education sciences

MDPI

Article

Physical Activity and Health-Related Quality of Life in Adults from Braşov, Romania

Georgian Bădicu

Department of Physical Education and Special Motility, Faculty of Physical Education and Mountain Sports, University Transilvania from Braşov, 500068 Braşov, Romania; georgian.badicu@unitbv.ro

Received: 4 April 2018; Accepted: 16 April 2018; Published: 17 April 2018

Abstract: (1) Background: This study aims to investigate the association between different levels of physical activity (PAL) and health-related quality of life (HRQoL) in a random sample of the adult population; (2) Methods: The study material comprised 1100 adults of the city of Brasov, Romania (700 men, 400 women), aged 30–45 years old. We used the short version of the International Physical Activity Questionnaire Short Form (IPAQ-SF) and Short-Form Health Survey (SF-36) to assess PAL and HRQoL, respectively; (3) Results: The differences in the number of respondents in groups assessing their HRQoL differently and PA were statistically significant ($p < 0.001$), both among men and women. The PAL was shown to be positively correlated with the adult HROoL domains; (4) Conclusions: Our results confirm that the highest PAL values were associated with more favorable scores in HRQoL dimensions among the adult population.

Keywords: physical activity; quality of life; adults

1. Introduction

Physical activity (PA) and exercise can have immediate and long-term health benefits. Research shows that regular PA can help reduce your risk for several diseases and health conditions and improve your overall quality of life (Qol). Regular PA can help protect from the following health problems: heart disease and stroke, obesity, osteoporosis, back pain, arterial hypertension, sarcopenia, and type 2 diabetes. Researchers have also noted positive effects of PA on mental health, such as stress alleviation [1], the improvement of perceived health condition and self-esteem [2], the reduction of anxiety and depression levels [3], or the improvement of enough sleep [4].

QoL is a multidimensional subjective construct that is hardly defined and systematized and thus of complex operationalization. QoL is conceptually defined as an individual's perception of his/her stand in life within a socio-cultural context with regards to their goals, expectations, standards, and concerns [5]. It is related to personal well-being and includes several aspects such as health, leisure, personal satisfaction, habits, and lifestyle [6].

Promoting PA has become one of the top public health priorities [7–9]. From previous cross-sectional studies, data show that PA is related to HRQoL [10].

From a public health point of view, PA also plays an important role in health-related quality of life (HRQoL), which is defined as the personal sense of well-being in physical, mental, and social domains of life [11].

The quality of life (Qol) is limited by the level of physical, psychological, and social health, with all three influencing one another [12]. HRQOL is a multidimensional construct that covers physical, psychological, and social health, and hence represents the overall health of an individual. Health-related quality of life (HRQOL) has been increasingly used as a health outcome among adults to assess their physical and social functioning, mental health, and well-being, and to evaluate population-based intervention programs.

Estimates of the relationship between HRQoL and particular health states have served as inputs for economic evaluations intended to inform resource allocation decisions [13]. From a public health perspective, a better understanding of how healthy lifestyles, such as the uptake of PA, can influence HRQoL might help to inform policy intended to stimulate PA in the general population [14].

Other research has analyzed the relationship between HRQoL and PA [15–21].

Research on the relationship between HRQoL and PA, to date, has rarely investigated how this relationship differs across objective and subjective measures of PA.

A systematic review showed that the few studies that have attempted to address this gap in knowledge, found a positive association between HRQoL and PA. The limited evidence base is, however, considered weak as the studies have methodological issues with respect to the measurement of PA [10,22]. The studies mainly used subjective (self-reported) measures of PA without adequate validation. Some commentators argue that regardless of appropriate validity and reliability tests, the use of subjective measures of PA is subject to overestimation.

In Braşov, sports activities are very rare, and the citizen's quality of life is modest. There are an insignificant number of sports actions aimed at leisure, organized by local authorities, the department of youth and sport, different private sports associations, and non-profit organizations, etc.; however, for this city, the reality does not present high values in regards to the arrangement and the practicing of leisure sport, because the priority lays with performance sport.

The purpose of this study was to determine the association between PA and HRQoL from adults of Brasov city.

2. Materials and Methods

2.1. Participants

The study was conducted in the period March–April 2018 on a sample of 1200 adult persons. The two questionnaires (IPAQ and SF-36) were applied in the parks of the city of Brasov ("Nicolae Titulescu" Parck, "Schaeffler" Park and "Noua" Park), for all categories of adults, from the target group.

The main hypothesis of the study predicted that there would be correlations between PA and HQol, i.e., that high PA would have a positive impact on the HQol and perceived health status of respondents from Brasov, Romania.

All adult participants had given their written informed consent before the interview. Written informed consent for participation was obtained after the explanation of the purpose and the test protocol. The approval of the university ethic committee was also granted. Seventy-seven participants were excluded because of incomplete data and another 23 were excluded because they reported spending more than 16 h a day "walking or being engaged in moderate or vigorous activity". The final sample consisted of 1100 participants (36.36% women and 63.64% men, 700 male and 400 female participants).

2.2. PA Measures

To estimate the level of PA, we used the official short form version of the International Physical Activity Questionnaire (IPAQ) [23]. The IPAQ questionnaire comprises seven generic items. This measure assesses the types of intensity of PA and sitting time that people do as part of their daily lives, which are considered to estimate total PA in MET-min/week and time spent sitting. IPAQ defines three categories of PA: "low" (physically inactive), "moderate", and "high" levels of PA, in relation to health-related recommendations [24].

The total weekly PAL, expressed as MET-minutes per week (MET·min·week^{-1}), was calculated as duration × frequency per week × MET intensity, and it was the expression of the sum of walking and moderate and vigorous PA for the week.

All questions refer to the activities during the previous seven days [25].

IPAQ has acceptable measurement properties for monitoring population levels of PA among 18- to 65-year-old adults in diverse settings [26].

2.3. HRQoL Measures

To assess HRQoL, we used the Short-Form Health Survey (SF-36). SF-36 has 36 items and eight dimensions:

- Scale of physical functionality—with 10 items: (example: climbing several levels using the staircase, walking a distance greater than 1 km. Scores between 10 and 30).
- Scale of problems caused by physical conditions—with four items (example: You have accomplished less activities than you originally desired; you were limited by the genre of work performed or by other activities? Scores between 4 and 8).
- Scale of social functionality—with two items (example: In the last four weeks, to what extent was your health condition or emotional problems affected in a negative way your usual social activities with your family, friends, neighbors, or other groups of people? In the last four weeks, how much did your health-related or emotional problems affect your usual social activities (like visit to friends, relatives, etc.)? Scores between 2 and 10).
- Scale of body pain—with two items; (example: With what intensity have you felt pain in your body in the last four weeks? In the last four weeks how much did the felt pain affect your daily work (including home and outside home activities?) Scores between 2 and 12).
- Scale of mental health—with five items (example: Were you mad? Were you calm and quiet? Scores between 5 and 30).
- Scale of problems caused by emotional states—with three items (example: Did you accomplish less activities than you originally desired? Did you reduce the time period spent working or performing other activities? Scores between 3 and 6).
- Scale of vitality—with four items (example: Were you feeling full of life? Were you feeling exhausted? Scores between 5 and 30).
- Scale of general health—with five items (examples: I feel that I get ill faster than other people; I am as healthy as anybody I know. Scores between 5 and 25) [27].

The questionnaire had 11 questions in its contents, with interpretable values between 0 and 100 points. The higher the value recorded is, the better the quality of life indicator is. Every participant checked one variant response.

The categorization values of the questionnaire are: scores between 80 and 100 points characterize a person capable of undergoing a normal activity, without obvious signs of illness, *HQoL*—high quality of life; scores between 50 and 79 define a person that cannot undergo a normal activity and sometimes needs assistance, *AQOL*—average quality of life; and scores below 49 points characterize an incapable person that needs special assistance, institutionalization, *LQOL*—low quality of life.

2.4. Data Analysis

Statistical analyses were performed using the statistical program IBM SPSS Statistics 20 (Armonk, NY, USA).

The number and percentage of respondents were calculated for overall Qol and physical PAL in different categories according to the age groups or educational level. The chi-square test was used to assess the meaning of differences between the numbers of classified respondents according to their levels of Qol and classed according to their PAL. Person correlations define the relationships between the percentage values of the eight domains of SF-36 and each of the participant's PAL.

3. Results

The subjects (n = 1100, 700 male and 400 female) are distributed as follows: aged between 30 and 35 y/o, n = 445 (299 males; 146 females); aged between 36 and 40 y/o, n = 315 subjects (180 males and 135 females);

for those aged between 41 and 45 y/o, we have n = 340 (males 221; females 119). Depending on the level of education, we have: no studies, n = 85 (males 60; females 25); compulsory studies, n = 193 (males 120; females 73); high-school studies, n = 294 (males 179; females 115); and higher education, n = 528 (males 341; females 187) (Table 1).

Table 1. Subjects' physical characteristics by gender and level of education.

Variable	Male	Female
Total number of subjects (n = 1100)	700	400
Age (years)		
30–35	299	146
36–40	180	135
41–45	221	119
Education level		
No studies	60	25
Compulsory studies	120	73
High-school studies	179	115
Higher education	341	187

Of the men, the highest percentages were respondents with a high level (44.3%), followed by respondents with a moderate level (36.4%), and with a low level (20.2%) of physical activity. For female, the largest group was those with a high PAL (47.6%), followed by those with a moderate level (41.4%), and a low level (11.1%). The numbers of respondents in groups according to their levels of PA differed significantly ($p < 0.001$) among male and female participants (Table2).

Additionally, for men, the highest percentage were respondents assessing their Qol as average (51.6%), followed by those assessing it as high (26.1%), and as low (22.3%). Similar percentages were found among the female respondents: average—43.5%, low—37.7%, and high—18.8%. The differences in the number of respondents in groups assessing their Qol differently were statistically significant among both men and women ($p < 0.001$) (Table 2).

Table 2. Number and percentage of respondents in groups with different levels of overall quality of life and physical activity.

Variable	Category	Group	Number	Percent	$\chi 2$	p-Value
Physical activity level	LPAL	Male	181	20.2	309.5	<0.001
	MPAL		205	36.4		
	HPAL		314	44.3		
	LPAL	Female	48	11.1	207.9	<0.001
	MPAL		158	41.4		
	HPAL		194	47.6		
Health-related Quality of life	LQOL	Male	223	22.3	430	<0.001
	AQOL		356	51.6		
	HQOL		121	26.1		
	LQOL	Female	128	37.7	290.4	<0.001
	AQOL		172	43.5		
	HQOL		100	18.8		

Abbreviations: LPAL—low physical activity level, MPAL—moderate physical activity level, HPAL—high physical activity level, LQOL—low quality of life, AQOL—average quality of life, HQOL—high quality of life.

For the male participants, according to the age group, the level of physical activity was: *low physical activity level*, n = 181 (30–35 years, n = 70; 36–40 years, n = 17 and for 41–45 years, n = 94); *moderate physical activity level*, n = 205 (30–35 years, n = 86; 36–40 years, n = 60, for 41–45 years, n = 59); and for *high physical activity level*, n = 314 (30–35 years, n = 143; 36–40 years, n = 103 and for 41–45 years, n = 68) (Table 3).

Table 3. Number of respondents with different levels of overall physical activity and quality of life according to the age groups.

Variable	Category, Age and Number			Group
Physical activity level	LPAL (n = 181) 30–35 = 70 36–40 = 17 41–45 = 94	MPAL (n = 205) 30–35 = 86 36–40 = 60 41–45 = 59	HPAL (n = 314) 30–35 = 143 36–40 = 103 41–45 = 68	Male
	LPAL (n = 48) 30–35 = 7 36–40 = 16 41–45 = 25	MPAL (n = 158) 30–35 = 53 36–40 = 42 41–45 = 63	HPAL (n = 194) 30–35 = 86 36–40 = 77 41–45 = 31	Female
Health-related Quality of life	LQOL (n = 223) 30–35 = 80 36–40 = 24 41–45 = 119	AQOL (n = 356) 30–35 = 123 36–40 = 135 41–45 = 98	HQAL (n = 121) 30–35 = 96 36–40 = 21 41–45 = 4	Male
	LQOL (n = 128) 30–35 = 35 36–40 = 66 41–45 = 27	AQOL (n = 172) 30–35 = 44 36–40 = 65 41–45 = 63	HQAL (n = 100) 30–35 = 67 36–40 = 4 41–45 = 29	Female

Abbreviations: LPAL—low physical activity level, MPAL—moderate physical activity level, HPAL—high physical activity level, LQOL—low quality of life, AQOL—average quality of life, HQOL—high quality of life.

For the female participants, the level of physical activity was: *low physical activity level*, n = 48 (30–35 years, n = 7; 36–40 years, n = 16 and for 41–45 years, n = 25); *moderate physical activity level*, n = 158 (30–35 years, n = 53; 36–40 years, n = 42, for 41–45 years, n = 63); and for *high physical activity level*, n = 194 (30–35 years, n = 86; 36–40 years, n = 77 and for 41–45 years, n = 31) (Table 3).

The level of quality of life, for the male participants, was: *low quality of life*, n = 223 (30–35 years, n = 80; 36–40 years, n = 24 and for 41–45 years, n = 119); *average quality of life*, n = 356 (30–35 years, n = 123; 36–40 years, n = 135 and for 41–45 years, n = 98); and *high quality of life*, n = 121 (30–35 years, n = 96; 36–40 years, n = 21 and for 41–45 years, n = 4) (Table 3).

For the female participants, the level of quality of life was: *low quality of life*, n = 128 (30–35 years, n = 35; 36–40 years, n = 66 and for 41–45 years, n = 27); *average quality of life*, n = 172 (30–35 years, n = 44; 36–40 years, n = 65 and for 41–45 years, n = 63); and *high quality of life*, n = 100 (30–35 years, n = 67; 36–40 years, n = 4 and for 41–45 years, n = 29) (Table 3).

According to the educational level, for male participants, the level of physical activity was: *no studies*, (n = 60), LPAL = 36, MPAL = 15, HPAL = 9; *compulsory studies*, (n = 120), LPAL = 40, MPAL = 64, HPAL = 16; *high-school studies*, (n = 179), LPAL = 63, MPAL = 85, HPAL = 31; and for *higher education*, (n = 341), LPAL = 42, MPAL = 41, HPAL = 258 (Table 4).

Table 4. Number of respondents with different levels of overall physical activity and quality of life according to the educational level.

Education Level	Male	Physical Activity	Quality of Life	Female	Physical Activity	Quality of Life
No studies	60	LPAL-36 MPAL-15 HPAL-9	LQOL-24 AQOL-21 HQOL-15	25	LPAL-10 MPAL-13 HPAL-2	LQOL-15 AQOL-9 HQOL-1
Compulsory studies	120	LPAL-40 MPAL-64 HPAL-16	LQOL-44 AQOL-51 HQOL-25	73	LPAL-17 MPAL-18 HPAL-38	LQOL-3 AQOL-40 HQOL-30
High-school studies	179	LPAL-63 MPAL-85 HPAL-31	LQOL-74 AQOL-71 HQOL-34	115	LPAL-12 MPAL-26 HPAL-77	LQOL-75 AQOL-25 HQOL-15

Table 4. *Cont.*

Education Level	Male	Physical Activity	Quality of Life	Female	Physical Activity	Quality of Life
Higher education	341	LPAL-42 MPAL-41 HPAL-258	LQOL-81 AQOL-213 HQOL-47	187	LPAL-9 MPAL-101 HPAL-77	LQOL-35 AQOL-98 HQOL-54
Total	**700**			**400**		

Abbreviations: LPAL—low physical activity level, MPAL—moderate physical activity level, HPAL—high physical activity level, LQOL—low quality of life, AQOL—average quality of life, HQOL—high quality of life.

For female participants: *no studies*, (n = 25), LPAL = 10, MPAL = 13, HPAL = 2; *compulsory studies*, (n = 73), LPAL = 17, MPAL = 18, HPAL = 38; *high-school studies*, (n = 115), LPAL = 12, MPAL = 26, HPAL = 77; and for *higher education*, (n = 187), LPAL = 9, MPAL = 101, HPAL = 77 (Table 4).

The level of quality of life, for the male participants, was: *no studies*, (n = 60), LQOL = 24, AQOL = 21, HQOL = 15; *compulsory studies*, (n = 120), LQOL = 44, AQOL = 51, HQOL = 25; *high-school studies*, (n = 179), LQOL = 74, AQOL = 71, HQOL = 34; and for *higher education*, (n = 341), LQOL = 81, AQOL = 213, HQOL = 47 (Table 4).

The level of quality of life, for the female participants, was: *no studies*, (n = 25), LQOL = 15, AQOL = 9, HQOL = 1; *compulsory studies*, (n = 73), LQOL = 3, AQOL = 40, HQOL = 30; *high-school studies*, (n = 115), LQOL = 75, AQOL = 25, HQOL = 15; and for *higher education*, (n = 187), LQOL = 35, AQOL = 98, HQOL = 54 (Table 4).

The PAL was shown to be positively correlated with the adult HROoL domains. The correlated SF-36 survey domains were physical function (p = 0.004), role limitation caused by a physical health problem (p = 0.048), vitality (p = 0.009), and general health (p = 0.044) domains (Table 5).

Table 5. The correlation between physical activity level and domains of health-related quality of life.

Variable	Domains of HRQoL	*n*	r	*p*-Value
Physical activity level	Physical Function	1100	0.281 **	0.004
	Role Limitation Caused by Physical Health Problem		0.200 *	0.048
	Role Limitation Caused by Emotional Problem			
	Social Function		0.057	0.566
	Emotional Well-Being			
	Vitality		0.057	0.348
	Body Pain		−0.076	0.447
	General Health		0.261 **	0.009
			0.158	0.117
			0.203 *	0.044

* Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (two-tailed).

4. Discussion

The results of the present study revealed positive correlations between PAL and Qol for the adult people. This relationship is consistent across different measures and types of PA. Regarding PAL, both men and women had a high level, followed by those with a moderate level and a low level. Following the IPAQ guidelines, respondents with a high PAL level were defined as those who performed vigorous physical exercise for three or more days a week at the caloric cost of at least 1500 MET min/week, or who performed any combination of low-, moderate-, or high-intensity activities for seven days a week at a caloric cost of at least 3000 MET min/week [28]. Depending on the level of education, those with a higher education showed a higher level of physical activity in both sexes.

The highest overall Qol, perceived health condition, and Qol in its particular domains: physical, psychological, social, and environmental, were noted in those men and women from Brasov whose level of physical activity was high. Additionally, the odds of assessing one's overall quality of life as

average and not as low, and as high and not as low, was the highest in respondents with the highest physical activity levels.

According to the educational level, for male and female participants, the level of Qol was higher for the respondents who had a higher education.

Brown et al. [29] found a significant improvement in perceived Qol in respondents who undertook moderate-level PA for at least 30 min a day for five days a week; or vigorous PA for at least 20 min a day for three days a week. Leino-Arjas et al. [30], however, found that only regular PA of high intensity had a positive impact on perceived Qol.

Results of the study conducted by Anokye et al. [31] suggest that higher levels of PA are associated with better HRQoL (regression coefficient: 0.026 to 0.072). This relationship is consistent across different measures and types of PA, although differences in the magnitude of HRQoL benefits associated with objective and subjective (regression coefficient: 0.047) measures of PA are noticeable, with the former measure being associated with a relatively better HRQoL (regression coefficient: 0.072).

Halaweh et al. [32] showed strong associations between higher levels of PA and all dimensions of HRQoL. Values in all dimensions of HRQoL were significantly higher ($p < 0.05$) in the moderate and high PA groups compared with the low PA group. Significant correlations were recorded between the five dimensions of HRQoL and the level of PA ($p < 0.001$).

Krzepota el al. [33] and Chai et al. [14] found positive correlations between PA and the psychological domain of Qol. There have been confirmed relationships between PA and factors such as optimism and joy of life [34], visual attention [35], self-esteem [36], and reduced anxiety or depression [37]. Additionally, Thiel et al. [38] found a significant positive association between PAL and HRQL, particularly physical health.

Similar to our findings, another cross-sectional study conducted on adults from France reported a positive trend of HRQoL scores across the four categories of leisure-time PA level [39].

Quehenberger et al. [40] and Kim et al. [41] found positive correlations between perceived health condition and the level of PA. This can be justified by the proven positive impact of physical exercise of an appropriate duration, frequency, and intensity on health condition in adults [42,43]. Perceived health condition, however, does not only depend on one's objective health status, but is also determined by psychological and cultural factors, such as one's lifestyle or socioeconomic status.

The present study has some strengths and weaknesses. Its main advantage is the broad age range of respondents (30–45 years) in comparison with many earlier studies. Few similar research studies have been published on Central European populations, and studies of possible correlations between PA and Qol in respondents divided according to their sex are also very rare.

Some limitations of the present study have to be mentioned. Our findings are certainly limited by the relatively small sample size and the uncontrolled nature of the study design. The small sample size may decrease the power to detect statistically significant results in general. In addition, one drawback of the study is the limitation of the study population to a single city and the application of the short version of the IPAQ.

5. Conclusions

A low impact of PA on Qol can result from the complexity of the notion of Qol itself.

The differences in the number of respondents in groups assessing their PA and Qol differently were statistically significant among both men and women.

Since improvement of Qol is one of the main strategic development goals of cities or regions, raising PAL in municipal communities should also be accounted for in these strategies.

At the Brasov City level, there are no policies directed towards leisure sports, and local authorities focus their attention on performance sport (professional).

Author Contributions: G.B. conceived and designed the experiments, performed the experiments, analyzed the data and wrote the paper.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Corazon, S.; Stitgsdotter, U.; Ekholm, O.; Pedersen, P.; Scopelliti, M.; Giuliani, M. Activities to alleviate stress and association with leisure time activities, socioeconomic status and general health. *J. Appl. Behav. Res.* **2010**, *15*, 161–174. [CrossRef]
2. Heiestad, H.; Rustaden, A.; Bø, K.; Haakstad, L. Effect of regular resistance training on motivation, self-perceived health, and quality of life in previously inactive overweight women: A randomized, controlled trial. *BioMed Res. Int.* **2016**, *2016*, 3815976. [CrossRef] [PubMed]
3. Dziubek, W.; Kowalska, J.; Kusztal, M.; Rogowski, Ł.; Gołębiowski, T.; Nikifur, M.; Szczepańska-Gieracha, J.; Zembroń-Łacny, A.; Klinger, M.; Woźniewski, M. The level of anxiety and depression in dialysis patients under-taking regular physical exercise training—A preliminary study. *Kidney Blood Press. Res.* **2016**, *41*, 86–98. [CrossRef] [PubMed]
4. Tsunoda, K.; Kitano, N.; Kai, Y.; Uchida, K.; Kuchiki, T.; Okura, T.; Nagamatsu, T. Prospective study of physical activity and sleep in middle-aged and older adults. *Am. J. Prev. Med.* **2015**, *48*, 662–673. [CrossRef] [PubMed]
5. WHOQOL Group. The World Health Organization Quality of Life assessment (WHOQOL): Position paper from the World Health Organization. *Soc. Sci. Med.* **1995**, *10*, 1403–1409. [CrossRef]
6. Minayo, M.C.; Hartz, Z.M.A.; Buss, P.M. Qualidade de vida e saúde: Um debate necessário. *Cienc Saude Coletiva* **2000**, *1*, 7–18. [CrossRef]
7. Hamer, M.; Stamatakis, E. Physical activity and Risk of Cardiovascular Disease Events: Inflammatory and Metabolic Mechanisms. *Med. Sci. Sports Exerc.* **2009**, *6*, 1206–1211. [CrossRef] [PubMed]
8. Sobngwi, E.; Mbanya, J.C.; Unwin, N.C.; Kengne, A.P.; Fezeu, L.; Minkoulou, E.M.; Aspray, T.J.; Alberti, K.G. Physical activity and its relationship with obesity, hypertension and diabetes in urban and rural Cameroon. *Int. J. Obes. Relat. Metab. Disord.* **2002**, *7*, 1009–1016. [CrossRef] [PubMed]
9. Williams, P.T. Relationship of Running Intensity to Hypertension, Hypercholesterolemia, and Diabetes. *Med. Sci. Sports Exerc.* **2008**, *10*, 1740–1748. [CrossRef] [PubMed]
10. Bize, R.; Johnson, J.A.; Plotnikoff, R.C. Physical activity level and health related quality of life in the general adult population: A systematic review. *Prev. Med.* **2007**, *6*, 401–415. [CrossRef] [PubMed]
11. Ware, J.E., Jr.; Sherbourne, C.D. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med. Care* **1992**, *6*, 473–483. [CrossRef]
12. Bădicu, G.; Balint, L. The meaning of physical health in the improvement of the quality of life index. In Proceedings of the 6th International Conference Edu World 2014 "Education Facing Contemporary World Issues", Arges, Romania, 7–9 November 2014; Volume 180, pp. 1221–1228. [CrossRef]
13. Petrou, S.; Kupek, E. Social capital and its relationship with measures of health status: Evidence from the Health Survey for England 2003. *Health Econ.* **2008**, *1*, 127–143. [CrossRef] [PubMed]
14. Chai, W.; Nigg, C.R.; Pagano, I.S.; Motl, R.W.; Horwath, C.; Dishman, R.K. Associations of quality of life with PA, fruit and vegetable consumption, and physical inactivity in a free living, multi-ethnic population in Hawaii: A longitudinal study. *Int. J. Behav. Nutr. Phys. Act.* **2010**, *83*, 1–6. [CrossRef]
15. Salwa, E.S. Physical Activity Level and Adult Saudi Health Related Quality of Life. *Open J. Ther. Rehabil.* **2014**, *2*, 106–113. [CrossRef]
16. Massidda, M.; Cugusi, L.; Mathieu, A. Physical activity levels and Health-related quality of life in young Italian population. *J. Sports Med. Phys. Fitness* **2015**, *5*, 506–512.
17. Bădicu, G.; Balint, L. The influence of leisure sports activities on social health in adults. *Springerplus* **2016**, *5*, 1647–1653. [CrossRef]
18. Dabiran, S. Health-Related Quality of Life in Iranian Women with Different Levels of Physical Activity. *Asian J. Sports Med.* **2012**, *3*, 203–207.
19. Pedisic, Z.; Rakovac, M.; Titze, S.; Jurakic, D.; Oja, P. Domain-specific physical activity and health-related quality of life in university students. *Eur. J. Sport Sci.* **2014**, *5*, 492–499. [CrossRef] [PubMed]
20. Gorucu, A.; Tokay, B.; Badau, A. The effects of three different type of exercises on aerobic and anaerobic power. *Phys. Educ. Stud.* **2017**, *21*, 152–157. [CrossRef]

21. Dusa, F.S.; Badau, A.; Badau, D.; Trambitas, C.; Brinzaniuc, K. Investigating the Deformation Parameters of PVC Fitness Balls in Relation to the Height and Body Mass Index of the Users. *Mater. Plast.* **2017**, *54*, 606–609.
22. Hamer, M.; Stamatakis, E. Objectively assessed physical activity, fitness and subjective wellbeing. *Ment. Health Phys. Act.* **2011**, *3*, 67–71. [CrossRef]
23. IPAQ (2005). Cultural Adaptation. Available online: http://www.ipaq.ki.se/downloads.htm (accessed on 10 February 2018).
24. Bauman, A.; Bull, F.; Chey, T. The International Prevalence Study on Physical Activity: Results from 20 countries. *Int. J. Behav. Nutr. Phys. Act.* **2009**, *31*, 6–21. [CrossRef] [PubMed]
25. Sf-36.org Website Traffic and Information. Available online: http://www.trafficestimate.com/sf-36.org (accessed on 15 February 2018).
26. Craig, C.L.; Marshall, A.L.; Sjostrom, M.; Bauman, A.E.; Booth, M.L.; Ainsworth, B.E.; Pratt, M.; Ekelund, U.; Yngve, A.; Sallis, J.F.; et al. International Physical Activity Questionnaire: 12-country reliability and validity. *Med. Sci. Sports Exerc.* **2003**, *8*, 1381–1395. [CrossRef] [PubMed]
27. Jurakic, D.; Pedisic, Z.; Greblo, Z. Physical activity in different domains and health—Related quality of life: A population-based study. *Qual. Life Res.* **2010**, *9*, 1303–1309. [CrossRef] [PubMed]
28. Puciato, D.; Rozpara, M.; Borysiuk, Z. Physical Activity as a Determinant of Quality of Life in Working-Age People in Wrocław, Poland. *Int. J. Environ. Res. Public Health* **2018**, *15*, 623. [CrossRef] [PubMed]
29. Brown, D.; Balluz, L.; Heath, G.; Moriarty, D.; Ford, E.; Giles, W.; Mokdad, A. Associations between recommended levels of physical activity and health-related quality of life. Findings from the 2001 Behavioral Risk Factor Surveillance System (BRFSS) survey. *Prev. Med.* **2003**, *37*, 520–528. [CrossRef]
30. Leino-Arjas, P.; Solovieva, S.; Riihimäki, H.; Kirjonen, J.; Telama, R. Leisure time physical activity and strenuousness of work as predictors of physical functioning: A 28 year follow up of a cohort of industrial employees. *Occup. Environ. Med.* **2004**, *61*, 1032–1038. [CrossRef] [PubMed]
31. Anokye, N.K.; Trueman, P.; Green, C.; Pavey, T.G.; Taylor, R.S. Physical activity and health related quality of life. *BMC Public Health* **2012**, *12*, 624. [CrossRef] [PubMed]
32. Halaweh, H.; Willen, C.; Ekman, G.A.; Svantesson, U. Physical Activity and Health-Related Quality of Life among Community Dwelling Elderly. *J. Clin. Med. Res.* **2015**, *11*, 845–852. [CrossRef] [PubMed]
33. Krzepota, J.; Biernat, E.; Florkiewicz, B. The relationship between levels of physical activity and quality of life among students of the University of the Third Age. *Cent. Eur. J. Public Health* **2015**, *23*, 335–339. [CrossRef] [PubMed]
34. Pavey, T.; Burton, N.; Brown, W. Prospective relationships between physical activity and optimism in young and mid-aged women. *J. Phys. Act. Health* **2015**, *12*, 919–923. [CrossRef] [PubMed]
35. Calitri, R.; Lowe, R.; Eves, F.; Bennett, P. Associations between visual attention, implicit and explicit attitude and behaviour for physical activity. *Psychol. Health* **2009**, *24*, 1105–1123. [CrossRef] [PubMed]
36. Sani, S.; Fathirezaie, Z.; Brand, S.; Puhse, U.; Holsboer-Trachsler, E.; Gerber, M.; Talepasand, S. Physical activity and self-esteem: Testing direct and indirect relationships associated with psychological and physical mechanisms. *Neuropsychiatr. Dis.* **2016**, *12*, 2617–2625. [CrossRef] [PubMed]
37. Hannan, J.; Brooten, D.; Youngblut, J.; Hildago, I.; Roche, R.; Seagrave, L. Physical activity and stress in adult Hispanics. *J. Am. Assoc. Nurse Pract.* **2015**, *27*, 79–86. [CrossRef] [PubMed]
38. Thiel, D.M.; Sayah, A.F.; Vallance, J.K.; Johnson, S.T.; Johnson, J.A. Association between Physical Activity and Health-Related Quality of Life in Adults with Type 2 Diabetes. *Can. J. Diabetes* **2016**, *1*, 58–63. [CrossRef] [PubMed]
39. Vuillemin, A.; Boini, S.; Bertrais, S.; Tessier, S.; Oppert, J.M.; Hercberg, S.; Guillemin, F.; Briançon, S. Leisure time physical activity and health-related quality of life. *Prev. Med.* **2005**, *5*, 562–569. [CrossRef] [PubMed]
40. Quehenberger, V.; Cichocki, M.; Krajic, K. Sustainable effects of a low-threshold physical activity intervention on health-related quality of life in residential aged care. *Clin. Interv. Aging* **2014**, *9*, 1853–1864. [CrossRef] [PubMed]
41. Kim, J.; Im, J.; Choi, Y. Objectively measured sedentary behavior and moderate-to-vigorous physical activity on the health-related quality of life in U.S. adults: The National Health and Nutrition Examination Survey 2003–2006. *Qual. Life Res.* **2017**, *26*, 1315–1326. [CrossRef] [PubMed]

42. Rozek-Piechura, K.; Ignasiak, Z.; Sławińska, T.; Piechura, J.; Ignasiak, T. Respiratory function, physical activity and body composition in adult rural population. *Ann. Agric. Environ. Med.* **2014**, *21*, 369–374. [CrossRef] [PubMed]
43. Norton, K.; Norton, L.; Lewis, N. Effects of short-term physical activity interventions on simple and choice response times. *BioMed Res. Int.* **2016**, *2016*, 1–8. [CrossRef] [PubMed]