



The Relationship Between Lower and Upper Extremity Strength Performance and Body Image Perception in Adolescent Athletes

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ABSTRACT

Body image perception is defined as the idea, feeling, and thought that an individual has about their body or the image that the body creates in the mind. It is believed that sports, physical activity, and exercise have a beneficial effect on body image perception since they enhance the individual's physical fitness and ability level. The purpose of this study is to investigate the relationship between lower and upper extremity strength performance and body image perception in adolescent athletes participating in different sports disciplines. A total of 102 handball and 99 volleyball players between the ages of 15-17 voluntarily participated in this study. The standing long jump test was applied for lower extremity strength performance, and the medicine ball throw (2 kg) test was used for upper extremity strength performance. The athletes' body image perception was evaluated using the Body Image Scale (BIS). Since the variables had a normal distribution, the t-test was used for the analysis of demographic variables (gender, ideal weight, discipline), and Pearson correlation analysis was used for the analysis of continuous variables' relationships. The IBM-SPSS-21 program was used for data analysis. There was no statistically significant relationship found between body image perception and gender, discipline, and age. Statistically significant relationships were found between body image perception and lower and upper extremity strength parameters, height, sports age, body weight, and the perception of being at ideal weight. Positive relationships were detected between athletes' lower and upper extremity strength parameters and body image perception. As a result, a positive relationship was found between adolescent athletes' lower and upper extremity strength parameters and body image perception. The athletes' body image perception scores increased positively as their muscle strength increased. It is recommended to conduct this study in different age groups, different sports disciplines, or to investigate the effects of strength training on body image perception.

Keywords: *body image perception, handball, volleyball, adolescent, strength*

INTRODUCTION

Body image is one of the important issues that has been emphasized in recent years (Tylka and Wood-Barcalow, 2015). It is defined as the idea, emotion, and thought that an individual has about how their body looks in their mind, or the image created by the body in the mind (Önal et al., 2019; Tok et al., 2011). In other words, it involves the individual's production of positive or negative ideas by evaluating the functions of their body parts and their overall perception and knowledge of the appearance and internal structure of their body. It varies according to age, gender, weight, health, time, and society (Tok et al., 2011; Grogan, 1996; Ergür 1996 Ilkim et al., 2018, Ilkim et al., 2021).

Physical appearance has an important place in people's lives, as it has throughout history. Written and visual communication tools increase people's desire to resemble the accepted, attractive, and thin female and muscular male figures in society by supporting these ideal figures, and cause individuals to perceive their own bodies positively or negatively (Semmler and Enoka, 2000). The satisfaction or dissatisfaction that an individual has with their body plays a role in their interaction with the outside world, interpersonal relationships, and the development of positive or negative feelings, thoughts, and behaviors towards themselves. The satisfaction that different parts of the body give to the individual is related to their self-confidence. Height, weight, body size, health status, face, self-worth, and self-behavior, which control a person's abilities, are reflected in their social relationships.

The harmonious relationship between body image and physical condition shows that individuals are at peace with their bodies and have a positive body image. Body image theory suggests that men and women perceive their bodies differently. The desire for an ideal physical structure, which is increasingly accepted in social life every passing day, gives the individual the perception of achieving unrealistic physical standards. In particular, it is believed that women's body image regarding weight is dependent on the increasing importance of physical features and the influence of popular

culture (Güngör and Karabörklü Argut, 2018). Body image is not only a psychological state but also related to an individual's sociological and physical appearance.

Body image in individuals begins in childhood and becomes more focused on their own body during adolescence. Therefore, in adolescence, defects related to the body can form the basis of unhappiness and shame (Er, 2015). In terms of gender, women are more concerned with their bodies than men. For this reason, body image for women starts at an early age and continues throughout their lives, unlike men (Acar, 2010).

Sports is a part of the social life we live in. Sports plays an important role in individuals' social, physical, mental, and spiritual development. It has a significant impact on the individual's self-confidence, character development, becoming a social person, practical thinking ability, and mental and physical development. Having high physical fitness and ability also has a positive effect on body perception. Therefore, participation in physical activity is believed to have a beneficial effect on body perception as it develops the individual's physical fitness and ability (Güngör and Karabörklü Argut, 2018).

Sports, physical activity, and exercise have a positive effect on body perception. Physical activity allows individuals to shape their bodies in a certain way and achieve their desired ideal body structure. Physical appearance is one of the issues that individuals, especially young people, often focus on. The individual's appearance can often hinder their behavior and success. Thinness for women and muscularity for men are social values accepted by society. An ideal body shows that your body is balanced and healthy (Güngör and Karabörklü Argut, 2018; Er, 2015).

When the adolescent population is examined, it is stated that physically active individuals' mental health and well-being are supported as a result of physical activity, and there are positive effects on happiness, emotional improvement, and decrease in anxiety level (Biddle and Asare, 2011; Kirkcaldy et al., 2002). It has been reported in studies focused on adolescents that physical activity contributes to individuals' socialization, such as creating positive self-image and self-

esteem and receiving positive social feedback in peer relationships, and also contributes to reducing social anxiety levels (Wen et al., 2018). Formation of a positive body image can be achieved by actively participating in sports and physical activities during adolescence. It should be encouraged as a state policy for adolescents to participate in social sporting communities where they can establish healthy relationships.

"Sprint, launching, and weightlifting are activities that require explosive and powerful movements, and require high levels of force. There is a strong relationship between throwing a medicine ball and jumping and muscular strength (Sayaca & Sevgili, 2020; Hackett et al., 2018). Strength training is effective for improving body image in both men and women (Martin & Lichtenberger, 2002). Williams and Cash (2001) found that a 6-week strength training program significantly improved body satisfaction and social physical anxiety in male and female university students. In another study, a 12-week strength training program among middle-aged women showed greater improvements in body image than walking programs (Tucker & Mortell, 1993). A 4-month strength training program among a group of male university students significantly increased body satisfaction (Tucker, 1987). These studies suggest that strength

training is effective for improving body image in both genders.

No study has been found in the literature that examines the relationship between strength performance and body image in adolescent individuals who engage in sports in different branches. The aim of this study is to investigate the relationship between strength performance and body image in adolescent individuals who engage in sports in different branches."

METHOD

A total of 102 handball and 99 volleyball players, aged between 15-17, voluntarily participated in this study. Prior to the study, detailed information was provided to the athletes, parents, and coaches, and informed consent forms were filled out and their approvals were obtained. This research was approved by Zonguldak Bülent Ecevit University Non-Interventional Research Ethics Committee on 08.05.2023 with decision number 2023/15. The study was conducted in accordance with the principles of the Declaration of Helsinki. The distribution of the athletes' demographic variables is presented in Table 1. and the statistical characteristics of the demographic variables are presented in Table 2.

TABLE 1: Distribution of Demographic (Categoric) Variables

	Variable	Frequency (n)	Percentage (%)
Gender	Woman	84	41,8
	Man	117	58,2
Ideal Weight	Yes	102	50,7
	No	99	49,3
Branch	Handball	102	50,7
	Volleyball	99	49,3

TABLE 2: Characteristics of Demographic (Categoric) Variables

			Age (year)	Sport Age (year)	Body Weight (kg)	Height (cm)	Long Jump (cm)	Throwing medicine ball (cm)
Gender	Woman	Mean	15,14	4,75	63,57	172,32	179,86	326,96
		Sd	1,21	2,38	6,11	5,99	23,29	53,34
		Min	14,00	2,00	48,00	160,00	148,00	240,00
		Max	18,00	14,00	72,00	185,00	240,00	488,00
	Man	Mean	15,82	5,56	75,74	181,85	206,44	369,92

		Sd	1,05	1,98	10,75	7,58	27,29	42,04
		Min	14,00	2,00	58,00	165,00	148,00	286,00
		Max	18,00	10,00	102,00	197,00	290,00	488,00
Branch	Handball	Mean	15,74	5,53	68,56	176,24	196,88	355,29
		Sd	1,31	2,53	11,30	8,32	26,35	52,58
		Min	14,00	2,00	48,00	160,00	154,00	240,00
		Max	18,00	14,00	98,00	190,00	240,00	488,00
	Volleyball	Mean	15,33	4,91	72,82	179,55	193,73	348,55
		Sd	0,96	1,74	10,14	8,22	31,31	50,63
		Min	14,00	2,00	58,00	165,00	148,00	248,00
		Max	17,00	10,00	102,00	197,00	290,00	488,00

Method

102 handball and 99 volleyball players between the ages of 15-17 voluntarily participated in this study. Detailed information was provided to the athletes, parents, and coaches before the study, and informed consent forms were filled out and approved. The distribution of demographic variables of the athletes is given in Table 1 and the statistical properties of demographic variables are given in Table 2.

Height and Weight Measurement

Naked foot height measurement of the athletes was taken using a Sega brand height measuring tool with 0.01 cm sensitivity, and a Baster brand scale with 0.1 kg precision was used for weight measurement.

Strength Assessment

Standing long jump was used to assess lower extremity strength performance, and medicine ball throw (2 kg) was used to assess upper extremity strength performance of the athletes (Sayaca, Sevgili 2020).

Standing Long Jump

Meter was used for the standing long jump measurement. A starting line was determined, and a measuring tape of 3 meters in length was fixed at 1 cm intervals from the starting line. For the athletes, the starting line was determined, and the athlete jumped forward with both legs without touching the starting line, and the point where the body last touched before the jump line was measured. Attention was paid to the athletes

not breaking their contact with the ground before the jump during the long jump. Each athlete repeated the measurement twice, and the best value was recorded.

Medicine Ball Throw (2 kg)

Athletes stood one step behind the starting line and threw the medicine ball forward with all their strength from the overhead level. The distance between the starting line and where the ball fell was measured in centimeters and recorded. Each athlete repeated the measurement twice, and the best value was recorded.

Body Image Evaluation

The athletes' body image was assessed using the Body Perception Scale (VAÖ). The scale consists of 40 items, each related to an organ or part of the body or its function. Each item is evaluated with scores ranging from 1 to 5, and the total score ranges from 40 to 200. The cutoff point of the scale is 135, and those with a score below 135 are defined as having low body perception. In this study, the Turkish version of the questionnaire was used (Hovardaoglu, 1993).

Statistical Analysis

The data was analyzed using IBM-SPSS-21 software. For categorical demographic variables (gender, ideal weight, sport type), frequency and percentage information were provided. For continuous demographic variables (age, years of sports experience, weight, height), as well as for performance measures (standing long jump, medicine ball throw) and body image assessment

(body image score), descriptive statistics including mean, standard deviation, minimum, and maximum were calculated.

To test the normality assumptions for standing long jump, medicine ball throw, and body image score, Kolmogorov-Smirnov test was used. As all variables were found to be normally distributed, independent sample t-tests were used for

analyzing the relationship between categorical demographic variables and performance measures. Pearson correlation analysis was used to examine the relationship between continuous variables.

RESULTS

TABLE 3: T-test results for the relationship between gender, branch and body perception.

	Gender Branch	Mean	Standard Deviation	t value	p value	difference
Gender	Woman	142,39	20,90	-0,154	0,878	-
	Man	143,23	22,64			
Branch	Handball	144,67	20,44	0,683	0,497	-
	Volleyball	141,03	23,22			

*p<0.05

TABLE 4: The relationship between height, age, sports age, and weight with body perception

N-201		Body Perception
Height (cm)	r	0,264
	p	0,031*
Age (years)	r	0,188
	p	0,129
Sport Age (years)	r	0,029
	p	0,016*
Body Weight (kg)	r	0,185
	p	0,133

*p<0.05

There was a statistically significant relationship between body perception and height and sports age variables. The relationship between body perception and height variable is a weak positive correlation (r=0.264 - p=0.031) and the

relationship between body perception and sports age variable is also weak and positive (r=0.029 - p=0.016). However, no significant relationship was found between body perception variable and age or weight variables.

TABLE 5: The relationship between performance and body perception.

N-201		Body Perception
Standing Long Jump (cm)	r	0,133
	p	0,042*
Medicine Ball Throwing (cm)	r	0,229
	p	0,032*

*p<0.05

There is a statistically significant relationship between body image and standing long jump and medicine ball throw ($r=0.133$ - $p=0.042$, $r= 0.229$ - $p=0.032$).

TABLE 6: Relationship between ideal weight and body perception.

Variable	Level	Mean	Standard Deviation	t value	P value	Difference
Ideal Weight	Yes	153,41	13,34	4,590	0,000*	1>2
	No	132,03	23,54			

* $p<0.05$

The statistical analysis revealed a significant relationship between body perception and ideal weight ($p<0.05$). The proportion of individuals who consider themselves to be at their ideal weight is higher.

DISCUSSION

The aim of this study was to examine the relationship between lower and upper extremity strength performance and body image in adolescent athletes. In this study, a significant correlation was found between body image and height, sports age, and lower and upper extremity strength, but no significant relationship was found between body image and gender and sport branch. In addition, the percentage of those who perceive themselves as being at their ideal weight is 50.7% (102 people).

In the study conducted by Karagöz and Karagün (2015), the body image scores of male athletes were found to be higher than those of female athletes. Considering that sport is a physical activity, having a positive body image is important for self-confidence, which is considered important for sporting success. Alagül (2004) found that athletes in the athletics branch had the highest body image scores, while athletes in the judo branch had the lowest body image scores, and Ayaz (2008) found a significant relationship between body image and sport branch, with basketball athletes having the highest and gymnasts having the lowest body image scores. The lack of a relationship between body image and sport branch in this study is thought to be due to handball and volleyball players having similar physical characteristics. In handball, jumping shots and their blockages, and

in volleyball, basic techniques such as smash and block largely require jumping force. According to Yılmaz (1989), the most important requirement for the application of the desired level of technical and tactical skills in handball and volleyball games is sufficient strength.

It is well-known that strength training provides significant increases in muscle strength and mass (Winett and Carpinelli, 2001). Strength training can also provide immediate feedback on a person's level of muscle strength and functional abilities, potentially leading to a reduction in emphasis on how one perceives their physical appearance (Ginis et al., 2012). In a study by SantaBarbara et al. (2017) involving 28 men and 16 women, a 12-week, five-day-per-week strength training program was implemented, and evaluations were conducted on body satisfaction, social physique anxiety, muscular drive, body composition, and muscle strength to examine gender differences in changes in body image. Significant improvements in body satisfaction and reductions in social physique anxiety were observed for both genders. Changes in body weight, muscularity, and physical competence all affect body image (Cash, 2002).

As athletes gain experience in their sport, their satisfaction with their skills tends to increase over time, as does their satisfaction with their physical and muscular development (Bastug and Kuru, 2009). The higher body image of athletes with fewer years of training may be due to their satisfaction with their physical and muscular development that occurs as they begin their sport. As athletes become stronger, they witness an objective increase in their training loads (i.e. the amount of weight they can lift), which leads to a

better perception of their bodies (Tucker, 1982). Decreases in body fat and increases in lean body (muscle) mass due to strength training can help people approach their body ideals, improving body image.

In conclusion, this study demonstrates a direct relationship between strength performance and body perception in adolescent individuals who engage in sports. Moreover, the weak relationship between body perception and height and sport age suggests that adolescent individuals' body perception may be dependent not only on their physical characteristics but also on their sports history. Similarly, the relationship between body perception and standing long jump and medicine ball throw performance emphasizes the importance of perceiving physical performance and body perception. These findings suggest that improving body perception in adolescent individuals who engage in sports can enhance their strength performance. However, the limitations of this research should also be considered. For example, only two sports branches were used in this study, and the results of studies conducted in different sports branches are needed. Additionally, other factors that affect the relationship between body perception and performance, such as exercise duration, sports branch, age, gender, dietary habits, genetic factors, exercise frequency, and exercise intensity, need to be examined. Investigating these factors can help to better understand the relationship between body perception and performance.

COI statements

The authors report no conflict of interest.

Declarations of interest

None

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