizikai aktivitás összetevőinek vizsgálata Hajdúböszörmény felnőttkorú lakossága körében. *GRADUS*, 9:1 <http://doi.org/10.47833/2022.1.ART.001>

Szerdahelyi Z. (2020a): Characteristics of physical activity at the university of Debrecen. *APSTRACT - APPLIED STUDIES IN AGRIBUSINESS AND COMMERCE*, 14:1–2, 1. <http://doi.org/10.19041/APSTRACT/2020/1-2/15>

Szerdahelyi Z. (2020b): Egyetemi hallgatók aktív sportfogyasztási szokásainak vizsgálata. *ACTA CAROLUS ROBERTUS*, 10:2, pp. 157–169. <http://doi.org/10.33032/acr.2483>

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