IJDSHS

INTERNATIONAL JOURNAL OF DISABILITIES SPORTS & HEALTH SCIENCES

Volume: 3 Issue: 1 June 2020

e-ISSN 2645-9094 TURKEY

IJDSHS
INTERNATIONAL JOURNAL OF DISABILITIES SPORTS & HEALTH SCIENCES
Volume: 3 Issue: 1 June 2020

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PUBLICATION FREQUENCY

The IJDSHS accepts the articles in English and is being published 2 times (June and December) a year.

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IJDSHS
INTERNATIONAL JOURNAL OF DISABILITIES SPORTS & HEALTH SCIENCES
Volume: 3 Issue: 1 June 2020

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2020;3(1):1-4
DOI:10.33438/ijdshs.731146

International Journal of
Disabilities Sports & Health Science

Editorial *Opinion*

Fight Coronavirus Disease (COVID-19): More Active People for a Healthier World: Physical Activity Recommendations

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Keywords
Physical Activity, COVID-19, Exercise, Public Health, Active People

During the end of 2019 and the beginning of 2020, multiple human cases of novel coronavirus infection were reported in relation to the Huanan Seafood Wholesale Market (South China Seafood City Food Market) in Wuhan, China. At 9 O'clock, 7 January 2020, the virus was identified as a novel coronavirus and officially named by the WHO as 2019-nCoV, the new coronavirus in 2019. COVID-19 is thought to spread mainly through close contact from person-to-person in respiratory droplets from someone who is infected. People who are infected often have symptoms of illness. Some people without symptoms may be able to spread virus (WHO, 2020). In addition, based on the worldwide information fromthe Covid-19 pandemic, some characteristics of the population at higher risk for Covid-19 have been identified, such as being older people, those with hypertension, Cancer, Type 2 diabetes, Osteoporosis, sarcopenia, Depression, Anxiety, Cognitive function or cardiovascular disease (CVD) risk factors and patients with respiratory diseases or conditions (Lavie et al., 2019; Demirci et al., 2018; McKinney et al., 2016).

Ensuring that all people have access to safe and conducive environments and opportunities to be physically active in their daily lives, improving the health of individuals and society and contributing to the social, cultural and economic development of all nations. The objective is to achieve a relative reduction of 15% in the global prevalence of physical inactivity in adults and adolescents by 2030 (WHO, 2018). These lifestyles and behaviors in many cases include a certain level of physical activity (PA) and exercise to maintain an adequate health status, to counteract the negative consequences of certain diseases (Ozemek et al., 2019), such as diabetes, hypertension, CVD, respiratory diseases, or even simply to guarantee an active aging by reducing the risk of frailty, sarcopenia and dementia, as associated diseases in older people (Fletcher et al., 2018). Therefore, to not totally interrupt or change the lifestyle of people during quarantine and tomaintain an active lifestyle at home is very important for the health of the overall population but, especially, for thosewith additional risk factors and older people.

The reason to promote physical activity for improving physical fitness components is that these (cardiorespiratory fitness, muscular strength, coordinationagility) are directly related with the physiological functions of the main organ systems (respiratory, circulatory, muscular, nervous and skeletal systems) and indirectly implicated in the appropriate functioning of other systems (endocrine, digestive, immune systems) (Imboden et al., 2019; Liu et al., 2019). Regular physical activity is one of the most important activities you can do for your health. For all of us, young and old, regular physical activity is important for staying healthy! Compared to just sitting around most of the time, moderate-intensity physical activity is associated with better immune function.

Received: 02 May 2020 ; **Accepted:** 07 May 2020
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Regular physical activity can help reduce your feelings of stress and anxiety (which many of us may be feeling in the wake of the COVID-19 pandemic). More active people for a healthier world: The Physical activity guidelines for recommends 150-300 minutes per week of moderate-intensity aerobic physical activity and 2 sessions per week of muscle strength training. Fit in 2, 5, 10 or 20 minutes, however and wherever you can. Every active minute counts!

Physical Activity It is a well-known preventive factor for the prevention and treatment of leading noncommunicable diseases (NCDs). It also helps prevent the risk factors for other important communicable diseases such as (Covid-19) (Rhodes et al., 2017). Regular physical activity participation was associated with prevention of more than 25 chronic medical conditions (Lavie et al., 2019; Warburton, Taunton, Bredin and Isserow, 2016). For example, systematic reviews of the literature (Warburton et al., 2010) have shown that there was an average risk reduction of 20-30% for multiple chronic medical conditions in people who was regularly. In physically active subjects, (such as cardiovascular disease, stroke, hypertension, colon and breast cancer, and Type 2 diabetes), the relative risk reductions observed for many chronic medical conditions have a significant impact on the population (Table 1. WHO, 2020-a; WHO, 2018-b; Lippi et al., 2020; Lippi and Sanchis-Gomar, 2020).

Table 1. To Fight Coronavirus Disease (COVID-19): Health-Related Benefits of Physical Activity

Age Groups	**Children**
0- 4 Years	Improved bone health and weight status
5-17 Years	Improved cognitive function (ages 6-13). Improved cardiorespiratory and fitness. Improved bone health Improved cardiovascular risk factor status. Improved weight status and adiposity Less depression symptoms
18-64 Years	**Adults of all ages**
Death due to all causes	Low risk
Cardiometabolic Situations	Low cardiovascular incidence and mortality (including heart disease and stroke). Low incidence of hypertension Lower incidence of type 2 diabetes
Cancer	Lower incidence of bladder, breast, colon, endometrium, esophagus, kidney, stomach and of lung cancers
Brain Health	Brain health Decreased risk of dementia Improved cognitive function. Improved cognitive function following aerobic activity. Improved quality of life. Improved sleep. Decreased anxiety and feelings of depression in healthy individuals and people with current clinical syndromes. Incidence of reduced depression
Weight status	Reduced risk of excessive weight gain. Weight loss and the prevention of weight regain following initial weight loss when a sufficient dose of moderate-to-vigorous physical activity is attained an additive effect on weight loss when combined with moderate dietary restriction
Above 65 aged	**Older Adults**
Falls	Reduced incidence of falls. Reduced incidence of fall-related injuries
Physical function	Improved physical function in older adults with and without frailty
	Patients
	Women who are Pregnant or Postpartum
During pregnancy	Reduced risk of excessive weight gain. Reduced risk of gestational diabetes. No risk to fetus from moderate intensity physical activity
During postpartum	Reduced risk of postpartum depression
	Individuals with Pre-Existing Medical Conditions
Upper respiratory infection	Reduced systemic imflammation
Breast cancer	Reduced risk of all-cause and breast cancer mortality
Prostate cancer	Reduced risk of prostate cancer mortality
Osteoarthritis	Decreased pain. Improved function and quality of life
Hypertension	Reduced risk of progression of cardiovascular disease. Reduced risk of increased blood pressure over time
Type 2 diabetes	Reduced risk of cardiovascular mortality. Reduced progression of disease indicators: hemoglobin A1c, blood pressure, blood lipids, and body mass index
Multiple sclerosis	Improved walking. Improved physical fitness
Dementia	Improved cognition

There is likely to be very limited opportunity to practise physical activity outdoors during this period, with most people forced to stay at home or adopt isolation protocols to prevent transmission of the virus. It is thus recommended that people should stay active by exercising at home. For this purpose, multiple exercise modes can be applied, including aerobic exercise using stationary bikes or rowing ergometers, bodyweight strength training, dance-based exercise and active gaming (Hammami et al., 2020). The aim should be to undertake at least 30 min of moderate physical activity every day and/ or at least 20 min of vigorous physical activity every other day. Ideally, a combination of both intensities of physical activities is preferable in addition to practicing strengthening-type activities on a regular basis.18 Children, the elderly, and those who have previously experienced symptoms of illness or are susceptible to chronic cardiovascular or pulmonary disease should seek advice from health care providers about when it is safe to exercise. (Table 2. WHO, 2018-b; WHO, 2018-c; Liu et al., 2017; Colberg et al., 2010).

Table 2. More Active People for a Healthier World: Physical Activity Recommendations

Age Groups	**Aerobic Activity**
0- 4 Years	For 1–4 year olds, ≥180 min of physical activity at any intensity on all 7 days of the week
5- 17 Years	≥60 min of moderate to vigorous intensity physical activity on all 7 days of the week
18- 64 Years	≥150 min/week of moderate aerobic activity, or ≥75 min/week of vigorous activity or an equivalent combination of moderate and vigorous activity accumulated in bouts of ≥10 min
Above 65 aged	≥150 min/week of moderate aerobic activity, or ≥75 min/week of vigorous activity or an equivalent combination of moderate and vigorous activity accumulated in bouts of ≥10 min
Patients	
Upper respiratory infection	√/×, 10-minute jog test: If the general condition and signs are changed: allow low to moderate physical activity (< 80% of VO deteriorated: prohibit physical activity until full recovery; If not 2 max)
Cancer-related fatigue	3x/week for 30 min per session of moderate intensity
Health-related quality of life	2-3x/week for 30-60 min per session of moderate to vigorous
Physical Function	3x/week for 30-60 min per session of moderate to vigorous
Lymphedema	2-3x/week of progressive, supervised, program for major muscle groups does not exacerbate lymphedema
Hypertension	>2-3 sessions per week/ >20-30 min per session of continuous or accumulated exercise of any duration. Moderate (40% - 59% VO2R or; Vigorous 60% - 80% VO2R)
Diabetes	Aerobic exercise should be at least at moderate intensity, corresponding approximately to 40–60% of Vo2max (maximal aerobic capacity) or vigorous exercise (>60% of Vo2max).
During pregnancy	Women should accumulate 150 minutes of moderate ≥150 min/week of moderate aerobic activity but should occur over a minimum of 3 days per week.
Weight status (obesity)	3x/week for 20-40 min per session of moderate to vigorous aerobic exercise, plus 2-3x/week of resistance training 2 sets of 8-12 reps for major muscle group at moderate to vigorous intensity

VO2R:oxygen uptake reserve, Vo2max :maximal oxygen uptake

Given the concerns about the increasing spread of COVID-19, it is imperative that infection control and safety precautions be followed. Home stay is a fundamental safety step that can limit infections from spreading widely. But prolonged home stays can increase behaviors that lead to inactivity and contribute to anxiety and depression, which in turn can lead to a sedentary lifestyle known to result in a range of chronic health conditions. Maintaining regular physical activity and routinely exercising in a safe home environment is an important strategy for healthy living during the coronavirus crisis.

As a result; physical activity is important across all ages, and should be integrated into multiple daily settings. Whether working or not, older adults, in particular, can benefit from regular physical activity to maintain physical, social and mental health (including prevention or delay of dementia), prevent falls and realize healthy ageing. Strengthening the provision of, and access to appropriate opportunities and programmes can enable all older adults to maintain an active lifestyle according to capacity. In the protection and treatment of diseases, it is recommended to increase the level of physical activity and to make life style changes and to ensure continuity.

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How to cite this article: Demirci, N. (2020). Fight Coronavirus Disease (COVID-19): More Active People for a Healthier World: Physical Activity Recommendations. Int J Disabil Sports Health Sci;3(1):1-4. https://doi.org/10.33438/ijdshs.731146

ISSN: 2645-9094

Demirci and Eraslan, Int J Disabil Sports Health Sci;
2020;3(1):5-10
DOI:10.33438/ijdshs.679613

International Journal of
Disabilities Sports & Health Science

RESEARCH ARTICLE

Investigation of Participation Motivation in Sports Activities of Children with Special Educational Needs

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Abstract

Education is expected to help individuals to be developed at the highest level by revealing their hidden powers and abilities. Sports is one of the important factors that helps children with need special education to take their places in daily life, to connect them to life by socializing, to orient themselves with motivation and to accept the idea that disability is not an obstacle to continue living. In this study, it was aimed to determine sport participation motivation levels of children with special educational needs. Method; descriptive survey model from quantitative research methods was used in the research. A total of 60 (20 Girls, 40 Boys) children from Mersin special education practice schools participated in the study. In the research, a personal information form prepared by the researchers and the "Scale of Motivation for Participation in Sports in Persons with Disabilities (SMPSPD)" developed by Tekkurşun, İlhan, Esentürk and Kan (2018) were used as a data collection tool. In the analysis of the data obtained in the research; Descriptive statistics and t- test, Pearson Moment Correlation, Mann-Whitney U and Kruskal-Wallis tests were used. According to the findings; the mean scores of internal and external motivation of children who participated in sports activities were significantly higher than those who did not participate in sports activities. While there was no significant difference according to gender, a positive significant difference was found between the age and intrinsic motivation level of the children. As a result; It can be concluded that children with special educational needs have high motivation to participate in sports.

Keywords

Special Education, Sports Activities, Sports Participation Motivation

INTRODUCTION

The obstacle is a disadvantage that negatively affects an individual's adaptation to daily life. Adaptation is about the extent to which social roles can be made. One of the effective mechanisms that help the individual realize his social roles is sports (İlhan, Esentürk & Yarımkaya, 2016). In this context, there are many factors that affect the participation of people with disabilities in their daily life and their participation in sports. One of these factors is motivation. Motivation is one of the cornerstones of the individual's participation in sports. Although the reasons for participation in sports activities are quite high, complex is one of the most important factors that encourage and maintain participation in sports activity (McDonough and Crocker, 2005). Motivation is a psychological concept that encourages an individual towards a desired goal and is considered a psychological force that includes the intent and direction of a particular behavior (Ball, Bice & Parry, 2014). Motivations play a key role in all areas of life, as well as participation in sports activity. Motivation is a key factor in shaping our daily behavior. It is important to understand the main reasons that encourage children to participate in sports activities.

Received: 24 January 2020 ; **Accepted:** 03 May 2020
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Participation motivation includes the processes of starting, continuing and withdrawing from sports activity (Ciocan, Milon & Mareş, 2017). For example, the future expectations of children who perceive themselves as successful in sports cause higher motivation and continued participation than those who perceive themselves as unskilled (Marcen, Gimeno, Gomez, Saenz & Gutierrez, 2013). Children have different reasons to participate in sports (Having fun, developing their skills, getting together etc) boys and girls have similar reasons for participating in sports activities, but these can vary significantly. Motivation is defined as all internal or acquired, conscious or unconscious internal behavior motifs; a pulse that energizes or activates, especially in sports performance, in general human behavior, is the inner urge. According to Golu (2002), motivation is "a subjective objective model of causality that is accumulated, transformed and transmitted in time through learning and education in an internal individual; (Fredricks & Eccles, 2006). According to the World Disability Report of the World Health Organization, an estimated 95 million children (5.1%) between the ages of 0-14 have a type of disability. Common problems include Autism Spectrum Disorder, Developmental Delay, Behavioral Disorders, and Learning Difficulty (WHO, 2018).

Individuals continue their lives as members of social life with their motoric, social, emotional and cognitive differences. Depending on the inadequacy of the individual and depending on the degree of this inadequacy, movement limitation or lack of sensory losses may make it different from other individuals of the society (Tekkurşun et al. 2018). Being different from others, being disabled, it is called as "disability". Along with the development of sports body and mental health, it includes the desire to rivalry, excitement, contest and prevail in competition according to certain rules (Yücel, 2004). Sports are physical activities that people do within the rules with the determination to fight to win. The person who does sports is more confident, better adapted to his environment, and his mental health is more balanced and organized (İlhan, 2010). Participation in sports is increasingly important in the protection and development of health in children with special educational needs (Demirci et al., 2018).

Undoubtedly, children who need special education also have an active place in sports activities. Sport is a biological, pedagogical and social phenomenon that improves the physical and mental health of the person, increases the communication with the social environment, and brings the person to a certain level mentally and physically. For this reason, sports should be considered as a tool in the realization of the social harmony of individuals who need special education (İlhan, 2008). Many people with disabilities are unable to participate in sports on a regular basis, which may increase the likelihood of developing secondary health problems. Therefore, there is a need for a source of information on the challenges and facilitators for sports participation (Jaarsma et al. 2014). According to Tenenbaum and Eklund (2007), they argue that the biggest problem in the sports participation of individuals with disabilities is the lack of time and motivation. One of the important elements that helps the acceptance of the idea that the children who need special education are socially connected to life, motivated by their goals, and the idea that their disability is not an obstacle to continue life is ensuring participation in sports. In this study, it was aimed to determine sport participation motivation levels of children with special educational needs.

MATERIALS AND METHODS

In this context, descriptive survey model from quantitative research methods was used in the research. A total of 60 children from Mersin special education practice schools participated in the study. A personal information form prepared by the researchers and the "Scale of Motivation for Participation in Sports in Persons with Disabilities (SMPSPD)" developed by Tekkurşun, İlhan, Esentürk and Kan (2018) were used as a data collection tool.

Participants

The universe of the study consists of all children with learning disabilities studying in Mersin special education practice institutions, while the sample consists of 60 children from application schools. In this context, those who have actively participated in school sports competitions for at least two years as a criterion in the selection of participants are included. These children consist of 60 children, 40 Boys and 20

Girls, who have participated in sports activities and did not do sports. Their mean boy age was (13,0±0,1), Height was (155± 0,5), Weight (45,7±6.4) and the mean body mass index (BMI) was (23,4±2,5) and mean girls age was (12,6±0,3), Height was (151± 0,6), Weight (46,1±6.1) and the mean body mass index (BMI) was (24,6±2,7). The informed consent has been given by the legal guardians of the children who were going to become subjects of this research. The scale was applied and the data was collected according to the ethical standards of application and collection of information when using a scale. The flow diagram showing children with learning disabilities participating in the study is shown in Fig1.

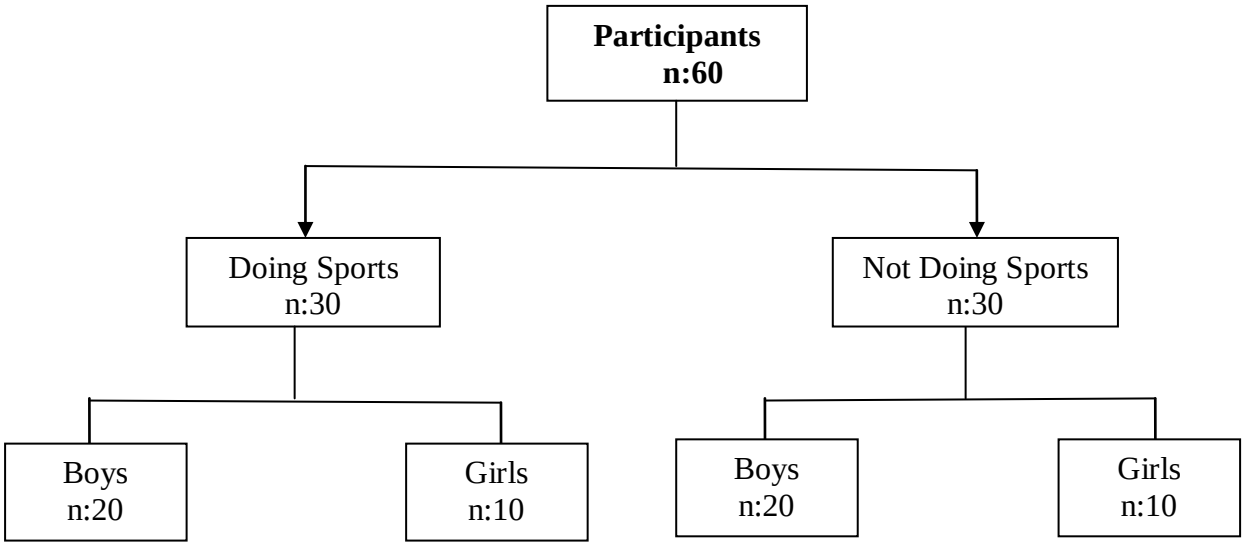


Fig 1. Flow showing children with learning disabilities participating in the study.

Data Collection Tool

Scale of Motivation for Participation in Sports in Persons with Disabilities (SMPSPD)

As the data collection tool, "Personal Information Form" created by the researchers and "Sports Participation Motivation Scale for Disabled Individuals (SMPSPD)", which was developed by Tekkurşun, İlhan, Esentürk and Kan (2018), were used as data collection tools. The scale includes the first 12 items under the name "Internal Motivation", 5 items under the "External Motivation" and the last 5 items under the name "Non-Motivation". The non-motivation factor consists of inverse substances. According to the data obtained from the participants, the Cronbach alpha value of Internal Motivation dimension, ".83" Cronbach alpha value of External Motivation dimension was calculated as ".87" and Cronbach alpha value of Non-Motivation dimension was calculated as ".88".

Statistical Analyses

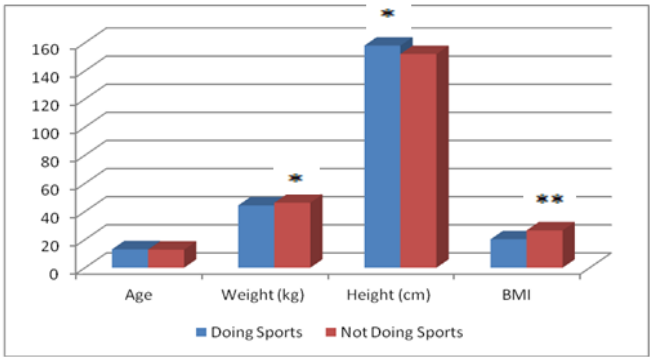
All statistical analyzes were done with SPSS 22.0 version. In the analysis of the data obtained in the research; descriptive statistics and t test, Pearson Moment Correlation Test were used.
When the data does not show normal distribution; Mann-Whitney U and Kruskal-Wallis tests were used. Significance was accepted as $p < 0.05$.

RESULTS

In the study, no significant difference was observed between the ages of boys and girls who doing and not doing sports. However, when it was evaluated in terms of Height ($P < 0.05$), Weight ($P < 0.05$) and BMI ($P < 0.01$), it was determined that it was significant in favor of those doing sports (Fig. 1,2).

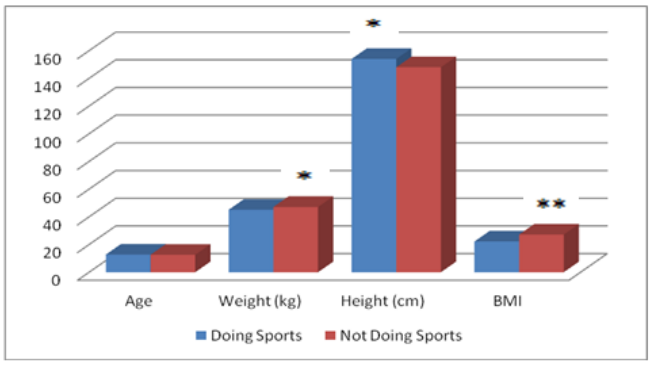
It was determined that the average of intrinsic and extrinsic motivation points of children who do sports is significantly higher than those who do not do sports (Table 1).

While no significant difference was found according to gender, a positive relationship was found between children age and intrinsic motivation level (Table 2,3).



* P < 0.05, ** P < 0.01, Body Mass İndex (BMI)

Fig. 1. Demographic Characteristics of Boys with special educational needs



* P < 0.05, ** P < 0.01, Body Mass İndex (BMI)

Fig. 2. Demographic Characteristics of Girls with special educational needs

Table 1. Sports Participation Motivation Results of Children Need Special Education

Variables	Sports Participation	N	SD	x^2	P Value
Internal Motivation	Doing Sports	30	48,22		
	Not Doing Sports	30	30,75	10,972	,00**
External Motivation	Doing Sports	30	51,15		
	Not Doing Sports	30	34,20	12,452	,00**
Non-Motivation	Doing Sports	30	43,31		
	Not Doing Sports	30	41,89	1,845	,73

* P < 0.05 , P < 0.01** , SD (Rank Average)

Table 2. The Relationship Between the Age of Children Needing Special Education and SMPSPD

Variables	Internal Motivation	External Motivation	Non-Motivation
Age	,282**	,172	-,08

(r=,282; P < 0.05)

Table 3. Investigation of Children's Sports Participation Motivation According to Gender

Variables	Gender	N	SD	Mann Whitney U	Z	P
Internal Motivation	Boys	30	95,41	3904,500	-,714	,81
	Girls	30	96,02			
External Motivation	Boys	30	101,18	3701,500	-,719	,43
	Girls	30	99,78			
Non-Motivation	Boys	30	43,10	532,500	-,379	,56
	Girls	30	41,42			

DISCUSSION

Studying the trends of recent research on motivation to participate in sports in people with disabilities will shed light on researchers, educators, teachers and children for scientific discussions and inquiries. Because, determining trends by examining and organizing educational research periodically, it is important in terms of shedding light on scientists who want to conduct

studies in the related field (Cohen, Manion, & Morrison, 2007). When the concept of motivation is viewed with the logic of turning to sports or directing it, the necessity of making the sport widespread especially among individuals with disabilities and determining the dynamics that can be used in line with this dissemination arises. Individuals can have many different sources of motivation to play sports. These sources of motivation are internal, external and non-motivational. There are many researches on the motivation of healthy individuals to participate in sports in our country (Ardahan, 2013; Demir & Cicioğlu, 2018; Hazar, Demir & Can, 2018; Treasure & Conroy, 2007). However, the number of studies on disabled people is limited.

In our study, it was determined that the girls and boys participating in sports activities were meaningful in favor of those doing sports when evaluated in terms of height, weight and BMI. It was determined that the average of intrinsic and extrinsic motivation points of the children participating in sports activities was significantly higher than those who did not participate in sports activities. While no significant difference was found according to gender, a positive relationship was found between children age and intrinsic motivation level. Therefore, it can be said that motivation factors are important in participation in sports. Motivation is defined as motivating, activate and encouraging the person to work. Interest in activity plays an important role in increasing motivation to participate in sports. If sports participation activities are not adapted for children in need of special support, participation restrictions may occur (Toptaş Demirci and Demirci, 2018).

Children have different reasons to participate in sports (having fun, developing their skills, exercising, being together and making new friends, competing) boys and girls have similar reasons to participate in sports activities, but these can vary significantly. Although sports participation has the potential to increase psychological well-being, studies suggest that motivation to participate in sports activities has decreased in childhood and adolescence. (Epuran and et al., 2008; Wigfield and et al., 1997). Children participating in sports have been shown to score higher on happiness, mental health and physical health scales than those who do not participate in sports. Regular participation in sports has also been associated with better quality of life (Khan et al., 2012). However, despite all known benefits, children also lead inactive lifestyles in relation to an increased risk of obesity and chronic diseases such as diabetes and coronary artery disease (Nelson et al., 2011). Sports is an important tool to gain the recommended physical activity level for children and young adults (Somerset and Hoare, 2018). As a matter of fact, in addition to supporting all development dimensions of the sport with a social and general approach, there are studies in which it is associated with physical development (Demir et al. 2017).

CONCLUSION

It was concluded that children with special educational needs have high motivation to participate in sports. The motivation of physical and physiological development comes to the fore in terms of internal motivational orientation factors. Among the external sources of motivation, it has been determined that achieving status and the feeling of success are the most basic elements that activate. Sports is a tool that supports all the development of disabled people in which they can express themselves. It is thought that the sport will serve to popularize among all disabled individuals in the path of socialization. After this research, which attempts to describe the reasons that lead people to sports, new studies to be carried out in different age groups and different types of disabilities should be planned. It is thought that it may create valuable effects in terms of participation in sports and taking measures to encourage individuals to this effective mechanism.

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How to cite this article: Toptaş Demirci, P. & Eraslan, K. (2020). Investigation of Participation Motivation in Sports Activities of Children with Special Educational Needs. Int J Disabil Sports Health Sci;3(1):5-10. https://doi.org/10.33438/ijdshs.679613

ISSN: 2645-9094

Deniz and A.Güzel, Int J Disabil Sports Health Sci;
2020;3(1):11-19
DOI:10.33438/ijdshs.690280

International Journal of
Disabilities Sports & Health Science

RESEARCH ARTICLE

Do Therapeutic Exercises Improve Kinesophobia and Health-Related Quality of Life in Adult Hemophilia Patients? A Randomized Controlled Trial

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Abstract

Objectives: Pain, risk of injury and physical limitations lead to the development of kinesiophobia and decrease in health-related quality of life in hemophilia patients. The aim of this study was to investigate the effects of therapeutic exercises on kinesiophobia and health-related quality of life in adult hemophilia patients. Material and Methods: A total of 24 patients aged 18 to 42 years were included in the study. Patients were randomly allocated to the control and exercise groups. Tampa Scale of Kinesiophobia (TSK) was used for evaluation of kinesiophobia; Short Form-36 (SF-36) and Hemophilia Adult Quality of Life (Hem-A-Qol) were used to assess health related quality of life. These evaluation scales were applied on the participants of both groups before and at the end of the study. Therapeutic exercises program including, warm up, resistive, stretching and balance exercises and information about positive effects of exercises on hemophilic arthropathy were administered to the exercise group three days a week for two months. Control group received only verbal information same as exercise group. Results: At baseline in physical, sociodemographic-clinical data, SF-36 and Hem-A-Qol scores there was not a significant difference between groups ($p>0.05$). However, in kinesiophobia level, there was a significant difference in favor of the control group ($p<0.05$). After the exercise program, there was a significant decrease in kinesiophobia and increase in total SF-36 score in the exercise group compared to the control group ($p<0.05$). However, there was a decrease clinically in favor of the exercise group in total Hem-A-Qol value, this difference was not statistically meaningful ($p>0.05$). Conclusions: Therapeutic exercises are simple and safe treatment modalities that can be used to improve kinesiophobia and health-related quality of life in adult hemophilia patients.

Keywords
Hemophilia, Kinesiophobia, Quality of Life

INTRODUCTION

Hemophilia is a hemorrhagic disease progressed due to the lack of some coagulant factors (factor VIII: hemophilia A, factor IX: hemophilia B) (White et al., 2001). In terms of factor efficiency, the classification of hemophilia on various levels (severe :<%1, medium: %1-%5 and mild: %5-%40) is performed. Recurrent musculoskeletal hemorrhages related to the lack of coagulant factors cause arthropathy characterized by severe degeneration in joint cartilage and subchondral bones (Fischer et al., 2016 & Witkop et al., 2017). The structures most affected by bleeding are knee, ankle and elbow joints. In case of bleeding in these joints, they are defined as the 'target joint'. Target joint formation in people with hemophilia causes to decrease of physical activity level (Stephenson et al., 2009). Decrease in the physical activity level developed by joint pain and limitations are the most important reason in worsening the health related quality of life (HR-QoL) (Hartl et al., 2008).

Received: 18 February 2020 ; **Accepted:** 3 May 2020
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Kinesiophobia is a person's state of having the fear of doing physical activity characterized by the sense of vulnerability against the risk of painful injury or the risk of being injured again (Vlaeyen et al., 1995). On individuals with particularly chronic musculoskeletal dysfunction and pain, kinesiophobia phenomenon is encountered frequently (Luque-Suarez et al., 2018). Kinesiophobia has a negative effect on the rehabilitation process. For this reason, it has to be taken into consideration and should be treated. Kinesiophobia management includes gradual exercise applications and cognitive-behavioral methods (Sethy and Sahoo, 2018). On hemophilic adult individuals, pain, risk of injury and lack of motivation cause the level of physical activities to decrease but, on the other hand, the phenomenon of kinesiophobia to increase. While there are some arguments in literature that multiple and safe exercise programs will increase the HR-QoL and decrease kinesiophobia on hemophilic patients (Lehmeier et al., 2018), no study about this issue is encountered. The aim of this study was to research the influences of regularly applied therapeutic exercise program on kinesiophobia and HR-QoL in hemophilic adults. The following hypotheses were investigated: therapeutic exercise improve (i) kinesiophobia and (ii) HR-QoL in hemophilic adults.

MATERIALS AND METHODS

Study Design

The study was performed randomized and controlled between July-September 2019 in one center and was approved by local ethics committee affiliated to the university (14.06.2019-89/56). The participants were informed about the study and their written consents were obtained. All procedures were conducted being in line with Helsinki Declaration. The study protocol was recorded in clinicaltrials.gov (NCT04205188).

Patient Participation and Randomization

Twenty-four individuals with hemophilia were enrolled in this study. They were selected from in Y region of X country. Individuals living in this region were informed through ether meeting or phone call about study. Those whose social and physical conditions were appropriate and who accepted to participate in this study were evaluated in terms of study criteria. Individuals older than 18, diagnosed with hemophilia A or B, without any cognitive problems and who literate were included in the study. On the other hand, those with another congenital coagulopathy such as Von Willebrand Syndrome, unable to walk due to hemophilic arthropathy and with whom inhibition arose against factor VIII-IX were excluded from the study (Figure 1).

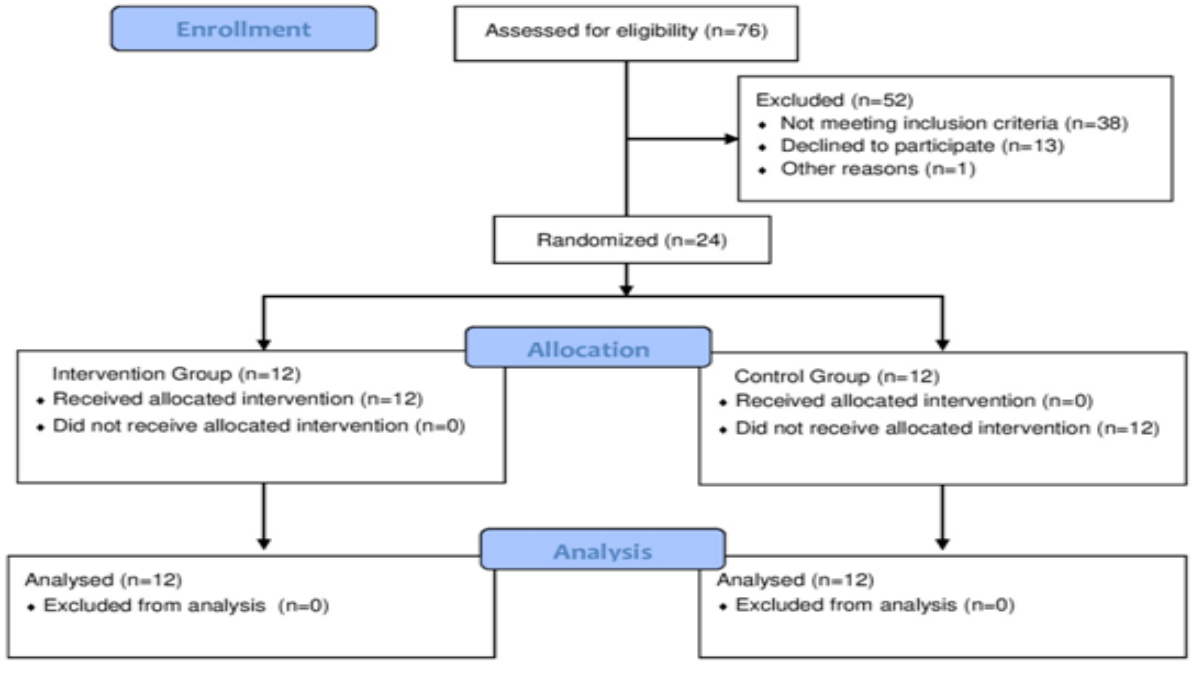

Figure 1. Flow Chart of The Study

Participants were randomized into exercise and control groups with computer aided randomization method. Computer aided randomization was performed using Statistical Package for Social Sciences, version: 22.0, Chicago, IL (SPSS) program. Individuals were enumerated by the researcher based on participation sequence and were registered into the program. Computer program distributed the participants randomly and in equal numbers into exercise and control groups (SPSS Tutorials, 2014).

Intervention

Therapeutic exercises and oral notification was applied to the exercise group. As part of oral notification, positive effects of exercises on joint stiffness and functions were described in a 45 minutes meeting. Therapeutic exercise program was applied by the researcher physiotherapist on alternating days (Monday – Wednesday – Friday) for eight weeks. Programs of those who were unable to attend some sessions due to physical (hemorrhage-pain) or social reasons was extended equal to the number of missed sessions (same frequency). Exercise applications were performed in the gymnasium affiliated to the university in which the equipment used in the study was included. For the participants in exercise group two-phase therapeutic exercises program including as; resistant exercises to enhance muscular strength, stretching exercises to increase flexibility and balance exercises to improve balance was applied (Cuesta-Barriuso et al., 2017). The first phase comprised of the first four weeks, the second phase consisted of the last four weeks. Sessions in both phases commenced with warm-up period including aerobic walking and active range of motions (AROM). Aerobic warm-up period was composed of walking on the treadmill for 10 minutes with 5 km/h in the first phase, 15 minutes with the same speed in the second phase. AROM was, on the other hand, applied in both phases including major joints (shoulder, elbow, hip, knee, ankle and spinal joints) and repeating 10 times.

Resistant exercises were implemented in both phases using yellow Therabant®. On muscles affecting shoulder, elbow, knee and ankle (m. deltoideus, m. biceps brachii, m. triceps brachii, m. quadriceps femoris, hamstrings, m. tibialis anterior and triceps surae) resistant exercises were performed %40 of 1 repetitive maximum (1RM) in the first phase recurring 10 times and for 3 sets, whereas in the second phase, %60 of 1RM recurring 15 times and again for 3 sets. Stretching exercises were done by the participants in static type, after warm-up period and at the end of the session. Static stretching was applied on shoulder posterior capsule as well as pectoral region, elbow flexors, hamstrings and triceps surae muscles. Stretching exercises including 15sec duration-10sec interval for 3 sets during the first phase, 20sec duration-10sec interval for 4 sets during the second phase were performed. Participants applied balance exercises bilateral upright and knees in semiflexion position. Balance training was in the form of weight-bearing or swinging anterior-posterior-right and left directions. Participants were provided with balance exercises including 15sec duration-30sec relaxation on static hard surface for 5 sets during the first phase, whereas in the second phase, the same exercises were applied but on a soft surface (on a BOSU® ball) (Table 1). Control group received only verbal information about positive effects of exercises on hemophilic arthropathy, in same meeting with exercise group. No physical exercise was applied to individuals in this group.

Outcome measures

Tampa Scale of Kinesiophobia (TSK), Hemophilia Adult Quality of Life Questionnaire (Hem-A-Qol) and Short Form-36 (SF-36) were used in the study. These evaluation scales were applied on the participants of both groups before and at the end of the (after eight weeks) study by the researcher physiotherapist. TSK is a questionnaire which evaluates pain or fear related to previous injuries and it consists of 17 questions. With this questionnaire, avoidance of physical activity with the fear of pain or injury risk is examined. In this questionnaire, likert scale from 1 to 4 (1: strongly disagree, 4: completely agree) is used. Turkish validity and reliability study was performed by Tunca Yılmaz et al. (Tunca Yılmaz et al., 2011). According to Vlaeyan et al., the total of 37 points and more indicate high kinesiophobia (Vlaeyan et al., 1995).

Hem-A-Qol is a valid questionnaire which evaluates the HR-QoL of adult hemophilic individuals and which is translated into more than 60 languages (von Mackensen et al., 2005). This questionnaire consists of 10 sections (physical health, feeling, view of oneself, sports and leisure, work and school, dealing with hemophilia,

treatment, future planning, family planning, relationship and sexuality) and 46 questions. Each question is scored with the likert scale from 1 to 5 (1: never, 5: always). There is an inverse proportion between the score received from this test and the quality of life. The higher the scores participants receive from this test, the less their quality of life is (Rambod et al., 2018). Its translation into Turkish and validation was conducted by Mercan et al. (Mercan et al., 2010).

SF-36 is a quality of life questionnaire and has 8 sections (physical function, physical role, pain, general health, life force, social activities, emotional functions and mental health) and 36 questions. In this questionnaire, scoring is from 0 to 100. There is a direct proportion between the point received and the quality of life. The fact that the points received from this questionnaire are high shows that they have a good quality of life. SF-36 is a valid questionnaire that can be used in evaluating hemophilic individuals' quality of life (von Mackensen et al., 2013). Turkish validity and reliability studies are conducted for many different illnesses

Table 1. Therapeutic Exercise Program

Exercise	Phase I (0-4. weeks)	Phase II (5.-8. weeks)
Aerobic Walking (warm up)	-10 min-5km/h -AROMs x 10	-15 min- 5km/h -AROMs x 10
Resistive exercises	%40 1RM x10 repetitions x 3sets -Material: Yellow Therabant®	- %60 1RM x15repetitions x 3sets - Material: Yellow Therabant®
Stretching exercises	-Type: Static - 15sec x 3 sets	-Type: Static - 20sec x 4 sets
Balance exercises	- Ground: Hard and static -Material: None - Duration: 15 sec weight bearing 30 sec rest	- Ground: Soft -Material: BOSU® ball - Duration: 15 sec weight bearing -30 sec rest

AROM (Active range of motion) RM (Repetitive maximum)

Statistical Analysis

For the statistical analysis, Statistical Package for Social Sciences, version:22.0, Chicago, IL (SPSS) program was used. Shapiro-Wilk Test revealed that data was normally distributed ($p>.05$). Sociodemographic-clinic and physical characteristics of the participants were compared by t test and x^2 test and were demonstrated as mean±standard deviation (sd) and mean (%). In the comparison of the delta (difference between the posttest and the first test) of SF-36, Hem-A-Qol and TSK scores, t test was used. $p<0.05$ was considered to be a statistically meaningful value. The effect sizes (Cohen d) between groups were also calculated. The effect sizes are presented with their %95 Confidence Interval (CI). A score less than 0.4 represents small effect; between 0.4 and 0.8, a moderate effect; and greater than 0.8, a large effect.

RESULTS

Data of 24 individuals were analyzed. There were no participants who were unable to complete the study for any reasons (such as pain, hemorrhage, social reasons). However, two patients discontinued the program because of the pain in their knees until their symptoms were relieved (the first one on the second week, the second one on the sixth week of the program). During the exercise program, no participant reported to have hemorrhage in any of the joints.

Physical and Sociodemographic- Clinical Characteristics

Participants' average of age in control group was specified as 25.5±8.8 years, in exercise group, as 26.3±6.6 years and body mass index (BMI) in control group as 22.0±3.5 kg/m^2, in exercise group, as 24.9±5.7 kg/m2. With all participants, at least in one joint, arthropathy was observed where this number in control group was calculated as 2.1±1.6 and as 2.0 ±1.8 in exercise group. All individuals notified they were literate and received school education in various levels, besides, half of them were married and the rest were single. When looked upon clinical values, 17 of the participants were seemed to have severe (factor activity: <%1), 7 of them mild (factor activity: %1-5) hemophilia and 17 to be diagnosed with hemophilia A, 7 with hemophilia B. In all physical and sociodemographic-clinical data, there was not a significant difference between groups (p>0.05) (Table 2).

Table 2. Physical and Sociodemographic-Clinical Characteristics of The Participants

Physical characteristics					
	Group	n	*x*	Sd	p
Age (year)	Control	12	25,5	8,8	,772
	Exercise	12	26,3	6,6	
BMI (kg/m^2)	Control	12	22,0	3,5	,225
	Exercise	12	24,9	5,7	
Target joints (n)	Control	12	2,1	1,6	,680
	Exercise	12	2,0	1,8	
Sociodemographic-clinical characteristics		n	(%)		p
Education, n (%) (PS/HS/Uni)	Control	1/7/4	8,3/58,3/33,3		,324
	Exercise	0/6/6	0/50/50		
Marital status (Single/Married)	Control	5/7	41,7/58,3		,424
	Exercise	7/5	58,3/41,7		
Severity (severe/medium)	Control	9/3	75,0/25,0		,660
	Exercise	8/4	66,6/33,3		
Type (A/B)	Control	9/3	75,0/25,0		,660
	Exercise	8/4	66,6/33,3		

BMI (Body massindex) PS (Primary school) HS (High school) Uni (University) x (mean) sd (Standart deviation)

Kinesiophobia

Before the exercise program, kinesiophobia level of the participants in control group was evaluated as 38.0±5.7 and in exercise group as 43.5±5.9. Between groups in kinesiophobia level, there was a significant difference in favor of the control group (p<0.05). After the exercise program, the kinesiophobia level was seemed to be 39.4±5.3 in control group and 41.0±5.3 in exercise group. While the kinesiophobia level of the control group was increasing, that of the exercise group seemed to decrease. Between the groups after the exercise program, a meaningful variation developed in favor of the exercise group (p<0.05) (Table 3).

HR-QoL

While the total Hem-A-Qol score was 42.9±9.9 in control group before the exercise program, it was 42.0±10.3 in exercise group. There was not a meaningful difference between the groups in terms of Hem-A-Qol value (p>0.05). It was indicated after the evaluation done at the end of the exercise program that the total Hem-A-Qol value increased to 44.3±7.4 in control group, whereas it decreased to 40.8±9.8 in exercise group. Besides, there was a difference clinically in favor of the exercise group in total Hem-A-Qol value, whereas this difference was not statistically meaningful (p>0.05) (Table 3).

Before the therapeutic exercise program, the total SF-36 score of the control group was evaluated as 70.3±15.3, that of the exercise group was calculated as 64.7±17.4 and there was not a

significant difference between groups in terms of SF-36 total score (p>0.05). It was seen at the end of the exercise program that the total SF-36 score of the control group decreased to 62.8±18.8 and the score of the exercise group increased to 73.3±20.6. At the end of the exercise program, there was a significant difference in SF-36 total score in favor of the exercise group (p<0.05) (Table 3).

Table 3. Kinesiophobia and Health Related Quality of Life Scores of The Participants.

Pre-exercise						**Post-exercise**					
	Group	**n**	***x***	**sd**	**p**	**Group**	**n**	***x***	**sd**	**p**	**Cohen d (%95 CI)**
TSK	Control	12	38,0	5,7	,033*	Control	12	39,4	5,3	,049*	0.86 (0.17 to 1.13)
	Exercise	12	43,5	5,9		Exercise	12	41,0	5,3		
Hem-A-Qol (total)	Control	12	42,9	9,9	,985	Control	12	44,3	7,4	,172	0.58 (-0.37 to 2.02)
	Exercise	12	42,0	10,3		Exercise	12	40,8	9,8		
SF-36 (total)	Control	12	70,3	15,3	,414	Control	12	62,8	18,8	,004*	1.25 (0.83 to 1.67)
	Exercise	12	64,7	17,4		Exercise	12	73,3	20,6		

Cohen d relation (between groups effect size) CI (Confidence Interval) TSK (Tampa Scale of Kinesophobia) SF-36 (Short Form-36) Hem-A-Qol (Haemophilia Adult Quality of Life Questionnaire) *x* (mean) sd (Standart deviation) (*) (p<0.05)

DISCUSSION

In this study where the effects of therapeutic exercises investigated on kinesiophobia and HR-QoL of adult hemophilic individuals, exercise group reflected a significant improvement in both parameters when compared to the control group. In musculoskeletal diseases, a decrease of 2 (95% CI: >2; >2) in TSK (Monticone et al., 2017) and an increase of 12% in SF-36 (Angst et al. 2001) was determined as minimal clinical important difference. Considering these values, it is seen that both parameters improve clinically in the exercise group.

Kinesiophobia is described as an extreme irrational and weakening fear about carrying out a physical movement due to the feeling of frailty against a painful injury or the possibility of being injured again (Kori et al., 1990). It generally springs out based directly on a bad experience or social learning (Meier et al., 2015). As in many other illnesses, avoidance of physical activity because of kinesiophobia is frequently confronted in hemophilia, as well (Steimer, 2002& Lehmier et al., 2018). Pain, fear of injury-hemorrhage and lack of motivation are some of the reasons for the development of this phenomenon in hemophilic individuals (Lehmier et al., 2018). In literature, there are studies in which positive effects of functional exercises on kinesiophobia are shown (Monticone et al., & Cruz Diazet et al., 2018). In addition, no study aiming to enhance the kinesiophobia phenomenon on hemophilic individuals is seen. We believe, in our study, by means of a good tolerance of therapeutic exercises by individuals, the level of kinesiophobia decreased. However, since the exercise program was limited to eight weeks, the level of kinesiophobia of individuals in the exercise group remained above normal. The increase in the kinesiophobia level of the control group which do not perform regular exercises supports the view that avoidance behaviors raise the level of kinesiophobia more. This situation is another indication to prove the importance of therapeutic exercises over kinesiophobia management.

In hemophilic individuals, the severity of hemophilia, frequency of hemorrhage, type of treatment and joint problems constitute physical conditions (Cuesta-Barriusoet et al., 2017) and characters of individuals, their demographic situations and status of life constitute social conditions (Bullinger et al., 2008) affecting the quality of life. When literature is observed, the general view is towards that the HR-QoL of hemophilic individuals is worse than the rest of the population. However, there are studies against this argument (Fischeret et al., 2005). In our study, in parallel with the widespread view, hemophilic individuals' HR-QoL was determined to be lower than the normal population. Main reasons of this situation are inadequacies in physical conditions and pain. We think that positive effects of therapeutic exercises on physical fitness parameters (Cuesta-Barriuso et al., 2017 & von Mackensen et al., 2013) and that they decrease the level of pain enhance the HR-QoL of hemophilic individuals.

Individuals being informed about their illnesses and the strategies to cope with their problems affect their emotional and physical conditions positively (Llewellynet et al., 2005). Cuesta et al. report in their study that improvement in HR-QoL of hemophilic individuals was provided giving information about the complications of hemophilia, benefits of therapeutic exercises and strategies to cope with the illness. They described this situation with the increase in individuals' skills to control and manage hemophilia (Cuesta-Barriusoet et al., 2017). It occurred differently in our study that there was no improvement in the HR-QoL of the control group receiving just verbal education. We believe no improvement was seen due to the fact that the duration of verbal education was low and that it was not supported with physical activity programs.

It is essential that exercises applied on hemophilic individuals do not cause hemarthrosis and should be well tolerated by patients (Calatayud et al., 2019). In literature, various results in terms of exercise programs' creating the risk of hemarthrosis, particularly including strengthening education, were stated. Heijenen et al. notified that strengthening exercises they used for the treatment of hemophilic arthropathy caused hemorrhage in some patients (Heijnen L and de Kleijn, 1999). Other researchers, on the other hand, inferred that these exercises did not cause hemarthrosis and, on the contrary, they decreased the frequency of hemorrhage (Tiktinskyet et al., 2002 & Calatayud et al., 2019). In our study, participants in the exercise group did not notify any hemorrhage based on exercises during the therapeutic exercise program, in the course of the exercise or within the same day. When data obtained from this study and other studies are considered, it can be concluded that therapeutic exercises are safe for hemophilic individuals.

Limitations

There are some limitations in this study. Firstly, long-term follow-up of patients could not be performed. Long-term patient follow-up is necessary to determine whether the effects of treatment programs are sustained. Second limitation is that only subjective tests were used in the study. Even though there some studies conducted regarding this issue (Calatayud et al., 2019&von Mackensen et al., 2013), subjective tests have to be supported by objective tests measuring physical parameters. Third limitation is that there was no blinding in this study. Blinding is a key methodological procedure to decrease risk of bias (Hróbjartsson et al., 2014). Because of these limitations, these results obtained in the study are required to be supported by prospective randomized studies in the long term.

CONCLUSIONS

In this study a decrease in kinesiophobia and increase in HR-QoL in adult hemophilic individuals were observed. Therapeutic exercises can be recommended in the management of kinesiophobia and HR-QoL deficiency in hemophilia.

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How to cite this article: Deniz, V. and A.Güzel, N. (2020). Do Therapeutic Exercises Improve Kinesophobia and Health-Related Quality of Life in Adult Hemophilia Patients? A Randomized Controlled Trial. Int J Disabil Sports Health Sci;3(1):11-19. https://doi.org/10.33438/ijdshs.690280

ISSN: 2645-9094

Suner-Keklik et al., Int J Disabil Sports Health Sci;
2020;3(1):20-27
DOI:10.33438/ijdshs.694943

International Journal of
Disabilities Sports & Health Science

RESEARCH ARTICLE

Comparison of Shoulder Muscle Strength of Deaf and Healthy Basketball Players

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Abstract

Purpose: It has still not been made clear whether the audio inputs from the environment may have on the muscle strength characteristics of people who spend long periods of their lives with hearing loss. The purpose is to evaluate shoulder muscle strength and endurance of deaf basketball (DB) players and to compare them with healthy basketball (HB) players. Methods: The study was carried out with a total of 26-man players including 13 players (years: 24±3) in DB group and 13 players (years: 22±2) in HB group. Internal rotator (IR) and external rotator (ER) muscles strength of shoulder dominant and non-dominant side was measured using an isokinetic dynamometer. Results: According to isokinetic test results, there was not a difference between two groups on either dominant or nondominant side in terms of ER and IR Nm/kg ($p>0.05$). The ER / IR ratio was different between the two groups in favor of HB players ($p=0.017$). The strength parameters of dominant extremities of players in both groups were found to be higher than nondominant extremity. Conclusions: As a result, IR and ER muscle strengths were similar in two groups, both groups were at risk for musculoskeletal injuries in terms of ER/IR ratio. It could be speculated that it is essential to design training programs with additional ER strengthening exercises to improve the balance between IR and ER muscles and minimize risk of injury. The dominant extremity was found to be stronger in both groups. In our opinion, symmetrical movement patterns will positively affect performance on dominant extremity.

Keywords
Basketball, Deaf Player, Shoulder Muscle Strength

INTRODUCTION

Basketball is a physically challenging sport which involves defensive and offensive movements (Pojskić, Šeparović, Užičanin, Muratović, & Mačković, 2015). Motoric and anthropometric features play an important role in achieving success in basketball. The sport of basketball requires strength, speed, flexibility, agility and endurance. The strength required for this sport is manifested in different forms such as maximal strength, agility (power) and endurance. Throwing power at offense passes at various positions, the arm strength during the jump from the three-point zone and the arm and leg strength at free throws are the most significant examples of this condition (Akçakaya, 2009).

Competitive sports for people with disabilities have entered a rapidly developing process in recent years (Akınoğlu & Kocahan, 2017). Many individuals with disabilities from elite level professional athletes to recreational sports participants have been participating in these sports. It can, therefore, be said that sports are the healthiest way to improve their social integration by strengthening their self-confidence, self-

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efficacy and quality of life as well as contributing to the improvement of the fitness parameters such as cardio-metabolic fitness and flexibility (Akınoğlu & Kocahan, 2017).

Deaf Basketball (DB) is played according to the rules of *Healthy Basketball* (HB), and each sport has similar physiological demands (Güzel & Kafa, 2016). Those who have a hearing loss of at least 55 dB in the better ear are eligible for being an athlete and participating in the competition (Brancaleone, Shingles, & DeLellis, 2017; Ross, Irrgang, Denegar, McCloy, & Unangst, 2002). A deaf athlete must be physically strong and able to compete without significant limitations (Kurková, Válková, & Scheetz, 2011). The strength of shoulder muscles and stabilization of these joints are substantially important for each of these two basketball groups who use upper extremity functions specific to basketball such as dribbling, lay-up and rebound (Berckmans et al., 2017).

External Rotators (ER) and Internal Rotators (IR) are responsible for the stabilization of the shoulders (Berckmans et al., 2017), and the muscular imbalance between these muscles is accepted as one of the factors that cause musculoskeletal dysfunction of the shoulder (Codine, Bernard, Pocholle, & Herisson, 2005; Dauty et al., 2003; Dvir, 2004; Warner, Micheli, Arslanian, Kennedy, & Kennedy, 1990). Overhead sports comprising repeated arm movements that require strength such as basketball, volleyball, baseball and handball cause increased shoulder injury incidences. Ballistic movements in such sports cause eccentric overload on the rotator cuff muscles which are prone to injury. Rotator cuff muscles are considered to be the most important dynamic stabilizers of the glenohumeral joint Weak rotator cuff muscles may lose the ability to maintain a balanced relationship with the antagonist's muscles as a result of micro-traumas caused by repetitive overhead movements. (Baltaci & Tunay, 2004).

These strength imbalances in the muscles which make up the rotator cuff can render injuries caused by eccentric overload worse or may cause secondary impingements or instabilities. Because of the critical functional role of the rotator cuff muscles, objective evaluation of shoulder IR and ER strength is essential in pre-participation evaluations to prevent injuries and during the rehabilitation of the injured athlete (Baltaci & Tunay, 2004). Because of its functional importance, the objective evaluation of the strength of ER and IR muscles is necessary to determine risk factors and prevent injuries. Many procedures such as manual muscle testing, hand dynamometers and isokinetic dynamometers are used in the evaluation of the shoulder strength. Isokinetic dynamometers are often used in the objective evaluation of muscle performance (Pascal Edouard et al., 2011).

Even though that the evaluation of the muscular performance of the upper extremity in sports such as basketball is considerably important for both determination of injury risk and elimination of deficiencies of the training program, such a study that evaluates the shoulder muscle strength of DB players has not been in studies. Moreover, it has still not been made clear what effects the audio inputs from the environment may have on the muscle strength on people who spend long periods of their lives with hearing loss despite the similarity of their physiological needs. The shoulder strength difference between DB and HB players has not been made clear yet, either. Therefore, this study aims to evaluate the shoulder muscle strength and endurance of the DB players and to compare these results with those of HB players.

MATERIALS AND METHODS

Participants

The study was done with 26 players, which included a group of 13 DB players and a group of 13 HB players. It included individuals who were between the ages of 18-30 and have been actively involved in basketball for at least two years with no difference between their active sports year and weekly training frequency as well as agreeing to participate in the study. The study excluded those who had undergone upper extremity operation, those with neurological problems, systemic diseases and who had shoulder problems or shoulder pain in the last 3 months. In March 2018, individuals started to be evaluated. Prior to the study, the purpose and content of the study were made clear to the players and a Clarified Consent Form was signed regarding their voluntary participation. Ethics committee permission was obtained from the ethics committee of the university with the decision dated 06.02.2018 and numbered 77082166-302.08.01.

Procedures

Players' age, height, body weight, BMI, dominant side, active sports year, weekly training time, history of any shoulder injury, background and family history were inquired and noted. Isokinetic systems are highly reliable for measurements at different positions and angular velocities (Brown, 2000). For this reason, they are frequently used to objectively evaluate the strength of rotator muscles (Ellenbecker & Davies, 2000). Therefore, IR and ER muscle strength values were measured using an isokinetic dynamometer (Cybex NORM®, Humac, CA, USA). Isokinetic evaluations were performed in seated position with the arm in the scapular plane. The players were seated upright on the device and the stabilization of the body was achieved with horizontal and pelvic straps. The elbow was stabilized with a band. The assessment order was randomly decided for either shoulder.

The range of motion was determined as 50° internal rotation and 40° external rotation to prevent excessive movement of the shoulder joint. (Moraes, Faria, & Teixeira-Salmela, 2008). Three submaximal repetitions at each angular velocity were done for warm-up and learning. Measurement of strength was performed in the concentric mode with 5 repetitions at an angular velocity of 60°/sec, and endurance measurements with 15 repetitions at an angular velocity of 180°/sec (Pontaga & Zidens, 2014). The subjects had 20 seconds of rest between trials and tests (warm-up and maximum measurement) and 90 seconds of rest between the sets.

Gravity compensation was turned on during the adjustment of the measurement parameters to improve the objectivity of the measurement. Before starting the measurement, the subject's arm was moved to neutral position in order to measure the weight of the subject and the device, thereby eliminating the effect of gravity during the test. Regardless of the hearing impairments of the players that form one of the two groups, the subjects in neither group were given any sort of verbal motivation, and the measurements were performed by the same person for objectivity. All measurements were repeated on the other extremity by changing the position of the dynamometer and seat. As a result of the test, peak torque of ER and IR were obtained at each angular velocity for each shoulder, and unilateral ER and IR ratios for peak torque (ER/IR ratio) were calculated.

Statistical Analysis

The statistical analysis was performed using "Statistical Package for Social Sciences" (SPSS) Version 22.0 (SPSS Inc., Chicago, IL, ABD). The normal distribution of the data was analyzed using visual (histogram and probability graphs) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk Test). The variables with no normal distribution were indicated with median and IQR (25-75) and categorical variables with frequency and percentage (%). "Mann-Whitney U Test" was used to determine the difference between DB and HB players. The probability level of a type 1 error was accepted 5% for statistical significance.

RESULTS

Demographic data of the subjects are given in Table 1. There was not a statistically significant difference between the two groups in terms of age, body weight, height and body mass index (BMI). While there was no difference between DB and HB subjects in terms of active sports year and weekly training time, the age at which regular basketball players started the sport was found to be statistically significantly younger ($p<0.05$, Table 1).

According to the isokinetic test results, there was not a difference between the two groups on either the dominant or non-dominant side at the angular velocity of 60°/sec and 180°/sec in terms of ER and IR Nm/kg and the ER/IR ratio at the angular velocity of 60°/sec ($p>0.05$, Table 2), while there was a difference in terms of ratio on the dominant side in ER/IR at the angular velocity of 180°/sec ($p<0.05$, Table 2). ER/IR ratio was found to be lower in the DB group.

Upon the examination on the difference between the dominant and non-dominant sides of DB players, it was determined that there was not a difference in terms of 60°/sec ER Nm/kg, 180°/sec ER-IR Nm/kg and ER/IR ratio ($p>0.05$, Table 3), whereas there was a difference in terms of 60°/sec IR Nm/kg and ER/IR ratio ($p<0.05$, Table 3). The strength on the dominant side was found to be higher than that of the non-dominant side in terms of 60°/sec IR Nm/kg. ER/IR ratio, however, was determined to be higher on the non-dominant side compared to the dominant side.

Table 1. Demographic characteristics of players

		DB (IQR) (n=13)	HB (IQR) (n=13)	p
Age (years)		23 (21/26.5)	22 (21.5/23)	0.496
Body weight (kg)		82.2 (79.2/91.6)	92 (85.5/97.5)	0.069
Height (cm)		183 (180.5/192)	192 (184/202.5)	0.057
BMI (kg/m^2)		24.53 (22.24/26.26)	24.96 (23.04/25.27)	0.750
Age of Starting the Sport (years)		12 (9/14)	9 (6.5/10.5)	**0.019***
Active Sport Years (years)		10 (8.5/14.5)	13 (11.5/16)	0.186
Weekly Training Time (hours)		10 (8/10)	10 (6.5/15)	0.840
Dom, n (%)	**R**	13 (100)	13 (100)	
	L	0 (0)	0 (0)	

DB: Deaf Basketball, HB: Healty Basketball, BMI: Body Mass Index, Dom: Dominant, Statistically significant difference (p<0.05)

Table 2. Shoulder strength and endurance of the DB and HB players

		DB (n=13)		HB (n=13)		p
		Median	**IQR**	**Median**	**IQR**	
Dom	**60°/sec IR (Nm/kg)**	63	58.5/66	63	58.5/72	0.815
	60°/sec ER (Nm/kg)	30	30/33	36	27/40.5	0.211
	60°/sec ER/IR	51	47/56	55	41.5/64	0.411
	180°/sec IR (Nm/kg)	51	48/57	51	52/55.5	0.365
	180°/sec ER (Nm/kg)	24	24/27	27	22.5/33	0.332
	180°/sec ER/IR	48	44.5/50	56	49/66	**0.017***
Non-dom	**60°/sec IR (Nm/kg)**	57	54/61.5	57	49.5/64.5	0.979
	60°/sec ER (Nm/kg)	33	28.5/33	33	27/37.5	0.815
	60°/sec ER/IR	56	49.5/58	53	48/61	0.644
	180°/sec IR (Nm/kg)	54	45/57	42	37.5/51	0.127
	180°/sec ER (Nm/kg)	24	22.5/27	24	19.5/28.5	0.562
	180°/sec ER/IR	47	42/57.5	54	46/69	0.258

DB: Deaf Basketball, HB: Healty Basketball, Dom: Dominant, Non-dom: Non dominant, ER: External Rotator, IR: Internal Rotator, Statistically significant difference (p<0.05)

Table 3. Strength comparison of the dominant and non-dominant shoulders of DB players

DEAF BASKETBALL GROUP			
	Dominant (Median IQR)	**Non-dominant (Median IQR)**	**p**
60°/sec IR (Nm/kg)	63 (58.5/66)	57 (54/61.5)	**0.022***
60°/sec ER (Nm/kg)	30 (30/33)	33 (28.5/33)	0.589
60°/sec ER/IR	51 (47/56)	56 (49.5/58)	**0.046***
180°/sec IR (Nm/kg)	51 (48/57)	54 (45/57)	0.360
180°/sec ER (Nm/kg)	24 (24/27)	24 (22.5/27)	0.414
180°/sec ER/IR	48 (44.5/50)	47 (42/57.5)	0.350

ER: External Rotator, IR: Internal Rotator, Statistically significant difference (p<0.05)

Upon the examination on the difference between the dominant and non-dominant sides of HB players, it was found that there was no difference in terms of 60°/sec ER/IR ratio, 180°/sec IR Nm/kg and ER/IR ratio (p>0.05, Table 4), whereas there was a difference in terms of 60°/sec ER and IR Nm/kg and 180°/sec ER Nm/kg (p<0.05, Table 4). The dominant side values were found to be higher than those of the non-dominant side for all three parameters.

Table 4. Strength comparison of the dominant and non-dominant shoulders of HB players

HEALTHY BASKETBALL GROUP			
	Dominant (Median IQR)	**Non-dominant (Median IQR)**	**p**
60°/sec IR (Nm/kg)	63 (58.50/72)	57 (49.5/64.5)	**0.044***
60°/sec ER (Nm/kg)	36 (27/40.5)	33 (27/37.5)	**0.026***
60°/sec ER/IR	55 (41.5/64)	53 (48/61)	0.456
180°/sec IR (Nm/kg)	51 (42/55.5)	42 (37.5/51)	0.096
180°/sec ER (Nm/kg)	27 (22.5/33)	24 (19.5/28.5)	**0.002***
180°/sec ER/IR	56 (49/66)	54 (46/69)	0.753

ER:External Rotator, IR:Internal Rotator, Statistically significant difference (p<0.05)

DISCUSSION

Due to the sensory feedback they received while planning the study, we had expected that muscle strength and endurance in HB players would be better than that of DB players. But as a result of this comparative study on the shoulder muscle strength and endurance of DB and HB players, it was found that the strength and endurance of the players in the two groups were similar. There was not a difference between the groups in terms of demographic features. However, it was believed that the sport starting age may have been delayed as a result of the medical treatments that the individuals in the DB group often had to receive because of the permanent drawback they had at an early age. Nevertheless, we still think that physical fitness levels are similar because they have a similar weekly training time.

Velocities up to 90°/sec are used for strength measurement with isokinetic systems, whereas 180°/sec-240°/sec velocity is generally preferred in endurance evaluation on the subjects. 60°/sec velocity is conventionally preferred in cases where strength evaluation is required in the shoulder joint while 180°/sec is preferred in endurance evaluation (Brown, 2000). Therefore, evaluations in this study were performed at similar angular velocities. Previous studies have shown that the most reliable position in the shoulder muscle strength measurement of ER and IR, which can be performed in seated and standing positions, is indeed in a seated position with the arm in the scapular plane (Brown, 2000). Consequently, evaluations in this study were done in the seated position in the scapular plane. Evaluation results indicated that IR and ER muscle strength of the dominant and non-dominant extremities were similar between the groups at the velocities of 60°/sec and 180°/sec. The fact that the DB group had similar shoulder muscle parameters suggested that auditory stimuli received from the environment did not affect the muscle strength parameters in the DB group despite the permanent drawback they sustained. Besides, having similar training time may have resulted in the absence of a difference in muscle strength despite their permanent drawback. In a study focusing on the effects of hearing loss on the performance of military personnel in combat with paintball simulation, it was found that hearing loss did not have any effect on the performance of surviving and winning despite the negative effects it had on the situational awareness of the individuals (Sheffield, Brungart, Tufts, & Ness, 2017).

In the isokinetic evaluation of shoulders, ER/IR ratio is one of the most important criteria that determine a healthy glenohumeral joint function. In previous research, it has pointed out that differences in the ER/IR ratio, which is known to vary between 66-75% in healthy individuals, may cause musculoskeletal modification on the shoulders (Wilk et al., 2009). This, in turn, precipitates many shoulder pathologies, especially subacromial impingement (Burnham, May, Nelson, Steadward, & Reid, 1993). Therefore, it may assist in the definition of strength profiles of orthopedic patients and athletes suffering from shoulder problems or the functional assessment of dynamic stability of muscle performance of the muscular structure of overhead throwing athletes (Codine et al., 2005; Dauty et al., 2003; P Edouard et al., 2009).

As a result of the evaluations, it was found that ER/IR ratios of dominant and non-dominant extremities of the DB and HB group at the angular velocity of 60°/sec were similar; however, ER/IR ratios of the DB group were lower than that of the HB group in the dominant extremity at the angular velocity of 180°/sec while they were similar in the non-dominant extremity at this velocity. ER/IR ratio, which is known to vary between 66-75% in healthy individuals, was lower than normal values in both groups, and this points out that they have a musculoskeletal injury risk. Since ER weakness against a strong IR will make the players more susceptible to injuries, it has been suggested that ER strengthening exercises should be included in their training programs. In a study on the prevention of overuse injuries of the shoulder on handball players, it was shown that a prevention program for strengthening ER in the dominant extremity reduced the shoulder injury rate by 28% (Andersson, Bahr, Clarsen, & Myklebust, 2017). Therefore, studies suggest focusing on addressing and reducing such risk factors by decreasing harmful rotational glenohumeral adaptations and strengthening ER through neuromuscular and strength training programs (Cools, Johansson, Borms, & Maenhout, 2015).

Comparison of the dominant and non-dominant extremities of the individuals in the DB group showed that IR at 180°/sec angular velocity, ER at 60°/sec angular velocity, ER and ER/IR ratios were similar. However, at 60°/sec angular

velocity, IR muscle strength was found to be higher in the dominant extremity while ER/IR ratios were found to be significantly different between the two extremities. This difference in the ER/IR ratio between the two shoulders of the individuals in the DB group may be since IR strength is different in the two extremities. It has been stated in the studies that sport-specific musculoskeletal adaptations are present in atheletes who perform repeated overhead throwing activities (Hams, Evans, Adams, Waddington, & Witchalls, 2019). The traditional movement profile of overhead athletes involves an increase in glenohumeral external rotation patency in the dominant extremity and a decrease in internal rotation (Hellem, Shirley, Schilaty, & Dahm, 2019; Rose & Noonan, 2018).

This excessive external rotation rate grants the glenohumeral joint a maximum internal rotation and consequently a maximum throw speed. Biomechanical studies have also shown that the increase in external rotation results in an increase in throw speed and IR torque in the internal rotation (Vogler et al., 2019). This is because the increase in the range of motion in external rotation will increase in the IR muscle length and muscle contraction strength. IR muscle strength on the dominant side may have turned out to be higher for this reason. Additionally, many studies on athletes have indicated that muscle strength is higher on the dominant extremity because it is the more commonly used extremity for throwing (Baltaci & Tunay, 2004; Cibulka et al., 2015). Having found similar results on the dominant extremity, this study, therefore, seems to be consistent with the previous studies.

A separate comparison of the dominant and non-dominant extremities of the individuals in the HB group showed that there was no statistical difference between ER/IR ratios at 60°/sec angular velocity and IR and ER/IR ratio at 180°/sec angular velocity. However, statistically, it was found that ER and IR muscle strength at 60°/sec angular velocity was significantly higher on the dominant side, and ER muscle endurance at 180°/sec angular velocity was also significantly higher on the dominant side. Better strength and endurance values on the dominant side were expectedly consistent with the previous studies (Baltaci & Tunay, 2004; Cibulka et al., 2015).

An overhead athlete's shoulder should be sufficiently balanced to allow for excessive external rotation, as well as to avoid subluxation of the humeral head (Vogler et al., 2019). Therefore, there is a need for a sophisticated balance between mobility and functional stability, including typical static (articular capsule, bone anatomy and labrum) and dynamic (rotator cuff, long upper-end tendons of the biceps muscle and scapulothoracic muscles) stabilizers. This is known as *The Throwers Paradox* (Vogler et al., 2019). The basic approach, in this case, is to eliminate muscular imbalance with the help of training programs to prevent musculoskeletal injuries. Despite the less frequent use of the non-dominant side, strengthening exercises should be performed on it as well to ensure a muscular balance for stabilization in case of a trauma.

The limitation of this study may be that we did not make performed a performance evaluation, although the force measurements provide information about performance. In future studies, besides the force measurements, performance measurements can also be made.

Results of this study have shown that shoulder IR and ER muscle strengths were similar in the individuals of the DB and HB groups; however, both groups were found to be at risk for musculoskeletal injuries with regards to ER/IR ratio. It has been considered that the addition of ER strengthening exercises in athlete training programs in order to eliminate the muscular imbalance between IR and ER muscles can reduce injury risk. Upon the separate evaluation of dominant and non-dominant extremities within themselves, it was seen that the strength of the dominant extremity muscles was generally higher. Hence, symmetrical muscle strength was found important in the maintenance of stability and avoidance of vertebral pathologies due to the intensity of movements in basketball that involve the use of both extremities at the same time. It was, therefore, concluded that improvement exercises for the strength of the non-dominant extremity should be performed because the achievement of symmetrical movement patterns and strength balance can have positive impacts. This study has, moreover, shown that deaf individuals can achieve similar muscle strength and endurance to that of healthy individuals as a result of well-planned training programs and consistent sports activities.

Conflict of interest
The authors declare no conflict of interest. No financial support was received.

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How to cite this article: Suner-Keklik, S., Cobanoğlu, G., Savaş, S. et al. (2020). Comparison of Shoulder Muscle Strength of Deaf and Healthy Basketball Players. Int J Disabil Sports Health Sci;3(1):20-27. https://doi.org/ 10.33438/ijdshs.694943

ISSN: 2645-9094

Serin and Ziyagil, Int J Disabil Sports Health Sci;
2020;3(1):28-32
DOI:10.33438/ijdshs.716858

International Journal of
Disabilities Sports & Health Science

RESEARCH ARTICLE

The Effect of 8 Weeks Squat Exercises Program on Body-Composition in Young Males

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Abstract

Not only aerobic exercises, but also resistance exercises program with maximum effort for large muscle groups such as squat has also been reported to be effective on muscle and body fat mass. Thus, this study aims to investigate the effect of squat exercises program on body composition. The data of this study were collected from 18 young adult males in July 2019 after 8 weeks of training. Workouts were held in 3 days in a week with the 48 hours resting interval. Each session consists of 4 sets of 6 repetitions squat exercises with the loads of 85% maximum strength. Independent t-test analysis was used in binary comparisons because of normal data distribution. The results of this study were not statistically significant with the increase in body weight, body mass index, total muscle weight, total body fluid weight and lean body mass and the decrease in total fat weight variable as a result of the 2-month squat strength training program. Only a significant decrease in body fat percentage by 7.15% was observed after two months squat training. In conclusion, it was proposed that the squat exercises as a resistance training program can be used effectively in decreasing body fat ratio and increasing muscle mass due to increased post-exercise oxygen consumption in aerobic metabolism supplying energy from fats mostly.

Keywords
Squat exercise, Resistance Training, Body Fat Percentage, Body Muscle Mass.

INTRODUCTION

The importance of resistance exercises to strengthen muscle and bone is well known and it is suggested that resistance training might have an impact on weight status in youth. Generally, resistance training with medium and high loads is an effective method for improving body composition and muscular strength from childhood to adolescence (Behringer et al., 2010; Malina, 2006) and it is necessary to work with appropriate techniques and methods in order to get rid of muscle injuries in adolescents (Behringer et al., 2010; Malina, 2006). A meta-analysis suggested that an isolated resistance training intervention may have an effect on weight status in youth. Overall, more quality research should be undertaken to investigate the impact of resistance training in youth as it could have a role to play in the treatment and prevention of obesity (Collins, Fawkner, Booth and Duncan, 2018).

In a study related the effects of squat exercise on body composition and muscular strength, results demonstrated that body mass based squat exercises training for two months is a applicable and effective method for improving body composition and muscular strength of the knee and hip extensors, and jump performance in male adolescents (Takai, Fukunaga, Fujita, Mori, Yoshimoto, Yamamoto & Kanehisa, 2013).

Eccentric contraction as a form of contraction is manifested by skeletal muscles during many daily physical activities such as running, climbing stairs or walking. Eccentric contractions, unlike concentric contractions, are caused by the lengthening of sarcomers, and

Received: 08 April 2020 ; **Accepted:** 03 May 2020
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thus, the actin filaments in the sarcomer seperate. Although there is less energy consumption in eccentric contractions compared to isometric and concentric contractions, the level of force produced is quite high. During the contraction process, muscle damage occurs due to the stresses in the muscle fibers (Newham, Mills, Quigley, & Edwards, 1983).

Not only aerobic exercises, but also resistance exercises programs with maximum effort for large muscle groups such as squat have also been reported to be effective on muscle and body fat mass. Serin (2018) stated that fat loss can be effectively supplied by squat exercise including 4 and 6 seconds eccentric contraction for flexing knees and hips, one second isometric contraction for keeping skuating position and two seconds concentric contraction for extension of knees and hips. In the study conducted by İşlegen (2013), it was emphasized that classical stretching exercises have acute effects in the prevention of sports injuries, and stretching exercises in which eccentric contractions are used to prevent chronic sports injuries.

Apart from aerobic exercises, strength training is used not only for muscle strength, but also for improving body composition and motor fitness in young people. We investigate how positive improvements in body composition using body mass change when working with loads close to the maximum strength of young adults. Thus, the aim of this study is to investigate whether 8-week squat training has an effect on body compositions in young men.

MATERIALS AND METHODS

Participants

A total of 18 healthy athletes participated in this study, with an average age of 20.72 ± 1.93 years, average dye of 175.11 ± 6.02 cm, average body weight of 70.58 ± 10.80 kg. All potential risks have been disclosed before participating in the work, and voluntary consent forms will be signed.

Experimental Design

The data of this study were collected from 18 young adult males in July 2019 after 8 weeks of training. Workouts were held in 3 days in a week with the 48 hours resting intervals. Each session consists of 4 sets of 6 repetitions squat exercises with the loads of 85% maximum strength interspersed 3 minutes rest interval between exercises. All measurements were taken before and after squat exercise training program wiyh no control group.

Data Collection Tools

Measurements of anthropometry and body composition

Body height and body weight:

Body weight was measured in a weighing scale of 0.1 kg with the participants wearing bare feet shorts and a T-shirt, and body height was measured using a metal stick in this scale with a height measuring instrument of 0.1 cm. Body mass index (BMI) was calculated using the formula: weight (kg) divided by height (m) squared (Zorba & Ziyagil, 1995).

Measurement of Body Composition

Bioelectrical impedance (Tanita Body Composition Analyzer BC418) method was used to determine the body composition of the participants. In body composition analysis, all participants' body weight, body fat percentage, lean body mass (LBM), total body water (TBW) and body mass index (BMI) were determined in accordance with the protocol (Heyward & Stolarczyk, 1996; Kravitz & Heyward, 1997).

Measurements of squat exercise

Traditional strength training was performed with squat exercises. In the periof of first month, squat exercise includes 4 seconds eccentric contraction for flexing knees and hips, one second isometric contraction for keeping skuating position and two seconds concentric contraction for extension of knees and hips. In the periof of second month, squat exercise includes 6 seconds eccentric contraction for flexions of knees and hips, one second isometric contraction for keeping skuating position and two seconds concentric contraction for extension of knees and hips (Serin, 2018).

Statistical Analysis

All statistical analyzes were performed with SPSS version 20.0. Due to the normal distribution of the data, independent t-test analyzes were used in binary comparisons.

RESULTS

Comparison of the physical characteristics of young adults between pre and post tests was presented inTable 1 while Comparison of physical characteristics between pretest and posttest in young males in Table 2.

Table 1: Comparison of the physical characteristics of young adults between pre and post tests.

Variables	Tests	N	Mean	±SD	Difference	% Difference	t-Value	Sig
Age (years)	Pre-test	18	20,72	1,93	0	0	0	0
	Post-test	18	20,72	1,93				
Body Height (cm)	Pre-test	18	175,11	6,02	0	0	0	0
	Post-test	18	175,11	6,02				
Body weight (kg)	Pre-test	18	70,58	10,80	-0,1	-0,14	-,191	,851
	Post-test	18	70,68	10,76				

Table 2: Comparison of physical characteristics between pretest and posttest in young males.

Variables	Tests	N	Mean	SD	Difference	% Difference	t-Value	Sig
BMI (kg/m^2)	Pre-test	18	22,94	2,84	-0,04	-0,17	-,263	,796
	Post-test	18	22,98	2,92				
Total Fat (kg)	Pre-test	18	8,89	4,48	0,57	**6,41**	1,876-	,078
	Post-test	18	8,32	4,84				
Total Muscle (kg)	Pre-test	18	58,88	6,84	-0,57	-0,97	1,190	,251
	Post-test	18	59,45	6,99				
Total Body Fluid (kg)	Pre-test	18	45,53	5,46	-0,12	-0,26	-,569	,577
	Post-test	18	45,65	5,26				
Lean Body Mass (kg)	Pre-test	18	62,04	7,46	-0,32	-0,52	-1,095	,289
	Post-test	18	62,36	7,20				
Body fat Percentage (%)	Pre-test	18	12,03	5,08	0,86	**7,15**	2,185	,043*
	Post-test	18	11,17	5,45				

*P<0.05

DISCUSSION AND CONCLUSION

Squat exercise is an effective tool in the development of low body muscular endurance, strength and power. It is a compound movement that includes many joint actions and associated muscular system. People performing squatting exercises should make the necessary corrections and be protected from preventable injuries, being aware of the common incorrect positions occurring in the feet, ankles, knees, hips and spine. Squat movement with or without weight is one of the most controversial exercises in physical fitness or conditioning, especially in the development of muscular endurance, strength and power of the legs. However, detailed motion analysis is needed to discuss its effectiveness. Presently, there is a lot of evidence explaining that its use is effective to improve muscular stamine, strength and power (Clark, Lambert &

Hunter, 2012; Folland & Williams, 2007; Marques et al., 2015; Soriano, Jiménez-Reyes, Rhea and Marín, 2015). There are many variations such as squatting with body weight, barbell bar squatting, barbell chest or neck squatting, dumbbell squatting, sumo squatting, split squatting. From this point, resistance training might have also an impact on weight status in youth. So, we aimed to investigate the effect of not only aerobic exercises but also full strength squat strength exercises on large muscle groups such as muscle and body fat mass. In our study, a significant decrease of 7.15% in body fat was observed only as a result of squat training. In another similar study, These findings decreased the body fat percentage by 4.2% compared to the control group by 4.2% of the 8-week exercise program consisting of 45 exercises with 100 repetitions per day for the experiment group consisting of 36 participants and the control group consisting of 22 participants, the lean body mass was 2.7% and the muscle thickness was 3.2%. This result seems to be consistent with the study of Takai et al. (2013). In a study examining the effect of aerobic exercises on body composition, it was observed that it had a positive effect on body composition (Serin, 2020). It has been reported in the literature that training models, in which eccentric contraction is used predominantly, are an effective method to improve sprint agility, especially in pliometric studies.

In the study conducted by Markovic et al. (2007), it was emphasized that training programs, such as the pliometric training model, where eccentric contraction is at the forefront, are an effective method of improving athletic performance. In the study conducted by Meylan and Malatesta (2009), it was aimed to examine the effects of the pliometric training model, where eccentric contraction is predominantly performed on young players, on some performance parameters.In this research, it was determined that the pliometric training program implemented during the season significantly improved sprint and agility performance as well as explosive force and vertical jump performance (Meylan and Malatesta (2009). In another study conducted by Vaczi et al. (2013), it was aimed to examine the effects of short-term high-intensity pliometric studies on motor performance parameters, and it was found that there was a statistically significant improvement in the agility performance of footballers in parallel with the training program applied at the end of the research. In similar studies in the literature, it was found that there was no significant difference in the agility performance of eccentric contraction training. On the basis of this, it can be thought that muscular and physiological adaptation lies in the training programs applied. Similar studies in the literature have also been reported to improve sprint and agility performance as a result of adaptation to different training models (Cochrane et al., 2004; Odabaş-Özgür et al., 2016; Chelly et al., 2010; Arazi and others, 2012).

In another study conducted by Kurt (2011), it was aimed to investigate the effects of eccentric contraction exercises (pliometric exercises) applied to football players on the motor performance parameters, and a statistically significant increase in speed, agility and anaerobic power performances was observed at the end of the 8-week training program. Several studies have consistently reported a greater excess postexercise oxygen consumption (EPOC) response for higher-intensity and intermittent exercise. It was also indicated that resistance exercise can produce a greater EPOC response. EPOC were highest for the heavy resistance exercise compared to aerobic cycling, circuit weight-training exercise. In generaly, EPOC represents the oxygen used in the regeneration of ATP used during training, the synthesis of muscle glycogen from lactate, the increase of oxygen levels in venous blood, skeletal muscle blood and myoglobin, protein repair for muscle tissue damaged tissue during exercise and lowering body temperature during exercise (Elliot, Goldberg, & Kuehl, 1992; Phelain, Reinke, Harris & Melby, 1997; Scott, 1998). Fat burning and decreasing body fat for the participants of our study can be partly explained in this way. Another reason for the significant increase in the muscle mass of the athletes included in this study can be shown that the training program implemented improves the muscular strength level, and the muscle mass increases in parallel with the development of the force.

In conclusion, it is proposed that the resistance training program including squat

exercises program can be used effectively in decreasing body fat ratio and increasing muscle mass due to increased post-exercise oxygen consumption in aerobic metabolism supplying energy from fats mostly.

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How to cite this article: Serin, E. & Ziyagil, M.A. (2020). The effect of 8 weeks squat exercises training program on body composition ın young males. Int J Disabil Sports Health Sci; 3(1): 28-32. https://doi.org/10.33438/ijdshs.716858

ISSN: 2645-9094

Snapp et al., Int J Disabil Sports Health Sci;
2020;3(1):33-41
DOI:10.33438/ijdshs.713634

International Journal of
Disabilities Sports & Health Science

RESEARCH ARTICLE

Enhancing Quality of Life for Children with Intellectual and Developmental Disabilities

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Abstract

Background: Quality of life (QOL) is a subjective appraisal of life conditions. Disabilities often decrease QOL for individuals, due to potential physical, cognitive, and social limitations. Children with intellectual and developmental disabilities (IDD) have delayed fundamental motor skills (FMS) and less physical activity compared to neurotypical peers resulting in lower QOL. The purpose of this study is to provide evidence that FMS interventions improve QOL for children with IDD. Objectives/Hypothesis: In the current study we evaluated the impact of three FMS interventions over 18 months on QOL for 10 children (age range from 4 to 14, *M*=8.88, *SD*=2.93) with IDD. Methods: The FMS intervention took place over three separate 10 week sessions. Using the Pediatric Quality of Life Scale 4.0 we measured physical, social, emotional, and school functioning QOL. Visual analysis was used to evaluate the group means of each subscale across six time points, revealing a trend toward improved QOL for all 4 QOL subscales. Results: Emotional and social function had the largest improvements. This study addresses the need for longitudinal research on how FMS interventions can enhance QOL for children with IDD. Conclusions: Community based programs focused on FMS can help improved QOL for children with IDD. This research helps to better understand how FMS interventions can improve several areas of life.

Keywords
Fundamental Motor Skills; Visual Analysis; Longitudinal Research; Intellectual and Developmental Disabilities

INTRODUCTION

The World Health Organization (WHO, 1948) has defined health "as a state of complete physical, mental and social well-being." Historically many researchers have focused solely on the physical aspect in their definition of health. However, the WHO (1948) definition began the inclusion of psychological and social concepts into health resulting in a more holistic approach. The idea of health as a multidimensional concept was instrumental in the development of quality of life (QOL) as a measurable construct. Broadly, QOL can be defined as the subjective and objective appraisal of life conditions for each individual (Felce & Perry, 1995). This appraisal can be measured for multiple domains of life including physical functioning, emotional functioning, social relationships, and more (Guyatt, Feeny & Patrick, 1993). Given the different domains, one can expect that personal perceptions of many factors such as physical activity, depression, anxiety, friendships, and self-esteem can potentially influence QOL (Muldoon, Barger, Flory & Manuck).

Quality of life can also be greatly impacted by disability or illness. Over time, health-related QOL became the preferred term for assessments measuring the impact of disease or disability and particularly how it relates to daily functioning (Wood-Dauphinee, 1999). Individuals with disabilities and individuals diagnosed with a disease or illness may experience difficulty with common activities of daily life compared to individuals without disabilities. These impairment-

Received: 02 April 2020 ; **Accepted:** 01 June 2020
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related challenges can potentially reduce health related QOL. Health related QOL works to encompass the impact on important aspects of daily life while including aspects that might not generally be considered health (Guyatt, Feeny & Patrick, 1993).

When assessing QOL, researchers have been specific and varied in their definition of QOL. As a result, this has led to hundreds of QOL definitions and a variety of different measures. With the diversity of definitions, comparison across studies using different measures has become almost impossible (Wallander, Schmitt & Koot, 2001; Wood-Dauphinee, 1999). Further, this leads to little opportunity for generalization of results about QOL across studies. Despite these differences, a consensus has emerged that multiple components of QOL are important for a comprehensive measure and subsequent understanding of QOL (Wallander et al., 2001).

Some individuals such as those with intellectual disabilities or young children may not have the ability to effectively complete QOL subjective assessments. Therefore, oftentimes, measures of QOL are completed by proxy, such as a parent or primary caregiver (Pickard & Knight, 2005). Upton and colleagues (2008) conducted a review of parent-child agreement across health related QOL measures. They found that there were some differences in scores between the parent and child, but the differences don't appear to be clinically significant between respondents (Upton, Lawford & Eiser, 2008). In general, scores for more concrete areas of functioning, such as physical functioning, show better agreement between the participant and their proxy, while proxies often rated more subjective aspects, such as social or emotional functioning, worse than the participant (Pickard & Knight, 2005). Researchers have speculated about the potential reasons for this, including proxies projecting their own negative feelings or the participants decreased awareness of their own deficits (Potvin, Snider, Prelock, Wood-Dauphinee & Kehayia, 2015). Nonetheless, parent or caregiver proxy is a commonly used method for assessment of QOL for individuals unable to complete the measures on their own.

Many researchers have examined QOL for individuals with disabilities (Martin, 2017). However, research on QOL for children with intellectual and developmental disabilities (IDD) is limited. Intellectual and developmental disabilities are characterized by deficits in intellectual functioning and/or impairment in adaptive behavior identified during the developmental period (American Psychiatric Association, 2013). The limited literature in this area is often focused on the QOL of parents and families of children with IDD (Brown, Schalock, & Brown, 2009; Peer & Hillman, 2014). Far fewer research efforts have focused on the outcomes of the child.

It is well established that physical activity (PA) participation is beneficial for health outcomes, such as maintaining a healthy weight status and body composition, preventing heart disease and diabetes, and improving physical functioning (Penedo & Dahn, 2005). However, it is also valuable for improving psychological well-being (Warburton, Nicol & Bredin, 2006), academic achievement (Strong et al., 2005), and enhancing overall QOL (Penedo & Dahn, 2005). Despite the value of PA, many able-bodied children do not meet PA guidelines. An even smaller percentage of children with IDD meet the PA recommendations compared to their neurotypical peers (Esposito, MacDonald, Hornyak, & Ulrich, 2012; Tyler, MacDonald, & Menear, 2014). The lower rates of PA for children with IDD often results from increased barriers to PA participation. These additional barriers can stem from lack of financial resources, limited social support, and poor fundamental motor skill development (Gregor et al., 2018; Memari et al., 2015). By intervening on fundamental motor skills (FMS) at an early age, school aged children are more likely to engage in regular PA across childhood (Robinson et al., 2015). However, while evidence-based guidelines for early FMS interventions exist, the opportunity to engage in such programming to enhance QOL for children with IDD is virtually non-existent. The current study seeks to address this research gap.

Purpose

To summarize, the purpose of the current study was to evaluate the impact of longitudinal participation in a free community-based FMS intervention on QOL for children with IDD. We hypothesized that all areas (physical, emotional, social and school functioning) of QOL would increase during a series of 3 interventions spread over 1.5 years. More specifically, we hypothesized that all 4 dimensions of QOL would increase between each pre- and post-intervention data

collection session. However, given the physical and social nature of the intervention we expected to see larger gains in physical and social QOL compared to emotional and school functioning. Additionally, we hypothesized that QOL would stay the same between the end of each intervention and the beginning of the next intervention given that the intervention was removed.

METHODS

Participants

Participants were recruited through local schools and agencies for those with special needs. The sample consisted of ten children diagnosed with various IDD. The majority of the sample reported a primary diagnosis of Autism Spectrum Disorder (ASD) (n=8), with some reporting co-morbid speech deficits (n=2), other primary diagnoses included Down syndrome and Fragile X syndrome. Age of participants at the initial data collection ranged between 4 and 14 years of age (*M*=8.88, *SD*=2.93).

Measure

Pediatric Quality of Life Inventory 4.0 (PedsQL)

The Pediatric Quality of Life Inventory 4.0 (PedsQL; Varni, Sied & Kurtin, 1998) is considered to be the gold standard for measuring child health related QOL (Feeney, Desha, Ziviani & Nicholson, 2012). The PedsQL was designed to measure the core health dimensions specifically outlined by the WHO in 1948. The scale has been shown to accurately span ages of 2 to 18 years for both self-report and proxy-report while maintaining item and scale construct consistency (Varni, Seid & Kurtin, 2001). Additionally, the PedsQL has been used to effectively assess QOL in children with various disabilities including autism spectrum disorder, IDD, spina bifida, heart disease and more (Kose et al., 2013; Murray et al., 2014; Uzark, Jones, Burwinkle & Barni, 2003). Viecili and Weiss (2015) found that the core scales (physical, emotional, social, and school functioning) maintain their psychometric properties when measuring QOL for children with IDD. Multiple researchers have shown that scale scores can differentiate between children at risk for IDD and children with typical development (Basgul, Uneri & Cakin-Memik, 2011; Lau, Chow & Lo, 2006). Given the consensus in the literature and strong psychometric properties, the PedsQL appears to be the best measure to assess health related QOL for children with IDD.

The PedsQL is a 23-item measure that assesses four core components: physical functioning (8 items), emotional functioning (5 items), social functioning (5 items), and school functioning (5 items). Researchers who have previously used the PedsQL with children with IDD have reported good internal consistency for the subscales (α = .78-.89) (Viecili & Weiss, 2015).

The parent proxy-report form was used to assess parent's perception of their child's health related QOL. The instructions asked for parents to identify how much of a problem the various activities have been for their child over the previous one month. For example, physical functioning, "walking more than one block;" emotional functioning, "feeling afraid or scared;" social functioning, "getting along with other children;" school functioning, "paying attention in class." Answers were rated on a scale of 0 (never a problem) to 4 (almost always a problem). Items were reverse coded and transformed to a scale of 0 to 100 (0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0). This transformation results in higher scores being translated into higher QOL. Subscale scores represent the mean of scale scores for the included items.

Intervention

Children participated in three separate 10-week interventions (1, 2, and 3). The interventions followed the academic calendar, with intervention 1 being conducted in the winter semester (January to April), intervention 2 in the fall semester (September to December) and intervention 3 in the winter semester (January to April). Each intervention was identical and consisted of the same general format focused on improving FMS. An important feature of this design is that each participant acts as his/her own control when the intervention is removed.

Specific target skills were based on the Test of Gross Motor Development Version 3 (TGMD-3). The TGMD-3 includes six locomotor skills (i.e., running, skipping) and seven ball skills (i.e., overhand throw, two hand catch). Each of the 10 sessions focused on one locomotor skill and one ball skill, with all 13 skills being covered at least once during each intervention. The 10 weekly sessions occurred once a week for one hour at an urban midwestern university.

The intervention was a free community-based, evening program. Each session followed the same general routine, developed using best practices for children with IDD (Ketcheson et al. 2017). This routine consisted of 10-15 minutes of free play, 5-minute warm up, 35 minutes of direct instruction, and 5-minute cool down. Direct instruction activities included individual work with the coach, small group work, and full group activities. Data was collected at a separate session, one-week before the intervention began and one-week after the intervention ended for all three interventions.

Each athlete was paired with a coach and worked in a 1:1 ratio throughout the session and maintained the pairing through the duration of each intervention. Coaches consisted of pre-service physical education teachers or individuals in a closely related area of study (e.g., special education, exercise science). Coaches were trained through classroom pivotal response teaching (CPRT) skills, which are methods for behavioral intervention for children with autism spectrum disorder to be used in classroom settings (Stahmer, Suhrheinrich, Reed, Bolduc & Schreibman, 2011). This framework has been previously used in gross motor intervention research for children with ASD (Ketcheson et al. 2017).

Procedures

Written informed consent was obtained from the child's parent before initial participation in the study. Following parent approval, an approved oral assent agreement was read to the child by the coaches to confirm their participation was voluntary. Parents completed a general demographic questionnaire and the PedsQL at the beginning and end of each FMS intervention. Over the year and a half of participation, a total of 30 intervention sessions and 6 data collection sessions occurred, for total of 36 sessions. A longitudinal design was employed examining participant's self-report answers to the PedsQL.

Statistical Procedures

Means and standard deviations were calculated for each of the subscales at the six time points (i.e., pre and post each of the three interventions). Given the lack of power associated with only 10 participants for four dependent variables assessed six times statistical analyses were contradicted. Hence, we created line graphs that were generated in SPSS Version 25 to create a visual representation of the data. Means of the full sample (N=10) for the 4 subscales at each time point were graphed.

We conducted a visual analysis and modelled our research design after the single case experimental design for within groups (Lane & Gast, 2013). Visual analysis of data displayed in graphs is a common method used in single case experimental design for ongoing evaluation of behavior change interventions (Lane & Gast, 2013). Using visual analysis for this study allowed us to identify if there was a change in QOL for each of the three interventions and, importantly, if any gains noticed at the end of each intervention stabilized when the intervention was removed.

Additionally, visual analysis allowed us to compare the changes in QOL across all participants when each subscale was assessed individually. When there is visual evidence of change over time of individuals' response to the interventions, a clearer picture of the impact on the outcome variables are demonstrated (Crabtree, Ray, Schmidt, O'Connor & Schmidt, 1989).

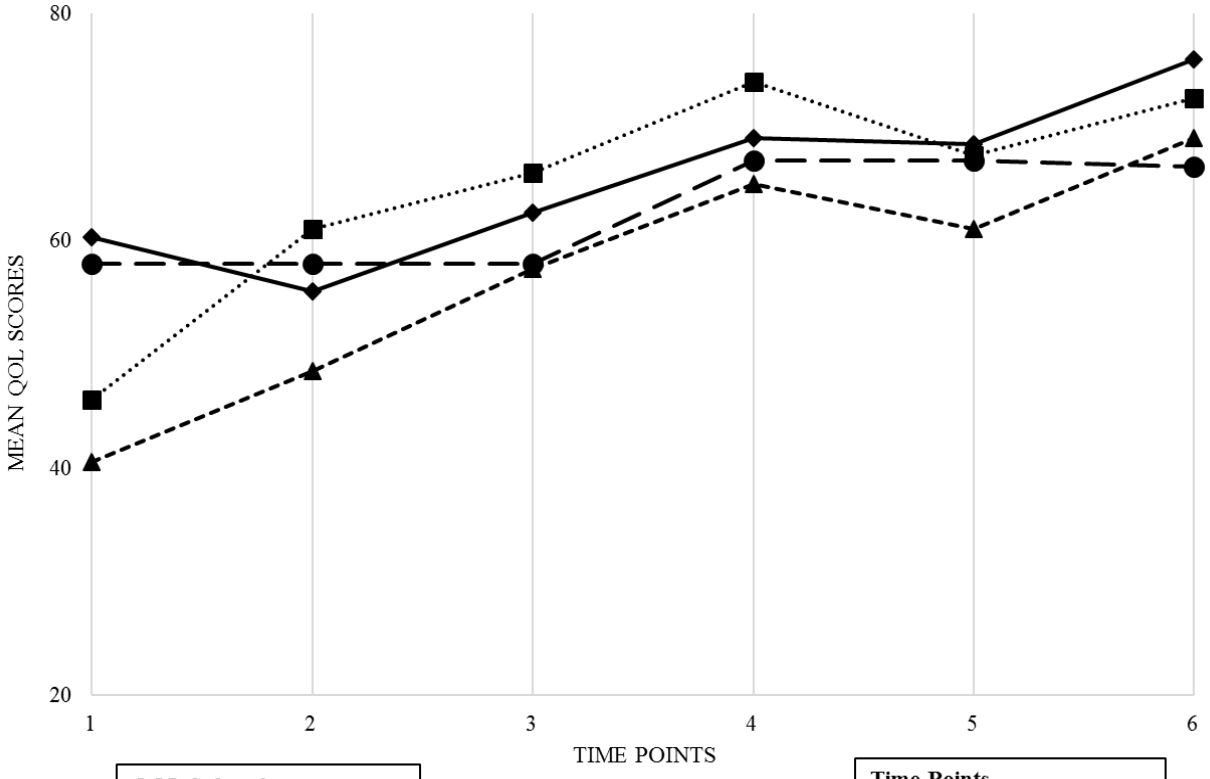
RESULTS

Participants attended most sessions as the average attendance for the 30 sessions (three interventions times 10 meetings per session) was 25 (*SD*=3.33). Internal consistency was determined using Cronbach's alpha for scores on each of the four subscales across the six time points. All of the subscales produced scores with good reliability (a score of .70 and above; Tavakol & Dennick, 2011) as follows: physical function (α = .82), emotional function (α = .85), social function (α = .85), and school function (α = .87).

The mean values of all 10 participants were computed and plotted for the four subscales at each of the six time points. A visual analysis shows that overall, there was a trend toward improved QOL for all subscales (see Figure 1). Our initial hypothesis, which stated an expectation of increased QOL during the interventions (1, 2, and 3), was, in general, supported with a few exceptions. Also, we expected QOL to stay the same during the times between interventions (end of intervention 1 to the beginning of intervention 2, end of intervention 2 to beginning of intervention 3).

First, for emotional function, there was an increase during all three interventions. Additionally, there was a slight increase between the end of intervention 1 and the beginning of intervention 2 and a decrease between the end of intervention 2 and the beginning of intervention 3 (i.e., when the interventions were removed). Second, for social function, there was an increase during all three interventions. For social function, there was continued increase between the end of intervention 1 and the beginning of intervention 2 and a decrease between interventions 2 and 3 (i.e., when the interventions were removed). Third, for physical function, there was a decrease during the first intervention and increase during the second and third interventions. Between interventions, physical function increased between the end of first intervention and the beginning of the second intervention and stayed the same between the end of intervention 2 and beginning of intervention 3. Lastly, for school function, there was no change during the first intervention or third intervention, but an increase during the second intervention. Additionally, there was no change between interventions 1 and 2 and 2 and 3 when the interventions were removed.

Figure 1: QOL Subscales Across All Time Points



*Note: PedsQL Full Mean Range is 0 to 100.

DISCUSSION

The purpose of this study was to evaluate the longitudinal impact of a three part FMS intervention on enhancing QOL for children with IDD. In general, it appears that the intervention served as an effective tool for improving the multiple components of health related QOL for children with IDD. The sample trended toward increased QOL throughout the entire duration of the study. Both emotional and social functioning increased during each of the 3 interventions. Physical functioning increased during the second and third intervention but not the first intervention. School functioning increased during the second intervention only and not the first and third intervention.

The changes in QOL shown in this study seem to be most prominent in social and emotional functioning, compared to physical and school functioning. This finding was somewhat unexpected given that we anticipated physical functioning to be more directly impacted because the primary focus of the interventions was on the development of FMS. We next discuss each QOL dimension separately.

First, the social functioning area of QOL showed the largest changes in this study. The questions on this subscale of the PedsQL consists of getting along with other children, keeping up when playing with other children, being able to do the same things as children their age, and getting teased by other children. There are four potential reasons why the current intervention may have influenced social functioning QOL. First, although the intervention specifically focused on FMS improvement it was delivered in a group setting of 10 children where plenty of social interaction occurred before, during and after each meeting time. Second, each child was paired with a coach who provided lots of instruction, positive feedback, and sought to create a team-like atmosphere. Hence the interventions had strong social components to them making it plausible that the increased social interaction resulted in increased social QOL. Third, most of the children did not have access to sport activities with their peers on a regular basis or to work individually with a coach who is specifically trained to provide a positive psychosocial climate. Additionally, children with IDD often lack social and communication skills which are barriers to developing friendships inside and outside of school. As a result, building a relationship with the coach and engaging with other children with similar abilities may be particularly powerful influences on social QOL compared to neurotypically children. Finally, children with IDD are often at risk for being teased and ostracized during regular school life. As researchers we were particularly mindful that the meeting times would be devoid of any such negative behavior. Hence it is quite plausible that the creation of a psychosocial safe space during the time of the intervention also contributed to enhanced social QOL.

Second, emotional functioning QOL also increased during each of the three intervention programs. Given that social interactions play a large role in people's emotional lives it is plausible that the positive social interactions among peers and between participants and coaches also generated positive affective states (e.g., increased happiness) and reduced negative affective states (e.g., anxiety). We believe that the net effect of such socially induced emotions led to enhanced emotional QOL. Similar, to social QOL it is also plausible that the safe space created during the meeting times also contributed to enhanced emotional QOL.

Third, for physical QOL, there are many factors that could have played a role in the decrease during the first intervention and increases in the second and third intervention. We next focus on two potential reasons. First, many of the PedsQL physical functioning questions are directed toward activities of daily living, such as lifting something heavy, taking a bath or shower by themselves, or having aches. FMS development during the multiple interventions is likely to increase PA and increased PA is likely to lead to increased fitness and one's ability to engage in various daily activities. However, such gains may take time and as a result may have failed to show up during the first intervention period. Second, the FMS intervention specifically focused on the locomotor and ball skills and such skill enhancement may not lead directly to an initial (first intervention) increased ability to engage in activities of daily life, but contribute later on after a second and third round of FMS skill development.

Lastly, for school functioning, the only change in QOL happened during the second intervention. We are unsure why parents noted an increase in school QOL for the second intervention but failed to recognize any improvement during the first and third intervention. It is possible that various factors outside of the control of children (e.g., course difficulty, subjects taken, teachers, etc.) differentially influenced this QOL dimension while any FMS or social/emotional QOL gains experienced had little influence on school QOL specific functioning.

Cumulatively, across the four QOL dimensions and three intervention periods increases were noted in nine of 12 instances. For the four QOL dimensions when the intervention was removed the first time three of four QOL dimensions continued to increase while one remained stable. During the time between the second and third interventions all four QOL dimensions remained stable or dropped. All four dimensions demonstrated higher QOL at the final data point compared to the initial baseline. In general, despite some fluctuations across the course of the study, the pattern of results was supportive as increases in the four QOL dimensions mostly increased during the interventions (9/12) and were stable or dropped when the intervention was removed (5/8). These preliminary results are encouraging and certainly warrant continued research with larger samples using a control group and examining the potential mechanisms behind QOL change.

Limitations

There are a few limitations to the current study. First, there was no control group included in the study although each participant served as their own control when they were not participating in the intervention. Second, outside factors were not measured to determine their external influence on the participants and their QOL. However, given the continuous trend of QOL improvement over the entire 1.5 years of the study, it is reasonable to think that participation in the various interventions had a positive and potentially cumulative impact on the participants' QOL. Third, the sample size was small. Though the sample was small, we were able to obtain complete data at six time points over 1.5 years for all participants. This is a large accomplishment given the accessibility of this particular population. Longitudinal studies are valuable as they provide a more representative picture of QOL compared to cross sectional research that assesses QOL at one moment in time. More research is needed to evaluate QOL overtime for children with IDD while also assessing more external factors, such as therapy programs or other extracurricular PA programs, that may positively impact these various areas of life functioning. Additionally, adding a waitlist control or use of a different PA (e.g., sport based) intervention program could be beneficial for direct comparison of program impact for participants.

Conclusions

Longitudinal research on how FMS interventions can enhance multi-dimensional QOL for young children with IDD is lacking and the current study addresses this research gap. Although preliminary, the current study provides initial support for the value of FMS interventions in enhancing QOL of life across physical, social and emotional functioning. As PA participation continues to decrease for children with IDD, while IDD diagnoses continue to increase, feasible programming can not only impact physical functioning, but also improve QOL, which is essential for overall health. Researchers should continue to examine how and why various areas of QOL can be improved through FMS interventions.

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How to cite this article: Snapp, E.E., Ketcheson, L.R., Martin, J.J. and Centeio, E.E. (2020). Enhancing Quality of Life for Children with Intellectual and Developmental Disabilities. Int J Disabil Sports Health Sci;3(1):33-41.
https://doi.org/10.33438/ijdshs.713634

ISSN: 2645-9094

Beale J.T. et al., Int J Disabil Sports Health Sci;
2020;3(1):42-51
DOI:10.33438/ijdshs.730528

International Journal of
Disabilities Sports & Health Science

RESEARCH ARTICLE

A Qualitative Investigation Into the Impact of the Basketball Learning Intervention Programme (BLIP) on Disengaged Secondary School Students in the United Kingdom

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Abstract

This paper will evaluate the longitudinal effects of a basketball based intervention programme that targeted ten disengaged male secondary school students at a school in the Kent, England. The programme aimed to improve the behaviour and academic performance of the participants through a weekly intervention carried out by an external basketball player and coach providing academic support, mentoring and specially designed basketball sessions. Sports interventions have been deemed to provide a positive short-term impact on young people. However, researchers have identified the need for a longitudinal approach in order to examine the effects of such interventions post involvement as supported. This study involved five former Basketball Learning Intervention Programme (BLIP) members (with a mean age of 16.4 SD± 0.55 years) that were interviewed using semi-structured interview approach, 12 months after completing the intervention. Interpretative Phenomenological Analysis (IPA) revealed four superordinate and eleven subordinate themes. The four supeordinate themes were; 'baseline behaviours pre-intervention', 'immediate outcomes of the BLIP', 'impact of the coach' and 'long standing transferable outcomes'. The results revealed an immediate impact in comparison to the baseline behaviours of the participants pre-intervention. The data suggested that one of the most effective aspects of the programme was the positive impact of the coach on the participants. More importantly, this is the only study to report long-term improvements amongst the participants in terms of behaviour and academics as a result of engagement in a sports based intervention.

Keywords
Antisocial Behavior, Basketball, IPA, Sport As The Social Instrument, Sport, Education

INTRODUCTION

Physical Activity, Anti-social Behaviour and Academic Achievement

Sandford *et al.* (2008) supports the impact of physical activity in relation to tackling anti-social behaviour amongst young people within the United Kingdom (UK) which is a concerning issue that sometimes leads to the resignation of school teachers (Hayden, 2011). Recently, a number of initiatives have been developed aiming to re-engage disaffected pupils through physical activity (Sandford *et al.* 2008). Physical activity and sport can play a vital role in assisting the cognitive development process amongst young people as stated by Lista and Sorrentino (2010). Inadequate cognitive development is linked to young people engaging in anti-social behaviour and poor academic performance (Farrington, 2005). Structured support should be put in place to assist the young people exhibiting anti-social behaviour, especially with the UK experiencing the highest rates of anti-social behaviour in Western Europe (ADT, 2006).

Australia emphasises the use of physical activity to prevent anti-social behaviour amongst young people highlighted by the Australian Institute of Criminology evaluating a number of sport based

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programmes that were accessed by young people at risk of being exposed to anti-social behaviour (Morris *et al.* 2003). The UK has taken a similar approach with various programmes being implemented within a number of schools (Sandford *et al.* 2008). One of the most successful programmes, the 'Sky Living For Sport' programme, is based on using physical activity to re-engage disengaged young people in education (Sandford *et al.* 2008). Such programmes focus on cognitive development amongst students and aim to reduce anti-social behaviour and improve academic performance (Sandford *et al.* 2008).

Pupils improved in terms of behaviour and academic performance whilst taking part in various programmes (Sandford *et al.* 2008) this supports research by (Morris *et al.* 2003) showing positive short-term improvement in participant behaviour. This suggests that physical activity facilitates positive behaviour and academic achievement amongst young people. However, to date studies have not taken a longitudinal approach and as such are not able to comment on the long-term impact of such interventions (Bull and Beale (2012).

Sandford *et al.*(2008) and Morris *et al.* (2003) present similar results in relation to physical activity impacts on anti-social behaviour and academic work. Morris *et al.* (2003) states that physical activity interventions reduce anti-social behaviour. Sandford *et al.* (2008) supports this by highlighting an immediate short-term positive impact of physical activity on anti-social behaviour and academics. However, these studies do not consider the contrasting impacts of different sports. Bull and Beale (2012) state that a boxing intervention, for example, could have negative effects as young people exhibiting anti-social behaviour were taught combat skills. This could be an issue if participants were exposed to hostile situations outside of the intervention. In contrast, a basketball intervention would not present such an issue. Sandford *et al.* (2008) and Morris *et al.* (2003) report that the data gathered does not truly represent the full sample of participants and programmes that were evaluated due to a limited number of evaluations of varying quality. Furthermore, the results collected by Sandford *et al.* (2008) were only gathered from programmes that were deemed to be successful. Both studies failed to incorporate incompleted programmes and participants that elected to leave the interventions.

Literature surrounding physical activity interventions indicates the need for long-term studies. Sandford *et al.* (2008) and Morris *et al.* (2003) report positive effects during interventions but fail to report any long-term effects regarding behaviour and academic performance post intervention. Therefore, the true effects of sports interventions must be evaluated through longitudinal studies (Sandford *et al.* 2008), (Morris *et al.* 2003) which is also suggested by Bull and Beale (2012). Longitudinal studies could evaluate whether sports interventions can encourage long-term personal development. Therefore, building on current literature in order examine the longitudinal effects of sports interventions makes this study unique amongst literature surrounding the impact of sports interventions.

Sport as a Social Instrument

Utilising sport as a social instrument can be beneficial to different communities. Various UK Governments have emphasised social inclusion and community renewal through participation in sport (Houlihan and Green, 2013). Tony Blair, in particular, had very strong views on the relationship between sport and community cohesion (Houlihan and Green, 2013). Furthermore, participation in sport can improve the quality of life amongst individuals and communities (Coalter, 2005).

Participation in sport benefits communities with individuals engaging in physical activity becoming 14.1% more likely to report good health (Fujiwara *et al.* 2014) which supports research by Coalter (2005). Fujiwara *et al.* (2014) also state that individuals participating in sport are 11% more likely to actively seek employment, which relates to the current study with participants choosing to engage in further education or employment. Using sport, as a social instrument is especially significant within neighborhoods that suffer from crime and deprivation as supported by Houlihan and Green (2013). There is evidence to suggest that the BLIP was useful to the participants involved in this study due to the demographics of the community in question. The current study also provides an unique longitudinal investigation on the impacts of sport as a social instrument in relation to the participants as suggested by Fujiwara *et al.* (2014).

Basketball Intervention Programmes, Youth Crime Statistics and Demographics

There is limited literature on the impact of basketball interventions on anti-social behaviour and academic achievement and basketball interventions are predominantly based in the United States. The Boston Celtics of the NBA and the 'Midnight Basketball Leagues' in America's urban areas (Hartman and Depro, 2006) have established the two most prominent interventions. 'Stay in School' (Boston Celtics, no date) is based on providing role models to inspire students to stay in school, as children tend to be inspired by athletes (Biskup and Pfister, 1999). However, this project does not address anti-social behaviour, is not linked to urban areas and does not track changes in participant behaviour.

The 'Midnight Basketball Leagues' aim to combat criminal behaviour within communities experiencing high crime rates (Hartman and Depro, 2006). This relates to Morris *et al.* (2003) in terms of providing a positive activity for young people within deprived urban communities. Communities engaging in the 'Midnight Basketball Leagues' experienced reduced crime rates which signifies the impact of physical activity on anti-social behaviors (Hartman and Depro, 2006). Furthermore, this programme relates to basketball participation amongst young people within communities similar to Swanscombe, which show the highest participation rates amongst males (Kelley and Carchia, 2013). These two programmes suggest that basketball participation and role models can be used to address anti-social behaviour and academic performance amongst young people within communities that are most vulnerable to anti-social behaviour. Swanscombe, the community where the BLIP took place, is one of the most deprived communities in Kent (Kent County Council, 2011) and experiences one of the highest crime rates in Dartford, Kent with anti-social behaviour responsible for 45% of all crime (UKCrimeStats, 2014). The BLIP was established at a School in Swanscombe in order to tackle anti-social behavior both within the school and the community. Basketball interventions can be used to support young people that may be exposed to criminal activity and negative behaviour in school (Hartman and Depro, 2006). Therefore, the BLIP was devised on the structures of the Boston Celtics 'Stay in School' project and the Midnight Basketball Leagues within the United States.

The Basketball Learning Intervention Programme (BLIP)

The BLIP was designed by the staff at the School and commenced in October 2012. The programme aimed to help struggling Year 11 male pupils in regards to inappropriate behaviour and academic achievement. The participants were selected based on behaviour and academic records between Year 7 and Year 10 and it was decided that external help may be needed for the intervention. The school contacted a local professional basketball club, about the possibility of involving a basketball player to become a coach and mentor during the intervention as previous research suggests young males see athletes as role models (Biskup and Pfister, 1999) and (Boston Celtics, no date). The basketball club suggested one of the players for the intervention who is the author in the current study.

Deprivation within the community was one of the main reasons for the intervention as young people from lower socioeconomic backgrounds report low physical activity participation (Dagkas and Stathi, 2007). Low physical activity participation has been demonstrated to result in low stimulation levels and leads to young people engaging in anti-social behaviour (Connor, 2012). The BLIP provided a positive role model and created an opportunity to participate in a positive activity, which could facilitate personal development and positive behaviour (Hagger *et al*. 2001).

The BLIP occurred Wednesdays between October and April, based around the school day between 08:30 and 15:00. The participants received a modified timetable which incorporated the intervention within regular school hours. Participants received support during Mathematics, English and Science lessons with the coach attending lessons with each participant in 15-minute segments. There was an hour-long mentoring session led by the coach to address any behavioural or academic issues. Lastly, a specialist basketball session was put in place to aid the cognitive development of young people as suggested by Dagkas and Stathi (2007).

METHODOLOGY

Participants

The study involved five former Year 11 male students (mean age 16.4 SD± 0.55 years). The selected participants successfully completed the BLIP, an intervention facilitated by a basketball coach, providing support in English, Mathematics and Science lessons along with weekly basketball sessions. The participants were of White British ethnicity from a deprived lower class community. Purposive sampling was used to identify the five participants from the total of ten students that took part in the intervention.

Procedure

The participants took part in 25-35 minute individual semi-structured interviews in order to provide detailed reflections following the intervention. Consent Forms along with Assent Forms were completed and signed before any interviews were conducted. Each participant took part in an individual interview that was conducted within the library of the school. The interviews took place in a private area of a public place, which was the 'silent study' room within the library and carried out by the researcher of this study.

The interviews were conducted using a semi structured interview schedule. Probing questions were used in order to facilitate the interviews with different participants as supported by Smith (2009). Interview topics and probing questions were altered to create a new interview schedule following a pilot interview as the pilot interview failed to provide sufficient insight about the participants' experiences.

Data Analysis

Interpretative Phenomenological Analysis (IPA) was used in order to significantly examine the processes of how the participants made sense of the BLIP. IPA allowed the researcher to examine participant experiences of the BLIP as it was assumed to be a significant life experience in the participants' lives as supported by Smith (2009).

RESULTS

The interviews were transcribed through reading and re-reading each interview in order to capture the quality and texture of individual experience (Smith, 2009). Emerging themes were identified and clustered within each transcription and then across the other cases (Smith, 2009). Summary themes were created and then analysed to identify clusters across all five interviews. An integrated table of themes (Table 1.) containing superordinate and subordinate themes was created with reference to each theme within the interview transcriptions. Transcriptions were analysed by the third author where there was a high degree of concordance suggesting inter-rater reliability

'Baseline Behaviours Pre-Intervention'

This superordinate theme describes the behaviours and characteristics that the BLIP participants exhibited before the intervention. This theme describes inadequate engagement throughout secondary school and behavioural issues inside and outside of school hours before year 11.

Subordinate Theme - 'Disengagement in School':

This theme suggests that the BLIP participants had low academic interest before the BLIP and developed negative opinions of the school as stated by Participant 2 (p1: L 78-83):

"I hated school, I hated Swann Valley it wasn't a very nice place. Like I never got on with the teachers they didn't like me for some reason."

Subordinate Theme - 'Behaviour Issues':

This theme identified participant behaviour issues during and outside of school hours as suggested by Participant 4 (p1: L15 / p3: L91-93):

"I used to get into a lot of trouble before, especially with the police and the antisocial behaviour that goes on in my area."

'Immediate Outcomes of the BLIP'

The next set of themes related to the initial positive effects of the BLIP on its participants within the early stages of the programme.

Subordinate Theme - 'Improved Attitude':

This theme implied a change in attitude towards education amongst the participants as stated by Participant 5 (p4: L 130-133):

"I started wanting to do my work, and I looked forward to the basketball during the week."

Subordinate Theme - 'Improved Focus':

This theme suggested that the participants developed a positive outlook on education through attending the BLIP as stated by Participant 1 (p8: L 235-237):

"I think with the basketball programme going on, it really helped me focus on the day, like when I had English, Maths and Science."

Subordinate Theme - 'Immediate Outcomes of the BLIP':

This theme showed positive engagement in the BLIP which contributed to an improved school experience and the willingness to utilise the intervention amongst the participants as said by Participant 3 (p5: L 152-154):

"I was really looking forward to it every week. It helped me and made me want to come to school!"

'Impact of the Coach'

This superordinate theme suggests that coach-participant relationship was one of the most significant aspects of the programme. Furthermore, this relationship helped develop a sense of respect towards others amongst the participants.

Subordinate Theme – 'Importance of Relationship':

This theme contributed to a positive school and programme experience as stated by Participant 1 (p8: L 247):

''Obviously with you spending time with me, getting to know you better, that relationship. You're a good laugh and good mate and you help me out as well!"

Subordinate Theme - 'Coach as a Role Model':

This theme identifies the importance of the participants having someone to look up to which facilitates an improvement in attitude, academic achievement and behaviour as suggested Participant 5 (p7: L 237):

"Definitely a good role model for the people taking part. I definitely saw you as a good role model for me."

Subordinate Theme - 'Respect':

This theme refers to newly developed respect towards others amongst the participants. The theme, 'Baseline Behaviours Pre-Intervention', suggested that the participants lacked respect towards teachers and pupils. However, this theme shows the participant change in attitude during the intervention as stated by Participant 4 (p6: L 189):

"Like I still went to school, it did motivate me for those other days because I know you would be expecting me to be in school and show respect towards others."

'Long Standing Transferable Outcomes'

This superordinate theme refers to the longitudinal effects of the BLIP as the participants were interviewed 12 months after the intervention and shows how the participants have used the BLIP experience on a daily basis.

Subordinate Theme - 'Appreciation of Education':

This theme refers to the participants feeling regret for not performing at school and how the participants are using these experiences to help others appreciate education as stated Participant 5 (p3: L 72-76):

"*I'm definitely going to push it on my sister to do well in education. I can see now, coming out of school, education is the key to success. She needs to buckle down and get that done and I'm helping from my experience. Hopefully she'll listen."*

Subordinate Theme – 'Improved Behaviour':

This theme refers to the changes in participant behaviour since leaving school and the BLIP 12 months ago. The participants show improved behaviour since the issues during the earlier years of education as supported by Participant 1 (p1: L 23-24):

"I don't get in trouble anymore. The programme helped me learn from my mistakes and I want to do better in life."

Subordinate Theme – 'Purpose':

This theme shows that the participants currently engage in positive environments since completing the programme and leaving school as stated by Participant 4 (p1: L 6-7):

"*I got an apprenticeship to do train work. I've been working on the tracks trying to work my way up."*

Table 1. Integrated table of themes containing superordinate and subordinate themes

Superordinate Theme: Baseline Behaviours Pre-Intervention					
	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Subordinate themes					
Disengagement in school	**P: 4.**L: 107-109 **P: 6.**L: 184-186	**P:3.**L: 78-83	**P:2.**L: 35-36 **P:2.**L: 39-40 **P:2.**L: 42	**P:1.**L: 29	**P:1.**L: 19-20
Behaviour issues	**P: 2.**L: 41 **P: 4.**L: 111	**P:1.**L: 22-23 / **P:3.**L: 87-88	**P:4.**L: 108	**P:1.**L: 15 **P:3.**L: 91-93	**P:1.**L: 33-35
Superordinate Theme: Immediate Outcomes of the BLIP					
	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Subordinate themes					
Improved attitude	**P: 5.**L: 143-145 / **P: 6.**L: 173-174	**P:5.**L:148-149		**P:5.**L:148-149	**P:4.**L:130-133
Improved focus	**P:8.**L:235-237	**P:5.**L:151-152		**P:5.**L:144-145	**P:5.**L:146-150
Positive engagementin BLIP	**P:8.**L:226-227	**P:5.**L:133-135	**P:5.**L:152-154	**P:5.**L:139-141	**P:4.**L:116-118
Superordinate Theme: Impact of the Coach					
	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Subordinate themes					
Importance of relationship	**P:8.**L: 247	**P:4.**L: 123-124	**P:5.**L: 162-166	**P:5.**L: 128-130	**P:4.**L: 126-128
Coach as a role model	**P:6.**L: 160-162	**P:8.**L: 261	**P:9.**L: 298	**P:6.**L: 189	**P:7.**L: 237
Respect	**P:10.**L: 315	**P:5.**L: 152	**P:9.**L: 296	**P:6**.L: 189	**P:5.**L: 141-143
Superordinate Theme: Long Standing Transferable Outcomes					
	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Subordinate themes					
Appreciation of education	**P:2.**L: 39	**P:1.**L: 27-29		**P:1.**L: 29-31	**P:1.**L: 27-30 **P:3.**L: 72-76
Improved behaviour	**P:1.**L: 23-24	**P:1.**L:16 / L:22		**P:1.**L: 15-17 **P:2.**L: 41	**P:1.**L: 23-25
Purpose	**P:1.**L: 6-7 L:9	/**P:1.**L: 6-8	**P:1.**L: 7-8	**P:1.**L: 6-7	

L = Line number from the original transcript.

DISCUSSION

The participant behaviours before the intervention highlighted challenging behaviour and signs of disengagement within a school setting which is consistent with previous research. Poor student behaviour is common within high-delinquency rate secondary schools found in deprived communities in the (Hayden, 2011), (Farrington, 2005). Community deprivation leads to challenging behaviour amongst pupils within and outside the school setting (Higgins *et al.* 2010). The BLIP participants reside within Swanscombe, a deprived urban community (Kent County Council, 2011) that experiences high crime rates (UKCrimeStats, 2014).

Poor behaviour could have contributed to academic disengagement and poor academic performance amongst the participants before the BLIP as supported by Sandford *et al.* (2008). This could have led to a lack of positive stimulation in schools and therefore encouraged anti-social behaviour (Connor, 2012). It was important to investigate the immediate changes within these behaviours once the intervention began. The participants reported immediate impacts of the programme through improved attitude, focus and positive engagement in the BLIP. Hagger *et al.* (2011) identify a strong link between sport participation and cognitive functions with sport being especially beneficial to students with behavioural issues. The study implied that the participants exhibited improved behaviour in the early stages of the intervention through attendance, attitude and respect towards others within the school environment which can be linked to the cognitive functions mentioned by Hagger *et al.* (2011). These findings relate to sports interventions providing an immediate short-term impact on disengaged students as suggested by Sandford *et al.* (2008). Furthermore, the current study relates to research by Fujiwara *et al.* (2014) and Coalter (2005) in relation to physical activity providing an impact on social well-being as seen amongst the participants.

The study suggests that the participant involvement in basketball improved focus in relation to academic performance which highlights the impact of sport on academic achievement as suggested by the subordinate theme, 'improved focus'. The cognitive benefits of sport mentioned by Tomporowski *et al.* (2011) relate to the importance of positive stimulation for students mentioned by (Connor, 2012). The positive stimulation from the basketball sessions led to participants reporting improved focus at the beginning of the intervention. Lastly, the participants reported that improvements in behaviour and academic performance resulted from positive engagement in the BLIP. Morris *et al.* (2003) and Sandford *et al.* (2008) suggest that students improve in behaviour and learning when engaging in sports interventions which is supported in this study through themes of improvements in attitude, personality and focus. Active engagement within the programme supports the research by Tomporowski *et al.* (2011), Sandford *et al.* (2008) and Hagger *et al.* (2011) as participation in sport and positive stimulation (Connor, 2012) provide great benefit to the cognitive functions and development of secondary school students.

Results indicate that the role of the coach within the intervention was significant to the participants. The study suggests that one of the biggest benefits of the BLIP was the impact of the coach on the participants. Factors such as the importance of coach-participant relationship, the coach as a role model and developing respect for others were significant effects of the BLIP. However, the literature did not mention any of these factors within the sports interventions evaluated by Morris *et al.* (2003) and Sandford *et al.* (2008). Coach-participant relationship was very significant in terms of communication, expressing any issues and receiving support during the intervention. Athlete-coach relationships are very important in relation to athlete development (Beswick, 2010). However, the BLIP participants were not athletes and athlete development was not the purpose of the intervention. Nevertheless, the personal aspects of an athlete-coach relationship can apply to the relationship between the coach and the BLIP participants. Mutual care and relationship-orientated interactions are significant aspects of a successful relationship with the coach (Poczwardowski *et al.* 2002). The study supports this as the participants expressed care towards the coach by respecting instructions and engaging in the BLIP tasks. Furthermore, the data suggests that a positive relationship with the coach contributed

to positive effects on the participants both within and outside of the school environment.

Seeing the coach as a role model during the BLIP was also a major factor that contributed to the positive impact of the intervention. Providing a role model for students can be seen in projects such as the 'Stay in School' initiative (Boston Celtics, no date). In contrast, most of the literature does not recognise the significance of role models during sports interventions. However, Bull and Beale (2012) identify the importance of the 'Fight For Peace' participants seeing the coach as a role model in order to successfully engage within the programme which relates to this study. Students are inspired by sports role models which leads to improved attitude and behaviour outside of the intervention environment (Biskup and Pfister, 1999) which shows that sports intervention participants can transfer a positive attitude into the outside world. This relates back to Hagger *et al.* (2001) in relation to behaviour improvements as a result of sports interventions.

Respect towards others was also a result of the coach impact highlighting the effects of sport participation on social skills (Lista and Sorrentino, 2010). Respect in terms of positive communication and behaviour is a social skill that can flourish through engagement in sports interventions (Fujiwara *et al.* 2014). Bull and Beale (2012) state that the 'Fight For Peace' programme contributed to the participants developing respect for the boxing coach which relates to this study with participant respect transferring to other aspects such as the school environment. This is the only longitudinal study measuring the impact of sport-based interventions on young people and should provide insight into the long-standing impact of such interventions.

The study shows a change of attitude towards education with participants regretting underperforming at school. Physical activity facilitates the development of cognitive functions amongst young people in terms of social skills, improving behaviour and positive engagement in school (Tomporowski *et al.* 2011), (Lista and Sorrentino, 2010), (Hagger *et al.* 2001) and (Sandford *et al.* 2008) which is seen amongst the BLIP members that have continued education following the intervention. However, it is difficult to determine how much of this change is a result of the current study, with a series of extraneous variables, such as maturity, possibly contributing to changes in participant behaviour.

The notion that participant behaviour can determine whether sport is successful in tackling anti-social behaviour is supported by (Sandford *et al.* 2008), (Morris *et al.* 2003) and (Bull and Beale, 2012). However, these studies fail to identify whether this is a long-term process following sports interventions. The current study indicates behaviour improvements at the beginning of the BLIP, which supports the short-term impact. Furthermore, the current study suggests improvement in participant behaviour post-intervention which indicates longitudinal impact. However, the study took place 12 months after the intervention prompting enough time to elapse to consider whether changes were long standing. Nevertheless, most participants involved reported significant improvements in behaviour following the intervention.

Lastly, it is important to discuss what the participants have been engaged in since the intervention. A theme of purpose was revealed, which suggested the willingness get involved in something productive. The participants are engaging or seeking to get involved within a positive environment. The current study relates to research by Coalter (2005) and Fujiwara *et al.* (2014) and exemplifies sport being utilised as a social instrument with participants reporting long-term improvements in behaviour, attitude and social skills as a result of the BLIP.

Conclusion

The current study has produced an insight into how sports participation can influence disengaged young people through positive impacts on behaviour and education. The results were similar to other sports interventions aimed at reducing anti-social behaviour and re-engaging disengaged young people within a school. Exploring participant behaviours pre-intervention allowed the researcher to evaluate the immediate impact of the BLIP which related to literature examining short-term impacts of sports interventions. Participants improved in behaviour, academic performance and thoroughly engaged with the intervention. The BLIP provided a positive stimulation for the participants that was not present pre-intervention, which could have encourgaed anti-social behaviour. The study revealed an aspect of sports interventions that was hardly mentioned in surrounding literature.

The role of the coach proved to be a significant part of the intervention for the participants. The BLIP coach provided a positive impact on the participants through mutual relationships and respect.

More importantly, this study evaluated the longitudinal effects of the BLIP making it the only research that examines the longitudinal impacts of sports interventions on disengaged young people. Furthermore, research suggested the need for a longitudinal qualitative approach in order to analyse the true effects of sports interventions once immersed into the outside world. It was necessary to evaluate if there were transferable personal development skills between the BLIP and general lifestyle amongst the participants. As a result; the study suggested a positive long-term impact of the BLIP amongst the participants as suggested by participant engagement in employment or further education.

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How to cite this article: Volskis L., Hunt, R. and Beale J.T. (2020). A Qualitative Investigation Into the Impact of the Basketball Learning Intervention Programme (BLIP) on Disengaged Secondary School Students in the United Kingdom. Int J Disabil Sports Health Sci;3(1):11-19.
https://doi.org/10.33438/ijdshs.730528

ISSN: 2645-9094

Yarımkaya et al., Int J Disabil Sports Health Sci;
2020;3(1):52-65
DOI:10.33438/ijdshs.733754

International Journal of
Disabilities Sports & Health Science

RESEARCH ARTICLE

The Effects of Family-Mediated Physical Activities on Communication Skills of a Student with Autism Spectrum Disorder: A pilot study

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Abstract

Effective strategies to address communication skills are critical to students with Autism Spectrum Disorder (ASD) participating in inclusive education. The purpose of this pilot study is to investigate the effects of family-mediated physical activities on the communication skills of a student with ASD. One inclusive student with ASD and his mother participated in the study designed in the pretest-posttest experimental model. For 8 weeks, family-mediated physical activities were carried out with the student with ASD and his mother. 6 sessions of family education programs were organized before family-mediated physical activities. The data were obtained with the Observation Form developed in line with the literature, and communication skills of the student with ASD. According to the findings of the study, it was determined that the communication skills of the student with ASD increased significantly after 8 weeks after family-mediated physical activities. As a result, it was obtained the impression that family-mediated physical activities had a positive effect on the communication skills of the student with ASD.

Keywords
Autism Spectrum Disorder, Communication Skills, Family-Mediated, Physical Activity

INTRODUCTION

Autism Spectrum Disorder (ASD) is a neuro-developmental disorder that manifests itself with limited and repetitive behavior patterns, as well as inadequate social interaction and communication skills (American Psychiatric Association [APA], 2013). ASD has a wide range of effects of behavioral, cognitive and mental functions on individuals with this diagnosis (Newschaffer et al., 2007). Individuals with ASD experience deficiencies in the fields of social interaction, understanding others' feelings and thoughts (Sani-Bozkurt & Vuran, 2014), joint interest (Ingersoll & Dvortcsak, 2010), eye contact (Reichow et al., 2011), sedentary life-obesity (Phillips et al., 2014) and motor skills (Pan, 2014). These deficiencies cause individuals with ASD to exhibit various behavioral problems in their lives (Hoevenaars-van den Boom et al., 2009; Webber & Scheuermann, 2008) and especially inadequacy in their communication skills (Paul & Wilson, 2009).

Communication skills are one of the basic requirements for individuals with ASD to interact and learn with their environment (Prelock et al., 2011). While individuals with TD can easily learn their communication skills in various environments (Trent et al., 2005), individuals with ASD find it difficult to learn their communication skills due to the deficiencies they show in development areas (Özen, 2015). The difficulties

Received: 07 May 2020 ; **Accepted:** 11 June 2020
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experienced by individuals with ASD in evaluating their communication opportunities have a negative effect on their social adaptation skills (Aydın, 2016) and direct them to social isolation (Bellini et al., 2007; Kasari et al., 2012). For this reason, education programs aiming to improve the communication skills of individuals with ASD have a vital importance in terms of adapting these individuals to social life as well as making it easier for them to adapt to school programs (Prelock et al., 2011).

In the literature, it is possible to come across many training programs that are used to eliminate the negativities that individuals with ASD experience in the field of communication and that provide flexibility to be designed in parallel with the development areas of individuals with ASD. Some of these training programs are: game (Yoder, 2006), joint interest (Charman, 2003), verbal behavior (Paul & Sutherland, 2005), language teaching (Freeman & Dake, 1997), replicating (Macduff et al., 2007), social stories (Litras et al., 2010), video modeling (Charlop et al., 2010) and physical education activities (Staples et al., 2011).

Physical education activities have emerged as a method that can be used in the process of supporting the development areas of individuals with ASD in recent years (Prupas & Reid, 2001). As a matter of fact, participation in the training program enriched with physical education and sports activities supports the multidimensional development of individuals with ASD (Srinivasan et al., 2014; Movahedi et al., 2013) and contributes to their development especially in social skills (Bass et al., 2009), self-confidence (Todd, Reid & Butler-Kisber, 2010), cognitive functions (Anderson- Hanley et al., 2011), stereotypical behaviors (Bahrami et al., 2012) and academic aptitude (Nicholson et al., 2011). Despite the mentioned effects of participation in physical education programs on the development areas of individuals with ASD, few studies seem to offer results on communication skills, one of ASD's main characteristic challenges (Bass et al., 2009; Hameury et al., 2010; Pan, 2010). In addition, it is understood that studies on physical education and ASD cover short experimental periods (Matson et al., 2007) and do not include family involvement (Alexander et al., 2011; Bahrami et al., 2016; Garcia-Villamisar & Dattilo, 2011). However, the principles of special education involve that families are actively involved in all stages of the education of their children with special needs. In the current study, this was taken into consideration and it was focused on examining the development of communication skills of the student with ASD who participated in family-mediated physical education activities. It is predicted that the results obtained in the study will provide empirical evidence for the use of family-mediated physical education activities in acquiring communication skills for children with ASD. In the light of this information, the aim of the study is to examine the effects of physical education activities with family participation on the communication skills of the student with ASD. The main problem sentences that guide the study towards this basic purpose are as follows:

- How are the changes in the communication skills (eye contact, joint interest, initiation of communication and respond to communication) of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the eye contact skill of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the joint interest skill of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the initiation skill of verbal communication of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the initiation skill of non-verbal communication of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the skill of respond to verbal communication of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the skill of respond to non-verbal communication of the student with ASD participating in the family-mediated physical activities?

METHODS

This section includes research model, participants, dependent variable (communication skills), independent variable (family-mediated physical activities), data collection tool and data analysis process.

Research Design

In the study, pretest-posttest experimental model was used to determine whether the program has an effect on the communication skills of the student with ASD. In this model, the independent variable is applied to the participants in the study group and if the post-test scores are higher than the pre-test scores, it is accepted that this is due to the independent variable (Ekici, 2008). The experimental design of the present study is presented in Table 1.

Table 1: The experimental design of intervention

Participant	Pre-intervention	Intervention	Post-intervention	Folow-up
Student with ASD	Communication skills was assessed 1 week before the family-mediated physical activity program	Intervention program was implemented for the 8 weeks	Communication skills was assessed two days after the family-mediated physical activity program	Communication skills was assessed 1 month after the family-mediated physical activity program

Autism Spectrum Disorder (ASD)

As seen in Table 1, prior to physical activity program, communication skills of the student with ASD were assessed. Then, family-mediated physical activity program was implemented throughout 8 weeks. Two days after physical activity program, communication skills of the student with ASD were assessed. Finally, one month after physical activity program, follow-up measurement related to communication skills of the student with ASD was obtained

Participants

One student with ASD and his mother residing in the district of Keçiören in Ankara province participated in this study. Detailed information about the participants is presented below under separate headings.

Student with Autism Spectrum Disorder

One student with ASD, who participated in the study, is receiving full-time inclusive education in one official secondary school in Keçiören district of Ankara. In addition, inclusive student with ASD receive two hours of individual special education per week in a private education and rehabilitation center. In addition to the diagnosis in the process of determining the inclusive student with ASD, the following prerequisites were sought: 1) showing limited communication skills, 2) not having any health problems, 3) not being disturbed by social interactions (touch), 4) having motor skills and 5) not participating regularly in any family-mediated training or physical activity to support communication skills before. In order to identify the inclusive student with ASD who have these prerequisites, the director and teachers of a special education and rehabilitation center in the district of Keçiören in Ankara was contacted. During the meeting, the director and teachers of the institution were informed about the study and the prerequisites sought in the student to be included in the study were explained, and support was obtained for the determination of the inclusive student with ASD. As a result of the meetings, male an inclusive student with ASD was selected as target student. Necessary permissions were taken from the families of the target student, who was planned to participate in the research, in written and verbal form. The target student participating in the research was codenamed (Berke). Berke is a male student aged 9 years and 5 months and diagnosed with ASD. Having language skills, Berke has generally limited expressive language skills. Berke answers the questions posed to him with very short sentences. It is observed that Berke does not react to communication from time to time. Berke generally spends time alone and does not communicate much with his peers.

Mother

In order to ensure family participation, one-to-one interviews were held with the parents of the positive effect on the target behavior (communication skills) of their children. It is stated that it is not possible to achieve educational gains in terms of both children and family without active participation of the family in the educational processes of individuals in the disability groups (Diken, 2009; Sameroff & Fiese, 2000). However, in the meeting with the mother and father, the father stated that he could not participate in the study due to the intensity of work, so only mother participation from the family was ensured in the studies. The mother who participated in the study is 43 years old and is a university graduate. A consent form was signed with the mother on voluntary participation in the study.

Family Education

In the study, 6 sessions of family education were organized before the physical activity program in order to present physical activities as a family-mediated. Family education was planned in order to provide the mother with the necessary knowledge and skills for family-mediated physical activities. The relevant literature (Esentürk, 2019; Lequia Machalicek & Liyons, 2013; Mazurik-Charles & Stefanou, 2010; Olçay-Gül, 2012; Ward-Hoorner & Sturmey, 2008) was used in the process of preparing family education systematically. In this regard, family education consists of three parts: informative education presentations, modelling physical activities and experimenting physical activities. In this context, the mother was informed about the purpose of the study and activities at the beginning of the family education. During the teaching sessions, the skills of the mother to start a game during the activities, to offer instructions and to reward were emphasized. Then, by creating role play environments, the mother was taught how to behave in exemplary situations. In this process, necessary feedbacks and corrections were made by giving tips and suggestions to the mother.

Independent Variable (Family-Mediated Physical Activity Program)

Independent variable of the study is the family-mediated physical activity program prepared as a result of the literature (Özen et al., 2012; Yarımkaya et al., 2017; Yarımkaya, 2018) and expert opinions. The program was presented to inclusive student with ASD. The content of the interview focused on the fact that participation of the family in educational practices can have a the inclusive student with ASD who participated in the study through the family (mother). It was noted that the program have a structure in which inclusive student with ASD can interact socially with his mother and positively affect their communication skills, and in this direction, activities based on cooperation, rhythm and music, which are suitable for the level of the family, were emphasized. The program consists of warm-up movements (rhythm and music), functional exercises (paired and individual), station tracks, relay baton races, educational games (paired, cooperative, grouped, regular, rhythm and musical games), sportive competitions and stretching-cooling (paired, group and individual) as a general content. The program was carried out for 40 minutes a day and 3 days a week for 8 weeks.

Dependent Variable

The dependent variable of the study is the communication skills of the student with ASD (eye contact, joint interest, initiation of communication and respond to communication). In order to determine the dependent variable, primarily the opinions of parents of the student with ASD and of his classroom and special education teachers were consulted. In addition, student with ASD were observed by the practitioner in an inclusive and special education environment and records were kept to determine the indicators of target behaviors. In particular, records were kept on the expressions, initiation of communication and response behaviors in communication of the target student during communication with the peers with typically development in the inclusive environment, and the most frequently repeated expressions and behaviors of the target student were tried to be determined. Considering the interviews and records about the communication skills of the target student, the dependent variable was defined as in Table 2 and indicative behaviors were determined (Yarımkaya et al., 2017).

Data Collection Tool

The data of study were obtained with the Observation Form developed in line with the literature, and communication skills of the student with ASD (Yarımkaya et al., 2017). Observation Form was developed by the researchers to examine

the changes in the communication skills of the inclusive student with ASD who participated in the study. In the process of developing the observation form, based on the opinions of the family and observation form. The first column contains target behaviors (eye contact, joint interest, initiation of communication and respond to communication), and the second and third columns include two separate note-taking sections to record the interactions of inclusive student with ASD. In order to create observation records in a healthy way, the researcher placed two separate cameras at the two corners of the gym. He went to another corner and created an environment where he can effectively observe the behaviors of the target student and his mother. While the researcher kept his written records personally, he later watched the video recordings of the student behaviors that he may have missed during the activity and compared them with his written records and finalized the observation records.

experts, the communication skills of the inclusive student with ASD, desired to be developed, were emphasized. There are three columns in the

Table 2: Definitions and indicative behaviors of dependent variable

Target Behaviors	Indicator Behaviors	Indicator Behaviors
Eye Contact	Maintaining eye contact for at least 2 seconds while in verbal and non-verbal communication with mother before, during and after the activity	Maintains eye contact with mother for at least 2 seconds in actions directed towards mother (pass, throwing ball, holding ball, speaking, feeling sad and rejoicing, and wanting-waiting reactions) before, during and after the activity.
Joint interest	Interacting verbal and non-verbal with mother towards common activities and equipment before, during and after the activity	Shows reactions such as looking at the activity or equipment in the environment with his mother, pointing at the equipment, or verbally attracting attention there, before (during promotion, editing), during and after the activity.
Initiation of Communication	Verbal and non-verbal communication with mother before, during and after the activity	Exhibits communication initiative behaviors to the target student mother, such as speaking (hello, goodbye etc.) offer (shall we play etc.), request (can you throw the ball), greeting (bravo, awesome, etc.), instruction (run to the right, throw slow, etc.) and suggestion (don't worry next time etc.) before, during and after the activity.
Respond to Communication	Verbal and non-verbal respond to verbal and non-verbal communication initiated by mother before, during and after the activity	Fulfills the proposal (shall we play? etc), the request (will you run? etc) and instructions (start from the right, etc.) made by the target student mother, before, during and after the activity. Responds verbally and non-verbally (saying no, of course, yes, etc., approving or shaking head, hand and arm meaning yes or no, happy and unhappy facial expression, etc.) to speech, proposals, requests, greeting, instructions and suggestions made by the target student mother before, during and after the activity.

Autism Spectrum Disorder (ASD)

Data Analysis

In the study, the data obtained through the observation form during the family mediated physical activities were analysed graphically. In the graphical analysis, the data obtained during the research are quantified and processed on the graph and then evaluated (Tekin-İftar, 2012). In the study, column graph, one of the graphical analysis methods, was used. While the frequencies of inclusive student with ASD to display their communication skills during the activities are shown on the vertical axis of the column chart, the periods of evaluation of the communication skills of the student with ASD are specified on the horizontal axis. With this method, the development trend of the communication skills exhibited by the student with ASD during each evaluation period during the family-mediated physical activities can be monitored. In addition, data on some parameters (communication skills) were collected to determine whether physical activities with the family participation applied in the study differ in terms of efficiency, and these data were compared and analysed.

RESULTS

As a result of the study, the findings regarding the communication skills of the student with ASD, who participated in the family-mediated physical activities, are presented below according to the sub-problem sentences, answers of which are sought in the study.

Findings Related to the First Sub-Problem Sentence of the Study

"How are the changes in the communication skills (eye contact, joint interest, initiation of communication and respond to communication) of the student with ASD participating in the family-mediated physical activities?"

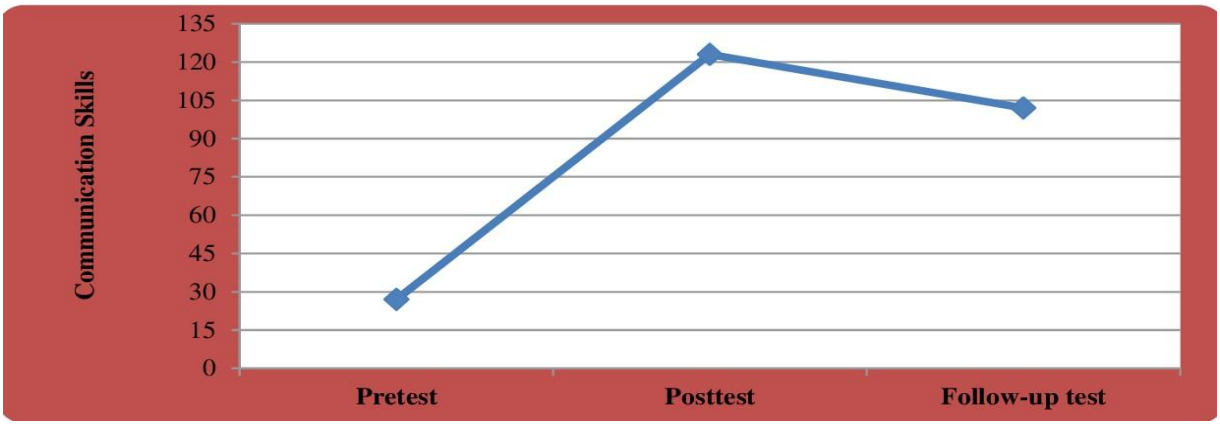

Figure 1: Findings regarding the communication skills of the student with ASD

As seen in Figure 1, it is determined that the student with ASD who participated in family-mediated physical activities exhibited his communication (eye contact + joint interest + initiation of communication + respond to communication) skills 27 times before the study, 123 times after the study and 102 times in the follow-up test obtained 1 month after the study.

Findings Related to the Second Sub-Problem Sentence of the Study

"How are the changes in the eye contact skill of the student with ASD participating in the family-mediated physical activities?"

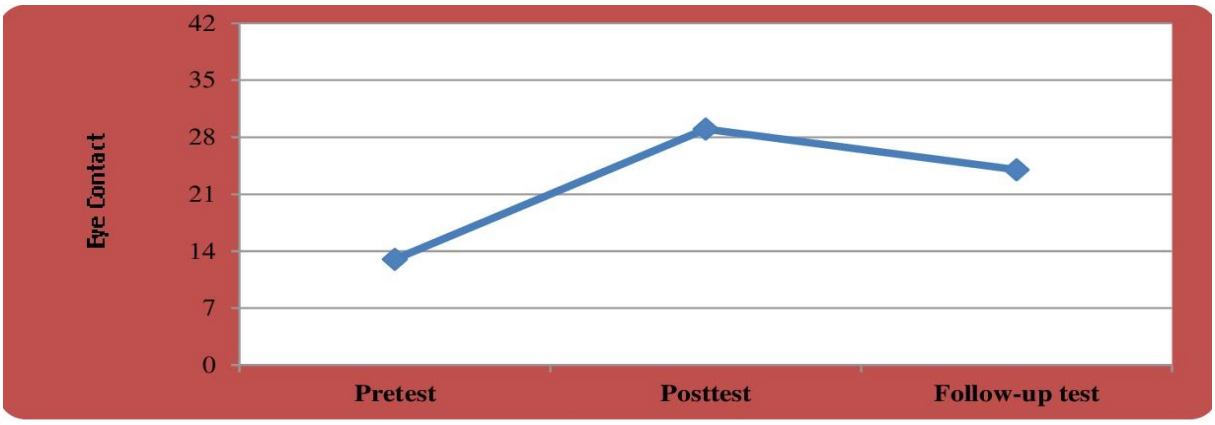

Figure 2. *Findings regarding the eye contact skill of inclusive student with ASD*

As reported in Figure 2, it is found that the student with ASD who participated in the family-mediated physical activities exhibited his eye contact skill 13 times before the study, 29 times after the study and 24 times in the follow-up test obtained 1 month after the study.

Findings Related to the Third Sub-Problem Sentence of the Study

"How are the changes in the joint interest skill of the student with ASD participating in the family-mediated physical activities?"

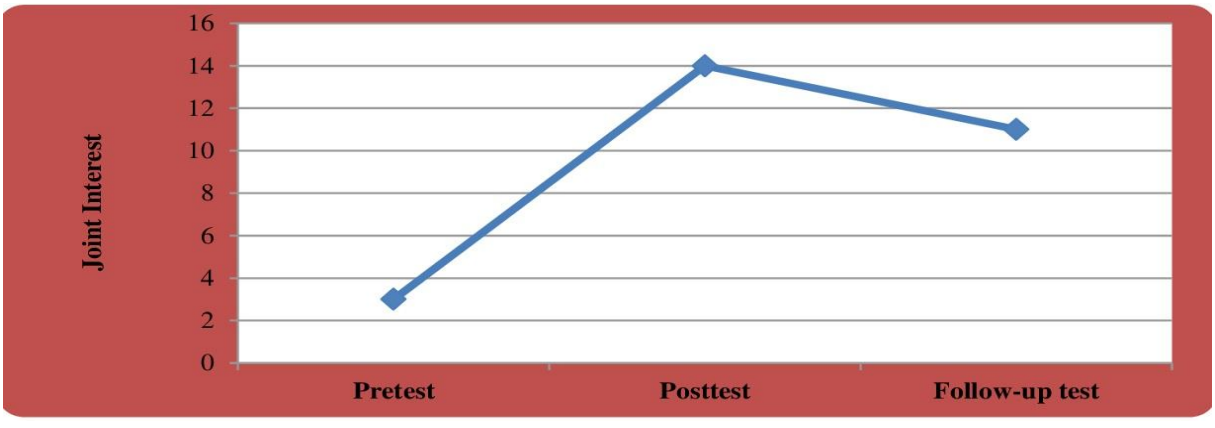

Figure 3. Findings regarding the joint interest skills of the student with ASD

As seen in Figure 3, it is determined that the student with ASD who participated in the family-mediated physical activities exhibited his joint interest skill 3 times before the study, 14 times after the study and 11 times in the follow-up test obtained 1 month after the study.

Findings Related to the Fourth Sub-Problem Sentence of the Study

"How are the changes in the initiation skill of verbal communication of the student with ASD participating in the family-mediated physical activities?"

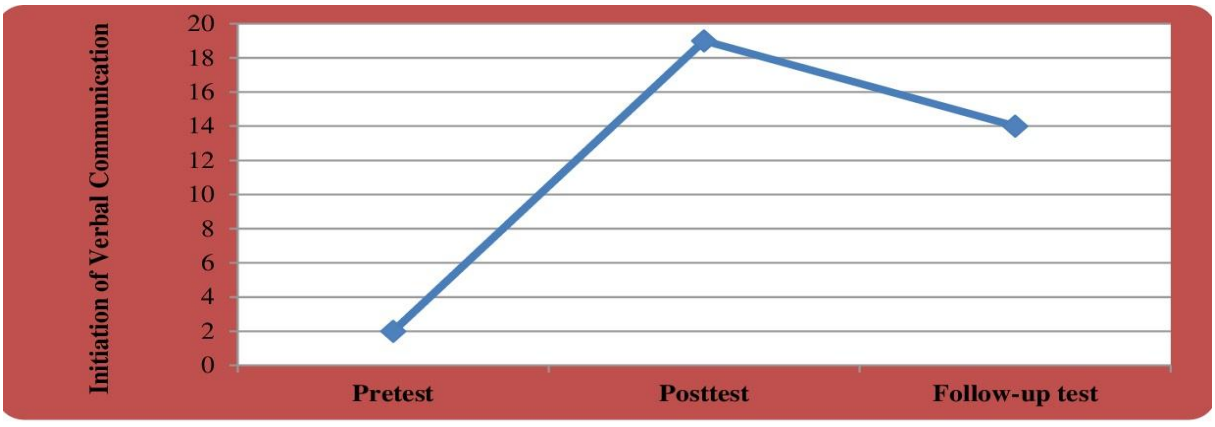

Figure 4. Findings regarding the initiation skill of verbal communication of the student with ASD

As reported in Figure 4, it is seen that the student with ASD who participated in the family-mediated physical activities exhibited his initiation skill of verbal communication 2 times before the study, 19 times after the study and 14 times in the follow-up test obtained 1 month after the study.

Findings Related to the Fifth Sub-Problem Sentence of the Study

"How are the changes in the initiation skill of non-verbal communication of the student with ASD participating in the family-mediated physical activities?"

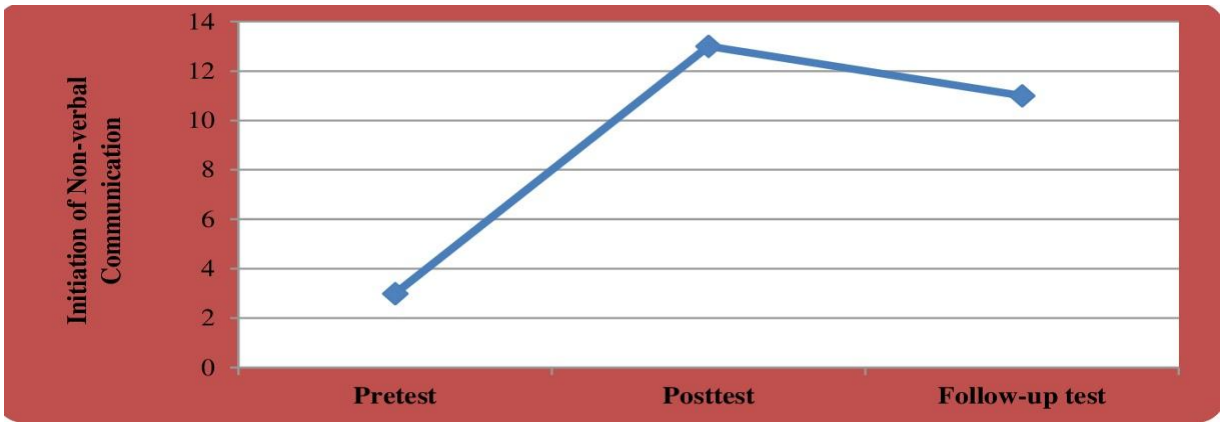

Figure 5. Findings regarding the initiation skill of non-verbal communication of the student with ASD

As seen in Figure 5, it is found that the student with ASD who participated in the family-mediated physical activities exhibited his initiation skill of non-verbal communication 3 times before the study, 13 times after the study and 11 times in the monitoring measurement obtained 1 month after the study.

Findings Related to Sixth Sub-Problem Sentence of the Study

"How are the changes in the skill of respond to verbal communication of the student with ASD participating in the family-mediated physical activities?"

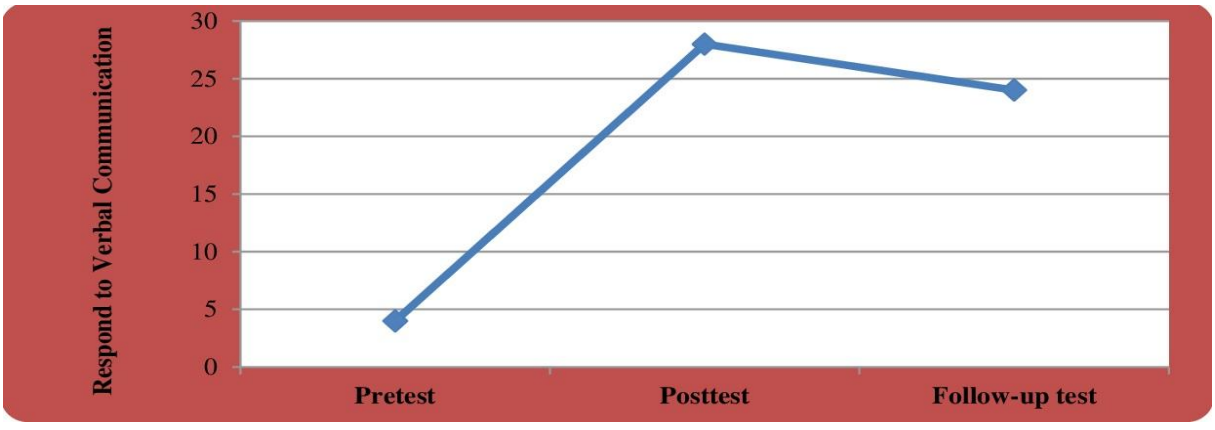

Figure 6. Findings regarding the skills of respond to verbal communication of the student with ASD

As reported in Figure 6, it is seen that the student with ASD who participated in family-mediated physical activities exhibited his skill of respond to verbal communication 4 times before the study, 28 times after the study and 24 times in the monitoring measurement obtained 1 month after the study.

Findings Related to the Seventh Sub-Problem Sentence of the Study

"How are the changes in the skill of respond to non-verbal communication of the student with ASD participating in the family-mediated physical activities?"

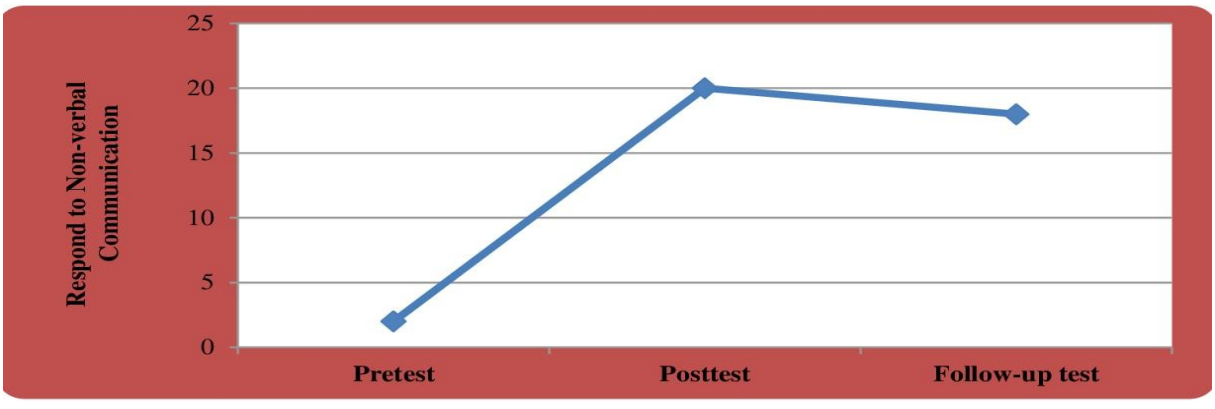

Figure 7. Findings regarding the skills of respond to non-verbal communication of the student with ASD

As seen in Figure 7, it is determined that the student with ASD who participated in the family-mediated physical activities exhibited his skill of respond to non-verbal communication 2 times before the study, 20 times after the study and 18 times in the follow-up test obtained 1 month after the study.

DISCUSSION AND CONCLUSION

The results of the studies that show that student with ASD have limited communication skills make it important to support their communication skills. Considering that student with ASD whose communication skills are not supported may face social isolation in the school environment, the importance of supporting communication skills of student with ASD will be better understood. In this context, in the present study, family-mediated physical education activities were designed for the development of communication skills of an inclusive student with ASD and the effects of these activities on the communication skills of inclusive student with ASD were examined.

There was a positive change in the communication skills of the inclusive student with ASD, who participated in family-mediated physical education activities for 8 weeks. In addition, it was found that the increase in the communication skills of the student with ASD after family-mediated physical education activities continued in the monitoring measurement obtained 1 month after the study. Studies in many different areas showed that the practices offered by family members were effectively implemented (Becker-

Cottrill et al., 2003; Brookman-Frazee et al., 2006). When the literature is analysed, studies involving families in the physical education activities of children with ASD are gathered in two groups. In the first group, there is only one study in which families participate in the application process only as intermediaries (İlhan et al., 2017). However, this study did not focus on the communication skills of children with ASD, and the level of awareness of families was examined after the applications. In the second group, there are studies where families were involved in at the point of practicing physical education activities and applications were carried out by families. Esentürk (2019) revealed that there was a positive development in the communication skills of children with ASD after the UFA program carried out by the mothers with their children with ASD in their study, which aimed to examine whether the UFA program, which was implemented by the families, was effective on the communication skills of children with ASD. Solomon et al. (2014) found that the UFA program applied by mothers made positive contributions to the communication skills of children with ASD in their study where the UFA program implemented by mothers dealt with the effects of the children with ASD. Solomon et al. (2007) investigated the effect of game-based interventions applied by family members in the communication skills of individuals diagnosed with ASD, in the study titled PLAY Project. Within the scope of the study, family members were provided with family education by the researchers, and the family members were provided to carry out applications to their children. Findings obtained as a result of the research showed that game-based interventions applied by family members had a positive effect on the communication skills of individuals with ASD. Similarly, five ASD-diagnosed individuals and family members participated in the study of Foster-Sanda (2014). In the study, family members were provided with the knowledge and skills to practice game-based interventions, and their children were given the opportunity to practice. As a result of the interventions applied in the home environment, it was observed that it had a positive effect on general interpretation and game-specific interpretation skills of the individuals with ASD. Despite the fact that the goals set for both the child and the family cannot be achieved without the active involvement of the family in the intervention programs applied to children with special need (Diken, 2009; Sameroff & Fiese, 2000), it was observed that there are very limited number of physical education activities with family participation. Indeed, it is anticipated that the current research will make a significant contribution to the literature in addressing this gap.

It is thought that there are some possible reasons for the positive changes observed in the communication skills of the inclusive student who participated in the study after the family-mediated physical activities. First of all, physical activities offered within the scope of the study were prepared in order to develop the communication skills required by student with ASD who participated in the study in line with the literature and expert opinions, and in the activity program, emphasis was placed on collaborative activities where student with ASD could interact with his mother. On the other hand mother who participated in the study were trained on strategies such as initiating a game, offering a game, inviting to the game, searching for a playmate and offering a reward. It is evaluated that this situation contributes to student with ASD to find a learning environment with rich stimulants for their communication skills during physical activities.

As a result, it was obtained the impression that the family-mediated physical activities are effective methods in supporting the communication skills of the inclusive student with ASD. The positive changes observed in the communication skills of the student with ASD, which were obtained one month after the study compared to situation before the study, strengthened this impression. Although highly significant and positive results were obtained regarding the communication skills of an inclusive student with ASD, who participated in the family-mediated physical activities in an experimental environment, the limitation of the study that it was carried out only on one student with ASD should be considered when interpreting the results. In line with the results and limitations of the study, the following suggestions can be made for teachers, experts, academicians and future studies:

- In-service training activities can be organized in the field of family mediation physical activities for teachers who take part in physical education and sports classes of student with ASD.

- Family-mediated physical activities can be offered to students with ASD who attend inclusive education in general education schools during physical education and sports classes.
- While physical education applications for students with ASD are offered on a family-mediated basis on certain days, they can be offered on certain days by providing the family's participation as audience.
- In future studies, the effects of the family-mediated physical activities on different communication skills (gesture-mimic use and communication maintenance) of students with ASD can be examined.

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How to cite this article:
Yarımkaya E., Esentürk O.K. & İlhan, E. L. (2020). The Effects of Family-Mediated Physical Activities on Communication Skills of a Student with Autism Spectrum Disorders: A pilot study. Int J Disabil Sports Health Sci;3(1):52-65.
https://doi.org/10.33438/ijdshs.733754

ISSN: 2645-9094

Acar et al., Int J Disabil Sports Health Sci;
2020;3(1):66-73
DOI:10.33438/ijdshs.736875

International Journal of
Disabilities Sports & Health Science

RESEARCH ARTICLE

An Investigation on Anxiety States of Students in Faculty of Sport Sciences During COVID-19

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Abstract

This study aims to investigate anxiety states of students in Faculty of Sport Sciences during coronavirus (Covid19) in terms of some variables. Total number of 166 students as 67 female and 99 male chosen by simple random sampling from Sinop University Faculty of Sport Sciences participated in this study. Informed consent form and Beck Anxiety Inventory were used as data collection tool. To disclose differences in statistical evaluation of the data Mann-Whitney U Test and for multiple comparisons Kruskal-Wallis Test were used. In paired comparison of the total scores in anxiety inventory, it was detected statistically difference with regards to gender variable in favor of males ($p<0,05$). On the other hand, there were not found any statistically significant difference in age, monthly personal income, home exercise status, exercise frequency, exercise duration, habit of cigarette smoking and following virus news at daily basis during coronavirus threat ($p>0,05$). Anxiety levels of females participated in this study were found higher than males. No statistically significant difference was found in home exercise. But, anxiety levels of the participants exercised at home were observed lower compared to the others who did not.

Keywords
Exercise, anxiety, covid-19, coronavirus.

INTRODUCTION

Having been detected with the clusters of pneumonia in China at December 19, the pandemic started to be seen in our country in March 2020 (He et al., 2020). This pandemic was called as 'Severe Acute Respiratory Syndrome-Coronavirus-2' (SARS-CoV-2) and the disease that it causes was named as Covid–19 (Corona Virus Disease 2019), by World Health Organization (Ignatowicz et al., 2019; Priya, 2020). Number of cases increased rapidly after officially announced to be seen in our country March 11, 2020. Rapid increase in numbers of the infected people was accompanied with some serious measures consecutively. The measures taken in our country were determined as prohibitions and guidelines. In this context, in our country as gradually; education (in-person class) was suspended, implementation of distance learning began, and people over the age of 65 and under the age of 20 were imposed a curfew. Besides, government agencies and experts called for 'staying at home' so as to keep people in self-isolation, by using mass communication. In this way, social interaction and contact of the people were reduced to minimum levels. People strived to stay at home in this isolation period, and this new routine and uncertainty led to anxiety. So, the concept of 'anxiety' became an important topic needs to be focused in this period.

Colloquial speech usage of this concept via translation was added to our language as 'concern/apprehension/worry' that could not meet the same meaning as in English. So, psychiatry experts who thought this usage causes loss of

Received: 13 May 2020 ; **Accepted:** 15 June 2020
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meaning, managed to replace it with 'anxiety' in scientific language and started to use it (Öztürk, 2004). The concept of anxiety, on the other hand, is considered as both symptom and also the reason of mental disorders by the experts. According to the researchers, anxiety is the expression of the fight-or-flight reaction which prepares human organism to physically move in case of danger (Beck, 2008).

Anxiety is an important health problem affects both individual and society. In treatment of the anxiety, medication is also given together with several methods. In addition, the effects of sport and exercise on mental health have been examined by many researchers (Byrne and Byrne, 1993; Salmon, 2000). These researchers have suggested that sport provides improvement on mood thanks to its physiological and biological characteristics (Dishman et al., 1997). Lawlor and Hopker (2001), Mead et al. (2009), on the other hand, have pointed out that there is a relationship between exercise and reducing of the depression symptoms. Sport, therefore, has been thought to be an implement producing positive effects on mental health. In this context, purpose of our study is to investigate the anxiety levels of the students, from Sinop University Faculty of Sport Sciences, in terms of some variables.

MATERIALS AND METHODS

Research design

This research was correlational survey model with cross-sectional and descriptive characteristics. Prior to this study, the application was made to Sinop University Human Research Ethics Board. In accordance with the Human Research Ethics Board decision dated 20/05/2020 and numbered 2020/51, it was pronounced that this research is compliance with the Human Research Ethics Board Guideline and there is no inconvenience ethically.

Participants

Sinop University Faculty of Sport Sciences (2019-2020 Academic Year, 263 students) comprised the population, whereas total number of 166 students as 67 female and 99 male selected randomly constituted the sample of the research.

Data Collection

Survey method was used as data collection tool in the study. Questionnaire prepared by the researcher consisted of two sections. 'Personal Information Form' in the first part and 'Beck Anxiety Inventory' in the second part were located. Questions were prepared by using 'Google Forms' so that it helps the students reach to the questionnaires easier. Introductory text of the questionnaire and online form link were sent to the students through e-mail and text message. Questionnaire remained as open access for three weeks, the questionnaire then was stopped when data entry was over and data set was made ready for the statistical analysis.

Personal Information Form

Participants were asked to respond the questions such as gender, age, home exercise status, exercise frequency, exercise duration, habit of cigarette smoking and the status of following virus news at daily basis during coronavirus.

Beck Anxiety Inventory

It is a Likert type self-assessment inventory created by Beck et al. (1961) consisted of 21 questions and scored between 0-3. Higher score demonstrates higher anxiety level in an individual. Validity and reliability study was performed by Ulusoy et al. (1998), and they found Cronbach's Alpha reliability (internal consistency) score as 0,93. Cronbach's Alpha reliability score for this study was determined as 0,89.

Statistical analyses

To control if the error terms show normal distribution, Shapiro-Wilk Normality test was used prior to the test selection which would be then applied to the obtained data of the study ($p<0,05$). Mann Whitney U test for paired comparisons and Kruskal Wallis test for multiple comparisons were utilized in total scores obtained from inventory. Research findings were expressed as n, (%), mean and standard deviation, and accepted as $p<0,05$ level of significance. All statistical calculations were made by using SPSS 22.0 V. statistical package.

RESULTS

In paired comparison of the total scores in anxiety inventory, it was detected statistically difference with regards to gender variable in favor of males ($p<0,05$). On the other hand, there were not found any statistically significant difference in age, monthly personal income, home exercise status, exercise frequency, exercise duration, habit of cigarette smoking and following virus news at Daily basis during coronavirus threat ($p>0,05$).

Table 1. Frequency and Percentage Distribution of The Participants in Terms of Their Demographic Information

Gender	**n**	**%**
Female	67	40,6
Male	99	59,4
Total	166	100,0
Age		
17-19	38	22,9
20-22	94	56,6
23-25	34	20,5
Total	166	100,0
Monthly Personal Income		
500 tl and under	39	23,5
501 tl and 1000 tl	51	30,7
1001 tl and 1500 tl	22	13,3
1501 tl and 2000 tl	18	10,8
2000 tl and over	36	21,7
Total	166	100,0
Home Exercise Status		
Regularly	80	48,2
Never	35	21,1
Sometimes	51	30,7
Total	166	100,0
Exercise Frequency		
1-2 times in a week	47	28,3
3-4 times in a week	58	34,9
5 times and more in a week	26	15,7
Total	131	78,9
Exercise Duration		
15 minutes	17	10,2
16-30 minutes	37	22,3
31-45 minutes	39	23,5
1 hour and over	38	22,9
Total	131	78,9
Smoking Status		
Yes	51	30,7
No	98	59,0
Sometimes	17	10,2
Total	166	100,0
Status of Following COVID-19 News		
Yes	136	81,9
No	30	18,1
Total	166	100,0

When Table 1 is examined, the ratio of the participants seems to be as 46.6% female and 59.4% male. The responses of the students with regard to the variable of home exercise were determined as 48.2% regular, 21.1% never and 30.7% sometimes. Besides, smoking status of the participants, that considered as risk group vulnerable to coronavirus by experts, were found as 30.7% yes, 59.0% no and 10.2% sometimes.

Table 2. Anxiety Levels of The Participants in Terms of Gender Variable

Gender	n	Mean	Std. Dev.	Median	IQR	p
Female	67	32,83	7,92	31,00	14,00	**0,001**
Male	99	26,14	5,64	24,00	6,00	

When Table 2 is considered, participants' scores obtained from the anxiety inventory in terms of gender variable show significance in favour of the males ($p<0,05$). So, anxiety levels of the female participants were found higher.

Table 3. Anxiety Levels of The Participants in Terms of Their Age

Age	n	Mean	Std. Dev.	Median	IQR	p
17-19 years	38	26,84	5,31	26,00	8,25	
22-20 years	94	30,12	8,01	28,00	13,00	0,100
23-25 years	34	27,76	7,15	25,50	7,75	

As it is seen in Table 3, any statistical difference was not found in anxiety levels of the students in terms of age variable ($p>0,05$).

Table 4. Anxiety Levels of The Participants in Terms of Their Monthly Personal Income

Personal Income	n	Mean	Std. Dev.	Median	IQR	p
500 tl and under	39	29,64	8,27	25,00	12,00	
501 tl and 1000 tl	51	29,24	7,84	27,00	12,00	
1001 tl and 1500 tl	22	26,95	4,67	26,50	6,25	0,958
1501 tl and 2000 tl	18	28,94	8,56	26,00	8,50	
2000 tl and over	36	28,72	6,65	28,00	9,25	

When Table 4 is considered, monthly personal incomes of the participants demonstrate no statistical significance ($p>0,05$).

Table 5. Anxiety Levels of The Participants in Terms of Home Exercise Status

Exercise	n	Mean	Std. Dev.	Median	IQR	p
Regularly	80	28,78	8,22	26,00	9,75	
Never	35	29,80	6,72	29,00	11,00	0,332
Sometimes	51	28,43	6,52	27,00	10,00	

When table 5 is examined, variable of home exercise status of the participants display no statistical significance ($p>0,05$). But, according to the obtained data; anxiety levels of the people who do not exercise at home were found higher.

Table 6. Anxiety Levels of The Participants In Terms of Home Exercise Frequency

Exercise Frequency	n	Mean	Std. Dev.	Median	IQR	p
1-2 times in a week	47	28,82	6,39	27,00	12,00	
3-4 times in a week	58	29,43	8,68	27,00	9,50	0,056
5 times/more in a week	26	25,46	4,81	25,00	7,00	

Exercise frequencies of the students show no statistical difference according to the table 6 (p>0,05).

Table 7. Anxiety Levels of The Participants in Terms of Exercise Duration

Exercise Duration	n	Mean	Std. Dev.	Median	IQR	p
15 minutes	17	25,00	4,31	25,00	5,00	0,069
16-30 minutes	37	29,70	7,62	28,00	11,00	
31-45 minutes	39	28,24	7,96	26,00	10,00	
1 hour and over	38	29,51	7,73	28,00	11,00	

When table 7 is examined, no statistical difference was detected in students' exercise durations (p>0,05).

Table 8. Anxiety Levels of The Participants in Terms of Their Smoking Status

Smoking	n	Mean	Std. Dev.	Median	IQR	p
Yes	51	28,90	7,31	27,00	9,00	0,605
No	98	28,76	7,60	26,00	11,00	
Sometimes	17	29,58	6,85	28,00	8,00	

Smoking habits of the participants indicate no significance according to table 8 (p>0,05). However, non-smokers' anxiety scores were identified lower than smokers.

Table 9. Anxiety Levels of The Participants in Terms of Following COVID-19 News

Following COVID-19 news	n	Mean	Std. Dev.	Median	IQR	p
Yes	136	28,75	7,43	27,00	9,00	0,570
No	30	29,53	7,34	33,00	27,00	

When table 9 is regarded, no statistical difference was detected in multiple comparison in terms of status of following coronavirus news (p>0,05).

DISCUSSION

In this study, it was aimed to investigate the anxiety states of the students, who study in Sinop University Faculty of Sport Sciences, during Coronavirus in terms of some variables. Participants seem to be as 46,6% female and 59,4% male in this study. The responses of the students with regard to the variable of home exercise were determined as 48.2% regular, 21.1% never and 30.7% sometimes. Moreover, smoking status of the participants, that considered as risk group vulnerable to coronavirus by experts, were found as 30.7% yes, 59.0% no and 10.2% sometimes (Table 1).

When the study is examined in terms of gender variable, the scores obtained from anxiety inventory display statistical significance in favour of males (p<0,05; Table 2). Anxiety levels of the female participants were found higher according to the above mentioned obtained data. Kinrys and Wyngant (2004), pointed out that women have higher risk of developing lifetime anxiety levels, compared to the men. Ateş et al. (2018) in their study with the caregivers of cancer patients; stressed that anxiety and depression states of the women are significantly higher than men. Keskin et al. (2013), reported mental disorders are more prevalent in women depending on reasons such as social, cultural, economic and biologic. Bayraktar et al. (2014), investigated the anxiety levels of the prospective teachers in terms of sport and different variables, they then discovered statistical significance in gender variable. According to the data they obtained, state anxiety levels of the women were found higher than men. These obtained data have the quality to support our study.

In the study, any statistical difference was not detected in anxiety levels of the students in terms of age variable (p>0,05; Table 3). Canan and Ataoğlu (2010) in a similar study, determined that there is no significant relationship between age and anxiety. On the other hand, Güvendi and Bilgin (2016), could not find any statistical significance in football players' anxiety levels in terms of age variable. These above mentioned studies also have quality to support our study particularly. During coronavirus pandemic, experts expressed disease to affect higher age groups. Participants between the ages of 17 and 25 constitute our sample, so age variable can be said not to affect anxiety levels of the participants considerably.

When examined the monthly income variable, no statistical significance was detected (p>0,05; Table 4). Aydın and Tiryaki (2017), could not find any statistical significance between income level and anxiety level. However, anxiety levels of the participants who had lower income level were higher according to the research results. Akgün et al. (2007), in their study, reached the results of no relationship between anxiety levels in terms of income levels. These studies have common ground with our study. Nevertheless, there are some studies indicating the anxiety levels decrease as long as monthly income increase (Saddicha and Khess, 2010; Deveci et al., 2012).

Our study does not display any statistical significance in terms of home exercise status which is thought to be paramount variable (p>0,05; Table 5). According to the data, however, anxiety levels of the participants who do not exercise at home were found higher. In a study conducted by Collingwood et. al. (2000), it was reported that significant decrease in anxiety and depression levels occur due to participation of exercise programs last for 8-16 weeks. In addition, Brown et al. (1992) indicated short duration exercise has positive effects on mental health. In our study, anxiety levels of the students exercise at home were detected lower than those who do not. In another research carried out by Gouttebarge (2020), with 1602 football player during Coronavirus pandemic; depression was observed in 22% of the female and 13% of the male while anxiety symptoms were observed in 18% of the female and 16% of the male football players. Researcher, in his statement about these above mentioned results, said that 'I worry about this sharp increase in depression and anxiety levels, which was induced of the unprecedented emergency that people had to confront, may be the same in rest of the society.' Therefore, exercise during coronavirus pandemic is thought to affect individual's mental health in positive way according to the obtained data.

No statistical difference was found when exercise frequency and exercise duration of the students were examined (p>0,05; Table 6-7). But anxiety scores of the participants who exercise 5 times and more in a week were found lower, compared to the others. Canan and Ataoğlu (2010), did not discover any relationship between exercise duration and anxiety. However, they found out that anxiety levels of the people who exercise regularly are in lower levels than those who do not exercise, no matter which sports are performed. (WHO, 2006) has encouraged people to make physical activity every day, at least 30 minutes. Besides recommended lower limit of daily physical activity duration is 30 minutes, exercise more than 30 minutes in a daily basis is also believed to have more positive effect on people's health.

Smoking has been commonly explained as a risk factor during the coronavirus by experts. No statistical significance was found in terms smoking status variable in our study p>0,05; Table 8). But according to the obtained data, anxiety scores of the non-smoker participants were detected lower than those who smoke. When the literature related to this topic is reviewed, studies showing a relationship between smoking and anxiety may be seen (Bjemgaard et al., 2013)

No statistical difference was detected in multiple comparison in terms of status of following coronavirus news (p>0,05). %81.9 of the participants, however, seem to follow Coronavirus news. This rate demonstrates how much anxiety the people feel about coronavirus.

In conclusion; anxiety levels of the female participants were found higher, compared to men. In our study, no statistical difference was found in terms of home exercise status. Anxiety scores, nonetheless, of the participants who exercise at home were concluded to be lower comparing to the others. As one of the Coronavirus risk factors, smoking was shown to have no significant effect on participants' anxiety levels. But, it was discovered that the students who smoke have higher anxiety levels than non-smokers.

As recommendations for the periods like this; keeping up well-balanced diet, considering

sleep quality, enhancing immune system and staying away from stress by increasing the motivation, in addition to all of these; low and moderate intensity exercise are to provide positive effects on anxiety levels of the people.

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How to cite this article: Acar, K., Mor, A., Baynaz, K., and Arslanoğlu E. (2020). An Investigation on Anxiety States of Students in Faculty of Sport Sciences During COVID-19. Int J Disabil Sports Health Sci;3(1): 66-73. https://doi.org/10.33438/ijdshs.736875