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INVESTIGATING THE EFFECTS OF SPORTS ON THE QUALITY OF LIFE IN PERSONS WITH PHYSICAL DISABILITIES

ORIGINAL ARTICLE

ABSTRACT

Purpose: Sport is an important tool in improving the quality of life of individuals with disabilities. The study aim to examine the life quality of individuals with physical disabilities with different functionality levels in relation to sports.

Methods: A total of 36 individuals with physical disabilities participated in the study. The participants included individuals without any regular exercise (non-sportive, NS), those who played Boccia (B), and persons who played Wheelchair basketball (WCB) who could not provide independent ambulation. The Rivermead Mobility Index (RMI), Functional Independency Measurement (FIM), Trunk Impairment Scale (TIS), and World Health Organization Quality of Life Instrument for People with Intellectual and Physical Disabilities (WHOQOL-DIS) were used for evaluating motor impairment of the trunk, functionality levels, mobility, and quality of life (QoL), respectively.

Results: Group B had lower RMI scores compared to group NS ($p<0.05$). FIM-motor and FIM-total scores were the lowest in group B ($p<0.05$), whereas FIM-cognitive scores were similar across all groups ($p>0.05$). However, TIS-total scores were the lowest in the B group ($p<0.05$) and TIS-coordination scores were higher in the WCB group ($p<0.05$). There was no difference between the groups in TIS static and dynamic evaluations ($p>0.05$). There was no difference between the groups in terms of the WHOQOL subscales and the disability module subdimensions ($p>0.05$). QoL-total score was similar for group B and NS ($p>0.05$), but higher in the WCB group ($p<0.05$).

Conclusions: It is thought that the low functional B players' having similar quality of life with the other participants is due to the psychological and social effects of B rather than its physical effects.

Keywords: Health-Related Quality of Life, Persons with Disabilities, Sports, Sports For Persons With Disabilities, Wheelchair Sports.

FİZİKSEL ENGELLİ BİREYLERDE SPORUN YAŞAM KALİTESİ ÜZERİNE ETKİSİNİN ARAŞTIRILMASI

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Spor, engelli bireylerin yaşam kalitesini artırmada önemli bir araçtır. Çalışmanın amacı değişik fonksiyonellik düzeyindeki fiziksel engelli bireylerin yaşam kalitelerinin sporla ilişkili olarak incelenmesidir.

Yöntem: Çalışmaya toplam 36 fiziksel engelli birey katıldı. Katılımcılar düzenli olarak spor yapmayan (SY), Boccia (B) ve Tekerlekli sandalye basketbolu (TSB) oynayan bağımsız ambulasyonu sağlayamayan bireylerden oluştu. Bireyler Rivermead Mobilite İndeksi (RMI), Fonksiyonel Bağımsızlık Ölçeği (FBÖ), Gövde Etkilenim Ölçeği (GEÖ), Dünya Sağlık Örgütü Zihinsel ve Fiziksel Engelliler İçin Yaşam Kalitesi Ölçeği (WHOQOL-DIS) kullanılarak sırasıyla gövde motor bozuklukları, fonksiyonellik düzeyleri, mobiliteleri ve yaşam kaliteleri değerlendirildi.

Sonuçlar: B grubunun RMI puanlarının SY'e göre daha düşük olduğu belirlendi ($p<0,05$). B grubu FBÖ-Motor ve FBÖ-Toplam puanları diğerlerinden düşük bulundu ($p<0,05$). FBÖ-Kognitif değerleri gruplar arasında benzerdi ($p>0,05$). GEÖ-Toplam puanlarının B grubunda en düşük ($p>0,05$), GEÖ-Koordinasyon puanlarının TSB grubunda en yüksek olduğu belirlendi ($p<0,05$). Grupların GEÖ statik ve dinamik değerlendirmeleri arasında fark görülmedi ($p<0,05$). Gruplar arasında yaşam kalitesi alt ölçekleri ve engelli modülü alt boyutları arasında fark görülmedi ($p>0,05$). B grubundaki bireylerin yaşam kalitesi toplam puanlarının SY grubuyla benzer ($p>0,05$), TSB grubuna göre düşük olduğu görüldü ($p<0,05$).

Tartışma: Düşük fonksiyonellik düzeyindeki B oyuncularının diğer katılımcılarla benzer yaşam kalitelerine sahip olmalarının B'nin fiziksel etkilerinden ziyade psikolojik ve soysal etkilerinden kaynaklandığı düşünülmektedir.

Anahtar Kelimeler: Sağlıkla İlgili Yaşam Kalitesi, Engelliler, Spor, Engelli Sporları, Tekerlekli Sandalye Sporları

INTRODUCTION

According to International Classification of Functioning, disability, and health (ICF), disability is the umbrella term for disorders or impairments that limit an individual's activity and participation. Both personal and environmental factors play a role in how disabilities affect an individual's life. Disability is affected by personal and environmental factors and adverse environmental conditions may aggravate the level or perception of disability for an individual. Convenient environmental factors, on the other hand, can reduce the extent of frustration despite the physical limitation (1). In this context, sports are considered a positive tool in improving physical, psychological, social aspects of participation and quality of life for people with disabilities (2).

Participation in sports or any physical activity supports the development of self-perception and allows individuals to recognize and fulfill their roles. At the same time, it develops the individual's perspective of her/himself such as self-esteem, physical self (appearance, strength, flexibility), and awareness (3). When done in a group, sports enables individuals to come together with peers and socialize (4). Therefore, sports play an important role in preventing problems such as social isolation, lack of interaction, and self-confidence perception in individuals with disabilities (2).

It is known that the general health of many people with physical disabilities is poor, their social participation is limited, and their quality of life is low (5). Sports, with its entertainment, treatment and competitive features, helps individuals focus on their abilities rather than their disabilities, and improves social relations and psychological health (6). Our study aims to examine this situation, which is valid for all physical disability groups, by comparing it with the sports groups that individuals are separated according to their physical adequacy levels. While Wheelchair basketball (WCB) is a sport performed by physically disabled individuals who can use their upper extremities, Boccia (B) is a sport and game that even individuals without limb and trunk control can do. These two sports require very different physical competencies. Therefore, in our study, we aimed to measure the effect of sports on the quality of life in the groups in which the physical disabilities are classified.

The aim of this study is to examine the quality of life (QoL) of physically disabled people with different levels of functionality in relation to sports. Physical independence levels and quality of life of the physically disabled individuals who play B and Wheelchair WCB and those who do not exercise regularly (non-sportive, NS) were compared in this study.

METHODS

The study is an original study completed between January 2020 and April 2021. The ethical approval of the study was obtained from Erciyes University Non-Interventional Research Ethics Committee (decision numbered 2020/71). Written approval was also obtained from the sport provincial directorate of the center where the study was conducted and from all participants. The research was conducted in accordance with the 2008 Helsinki Declaration of Human Rights.

Participants

The B and WCB participants were collected from Kayseri Youth Services and Sports Activities, 'Boccia' and 'Wheelchair Basketball' Clubs. The NS participants were contacted through Kayseri Orthopedically Handicapped Association. All of the participants were individuals who could mobilize with a wheelchair and did not have independent ambulation. According to the results of the power analysis, we aimed to reach 26 people in each group. The study started with a total of 40 participants; however, 36 individuals completed the study. On the other hand, 3 participants refused to join the Trunk Impairment Scale (TIS) assessment as it entailed close physical contact. The study groups were as follows: Non-sportive Group (NS, n=19), Boccia Group (B, n=9), and Wheelchair basketball Group (WCB, n=8). The Sportive group (S, n=17) consisting of B and WCB.

In our country, the limited opportunities, facilities and motivations of disabled people to do sports are the main obstacles in reaching individuals who can do sports. During the research process, it became more difficult to reach the sensitive groups

with the restrictions of the Covid 19 crisis. Because of reasons such as the participants' unwillingness to meet face-to-face and not being able to reach new participants, the number of group participants were not been able to equate but the number participants in sportive group and the number of participants in non-sportive group are kept in the comparable order.

The NS group consisted of 3 persons with bilateral lower limb amputation, 5 with spinal cord injuries, 1 with muscular dystrophy, 6 with cerebral palsy, 2 with poliomyelitis, and 2 with spina bifida. The Boccia group consisted of 3 persons with muscular dystrophy, 1 with spinal cord injury, 2 with cerebral palsy, 2 with poliomyelitis, and 1 with spina bifida. The WCB group included 4 persons with spinal cord injuries, 1 with cerebral palsy, and 3 with spina bifida.

Inclusion criteria were being over 18 years of age, having a physical disability, good level of cognition and communication, playing the sport for a minimum of 1 year for the B and WCB groups, and doing no team/individual sports for at least five years for the NS group.

Assessments

Anthropometric measurements were done either by the evaluator or the participants themselves when a face-to-face evaluation session was not possible (5 participants). The demographic information of the individuals and their background in sports were recorded.

Anthropometric Measurements: Participants' weight (kg) and height (m) (measured in the supine position) were used to calculate Body Mass Index (BMI=kg/m^2) (7).

Rivermead Mobility Index (RMI): This one-dimensional assessment of mobility was originally developed for people with acquired brain injury or stroke. Comprising of 14 self-reported items and 1 observational item (8), the RMI is a hierarchical scale that involves a series of activities ranging from rolling in bed to running. All items are coded as either "Yes" (score 1), or "No" (score 0) and total scores range from a minimum of 0 (=inability to perform any of the activities) to a maximum of 15. Higher scores indicate better mobility performance (9,10).

Functional Independency Measurement (FIM): It evaluates the functional performance of individuals with disabilities with all diagnoses within a rehabilitation population (11). Comprising of 18 items in 2 subscales (namely: motor subscale (13 items) and cognition subscale (5 items), the FIM assesses function in six areas including self-care, continence, mobility, transfers, communication, and social perception. Each item is graded on a scale of 1--7 based on level of independence. Total scores range from 18 to 126, wherein higher scores indicate higher level of independency in daily living activities. Scores between18-36 are classified as "maximal assistance required", between 37-72 as "moderate assistance required", and between 73-126 as "minimal supervision required". The Turkish version of FIM, for which validity and reliability studies are already available, was used in the present study (12).

Trunk Impairment Scale (TIS): It assesses static and dynamic sitting balance and trunk coordination. Developed by Geert Verheyden (2003) to evaluate motor impairment of the trunk after stroke, TIS can be used in many neurological diseases such as Parkinson, multiple sclerosis, and cerebral palsy (13-15). The validity and reliability of the Turkish version has been demonstrated by Sağ et al (3) The first 3 items on the scale evaluate static sitting balance, the next 10 items assess dynamic sitting balance, and the last 4 items evaluate coordination. Scores range from a minimum of 0 to a maximum of 23. During all evaluations, the individuals were seated on an examination table with their feet flat on the floor, and hips and knees at 90° flexion. Each scale item was repeated 3 times and the best performance was recorded as the final score (17).

World Health Organization Quality of Life Instrument for People with Intellectual and Physical Disabilities (WHOQOL-DIS): With a total of 39 questions, this scale consists of two parts: 1) WHOQOL-BREF (26 questions): including Physical, Psychological, Social relations, and Environmental health subscales, and 2) WHOQOL-DIS disability module (13 questions): including 'discrimination and support', 'autonomy/independence', and 'community participation' sub-dimensions. Although the disability module consists of 13 questions, the first question of this module is a screening question and

is not included in scoring. The questions are scored on a scale of 1 to 5, and higher scores indicate higher quality of life. We used the Turkish version of the WHOQOL-DIS to assess QoL of our participants (18).

Statistical analysis

IBM SPSS Statistics 22.0 (SPSS Statistics for Windows, version 22.0, IBM Corp. Armonk, NY/USA) was used for statistical analyses. G*Power 3.1.9.2 program was used for power analysis.

Numerical variables conforming to the normal distribution were expressed as mean ± standard deviation and ordinal variables in percentages (%). Student t test was used for the comparison of two groups for normally distributed data, while Mann Whitney-U test was used for non-normally distributed groups. While making comparisons according to the type of sport performed, the F test was used for data showing normal distribution, while the Kruskal Wallis-H test was used for data not showing normal distribution. The results of multiple regression analysis performed to examine the effect of the type of sport and the functional level of individuals on the quality of life.

According to the results of the G*Power analysis to determining the sample size, for statistical power of 0.80, significance level of 0.05, and effect size of 0.80 in the two-tailed t test for independent groups, a total of 78 participants (26 people per group) was required. Within the scope of the independent samples t-test applied for the WHOQOL-DIS scores, the effect value was calculated as approximately 0.362. According to the power values, with a total of 36 observations in the study, test power would be 62%. Using the TIS scores, it was concluded that a test power of 70% could be obtained with 33 observations.

RESULTS

Demographic data of the participants (n=36) was as follows: Gender: 7 females and 29 males, mean age: 31.57±10.15 years, and BMI: 24.80±4.60 kg/m2. The non-ambulatory ages of the groups NS, B, WCB were 4.68±6.36, 4.56±6.15, 6.81±10.56,

Table 1. Participants' Age and BMI in Relation with The Type of Sports

State of Sportiveness and Type of Sports			
Variables	**Non-Sportive X±Sd**	**Boccia X±Sd**	**Wheelchair Basketball X±Sd**
Height (cm)	159.36±44.63	165.78±10.54	162.62±13.02
Weight (kg)	78.80±15.90	61.88±13.24	60.00±11.74
Age of non-ambulation (y)	4.68±6.36	4.56±6.15	6.81±10.56
Age of start sports (y)	-	22.78±8.63	15.75±4.10
Period of doing sports(y)	-	4.22±0.97	9.58±5.62

State of Sportiveness			
	Non-Sportive (n=19)	**Sportive (n=17)**	**p**
	X±Sd	**X±Sd**	
BMI (kg/m²)	27.42±4.21	22.49±3.68	**0.001***
Age (y)	34.50±11.81	28.47±7.14	0.790

Type of Sports				
	Non-Sportive (n=19)	**Boccia (n=9)**	**Wheelchair Basketball (n=8)**	**p**
	X±Sd	**X±Sd**	**X±Sd**	
BMI (kg/m²)	27.42±4.21[b]	22.36±3.61[a]	22.65±4.01[a]	**0.006***
Age (y)	34.50±11.81	29.44±8.52	27.38±5.58	0.199

*p<0.05. X±Sd=mean±standart deviation, BMI: Body Mass Index, Student t test (for the comparison of two groups) , F:F-test (Analysis of variance). a. and b. stands for indicating significant difference between the means defined by different letters in the same line (p < 0.05).

Table 2. Comparison of Participants' Trunk Impairment, Functional Independence, Mobility, and Quality of Life in Relation with State of Sportiveness and The Type of Sports

Variables	State of Sportiveness			Type of Sports			
	Non-Sportive X±Sd	Sportive X±Sd	p	Non-Sportive X±Sd	Boccia X±Sd	Wheelchair Basketball X±Sd	p
RMI	9.11±3.36	6.00±4.60	0.026**	9.11±3.36[a]	3.44±3.43[b]	8.88±4.12[ab]	0.005*
FIM-Motor Functions	76.84±15.98	65.53±24.86	0.285	76.84±15.98[a]	52.11±26.05[b]	80.63±12.06[a]	0.033*
FIM-Cognitive Functions	34.11±7.76	34.35±2.67	0.639	34.10±7.76	33.78±3.67	35.00±0.00	0.620
FIM-Total Score	110.42±15.38	100.65±27.13	0.471	110.42±15.38[b]	85.11±26.22[a]	118.13±15.41[b]	0.002*
TIS- Static Sitting Balance	5.69±1.66	4.53±2.45	0.217	5.69±1.66	4.11±2.62	5.00±2.33	0.269
TIS- Dynamic Sitting Balance	6.44±2.80	5.76±3.91	0.576	6.44±2.80	3.89±4.11	7.88±2.47	0.074
TIS - Co-ordination	3.06±1.77	4.12±2.18	0.118	3.06±1.77[a]	2.89±2.03[a]	5.50±1.41[b]	0.008*
TIS –Total Score	15.37±4.34	14.29±7.34	0.608	15.36±4.33[ab]	11.00±7.58[a]	18.00±5.26[b]	0.044*
WHOQOL - Physical health	66.16±16.30	67.44±18.07	0.731	66.17±16.30	62.70±22.24	72.77±10.96	0.581
WHOQOL- Psychological	68.64±16.75	73.53±19.98	0.232	68.64±16.75	75.00±11.41	71.88±27.53	0.463
WHOQOL- Social relationships	75.66±11.48	77.45±19.49	0.415	75.66±11.48	75.93±24.45	79.17±13.36	0.866
WHOQOL-Environment	74.51±15.21	68.75±14.41	0.253	74.51±15.21	67.01±17.34	70.70±11.07	0.463
WHOQOLDIS - Discrimination	42.11±23.92	40.44±18.37	0.818	42.11±23.92	29.17±15.63	53.13±12.05	0.061
WHOQOLDIS -Autonomy	65.13±18.55	59.93±15.79	0.374	65.13±18.55	60.42±11.69	59.38±20.32	0.673
WHOQOLDIS - Community	71.49±11.64	69.85±24.76	0.731	71.49±11.64	61.11±29.02	79.69±15.18	0.119
WHOQOLDIS –Total Score	62.85±7.75	59.96±13.99	0.456	62.85±7.75[ab]	53.21±14.55[a]	67.55±8.99[b]	0.016*

*p<0.05. X±Sd=mean±standart deviation, RMI: Rivermead Mobility Index, FIM: Functional Independency Measurement, TIS: Trunk Impairment Scale, WHOQOL-DIS: The World Health Organization Quality of Life Instrument for Physically and Intellectually - Disabled Individuals U: Mann whitney U test (for variables that do not show a normal distribution)..t: Student t test, KW:Kuruskal Wallis-H test (for variables that do not show a normal distribution). F:F-test (Analysis of variance). a. b. and c stands for indicating significant difference between the means defined by different letters in the same line (p < 0.05).

respectively. The NS group has never done sport regularly. The Boccia group was playing the game for 4.22±0.9 years and the WCB group was playing wheelchair basketball for an average of 9.57±5.6 years. The age of starting the sport was 22.77±8.6 and 15.75±4.06 years for the boccia and basketball players, respectively (Table 1).

The age and BMI values of the participants are given in Table 1. The groups were similar in terms of their mean age (p=0.790). Compared to the sports groups, the NS group had higher BMI values and was in the pre-obesity category, whereas B and WCB groups were similarly in normal weight category (p=0.006).All comparisons of the participants are shown in Table 2. The mobility level and motor functional in group B had lower than both NS and WCB groups (RMI, FIM-Motor Functions, respectively; p=0.005, 0.033). Although there was no difference between the FIM total scores of the NS and S groups (p=0.471), FIM motor functions were higher in the WCB and NS groups than B group. In terms of FIM-Cognitive functions, there was no difference between the groups (p=0.062). However, FIM-Total score differed according to the type of sport (p=0.002). FIM-Total score of group B was lower than both NS and WCB groups (p=0.002), (Table 2).

There was no difference between the groups in TIS-S and TIS-D scores (p=0.269; p=0.074 respectively, Table2). However, TIS-C scores were different depending on the type of sport (p=0.008). The TIS-C mean score of the WCB group was higher than both NS and B groups The TIS-Total scores also differed according to the type of sport (p=0.044). The TIS-Total mean score of group B was similar to the NS but lower than the WCB group (Table 2).

Regarding WHOQOL results, there was no difference between the groups in the WHOQOL-BREF subscale (physical, psychological, social relations, and environmental) and the WHOQOL-DIS disability module (discrimination, autonomy, community) (p = 0.581; 0.483; 0.866; 0.463; 0.061; 0.673; 0.119, respectively). The WHOQOL-DIS total score varied according to the type of sport (p=0.016), and this difference was due to the lower quality of life in

group B than WCB.

The results of multiple regression analysis performed to examine the effect of the type of sport and the functional level of individuals on the quality of life were found to be statistically insignificant ($p>0.05$).

DISCUSSION

It is known that sports or recreational activities support the physical, psychological, social, and economic well-being of persons with disabilities, while inactivity poses many health risks such as musculoskeletal conditions, weight problems, personality disorders, and depression (19-21). Studies have also shown that individuals with physical disabilities can reduce these inactivity-related risks by exercising regularly (20-22). We observed that while BMI values of B and WCB group were in normal weight range, the NS group was at the pre-obesity level and thus, exposed to health risks associated with obesity. This highlights the importance of sports and physical activity on weight control.

Individuals in group B had lower mobility, and functional independency than the WCB and NS groups. As an important component of functionality, mobility is the ability to move from one position to another. Mobility impairments limit daily living and transfer activities. Many factors affect functional mobility, including spasticity, limitation in normal range of joint movement, loss of selective motor control, and loss of gross motor functions (23). Individuals with severe physical disabilities can play Boccia (24). Indeed, our participants in group B had severe physical disabilities and the lowest levels of mobility and independent functionality, as indicated by their RMI and FIM values. However, based on FIM classification criteria, our B group can be classified in "low disability" level (FIM≥73). Despite their low level of mobility, our Boccia players were as functional as the participants in other groups. This shows the effectiveness of Boccia on the functional independence of individuals with physical disabilities. Similarly, many studies have reported increased FIM scores in individuals who do sports. In their study with 60 paraplegic sportsmen, Porto et al. (2016) reported that sports can improve functional independence (25). In female athletes, Saltan et al reported a direct relationship between sportive skills and independence in daily life (26).

Although there was no difference between the groups in terms of trunk evaluation results, sitting balance was numerically lower in the NS group. Based on the TIS-C results, the WCB group had the highest and NS group had the lowest level of coordination. Although there was no statistical difference between the static and dynamic body results of the groups (TIS-D score of group B is half of other groups), the fact that coordination was higher in the WCB group can be due to the effect of basketball on improving coordination. It has been shown that in individuals with physical disabilities, sports help increase endurance, strength, speed, aerobic and cardiopulmonary capacity, and improves coordination, balance and mobilization skills (27-30). Boccia and basketball require controlled movements and precise coordination in the upper limbs. In these sports, the ability to throw a ball necessitates wrist, elbow, and shoulder movements, trunk stabilization, and eye-hand and head coordination (31-33). This explains the high coordination level in the two sportive groups of our study. The fact that coordination scores were lower in group B than WCB, is associated with the higher levels of physical disabilities in individuals in group B. Dynamic balance scores of Boccia players were way below compared to the scores of the NS and WCB groups. Boccia players had higher levels of physical disability and 5 of them used assistive devices to play the game. The low coordination results in group B seem to be related to their higher physical disability levels. WCB is a sport that requires and improves upper limb and trunk control. Although trunk and functional independence results of the WCB and NS groups were similar, the fact that basketball players had the highest scores is due to the physical skill-enhancing effects of WCB. This difference can be clearly seen in TIS-Coordination results. According to a previous study, individuals with physical disabilities who play basketball are more independent in daily life in terms of mobility, have higher social participation levels, and higher quality of life compared to those who do not play any sports (34).

In our study, there was no difference between the groups in the WHOQOL-BREF scores; however,

group B had the highest score in the psychological domain. Individuals with all kinds and levels of disability can actively play Boccia. Even if players have low physical capacity, they can actively participate in the game by using different compensatory mechanisms or physical assists. For these reasons, Boccia is preferred by individuals with severe locomotor dysfunction due to neurological disorders, musculoskeletal disorders, and limb deformities (International Paralympic Committee 2015). Although Group B had the lowest mobility and functional independence, the group's quality of life was similar to that of other groups, even the highest in the psychological domain. This clearly indicates the positive effect of sports on social participation and life perception. Similarly, in the WHOQOL-DIS module, there were no differences between the groups in any of the sub-dimensions, again suggesting that the quality of life in Group B was similar to that of Group NS despite being more severely disabled. Team sports -such as Boccia- strengthen an individual's sense of belongingness, provide opportunities for friendship and socialization, and increase self-esteem and confidence (35). Therefore, the quality of life of the individuals in group B is similar to the NS group despite their severe physical disability, and they are even at the highest level in the psychological subscale. Similarly, in the study conducted by Safania and Mokhtari on 240 disabled individuals, physically active disabled individuals had better physical and psychological health and WHOQOL (environmental and social dimension) scores compared to nonactive persons (36). In this context, our findings are in line with the relevant literature.

Our study makes a different contribution to the literature in terms of comparing group B individuals with low mobility and motor function to individuals with higher functionality. When we examine the groups in terms of the sub-dimensions of quality of life, we see that group B has the lowest scores in the sub-dimensions of physical health, environment and discrimination, which are mostly related to the physical disability dimension. On the other hand it has the highest psychological score. In terms of social relationships and autonomy, it is in the middle level among the groups. B is a sport that can be done even in the most severe physical handicap situations since there is no physical performance prerequisite for participation and physical disability can be compensated under all circumstances. Therefore, it is not always expected that B improves the physical health of the players. However, it increases the quality of life of the individual with its cognitive, psychological and social effects (19,20,35,37). The fact that group B had high results in terms of psychological and social relations in our study shows exactly this situation. Group B has similar quality of life as individuals with better physical functionality. The difference in total scores seems to be related to physical health and its related sub-dimensions. Possibly, the low number of our data prevented this result from being clearly demonstrated. This is an important limitation of our study. Another limitation is that the physical activity levels of the participants were not evaluated.

The inability to find significant results in the regression analysis performed to measure the effect of sports or physical disability on quality of life may also be due to similar factors. In addition to its social and psychological effects, WCB has positive effects on physical health (strength, endurance, cardiopulmonary performance, etc.) because it is an aerobic sport (22,26). B is a strategy and group game. The contributions of both types of sports to the quality of life are different from each other. The NS group, on the other hand, consists of individuals with a higher level of mobility, even if they are not doing sports. For this reason, it is an expected result that they have higher physical activity. The contribution of this study to the literature is to show that sports or recreational activities can affect the quality of life of individuals, even at low mobility and functionality levels. In order to reveal this situation with more precise results, it is recommended to compare groups with the same mobility and motor functionality at a larger sample level in future studies.

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REFERENCES

1. Organization World Health. World Health Organization International Classification of Functioning, Disability and Health. Geneva: WHO. 2001.
2. Byrne A, Byrne DG. The effect of exercise on depression, anxiety and other mood states: a review. J Psychosomat Res. 1993;37(6):565-574.
3. Santamaria T, Mallia L, Vitali F, Girelli L, Alivernini F, Lucidi F. Imagine your body even without seeing it: the effect of physical activity upon the physical self-concept in people with and without blindness. Sport Sci Health. 2020:1-10.
4. Wise EK, Hoffman JM, Powell JM, Bombardier CH, Bell KR. Benefits of exercise maintenance after traumatic brain injury. Arch Phys Med Rehabil. 2012;93(8):1319-1323.
5. Rimmer JH, Riley B, Wang E, Rauworth A, Jurkowski J. Physical activity participation among persons with disabilities: barriers and facilitators. Am J Prev Med. 2004;26(5):419–25.
6. Wetterhahn KA, Hanson C, Levy CE. Effect of participation in physical activity on body image of amputees. Am J Phys Med Rehabil. 2002;81(3):194–201.
7. World Health Organization. Body mass index - BMI. https://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi.
8. Collen FM, Wade DT, Robb GF, Bradshaw CM. The Rivermead mobility index: a further development of the Rivermead motor assessment. Int Disabil Stud. 1991;13(2):50-54.
9. Akın B, Emiroğlu ON. The validity and reliability of Turkish version of Rivermead Mobility Index (RMI) in the elderly. Turkish Journal of Geriatrics. 2007;10(3):124-130.
10. Franchignoni F, Tesio L, Benevoloand E, Ottonello M. Psychometric properties of the Rivermead Mobility Index in Italian stroke rehabilitation inpatients. Clin Rehabil. 2003;17(3):273-282.
11. Segal ME, Ditunno JF, Staas WE. Interinstitutional agreement of individual functional independence measure (FIM) items measured at two sites on one sample of SCI patients. Spinal Cord. 1993;31(10):622-631.
12. Küçükdeveci AA, Yavuzer G, Elhan AH, Sonel B, Tennant A. Adaptation of the Functional Independence Measure for use in Turkey. Clin Rehabil. 2001;15(3):311-319.
13. Verheyden G, Nieuwboer A, Feys H, Thijs V, Vaes K, De Weerdt W. Discriminant ability of the Trunk Impairment Scale: a comparison between stroke patients and healthy individuals. Disabil Rehabil 2005;27(17):1023-1028.
14. Verheyden G, Willems A-M, Ooms L, Nieuwboer A. Validity of the trunk impairment scale as a measure of trunk performance in people with Parkinson's disease. Arch Phys Med Rehabil. 2007;88(10):1304-1308.
15. Sæther R, Jørgensen L. Intra-and inter-observer reliability of the Trunk Impairment Scale for children with cerebral palsy. Res Dev Disabil.2011;32(2):727-739.
16. Sag S, Buyukavci R, Sahin F, Sag MS, Dogu B, Kuran B. Assessing the validity and reliability of the Turkish version of the Trunk Impairment Scale in stroke patients. North Clin Istanb. 2019;6(2):156.
17. Verheyden G, Nuyens G, Nieuwboer A, Van Asch P, Ketelaer P, De Weerdt W. Reliability and validity of trunk assessment for people with multiple sclerosis. Phys Ther. 2006;86(1):66-76.
18. Eser E, Aydemir Ö, Cengiz Özyurt B, Akar A, Deveci, Serol; Eser S, Ayik C. Psychometric Properties of the Turkish Version of the World Health Organization Quality of Life Instrument for People with Intellectual and Physical Disabilities (WHOQOL-DIS-TR). Turkish Journal of Psychiatry. 2018;29(1).
19. Sahlin KB, Lexell J. Impact of organized sports on activity, participation, and quality of life in people with neurologic disabilities. Phys Med Rehabil. 2015;7(10):1081-1088.
20. Hutzter Y, Bar□Eli M. Psychological benefits of sports for disabled people: A review. Scand J Med Sci Sports . 1993;3(4):217-228.
21. Durstine JL, Painter P, Franklin BA, Morgan D, Pitetti KH, Roberts SO. Physical activity for the chronically ill and disabled. Sports Med . 2000;30(3):207-219.
22. Shephard RJ. Benefits of sport and physical activity for the disabled: implications for the individual and for society. Scand J Med Sci Sports .1991;23(2):51-59.
23. Heesen C, Böhm J, Reich C, Kasper J, Goebel M, Gold SM. Patient perception of bodily functions in multiple sclerosis: gait and visual function are the most valuable. Mult. Scler J. 2008;14(7):988-991.
24. Tsai Y-S, Yu Y-C, Huang P-C, Cheng H-YK. Seat surface inclination may affect postural stability during Boccia ball throwing in children with cerebral palsy. Res Dev Disabil. 2014;35(12):3568-3573.
25. Porto I dos P, Cardoso FL, Sacomori C. Sports practice, resilience, body and sexual esteem, and higher educational level are associated with better sexual adjustment in men with acquired paraplegia. J Rehabil Med.2016;48(9):787-792.
26. Saltan A, Ergun N. An investigation of functional independence, quality of life and wheelchair skills in women wheelchair basketball players. Phys Rehabil. 2017;28(2):60-67.
27. Mostamand J, Baharlouei H. Physical Activity in People with Intellectual Disability: A Narrative Review. J Rehabil Sci. 2019;14(5):311-317.

28. Fadaei-Dehcheshmeh M, Shamsi-Majelan A. Comparison of physical fitness in persons with intellectual disability with and without experience of Special Olympics Iran. J Rehabil Sci.2018;14(3):175-182.
29. Jeng S-C, Chang C-W, Liu W-Y, Hou Y-J, Lin Y-H. Exercise training on skill-related physical fitness in adolescents with intellectual disability: A systematic review and meta-analysis. Disabil Health J. 2017;10(2):198-206.
30. Lifshitz H, Merrick J, Morad M. Health status and ADL functioning of older persons with intellectual disability: Community residence versus residential care centers. Res Dev Disabil. 2008;29(4):301-315.
31. International Paralympic Committee. Explanatory guide to Paralympic classification. What is classification. 2015.
32. Reina R, Domínguez-Díez M, Urban T, Roldan A. Throwing distance constraints regarding kinematics and accuracy in high-level boccia players. Sci Sports 2018;33(5):299-306.
33. Zacharakis E. The effect of upper limb characteristics on palm strength, anaerobic power, and technical skills of wheelchair basketball players of varying classification. J. Phys Educ Sport 2020;20(2):584-591.
34. Yalçın Al. Farklı Klasifikasyon Puanlarına Sahip Tekerlekli Sandalye Basketbol Oyuncularında Üst Ekstremite Fiziksel Uygunluk Parametreleri ile Spora Özgü Beceriler Arasındaki Ilişkinin Incelenmesi. 2015. http://openaccess.hacettepe.edu.tr:8080/xmlui/handle/11655/1670#.YGNuY62uRQk.mendeley. Accessed March 30, 2021.
35. Ovenden I, Dening T, Beer C. "Here everyone is the same" – A qualitative evaluation of participating in a Boccia (indoor bowling) group: Innovative practice. Dementia. 2019;18(2):785-792. doi:10.1177/1471301216675988
36. Safania A, Mokhtari R, Khalkhal I. Participation in sports activities in leisure time and quality of life of activde and inactive disbled war veterans disabled people. Int Res J basic appl. sci 2012;3(4):859-867.
37. Mitic P, Jorgic B, Popovic I, Hadzovic M. The relationship between playing sports and self-efficacy in people with disabilities. Facta Universitatis Series: Physical Education and Sport. 2020;18(2):409-416.