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Research Topic S-4

The preventive, therapeutic and rehabilitative role of regular physical activity

THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND PHYSICAL DISABILITY IN THE CASE OF NEUROLOGICAL, MUSCULOSCELETAL AND INTERNAL MEDICINE DISEASES IN THE AGE OVER 50

Ph.D. Dissertation

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INTRODUCTION

Life expectancy at birth is increasing in the member states of the European Union (EU), including in Hungary (men: 72 years, women: 79.5 years), yet we fall short of the EU average (men: 77.9 years, women: 83.3 years). Based on 2020 data, 9% of the world's population is over 65, while in Europe this proportion is over 19% (Eurostat, 2020). As age progresses, the prevalence of a physically inactive lifestyle increases significantly (Nowak et al., 2019), it causes the death of 5 million people worldwide and is associated with the appearance of many diseases, such as cardiovascular and musculoskeletal diseases (Cunningham et al., 2020). However, the process can also be interpreted as a reciprocal factor, as an already developed disease can significantly worsen the level of physical activity (Macfartlane et al., 2017). Aging is a multifactorial and irreversible process associated with a significant decline in muscle mass and neuromuscular function. One of the most effective methods for counteracting age-related changes in muscle mass and function is exercise (Cveka et al., 2015). Inactivity is causing serious problems worldwide. In addition to a largely sedentary and sedentary lifestyle, one of the triggering factors of a passive lifestyle is the development of modern technology, which is accompanied by the narrowing of spaces for an active lifestyle and leisure activities (World Health Organization, 2020). In our country, the large majority of adults can be considered passive even during their work activities, since more than half of the population engages in sitting or standing activities (in this ratio, the activities around the house and at the home of non-workers were also taken into account) (Central Statistical Office, 2019b). In Hungary, the health status and quality of life of the population is greatly inferior compared to the developed countries of the EU. Three-quarters of Hungarians over the age of 65 suffer from some chronic illnesses (Varsányi & Vitrai, 2017), the proportion of people with disabilities is 4.9% (Central Statistical Office, 2019a). The growing average age, the sedentary lifestyle of an aging society, and the consistently increasing number of health problems and decreased mobility all put a greater burden on the healthcare system (Semsei, 2016). This justifies the creation of tests and prevention programs that help individuals live their old years in good health and well-being, actively.

OBJECTIVES OF THE STUDY

Our choice of topic was justified by the fact that a review of the currently available literature revealed that the topic of the relationship between physical activity and the physical disability of people living with various diseases is a rather neglected and less researched area. The existence of a disability provides only partial information about the health status of the affected people, as well as about possible problems related to the health status. It is therefore an important question to what extent disabled and non-disabled people are hindered by their health status during their daily activities. The aim of our study was to contribute to the easy and quick self-registration of physical activity and physical disability by validating a measurement tool adapted to the age group over 50, which can also be used in healthcare institutions. This would also be important because, despite the diseases, adequate physical activity would be important in order to avoid further, secondary problems, but people with disabilities are often not aware of their possibilities and the forms of exercise that are suitable for them. Appropriate counseling is the task of specialists, who would be helped by the existence of monitoring options that provide adequate and extensive information. Our further aim is to examine the relationship between physical activity and physical disability.

HYPOTHESIS

H1   We assume that the Hungarian version of the Health Assessment Questionnaire Disability Index (HAQ-DI) for the assessment of physical disability proves to be a reliable, valid, and good measuring tool.

H2   We assume that the Hungarian version of the Rapid Assessment of Physical Activity (RAPA) questionnaire, adapted for the over 50 age group and used for rapid assessment of physical activity, proves to be a reliable, valid, and good measuring tool.

H3   We assume that the physical activity of people with physical disabilities in Hungary is lower than that described in age-appropriate professional recommendations.

H4   We assume that the physical activity of people with physical disabilities in Hungary is lower than the values observed for Hungarian people without physical disabilities of the same age.

MATERIALS AND METHODS

Our research is presented along three main aspects: (1) on the test material of the measurement method of physical disability (HAQ-DI) and (2) of physical activity (RAPA), (3) and among the domestic population, through a study assessing these two variables.

The validation process of a physical disability assessment questionnaire

We conducted our quantitative cross-sectional validation of the questionnaire for the assessment of physical disability in Hungary between February and May 2021. Based on a non-random, purposeful/expert sample selection, patients whose medical diagnoses included poliomyelitis anterior acute (polio), rheumatological or locomotor diseases could be included in our target group. To determine the minimum size of the sample during the validation studies, in order to achieve adequate reliability, we used the tenfold multiplier of the number of items in the questionnaire as a basis (Nunnally, 1978). In order to increase the power of the study, we increased this sample size. Non-Hungarian speakers and those who filled out the questionnaire incompletely were excluded from the research. The purpose of the study was explained to all participants, and they had to fill out a written informed consent form before starting the study. The research ethics permit was issued by the Regional/Institutional Research Ethics Committee of the Markusovszky University Teaching Hospital in Szombathely, permit number: 3/2021. During the validation, participants had to fill out the Hungarian version of the HAQ-DI (Health Assessment Questionnaire Disability Index - EKFI) and the 36-Item Short Form Survey (SF-36) with the participants. Of the 438 people who filled out the data sheets, 6 people were excluded from the survey due to incomplete filling, therefore we analyzed the data of 432 people, whose average age was 55.9±13.6 years (min: 13, max: 94). The proportion of women was 76.9%. 26.1% of the sample live alone and 22% need help with self-sufficiency.

Health assessment questionnaire disability index

The HAQ is one of the first questionnaires based on self-assessment, which assessed the degree of functional status and disability (Fries et al., 1980). The questionnaire consists of 34 questions (20 questions about activities of daily living and 14 questions about the use of assistive devices), in which the area of disability is evaluated based on 8 categories (dressing, getting up, eating, walking, hygiene, reaching objects, grasping and activities), and also asks about the use of possible aids and the help of an external person. During the questions, patients report how much difficulty they have in performing two or three specific activities. The time frame for the questions is the last week. It also scores the use of the used aids and assisting persons, and the tools or comments written in the "other" section should also be taken into account if they are used for the given category (e.g. the use of Velcro on clothing should also be considered aids) (Bruce & Fries, 2003). The higher the score, the more severe the physical disability.

Questionnaire validation methodology

The questionnaire was validated according to the guidelines formulated by Beaton et al. (2000), which included the following: translation, synthesis, back-translation, pre-testing, internal consistency testing, external validation with another questionnaire, and test-retest testing. The Hungarian adaptation of the HAQ-DI was carried out by Mapi SAS Language Services, authorized by Stanford University, from whom we received permission to use the questionnaire, so we carried out the examination from the fourth step. Statistical calculations were performed with the IBM SPSS 22.0 program (IBM Corporation, Armonk, NY, United States of America). The presentation of socio-demographic characteristics of the sample is presented by means of the number of items and percentage distribution, and in the case of a continuous variable, the mean (standard deviation). The reliability of the measuring instrument was determined by the test-retest method (Intra-class correlation coefficient - ICC 95% CI) and by calculating the inter-item correlation (Cronbach's alpha coefficient). The repeatability test was performed with a group of 30 people using the test-retest method, where the time between measurements was 1 week. A Cronbach's alpha value above 0.7 was considered reliable, and an ICC value above 0.85 was considered acceptable. The Cronbach alpha value was calculated for the entire sample

and the 3 study groups. During the test-retest examination, the ICC coefficient was calculated for the EKFI total score and the 8 subscales. with 36 questionnaires and Visual Analog Scale (VAS) values. During the study, Spearman's rank correlation analysis was performed, where the value of the "r" correlation coefficient was considered weak below 0.3, medium between 0.3-0.6, and strong above 0.6. Our results were considered significant at $p < 0.05$.

The validation process of a physical activity questionnaire

During the validation of the RAPA questionnaire for rapid assessment of the physical activity of the over-50 age group, we conducted our cross-sectional study in Hungary between November and December 2020. The formation of our target group was based on a non-random, targeted/expert sample selection in the over-50 age group. In order to determine the minimum size of the sample, in this case as well, we used a factor of ten times the number of items in the questionnaire (Nunnally, 1978). Non-Hungarian speakers, dementia patients, amputees, and individuals living in wheelchairs were excluded from the research. The purpose of the study was explained to all participants, and they had to fill out a written informed consent form before starting the study. The research ethics permit was issued by the Regional/Institutional Research Ethics Committee of the Markusovszky University Teaching Hospital in Szombathely, permit number: 28/2020. During data collection, participants filled out two questionnaires with the participants, the long version of the International Physical Activity Questionnaire (IPAQ-H) (Ács et al. 2020b) and the Hungarian version of the RAPA (Topolsky et al., 2006) (Rapid Physical Activity Assessment Questionnaire - FAGYÉK). 222 people participated in the research (159 women and 63 men), and their average age was 61.08 ± 7.9 years (min: 50 years, max: 90 years). 51.4% of the respondents are currently active workers and less than half, 48.6%, are retired. 87% of the participants (194 people) indicated that they already have some form of disease. We found a significant correlation between the FAGYÉK total score and neurological diseases (p=0.032), and testicle and prostate problems (p=0.044).

Rapid assessment of physical activity questionnaire

In 2006, the American Tari Topolski, working at the University of Washington, and her colleagues developed the RAPA questionnaire for the rapid assessment of the physical activity of the over-50 age group in the spirit of ease of use and interpretation. The questions of the nine-item questionnaire range from a sedentary lifestyle to regular and vigorous physical activity, as well as from strength training to flexibility exercises. The instructions for completing the questionnaire are based on a brief description of the three levels of physical activity (light, medium and vigorous), with graphic and textual representations helping to assess the type of activities belonging to each category, so it can even be used as a health education tool (Alqahtani & Alenazi, 2020). It takes a maximum of 5 minutes to complete. The score obtained by the respondent can be classified into one of five physical activity levels (Table 1). The second part of the questionnaire (RAPA 2) also assesses strengthening and stretching training habits, which are important for reducing the risk of falls and maintaining independent living. Another advantage of the questionnaire is that it is easy to understand thanks to its wording at the sixth-grade level, so it can also be completed by people with cognitive disorders.

Category	Description / amount of physical activity	Duration	Points
(1) Sedentary lifestyle	Very rarely or never does physical activity	Rarely/never	1
(2) Less active	All *light* or moderate physical activity	Not every week	2
(3) Performs regular, light activity	Performs *light* physical activity regularly	Every week	3
(4) Less, but regularly active	*Moderate* physical activity every week	30 min/day ↓ 5 days/week↓	4
	Vigorous physical activity every week	20 min/day↓ 3 days/week↓	5
(5) Regularly active	*Moderate* physical activity every week	30 min/day↑ 5 days/week↑	6
	Vigorous physical activity every week	20 min/day↑ 3 days/week↑	7

Table 1: Categories of physical activity based on the RAPA questionnaire

Questionnaire validation methodology

The RAPA questionnaire was translated into Hungarian based on the consultation with the original author, while its validation was carried out according to the guidelines formulated by Beaton et al. (2000), similar to the validation methodology of the EKFI questionnaire. As part of the translation process, the English questionnaire was first translated by a lay translator with no medical knowledge or a physiotherapist. By comparing the versions obtained in this way, a synthesis was created, which was translated back into English by an independent translator. For the final version, international harmonization was carried out with the available multilingual versions. The resulting final questionnaire was pretested on a group of 32 people over the age of 50. Originally, the questionnaire was compared with the Community Healthy Activities Model Program for Seniors questionnaire, which is not yet available in our country, so we chose the IPAQ-H questionnaire for external validation. Descriptive and mathematical statistics were used in the statistical calculations. The data were entered into the Microsoft Excel program and analyzed with the IBM SPSS 22.0 program (IBM Corporation, Armonk, NY, United States of America). To present the quantitative data, we calculated the mean and median. The internal consistency of the questionnaire was assessed by calculating Cronbach's alpha value. The repeatability test was performed with a group of 32 people, using the one-week test-retest reliability, and during the statistical analysis, we calculated the intraclass correlation coefficient (ICC). To examine the sensitivity and specificity of the FAGYÉK questionnaire, we calculated negative and positive physical activity values from the results of the IPAQ-H and FAGYÉK questionnaires. FAGYÉK received a positive evaluation with a total score above 5 and moderate-intensity activities above 150 minutes. Our results were considered significant at $p < 0.05$.

Survey of the domestic population

 Questionnaires assessing physical activity (FAGYÉK, IPAQ-short version (IPAQ-R)) and degree of physical disability (EKFI) on online interfaces, in various Facebook social and patient groups (e.g. Rheumatoid Arthritis Hungary, Heine-Medin Klub/polio, Bechterew klub Hungary, etc.) was filled out based on a non-random, targeted/expert sample selection of the over 50 age group (N=531) through advertising. The research was

conducted in Hungary between January 2021 and May 2022. In addition to the questionnaires, we assessed socio-demographic factors (age, gender, education, occupation, living environment), and made a comparison with the World Health Organization (WHO) recommendation for physical activity and the average physical activity values of people of the same age group in Hungary. The statistical calculations (descriptive and mathematical statistics) were analyzed with the IBM SPSS 22.0 program, a one-sample T-test was used for the comparison, and our results were considered significant if $p < 0.05$. Inclusion criteria included the completion of the consent form required for participation in the research and the presence of at least one chronic disease (which has existed for at least 3 months) in the field of musculoskeletal, neurological, or internal medicine. Foreign citizenship was considered an exclusion criterion. The subjects of the sample were classified into 3 groups based on their defining disease: musculoskeletal (MO) (N=215), neurological (NE) (N=164,) and internal medicine (BE) (N=152) diseases.

RESULTS

Health assessment questionnaire disability index validation results

The results of the internal consistency test of the questionnaire

The reliability of the questionnaire was examined using Cronbach's α values. The figures show that the EKFI is reliable, the questions correlate well with each other for the entire sample (Cronbach's α =0.912).

The results of the test-retest study

The reliability of the questionnaire was also examined using the test-retest method, which was calculated by determining the Spearman correlation coefficient. Its value ranged between 0.858 and 1, which shows a suitable correlation between the two measurements.

Results of the correlation study of the EKFI and the SF-36 questionnaire

The correlations between the two questionnaires and the validity of the EKFI were analyzed using Spearman's rank correlation test. In addition to the total score of the EKFI

questionnaire, we also compared the values of the 8 subscales with the values of the SF-36 and VAS scales. The correlation coefficient showed a moderate correlation with all variables of Physical functioning and EKFI, only the dimension of eating and grasping indicated a weaker-than-average relationship. The total score of the EKFI also showed a moderate correlation with four of the 8 dimensions of the SF-36 questionnaire, as well as with the intensity of the pain ($r \geq 0.51$).

Elements of FAGYÉK	Intraclass Correlation	95% CI		
		lower	upper	p
„I rarely or never do any physical activities."	0.844	0.680	0.924	<0.001
„I do some light or moderate physical activities, but not every week."	0.686	0.358	0.847	<0.001
„I do some light physical activity every week."	1.000	1.000	1.000	
„I do moderate physical activities every week, but less than 30 minutes a day or 5 days a week."	0.936	0.870	0.969	<0.001
„I do vigorous physical activities every week, but less than 20 minutes a day or 3 days a week.."	0.921	0.839	0.962	<0.001
„I do 30 minutes or more a day of moderate physical activities, 5 or more days a week."	0.922	0.839	0.962	<0.001
„I do 20 minutes or more a day of vigorous physical activities, 3 or more days a week."	0.916	0.827	0.959	<0.001
„I do activities to increase muscle strength, such as lifting weights or calisthenics, once a week or more."	1.000	1.000	1.000	
„I do activities to improve flexibility, such as stretching or yoga, once a week or more."	1.000	1.000	1.000	
FAGYÉK total score	0.996	0.992	0.998	<0.001
FAGYÉK 2	1.000	1.000	1.000	

CI= Confidence interval; FAGYÉK=RAPID Assessment of Physical Activity Questionnaire; ICC = intraclass correlation coefficient

Table 2 Test-retest reliability results of the Rapid Assessment of Physical Activity Questionnaire using intraclass correlation coefficient (N = 32)

Validation results of a rapid assessment of physical activity

Sample characteristics

The average total score of the sample calculated on the basis of the FAGYÉK questionnaire was 5.51 ± 1.55 (min: 1, max: 7), the average value of FROST 2 was 1.15 ± 1.25 (min: 0, max: 3). 65.8% of the participants can be classified as active, i.e., they perform 30 minutes or more of moderate or 20 minutes of strenuous physical activity 5 or more times a week for 3 or more days. More than 50.5% of respondents (112 people) do not do any strength or flexibility training, and only 21.2% (47 people) do both types of training regularly.

Examination of the reliability of the FAGYÉK questionnaire

Based on the results of the internal consistency test, the reliability of the questionnaire can be considered a reliable measuring tool (Cronbach's alpha=0.584). The reliability was further tested using the one-week test-retest method (N=32 people), which was analyzed by calculating the intraclass correlation coefficient (Table 2). The result obtained based on the total score was 0.996 (95% CI 0.992–0.998), which can be interpreted as very good reliability. The result exceeded 0.6 for all 9 items of the questionnaire.

Criterion validity of FAGYÉK

We analyzed the correlations between the FAGYÉK and the IPAQ-H questionnaires using Spearman's rank correlation test, which was used to examine the validity of the FAGYÉK. The two questionnaires showed a significant correlation, with a moderate correlation (r=0.542, p<0.001). The second half of the FAGYÉK, which includes strength training and flexibility items, assumes a certain but weak relationship (r=0.251, p<0.001), i.e., the higher the value of the IPAQ-H, the higher the physical activity of the affected persons should be evaluated based on the FAGYÉK questionnaire as well. We found a negative but weak correlation between FROST 2 and age (r=-0.182, p<0.001) and BMI (r=-0.305, p<0.001). The "r" values indicated that convergent and discriminant validity were acceptable.

Sensitivity, specificity, and predictive values

FAGYÉK showed good sensitivity and positive predictive value. The sensitivity and specificity of FAGYÉK were 84.71% and 56.25%, respectively. The positive predictive value is 82.61% and the negative predictive value is 60.00%.

Correlations between physical disability and physical activity based on a survey of the domestic population

Regarding the entire sample, the average age of the respondents (531 people) was 61.64±7.73 years (min-max: 50-94). 52.4% of the NE group are old-age pensioners, while the majority of the members of the MO (54%) and BE (53.3%) groups are still active workers. The majority of subjects in the examined sample were women (75%). 92.1% of the NE group suffered from poliomyelitis anterior acute, 10.4% indicated stroke, and 7.3%

discus herniation as the main disease. The majority of the MO group suffers from rheumatological symptoms (rheumatoid arthritis to the greatest extent), orthopedic (18.1%), and traumatological problems (4.2%) were also mentioned to a lesser extent. Diseases of the heart, vascular system (44.7%), digestive system, and endocrine (17.8-17.8%) dominate in the BE group. To the greatest extent, members of the NE group (37.2%), least among members of the BE group (6.6 %) need help with their self-sufficiency. 36.6% of the NE group live in a wheelchair. Based on the comparison with the recommendations proposed by the WHO (Table 3), the time of minimal intensive activity was lower by -6.8% (p>0.05) in the MO group, and by +37.2% (p>0.05) in the BE group <0.05) outperformed. The average number of minutes per week spent in intensive activity of the NO group falls short of the minimum recommendation by 52% (p<0.05). Compared to the maximum recommended 150 minutes/week of intense activity, all three groups showed a significant delay (p>0.05). Although the moderate activity can be characterized to a greater extent in the case of all three groups, in the case of the NE and BE groups, the average values did not show a significant difference compared to the lower level of expectation (p>0.05), and the MO group showed a lag of 10.08% compared to this value (p=0.001). The three subgroups showed a lag between -44.8 and -55.4% compared to the maximum recommended moderate activity (p<0.05). Looking at the entire sample, it can be said that there is a -8.2% shortfall compared to the minimum recommendations and a -54.1% shortfall compared to the maximum. In the case of moderate activity, these values decreased to -0.3 and -50.2 %.

		Group			
		NE	**MO**	**BE**	**Total**
IPAQ-R min/week	*Intensive*	35,98±53,91	69,86±58,02	102,93±86,94	68,84±71,17
WHO min	*75 min/week p*	**0,000**	0,195	**0,000**	
WHO max	*150 min/week p*	**0,000**	**0,000**	**0,000**	
IPAQ-R min/week	*Moderate*	155,30±86,99	133,75±72,19	165,72±115,18	149,42±91,60
WHO min	*150 min/week p*	0,436	**0,001**	0,094	
WHO max	*300 min/week p*	**0,000**	**0,000**	**0,000**	
IPAQ-R min/week	*Walk*	61,55±71,87	56,44±48,27	131,05±121,77	79,38±88,41
	Total	352,84±140,45	206,05±122,23	399,70±280,01	297,65±54,91
	Seat	542,07±245,99	450,98±135,14	450,26±130,206	
MET/week	*Intense physical activity*	251,83±377,39	489,02±406,13	720,49±608,56	
	Moderate physical activity	621,82±347,98	535,00±288,76	662,89±460,71	
	Walk	203,13±237,16	186,26±159,28	432,47±401,83	
	Total	1076,18±637,92	1210,28±607,73	1815,86±1239,01	

BE=Group of people with internal medicine diseases; MET=metabolic equivalent; MO= group of people with locomotor diseases; NE= group of people with neurological diseases; IPAQ-R= International Physical Activity Questionnaire short version

3. table: Comparison of the physical activity of the three different disease groups with the WHO recommendation (N=531)

The physical activity values we obtained were compared according to the individual subgroups with the average values of the Hungarian population of the same age. The comparison was based on the results of Pongrác Ács (2020, 2021), assessed before/during the periods of the epidemic wave of COVID-19. Based on the pre-epidemic data, we found that NE and MO group members between the ages of 50 and 69 (for both sexes) spent intensive physical activity (NE: between -27% and -79%, $p<0.05$; MO: - between 29% and -78%, $p<0.05$) and time spent walking (NE: between -67% and -79%, $p<0.05$; MO: between -59% and -78%, $p< 0.05$) was significantly lower. In terms of moderate activity, women under the age of 60 (NE: 64%, MO: +17%, $p<0.05$) surpassed the studied

population. In the area of intensive activity, MO female group members aged 60-69 proved to be more active than their age group by 29% ($p < 0.05$). The BE group had almost the same physical activity compared to the reference data, we observed better intensive activity in the female (+95%, $p < 0.05$) and male (+95%, $p < 0.05$) members of the 60-69 age group. Based on the data collected during the third epidemic wave, almost the same intensity was shown in the case of the NE group, women between the ages of 60 and 69 were intensive; between the moderate intensity of women and men aged 50-59 and the moderate intensity of men aged 60-69 and the reference values. Among the members of the MO group, the intensive and moderate activity of men aged 60-69 showed no significant difference between the data, and only the moderate activity of women aged 60-69 (+39%, $p < 0.01$) significantly exceeded the 2021 Hungarian population data. In the case of the BE group, there was a difference in the intensive (+124%, $p < 0.05$) and moderate (+69%, $p < 0.05$) physical activity of women aged 60-69 compared to the average values of domestic women of the same age. On the other hand, the moderate activity of the BE group in the 50-59 age group (women: -35%, men: -33%, $p < 0.05$) is significantly lower. All three groups showed significant delays in the time spent walking, with reference to the period before and during the epidemic.

DISCUSSION

Validation of a physical disability assessment questionnaire

The most important result of the study shows that we received a valid and reliable (Cronbach 0.912) questionnaire for assessing the degree of physical disability. The questionnaire was validated on the Hungarian population. The EKFI questionnaire expands the range of self-completed questionnaires in Hungarian for the assessment of physical disability. Until now, in Hungary, we have not had a validated, self-completed questionnaire in Hungarian that comprehensively assesses the degree of disability. It is recommended to base medical decisions only on questionnaires with a Cronbach's alpha value above 0.9, which was met for the Hungarian version of the HAQ-DI (0.91), so it can be characterized with adequate reliability. The questionnaire proved to be a valid measuring instrument, with a medium correlation coefficient with the total score and some subdimensions of the SF-36 questionnaire used for external validation.

Validation of a physical activity assessment questionnaire

The FAGYÉK questionnaire is the first self-completed questionnaire in Hungary, which was developed specifically for the over-50 age group. During our validation study, the questionnaire proved to be a reliable (Cronbach 0.584) and valid (r=0.542, p<0.001) measurement tool.

Physical activity of people with disabilities according to the WHO recommendation and in domestic comparison

The physical activity index of people with disabilities has not been assessed at the national level. Among the three different patient groups, the EKFI results of those with neurological diseases showed a significant lag compared to the other two groups (1.35±0.76, p<0.001). Compared to the WHO recommendations for physical activity, the intensive activity of the NE group was between -39.02 and -114.02 minutes/week (p<0.01), while the MO group significantly lagged behind in terms of both activity levels (max: -53.4 %, moderate min-max: -10.8 and -55.4%, p<0.05). Despite their severe disability value, the NE (+3.5%, p>0.05) group reached the minimal, moderate level of 150 minutes/week, while the values of the right BE group members were significantly lower (-44, %, p<0, 05). The results show that the entire sample reaches the minimum recommendations, however, based on group breakdown, the NE and BE groups did not reach the lower limit of the recommendation, and none of the groups reached the upper limit, so in these cases our assumption was confirmed. However, all three groups significantly fell short of the lower, recommended upper limit of moderate activity for the MO group, so our hypothesis was only partially confirmed with regard to moderate activity. Based on a comparison with the most recent domestic data (Ács, 2020, 2021), a high degree of underperformance in intensive activities and walking is evident in the case of the NE and BE groups (p<0.05). In the case of those with internal medicine problems, our hypothesis was confirmed on the basis of moderate activity. However, in the case of the intensive and moderate activity of the over 60 age group, our assumption was not confirmed, because despite the physical limitations, it seems that they make up for their lack of activity due to the disadvantages with a greater degree of moderate activity.

INTERPRETATION OF THE NEW RESULTS

Up until now, there has been little opportunity for a quick, questionnaire-based self-assessment of physical disability that can also be used in clinical settings, and thus it has not become a proven practice in Hungary. With the domestic validation of the EKFI, we found a reliable tool (Chronbach $\alpha = 0.912$) for assessing and evaluating the degree of disability, and the effectiveness of clinical interventions on Hungarian patients and the improvement in quality of life achieved through them became easily measurable and comparable from the patient's point of view. Another novelty of our study is that we used a measurement tool (FAGYÉK) that assesses the strengthening, - and stretching training habits of the older generation, which has not been used in our country until now, to explore the physical activity patterns of people over 50, at the same time we examined the social, demographic and health-related factors also the effect of factors on individual forms of physical activity. It also has the advantage that it can be used for educational purposes and as a kind of incentive through simple, easy-to-interpret diagrams. Physical disability and physical activity are closely related, but the examination of their interactions is unusual in this diploma thesis. The results highlighted the poor functional status of neurological patients, including a large proportion of polio patients (EKFI: 1.35; min-max: 0-3), those suffering from locomotor diseases had moderate (EKFI: 0.74; min-max: 0- 2.75) and the minimal functional deficits of people with internal medicine problems (EKFI: 0.36; min-max: 0-1.50). The obtained results can contribute to and form the basis of some future research on disability and can be a step forward for the adequate determination of recommended and appropriate physical activity in the case of certain diseases. The data of Hungarian disabled people became comparable to the WHO's physical activity recommendation for disabled people, which I believe will help to promote adequate and adequate physical activity among people with physical disabilities, as well as the even greater expansion and promotion of the domestic parasport movement. Although the obtained results only partially confirmed our hypothesized lack of activity for all patient groups, it is still noteworthy that the results obtained show that people suffering from various diseases just reach the minimum physical activity recommendations (+3.5% and 10.5%, $p>0.05$), while the upper limit is not even approached (between -31.4 and 76%, $p<0.05$). Those suffering from neurological (39.98 minutes/week of intense activity) and

locomotor diseases (133.75 minutes/week of moderate activity) significantly fall short of the lower limits of the recommendation. The comparison with domestic data shows a more nuanced picture, where the lagging of the NE and MO groups in terms of intensive activity and walking is also striking, but the older people reported surprisingly good activity in the field of moderate activity, which cannot be said for the average Hungarian population.

ACKNOWLEDGMENT

LIST OF PUBLICATIONS

Related to the topic of the dissertation

Original article

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