



# Assessment of Physical Activity Level in Adults with Intellectual Disabilities - Users of Habilitation Programs

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## Abstract

Beside health benefits, the impact of physical activity on individuals with intellectual disabilities is evident in all the spheres of life, such as psychological, social and cognitive development. The goal of this research was to examine the physical activity level in persons with intellectual disabilities, who are users of habilitation programs.

Thirty-six parents of persons with intellectual disabilities participated in the study. An appropriate sample was used in referential centre's and associations caring for persons with intellectual disabilities older than 21 years of age. We used the International Physical Activity Questionnaire (IPAQ) to evaluate the physical activity and Personal Wellbeing Index (PWI) for quality of life.

The results show that the total level of physical activity in persons with intellectual disabilities, evaluated by their parents and expressed through MET-minutes/week, is high (M=3434.7). No differences were found with regard to gender and the intellectual disability category. Quality of life estimated by the parents was positively correlated with the inclusion of persons with intellectual disabilities into a physical activity.

This study gives insight in the physical activity level of persons with intellectual disabilities and implicates the importance of their inclusion in various centre's for rehabilitation and occupational activities.

**Keywords:** Persons with intellectual disabilities; Physical activity; Quality of life

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## Introduction

The assessment of the level of physical activity in the population of people with intellectual disabilities, deemed as "adults" as based on their chronological age, is an important indicator of the achieved level of the habilitation and rehabilitation process. Research showed that people with Intellectual Disabilities (ID) have significantly lower levels of physical activity compared to the general population [1-3]. A systematic review of physical activity in children living with intellectual disability has shown that they are significantly less active compared to children without disabilities and following the transition from childhood to young adulthood, the involvement in various forms of physical activity decreases [4]. In their study, Barnes et al. [1] found physical activity in individuals with intellectual disabilities to be under the level of the general population and found the higher prevalence of obesity in people with intellectual disabilities. Other authors have also confirmed that this group has a higher risk of developing diabetes, high blood pressure, cardiovascular diseases and obesity [5-7]. Robertson et al. conducted a study on 500 people with intellectual disabilities and found that 80% to 93% of them were physically inactive [8]. The biggest problem was the long periods of time spent in sedentary activities, which increased the risk of developing a disease associated with inactivity [8,9].

There is extensive health promotion efforts aimed to improve physical activity in the general community, but relatively poor efforts are made to improve participation in physical activity among people with ID [10]. Some authors think that those efforts should focus on not only specific interventions but also on the inclusion of people with ID in mainstream interventions [10]. The participation of this part of the population in an organized form of sport activities gives important health information that determines the further course of the rehabilitation process. Stanish et al. pointed out that people with intellectual disabilities want to be included and will persist in some physical activity if given a chance [11]. One of the steps towards the improvement of their health

**Table 1:** Socio-demographic characteristics of participants (persons with ID).

	f	%
<b>GENDER</b>		
Male	23	63.9
Female	13	36.1
<b>CATEGORY OF COGNITIVE IMPAIRMENT</b>		
Mild intellectual disability	14	38.9
Moderate intellectual disability	13	36.1
Severe intellectual disability	1	2.8
Profound intellectual disability	1	2.8
<b>OTHER DISABILITIES</b>		
Physical disabilities	12	33.3
Hearing impairment	1	2.8
Visual impairment	6	16.7
No other disabilities	12	33.3
<b>USE OF A HANDICAP DEVICE</b>		
Yes	2	5.6
No	33	91.7

**Table 2:** Sport activities in persons with intellectual disabilities.

	f	%
<b>INCLUSION IN SPORT ACTIVITY</b>		
Included	16	44.4
Not included	19	52.8
<b>PLACE OF INCLUSION IN SPORT ACTIVITY</b>		
Organized kinesiology as a part of the association/centre	10	27.8
Sports club	5	13.9
<b>THE LEVEL OF INCLUSION IN SPORT ACTIVITY</b>		
Recreational	11	30.6
Competitive	5	13.9

behavior is certainly ensuring that parents, caregivers and other persons involved in caring for people with intellectual disabilities have enough knowledge, skills and sources of support to encourage a healthy lifestyle. Although the information about the importance of physical activities to health may alone not be sufficient to encourage them to change their health behavior, it is very important that people with intellectual disabilities perceive the benefits of physical activities. Considering their possible lack of sufficient skills or the ability to understand how to exercise safely, they may experience physical activity as too difficult. For this reason, it is important to include experts who would modify certain activities for specific user groups. Currently, kinesiologists in the Republic of Croatia are involved in the framework of reference centres and, if necessary, physical therapists are involved in the formation of a program for the inclusion of people with intellectual disabilities in organized forms of physical activities. In addition, the main organization that deals with the implementation of specific sports and recreational activities for people with intellectual disabilities is the Croatian National Sports Federations of the Special Olympics.

Small number of studies in Croatia deals with the assessment of physical activity in young adults with intellectual disabilities who are users of rehabilitation centre's and associations. Therefore, the objectives of this study were:

**Table 3:** Levels of physical activity (IPAQ) for persons with intellectual disabilities.

	N	Min.	Max.	M	SD.
<b>MET</b>	36	160	8868	3434.74	2437.199
<b>MET walking</b>	36	0	6720	973.33	1511.313
<b>MET moderate</b>	36	0	5040	811.67	1199.356
<b>MET high</b>	36	40	8316	1649.74	1551.657

**Table 4:** Categorical scores for IPAQ.

CATEGORY	f	%
LOW LEVEL <600 MET	4	11.1
MODERATE LEVEL 600-3000 MET	14	38.9
HIGH LEVEL >3000 MET	18	50.0
OVERALL	36	100

1. To examine the level of physical activity of young adults with intellectual disabilities, users of habilitation programs in Zagreb,

2. To examine the relation between socio-demographic characteristics and the levels of physical activity in the studied population,

3. To examine the correlation between the estimated quality of life by parents and the inclusion of people with intellectual disabilities in physical activities.

## Methods

### Participants

The sample consisted of a total of 23 men and 13 women with Intellectual Disabilities (ID) who were older than 21 by their chronological age without an associated psychiatric diagnosis. The information on the general characteristics of children with intellectual disabilities was given by their parents (Table 1).

The average age of the persons with intellectual disabilities was 35 years (SD=7.07), the youngest participant being 24-years-old and the oldest 49-years-old. Considering the degree of intellectual disability, the majority of subjects belonged to the category of light, 38.9%, and moderate intellectual disability, 36.1%. Most of the participants had no other problems (33.3%) and of those who cited the existence of other problems along with intellectual, physical problems were the most represented (33.3%). Two study participants used motoric aids daily.

### Measuring instrument

To assess the level of physical activity of adults with intellectual disabilities the short version of the International Physical Activity Questionnaire (IPAQ, 2005) was used [12]. IPAQ questionnaire was developed by researchers from 16 countries at the congress held in Geneva in 1997, with the goal of standardizing the measurement of physical activity [13]. The IPAQ questionnaire was a frequently used instrument in numerous studies whose results confirmed that the measuring characteristics are satisfactory. In the IPAQ questionnaire the level of physical activity is estimated as the sum of time (minutes) and frequency (days in a week) spent in each activity or domain [12].

Calculating the overall result includes summarizing the duration (in minutes) and frequency (in days) of activities for all types of activities in each of the domains. Calculating the results in a particular domain requires summarizing the values calculated for walking,

moderate intensity physical activity and high intensity physical activity in that category. The estimated level of physical activity may be compared to the anticipated norms for the test population in order to design a strategy to improve the level of physical activity of the studied population [14]. In this study, a validated Croatian version of the questionnaire was used.

To assess the quality of life of people with intellectual disabilities the Personal Wellbeing Index (PWI, Cummins et al., 2003) was used [15]. The parents evaluated the quality of life of their children on a scale between 0 and 10 in response to the question: "How satisfied are you generally with the life of your child/person with intellectual disabilities you care for?" For the assessment of the quality of life of people with intellectual disabilities, the adapted version of the PWI was used, which is intended for persons with intellectual disabilities or with other forms of cognitive impairment (Personal Wellbeing Index Intellectual Disability, PWI-ID) [16]. In order to adjust the application of questionnaires for people with intellectual disabilities, the authors' term "satisfaction" in the PWI's for adults was replaced by the term "happiness". The version of the scale for people with intellectual disabilities used simpler language in shaping claims and some claims were modified. In this study a scale with three faces was used, where faces are subsequently added to numbers (0 - sad, 1- neither sad nor happy, 2 - happy). The use of the scale was carried out with the help of employees in the centre or the association where the testing was conducted. The results obtained in both questionnaires were transformed to obtain a total score range from 0 to 100 with the higher scores indicating a greater degree of satisfaction with life [17].

## Procedure

The survey was carried out from the beginning of September 2013 to December 2014. The implementation of the research was approved by the referent centre's and associations for the care of people with intellectual disabilities over the age of 21 in the City of Zagreb and the Zagreb County. All subjects were informed on the purpose of the research and all participants voluntarily agreed to participate in the research. There was an ethical consent for the parents and children that participate in this research. Subjects' anonymity was guaranteed by coding the questionnaires. Parents of the persons with intellectual disabilities evaluated the level of physical activity (IPAQ) and quality of life of their children ("How satisfied are you generally with the life of your child/person with intellectual disabilities you care for?"). Persons with Intellectual Disabilities also evaluated their quality of life (PWI). The guidelines were at the beginning of the questionnaire. The time necessary for the completion ranged between 20 min and 30 min. The user database of the centre's was the basis for the selection of the study population. Given that this was a population of people with intellectual disabilities and in order for them to understand the task and fill in questionnaires, data was collected by a structured interview with parents or caregivers. The draft and the process of research was designed and made in accordance with the general principles of human research.

## Results

### Participation in sport activities

In order to get information on the physical activity of people with intellectual disabilities, we gathered information on sports activities, as presented in (Table 2). In our study, almost a half of the subjects were involved in sport activities, mostly organized through associations or centre's for the rehabilitation of people with intellectual disabilities,

**Table 5:** Descriptive for levels of physical activity related to sport activities.

INCLUSION IN SPORT ACTIVITY		N	M	SD
MET	Included	16	4054.22	1789.773
	Not included	19	2976.37	2870.057
THE LEVEL OF INCLUSION IN SPORT ACTIVITY		N	M	SD
MET	Recreational	8	3457.50	1133.529
	Competitive	4	6036.00	369.735

**Table 6:** Descriptive for IPAQ scores regarding other disabilities of persons with intellectual disabilities.

Other disabilities	N	M
Physical disabilities	12	1915,83
No other disabilities	12	4323,37
Visual impairment	6	5431,00

while other subjects were not involved in sport activities. Most of the subjects were involved in recreational sports activities, and only a small number in competitive sports.

To answer the first objective of our research, which was to examine the level of physical activity of adults with intellectual disabilities, we showed the basic descriptive parameters of total MET-minutes/week result achieved in the IPAQ questionnaire (Table 3).

According to the results obtained in this study, the overall level of physical activity of people with intellectual disabilities, expressed through MET-minutes/week, was high (M=3434.7). The highest level of physical activity was obtained for walking.

If the results obtained from the IPAQ are expressed in categories according to the level of physical activity of participants, we may see that 50% of people with intellectual disabilities fall into the category of high-level involvement or "HEPA" active (Health Enhancing Physical Activity). This indicates that their quantity of physical activity is sufficient for a healthy lifestyle and has positive effects on their health (Table 4).

### The Link between Socio-Demographic Characteristics, the Quality of Life and the Level of Physical Activity of Adults with Intellectual Disabilities

To answer the second objective of the research, we examined whether there were statistically significant differences in the level of physical activity due to socio-demographic characteristics of the test sample. The differences with regard to gender ( $t = -0.474$ ;  $p = 0.639$ ) and the category of intellectual disabilities ( $t = 0.012$ ;  $p = 0.991$ ) were not significant.

The results of the t-test showed that there were no statistically significant differences in the assessment of the level of physical activity in adults with intellectual disabilities, depending on their involvement in sport activities ( $t = 1.302$ ;  $p = 0.2$ ). If we look at the average values, we may see that those involved in sport activities had higher levels of physical activity, but there was a great variability present in the group not involved in any sport, which may partially explain this result (Table 5).

Given the level of involvement in sport activities, there was a statistically significant difference ( $t = -4.342$   $p = 0.001$ ). Based on average values, we may conclude that adults with intellectual disabilities involved in competitive sports had higher levels of physical activity in relation to the experimental group involved in

**Table 7:** Quality of life (PWI) evaluated by parents and persons with intellectual disabilities.

	N	Min.	Max.	M	SD
PWI children	35	64.29	100.00	89.18	11.409
PWI parents	36	20.00	100.00	63.33	20.284

**Table 8:** Correlations between MET (IPAQ) and quality of life (PWI, by parents and persons with intellectual disabilities).

		MET	PWI children	PWI parents
MET	r	1	0.283	0.359
	p		0.099	0.032
	N	36	35	36
PWI children	r		1	0.051
	p			0.772
	N			35
PWI parents	r			1
	p			
	N			36

\*p&lt;0.05

some recreational form of sport activities (Table 5).

The analysis of variance showed that there was a difference in the level of physical activity due to the presence of other problems of people with intellectual disabilities ( $F=8.280$ ;  $p=0.002$ ). Post hoc analysis (Scheffe test) showed that people with physical disabilities had a significantly lower level of physical activity compared to the group which did not have additional problems ( $p=0.017$ ) and the group with visual difficulties ( $p=0.004$ ) (the average values are shown in (Table 6).

In order to gain insight into how adults with intellectual disabilities assess their quality of life, we calculated the average values of the customized version of the Index of Personal Well-Being (Table 7).

According to the results obtained in this study, people with intellectual disabilities achieved better results than the expected normative range achieved by the healthy population and they evaluate their quality of life as better than the estimations of their parents.

In accordance with the third set goal, we examined the relation between the parents' estimation of the quality of life of people with intellectual disabilities and the involvement of people with intellectual disabilities in physical activities. In addition, we analyzed the relation between self-assessment of the quality of life of people with intellectual disabilities and the level of their physical activity. There was a positive correlation between the quality of life estimated by parents and the inclusion of people with intellectual disabilities in physical activity. The self-assessment of the quality of life was not associated with the level of physical activity (Table 8).

## Discussion

The measuring instrument, such as the IPAQ, has proved to be insufficiently sensitive and applicable for the observed population in this research, given that the assessment of physical activity was carried out with the help of parents and caregivers of people with intellectual disabilities. Also, the obtained high values indicate that the results should be confirmed with some objective measures for an accurate determination of the level of physical activity in this

population. Dairo et al. [18] in their review state that between 0% - 46% of persons with ID met specified physical activity guidelines measured with different measurement tools, with 46% in study using IPAQ. In further research, it would be necessary to assess the level of physical activity with the help of an accelerometer, pedometer and the measurement of the body mass index. This would provide objective measurement of physical activity and not depend on the memory of people with intellectual disabilities or their caregivers on the amount of physical activity during the day or a week [19]. Although, objective tools as accelerometer protocols play an important role in the measurement of physical activity levels in this population, lack of standardized protocols enables comparing results across studies [20].

The application of the questionnaires a challenge if applied to people with intellectual disabilities because of their difficulties in cognitive functioning and difficulties with attention, memory, generalization and communication, [19]. For this reason, information about the physical activity in this study was collected from parents or caregivers. Keeping a diary or regular recording of everyday activities by parents or staff who work directly with people with intellectual disabilities is demanding, but gives more insight into the type and the duration of physical activity [9].

Health promotion, physical activity and the practice of a healthy diet are the basic components of habilitation programs carried out by educational rehabilitators, occupational therapists, physiotherapists and kinesiologists. As a part of the program with expert guidance, people with intellectual disabilities are actively involved. High scores in the overall assessment of physical activity of the studied population may be explained by the fact that all the subjects were users of centre's and associations for rehabilitation and work activities of people with intellectual disabilities. As much as 50% of people with intellectual disabilities in this study had a level of physical activity, which may be described to have a significant benefit for their health. Cartwright et al. [21] state three barriers that hindered service users with intellectual disabilities from regular physical activity: acceptance of an inactive lifestyle by careers, restriction on activity due to paid career preferences and resource limitations, communication issues between family careers and paid careers.

In addition, it should be noted that although 52.8% of subjects were not included in sport activities, their average performance on MET-minutes/week were satisfactory and showed an appropriate level of physical activity. The results of the t-test showed that there were no statistically significant differences in the level of physical activity in adults with intellectual disabilities depending on their active involvement in sport activities. This may partly be attributed to great versatility in the group of people who were not involved in sports. Given the level of involvement in sport activities, it was understood that the persons doing sports, especially those who participate in competitions, had higher levels of physical activity, which the analysis demonstrated. Significant differences in the level of physical activity due to the category of intellectual disabilities were not observed, although it was indicated by the results of some previous studies [3]. Very few studies have explored physical activity levels in people with more severe ID [22]. In this study, we also had only 5.6% people with more severe ID. There were no gender differences, which is in concordance with majority of studies on physical activity among adults with ID [23]. If we consider the average value of walking and activities of medium and high intensity, we may see that these variables contributed the most to the high-total MET-minutes/week result in this sample.

From these results we conclude that physical activity in this population is an important therapeutic agent and the central point in defining a plan and a rehabilitation program to be applied in the centre's and associations for people with intellectual disabilities. The research results indicate that difficulties, such as physical or visual disability in people with intellectual disabilities, affect the inclusion of this population in an organized form of physical activities. People with multiple disabilities, such as people with cerebral palsy who, along with intellectual disabilities, also have physical, visual or hearing disability, are not sufficiently involved in organized physical activities. Using a technology-aided program (monitoring responding and ensuring preferred stimulation and encouragements) for promoting physical activity with severe/profound intellectual and multiple disabilities was shown to be successful [24]. These results are a key starting point for the development of strategies for improving the program of physical activity. Currently in Croatia there is the FUN fitness program organized by the Croatian Special Olympics that allows people with multiple impairments to engage in sport activities. The goals of the FUN fitness program are athletic activities, not focused only on competition but also on promoting and raising the public awareness of the need to support people with intellectual disabilities with multiple impairments. In this sample, we obtained that most people involved in a sports activity are most frequently engaged in swimming, followed by bowling. Most of them actively practice only one activity, while some of them practice two or even more sports activities.

In this study, parents have also evaluated the quality of life of their children by answering the question "How satisfied are you generally with the life of your child/person with intellectual disabilities you care for?" There is positive correlation between the estimated quality of life of people with intellectual disabilities and the inclusion of people with intellectual disabilities in sport activities. Parents and caregivers of people with intellectual disabilities are the most important prerequisite for ensuring and determining the quality of life of the child. It has to be taken into consideration that population with intellectual disabilities has witnessed a dramatic increase in life expectancy and that support by family as young adults grow older won't be always available [25,26]. Therefore, a strategy for successful ageing with intellectual disability is to focus on modifiable and preventable conditions that have been found to be predictors of successful ageing in healthy older adults like exercise and health education [27]. The inclusion of people with intellectual disabilities in physical activities significantly determines the quality of life of parents and the whole family. The self-assessment of the quality of life for people with intellectual disabilities was not sufficiently reliable. Subjects gave a very high estimate, which is in line with the results of some studies that also show that this population has a tendency of giving high assessment of satisfaction with their life and health [28]. As it was concluded in discussion of methodological issues in measuring different areas of functioning in adults with intellectual development, this population represents a great challenge for investigators [29]. Due to the reduced self-criticism and their environment, the self-assessment of people with intellectual disabilities was not a sufficiently reliable and valid way of assessing the experience and behavior in this population.

### **Advantages and Disadvantages of the Study**

This research provides guidelines for further research related to physical activity and the quality of life of adults with intellectual disabilities in the Republic of Croatia. The research also contributes

to the assessment of the level of physical activity of adults with intellectual disabilities who are users of reference centre's and associations for rehabilitation and work activities of people with intellectual disabilities. The practical value of this work is the specificity of the sample of individuals who belong to a population of people with intellectual disabilities and are young adults based on their chronological age. Also, this study points out the importance of the development of habilitation and rehabilitation intervention models of the population of people with intellectual disabilities, with the ultimate goal of achieving a better quality of life for individuals and their families.

Methodological shortcomings are related to a small and convenient sample of people with intellectual disabilities and the used measuring instrument. In future research it may be necessary to include people with intellectual disabilities from a wider area of the Croatian territory and those who are not users of reference centre's and associations for rehabilitation and work activities, also taking into account the residents of non-urban areas. By doing longitudinal studies, we could examine the changes in level of physical activity of people with intellectual disabilities through time, the factors affecting the inclusion of the study population in organized physical activities, as well as gather useful information on the link between physical activities included, physical health and the quality of life. In this study, the application of the IPAQ questionnaire showed insufficient sensitivity in the assessment of the level of physical activity in the tested population. Therefore, in future studies the evaluation of physical activities should be conducted by using an accelerometer or pedometer and the measurement of body mass index. All data collected are based on self-assessments and do not necessarily reflect objective results, which represents a methodological problem in the interpretation of the collected data.

### **Conclusion**

In accordance with the set objectives in this study, it was found that the overall level of physical activity of people with intellectual disabilities, expressed through MET-minutes/week, is high although there are no differences considering their involvement in sports activities. No differences were noticed with regard to gender and the category of intellectual disability in the level of physical activity. People with physical disabilities have significantly lower levels of physical activity compared to the group with no additional problems and a group with visual impairment.

People with intellectual disabilities assess their quality of life higher than expected by a normative range achieved by a healthy population and better results compared to those of their parents. In conclusion, this study found a positive correlation between the estimated quality of life of people with intellectual disabilities by their parents and the level of physical activity of people with intellectual disabilities. These results confirm the importance of inclusion of this population in organized physical activities in order to increase the overall quality of life and health of people with intellectual disabilities, as well as their families.

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### **References**

1. Barnes TL, Howie EK, McDermott S, Mann JR. Physical Activity in a

- Large Sample of Adults with Intellectual Disabilities. *J Phys Act Health*. 2013;10(7):1048-56.
2. Temple VA, Frey GC, Stanish HI. Physical Activity of Adults With Mental Retardation: Review and Research Needs. *Am J Health Promot*. 2006;21(1):2-12.
  3. Emerson E. Underweight, obesity and exercise among adults with intellectual disabilities in supported accommodation in Northern England. *J Intellect Disabil Res*. 2005;49(Pt 2):134-43.
  4. Hinckson EA, Curtis A. Measuring physical activity in children and youth living with intellectual disabilities: A systematic review. *Research in Developmental Disabilities*. 2013;34(1):72-86.
  5. Hutzler Y, Korsensky O. Motivational correlates of physical activity in persons with an intellectual disability: a systematic literature review. *J Intellect Disabil Res*. 2010;54(9):767-86.
  6. Draheim CC. Cardiovascular Disease Prevalence and Risk Factors of People with Mental Retardation. *Ment Retard Dev Disabil Res Rev*. 2006;12(1):3-12.
  7. Rimmer JH, Yamaki K. Obesity and Intellectual Disability. *Ment Retard Dev Disabil Res Rev*. 2006;12(1):22-7.
  8. Yanardag M, Arıkan H, Yılmaz I, Konukman F. Physical fitness levels of young adults with and without intellectual disability. *J Appl Res Intellect Disabil*. 2016;29(1):93-8.
  9. Temple VA, Walkkley JW. Physical activity of adults with intellectual disability. *J Intellect Dev Disabil*. 2003;28(4): 342-52.
  10. Brooker K, van Dooren K, McPherson L, Lennox N, Ware R. A systematic review of interventions aiming to improve involvement in physical activity among adults with intellectual disability. *J Phys Act Health*. 2015;12(3):434-44.
  11. Stanish HE, Frey GC. Promotion of physical activity in individuals with intellectual disability. *Salud Publica Mex*, 2008;50(2):178-184.
  12. International Physical Activity Questionnaire (IPAQ). Scoring protocol/online/ 2005; Dostupna.
  13. Ainsworth BE, Macera CA, Jones DA, Reis JP, Addy CL, Bowles HR, et al. Comparison of the 2001 BRFSS and the IPAQ physical activity questionnaires. *Med Sci Sports Exerc*. 2006; 38(9):1584-92.
  14. Jurakić D. Taksono mskekarakterist ikezapole nikasrednje dobikaosno vaizrades portskor rekreacijskih programa. Doctoral Thesis. University of Zagreb, Kinesiological Faculty. 2009.
  15. Cummins RA. Developing a national index of subjective wellbeing: the Australian unity wellbeing index. *Social Indicators Research*. 2003;64:159-90.
  16. Lau ALD, Cummins RA. Test-retest Reliability of the Personal Wellbeing Index. [dissertation]. The Hong Kong Polytechnic University; 2005.
  17. International Wellbeing Group. *Personal Wellbeing Index*. 5<sup>th</sup> ed. Melbourne: Australian Centre on Quality of Life, Australia, Deakin University; 2013.
  18. DairoYM, Collett J, Dawes H, Oskrochi GR. Physical activity levels in adults with intellectual disabilities: A systematic review. *Prev Med Rep*. 2016;8;4:209-19.
  19. Temple VA, Stanish HI. Physical activity and persons with intellectual disability: some consideration for Latin America. *Salud Publica Mex*. 2008;50(2):185-93.
  20. Leung W, Siebert EA, Yun J. Measuring physical activity with accelerometers for individuals with intellectual disability: A systematic review. *Res Dev Disabil*. 2017;67:60-70.
  21. Cartwright L, Reid M, Hammersley R, Walley R. Barriers to increasing the physical activity of people with intellectual disabilities. *Br J Learn Disabil*. 2016;45(1):47-55.
  22. Bossink LWM, van der Putten AAJ, Vlaskamp C. Understanding low levels of physical activity in people with intellectual disabilities: A systematic review to identify barriers and facilitators. *Res Dev Disabil*. 2017;68:95-110.
  23. Gerald L, Earle Hahn J. Self-Reported Health Status Predicts Physical Activity in Adults with Intellectual and Developmental Disabilities. *Novel Physiotherapies*. 2014;4(2):1000204.
  24. Lancioni GE. Promoting physical activity in people with intellectual and multiple disabilities through a basic technology-aided program. *J Intellect Disabil*. 2016;1-12.
  25. Wagner Jakab A, Dumančić Z, Sačar K. Challenges of Aging of Persons with Intellectual Disabilities. *Croatian review of rehabilitation research*. 2016;52(2):73-82.
  26. Van Schijndel-Speet M, Evenhuis HM, van Wijck R, van Empelen P, Echteld MA. Facilitators and Barriers to Physical Activity as Perceived by Older Adults With Intellectual Disability. *Intellect Dev Disabil*. 2014;52(3):175-86.
  27. Reppermund S, Trollor JN. Successful ageing for people with an intellectual disability. *Curr Opin Psychiatry*. 2016;29(2):149-154.
  28. Crnković I, Rukavina M. Sport and improving the quality of life with disabilities. *Croatia reviaarea rehabilitation research*. 2013;49(1).
  29. Crnković I, Rukavina M. Evaluation of the activity of adults with intellectual disabilities. *Knjigasažetaka 1st Conference of Healthcare Professionals*. Zagreb University of Health Sciences. 2016; 137.