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Original article

Investigation of the relationship between cognitive behavioral physical activity and multiple intelligence levels in different team sports athletes

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Abstract. *Study Objectives:* This study aimed to examine the relationship between cognitive behavioral physical activity and multiple intelligence levels of athletes in different team sports. *Methods:* The sample of the study consisted of 518 athletes dealing with different team sports. As a data collection tool, "Cognitive Behavioral Physical Activity Scale" developed by Schembre et al. (2015) and adapted into Turkish by Eskiler et al. (2016), and "Multiple Intelligence Scale" developed by Gardner (1990) and adapted into the Turkish Selçuk et al. (2003), were used. In the analysis of the data, it was determined that the data did not show normal distribution as a result of the Kolmogorov-Smirnov test, and non-parametric analysis was used. Mann-Whitney U test was used for paired comparisons and the Kruskal Wallis-H test was used for multiple comparisons. *Results:* It was determined that female athletes had higher result expectation from cognitive behavioral physical activity sub-dimensions, while males' personal disabilities were higher than female. When multiple intelligence levels were examined, although the logical intelligence levels of male were higher than female, it was found that their kinesthetic intelligence levels were higher. Also, when compared according to sports branches, it was found that the logical intelligence levels of basketball players were higher than futsal players. Finally, when the relationship between the cognitive behavioral physical activity levels of athletes and multiple intelligence sub-dimensions was examined, it was found that there was a positive relationship between cognitive behavioral physical activity and intelligence types. These results showed that as the level of cognitive behavioral physical activity increased, the mean that individuals can obtain from the multiple intelligence scale can increase. *Conclusion:* These results suggested that especially sedentary individuals should be directed to physical activities starting from adolescence. Thus, they can contribute to the development of multiple intelligences.

Key words: Cognitive Behavior, Physical Activity, Multiple Intelligences

Introduction

Technological developments and social changes experienced at the global level have caused changes in the lifestyles and consumption habits of the societies (1). As a result of the technological developments, individuals (especially young people) spend most of their time on computers and phones, resulting in negative physiological effects on individuals (2). For this reason, it is important to conduct studies to understand the individual's attitudes and motivations towards physical activities (3). Although there are different theoretical models regarding the participation of individuals in physical activities, among these theoretical models, it is stated that the most effective model that affects participation in physical activities is the social cognitive theory model (4). Although there is a positive effect of participation in physical activities and making them a lifestyle on individual's health and public health, it is thought that individuals participating in physical

activities also show positive development in the areas of mental and social skills (5). Whether participation in physical activities has a positive or negative effect on the development of cognitive skills has been studied for a long time. Sibley and Etnier (2003), in their study on children, find a positive relationship between participation in physical activity and the development of some cognitive skills and intelligence (6). Therefore, it can be said that there is a direct relationship between physical activity and intelligence.

Although there is no clear definition of intelligence today, it is stated that there is a deficiency in the definitions (7). Many scientists have defined intelligence differently. Many scientists have defined intelligence differently. While Piaget (1952) defines intelligence as "the organism's ability to adapt to the environment" (8), Gardner and Moran (2006) define it as the ability to process information, cope with emerging problems, and reveal new products with cultural value (9). Scientists do researches to understand how learning occurs and examine how brain functions work. As a result of the research and studies, intelligence tests emerge and it understands that there is a relationship between intelligence and creativity. While all superior intelligence individuals are defining as creative individuals, research has shown that some of these individuals are creative individuals. This situation has brought scientists to the possibility of having different intelligence fields (10). A study by Gardner conducted in 1983 has revealed the "Theory of Multiple Intelligences" and state that there are eight areas of intelligence (11). The eight different intelligence domains that Gardner mentioned; (1) verbal intelligence, (2) logical intelligence, (3) visual intelligence, (4) musical intelligence, (5) kinesthetic intelligence, (6) interpersonal intelligence, (7) intrapersonal intelligence and (8) naturalist intelligence and stated that each individual may have one or more of the mentioned intelligence domains (12). It is stating that inheritance affects the development of these areas of intelligence, as well as environmental factors (13). Therefore, education and training institutions can be said to be an effective environmental factor on the individual, and it can be stated that the education that individuals who receive education in schools have positive or negative effects on one or more of the intelligence fields according to the different departments they are in (14). It is knowing that sportive activities have a positive effect on the social, physical, and cognitive development of the individual. In this context, the purpose of this study was to examine the relationship between cognitive behavioral physical activity levels and the multiple intelligence levels of athletes in different team sports.

Materials and Methods

In the research, a method for descriptive and relational screening aimed to reveal the current situation was used. Descriptive screening models are a research approach that aims to describe a past or present situation as it exists. Relational survey models, on the other hand, are research models that aim to determine the presence and/or degree of change between two or more variables (15).

Participants

518 (Female: 189; Male: 329) athletes, who were active competitors in 4 different branches (football, volleyball, basketball, futsal) and selected by convenience sampling method, participated in the study voluntarily in the 2020-2021 season.

Data Collection Method

In this study, "Personal Information Form" developed by the researcher, "Cognitive Behavioral Physical Activity Scale" and "Multiple Intelligence Inventory" were used as data collection tools.

Personal Information Form

Demographic characteristics such as age, gender, education level, income level, sports branch, sports experience and hobby areas were included as sociodemographic characteristics of the participants.

Cognitive Behavioral Physical Activity Scale

There is a scale prepared to determine the cognitive-behavioral physical activity levels of the participants.

The cognitive-behavioral physical activity scale was developed by Schembre et al. (4) and adapted to Turkish by Eskiler et al. (3). The scale consisted of 3 sub-dimensions as Results Expectation, Self-Regulation, and Personal Barriers, and 15 items. All expressions in the scale were scored with a 5-point Likert Type as "1 = Strongly disagree, ……., 5 = Strongly agree".

Multiple Intelligence Scale

Multiple intelligence Scale, which was prepared to determine the multiple intelligence domains of the participants, was developed by Gardner (16) and adapted to the Turkish by Selçuk et al. (17). The Multiple Intelligence Inventory was developed to measure eight different intelligences. The Cronbach Alpha internal consistency coefficient of the measuring tool was calculated as 0.884. In order to determine the degree of participation of the participants in each item, a 5-point Likert Type rating scale was used as "1 = Never, ……., 5 = Always."

Data Analysis

SPSS package program was used in the analysis of the data. The normality test of the data was tested with the Kolmogorov-Smirnov test and it was found that the data did not show normal distribution. Mann-Whitney U test was used for paired comparisons and the Kruskal Wallis-H test was used for multiple comparisons. Pairwise Multiple Comparisons Test was used to determine the source of the difference in multiple comparison results. Additionally, Spearman correlation analysis was used to determine the relationship between sub-dimensions. The confidence interval was chosen as 95% and values below $p < .05$ were considered statistically significant.

Results

As a result of the Mann-Whitney U test performed to determine whether there a significant difference between the cognitive-behavioral physical activity and multiple intelligence levels of the athletes according to their gender was, while a statistically significant difference was detected between sub-dimensions of results expectation ($U = 10992.000$; $p < 0.05$), personal barriers ($U = 11208.500$; $p < 0.05$), logical intelligence ($U = 12254.000$; $p < 0.05$) and kinesthetic intelligence ($U = 13221.00$; $p < 0.05$), no statistically significant difference was found between the other sub-dimensions. When the mean rank of the gender variable was examined, it was determined that female athletes' result expectation and kinesthetic intelligence sub-dimension mean ranks was higher than male athletes. On the other hand, male athletes had higher rank means for personal barriers and logical intelligence sub-dimension than female athletes (Table 1).

According to the analysis results, a statistically significant difference was detected between the branch variable and the logical intelligence ($\chi^2 = 9.112$; $p<0.05$) sub-dimension, while no statistically significant difference was found between the other sub-dimensions. When the branches caused by the significant difference in the logical intelligence sub-dimension were examined, a statistically significant difference was found between the athletes who only competed in the football branch and the basketball players, while there was no statistically significant difference between the other branches (Table 2).

When the results of the Spearman correlation analysis test conducted to determine the relationship between the cognitive-behavioral physical activity and multiple intelligence levels of the athletes were examined, it was found that both cognitive behavioral physical activity sub-dimensions were positively associated with all multiple intelligence domains. This result shows that as the level of cognitive behavioral physical activity increases, the mean that individuals will obtain from the multiple intelligence scale will increase (Table 3).

Discussion and Conclusion

When the results of the present study were examined, it was found that there was a positive relationship between cognitive behavioral physical activity sub-dimensions and multiple intelligence dimensions. Besides, although there was a difference between cognitive behavioral physical activity and

Table 1. Comparison of athletes' cognitive behavioral physical activity and multiple intelligence levels according to gender

Dependent Variables		Gender	N	Mean Rank	Total Rank	U	p
Cognitive Behavioral Physical Activity	**Results Expectation**	1.Female	189	**256.75**	21483.00	10992.00	**.001**
		2. Male	329	186.24	59522.00		
	Self-Regulation	1.Female	189	218.36	18131.50	13146.500	.275
		2. Male	329	205.23	63775.50		
	Personal Barriers	1.Female	189	171.77	12027.50	11208.500	**.002**
		2. Male	329	**218.31**	70976.50		
Multiple intelligence	**Naturalist**	1.Female	189	210.94	19331.00	13925.500	.701
		2. Male	329	206.58	65334.00		
	Intrapersonal	1.Female	189	205.81	16868.00	14041.00	.761
		2. Male	329	207.01	68053.00		
	Visual	1.Female	189	217.56	19004.50	13175.00	.381
		2. Male	329	204.29	66901.50		
	Interpersonal	1.Female	189	211.67	17788.00	13436.00	.339
		2. Male	329	202.33	68114.00		
	Logical	1.Female	189	184.66	16065.00	12254.00	**.035**
		2. Male	329	**213.58**	69840.00		
	Kinesthetic	1.Female	189	**240.67**	20163.00	13221.00	**.031**
		2. Male	329	206.09	65741.00		
	Verbal	1.Female	189	203.37	18500.00	13967.50	.681
		2. Male	329	207.86	58261.00		
	Musical	1.Female	189	198.33	16342.00	12631.00	.689
		2. Male	329	205.07	59830.00		

*p<0.05; N=518

Table 2. The results of analysis of variance according to the branch variable of the cognitive behavioral physical activity and multiple intelligence levels of the athletes

Dependent Variables		Branch	N	Mean Rank	χ^2	p	(I-J)
Cognitive Behavioral Physical Activity	**Results Expectation**	1. Football	276	205.54	1.186	.773	
		2. Futsal	91	208.11			
		3. Basketball	84	203.31			
		4. Volleyball	68	230.42			
	Self-Regulation	1. Football	276	203.62	2.228	.488	
		2. Futsal	91	205.69			
		3. Basketball	84	229.91			
		4. Volleyball	68	231.41			
	Personal Barriers	1. Football	276	205.36	2.621	.421	
		2. Futsal	91	221.82			
		3. Basketball	84	216.01			
		4. Volleyball	68	178.55			

Dependent Variables		Branch	N	Mean Rank	χ^2	p	(I-J)
Multiple intelligence	Naturalist	1. Football	276	206.92	5.768	.138	
		2. Futsal	91	193.09			
		3. Basketball	84	247.89			
		4. Volleyball	68	188.06			
	Intrapersonal	1. Football	276	204.76	3.881	.181	
		2. Futsal	91	203.33			
		3. Basketball	84	250.79			
		4. Volleyball	68	191.21			
	Visual	1. Football	276	205.09	6.630	.085	
		2. Futsal	91	198.46			
		3. Basketball	84	252.09			
		4. Volleyball	68	188.00			
	Interpersonal	1. Football	276	207.11	1.639	.584	
		2. Futsal	91	197.75			
		3. Basketball	84	229.81			
		4. Volleyball	68	205.35			
	Logical	1. Football	276	210.12	9.112	**.027**	**2-3**
		2. Futsal	91	**174.41**			
		3. Basketball	84	**246.87**			
		4. Volleyball	68	186.23			
	Kinesthetic	1. Football	276	205.25	5.110	.131	
		2. Futsal	91	205.16			
		3. Basketball	84	241.54			
		4. Volleyball	68	189.76			
	Verbal	1. Football	276	206.21	2.211	.381	
		2. Futsal	91	206.72			
		3. Basketball	84	204.11			
		4. Volleyball	68	186.12			
	Musical	1. Football	276	204.33	4.393	.127	
		2. Futsal	91	217.01			
		3. Basketball	84	230.11			
		4. Volleyball	68	179.51			

*p<0,05; N= 518

multiple intelligence dimensions according to gender and branch variables, it was found that there was no difference according to age, education level, income level, sports age and hobby areas.

According to the gender of the participants, while statistically significant differences were determined between the sub-dimensions of result expectation (in favor of female), personal barriers (in favour of male), logical intelligence (in favor of male) and kinesthetic intelligence (in favour of female) (p <.05), it was determined that there was no statistically significant difference between self-regulation, naturalist intelligence, internal intelligence, visual intelligence, interpersonal intelligence, verbal intelligence, and musical intelligence sub-dimensions. In the study conducted by Gülle (2019) on university students, it was seen that

Table 3. Results of the correlation test between cognitive behavioral physical activity and multiple intelligence levels of the participants

Variables	NI	INP	VI	INP	LI	KI	VEI	MI
RE	.381**	.271**	.212**	.252**	.102*	.378**	.138*	.212**
SR	.385**	.395**	.372**	.273**	.334**	.374**	.295**	.344**
PB	.311**	.291**	.198**	.162**	.264**	.085	.302**	.219**

*p<0,05; **p<0,01; N= 518; NI: Naturalist Intelligence, INP: Intrapersonal Intelligence, VI: Visual Intelligence, IP: Interpersonal Intelligence, LI: Logical Intelligence, KI: Kinesthetic Intelligence, VEI: Verbal Intelligence, MI: Musical Intelligence; RE: Results Expectation, SR: Self-Regulation; PB: Personal Barriers

our result was parallel with the multiple intelligence, logical intelligence levels of male (18). In the study conducted by Loori (2005), it was concluded that the logical intelligence levels of the participants were in favor of male (19). Moreover, in the study conducted by Çinkılıç and Soyer (2013) on the multiple intelligence levels of physical education teacher candidates, they have reported that there was no significant difference according to gender (20). Furnham, Hosoe and Tang (2001) in a study conducted with British, American, and Japanese participants to determine the types of intelligence, no significant difference was found between males and females in terms of multiple intelligence sub-dimensions (21). Considering the levels of physical activity, the total score means of the studies of Hazar et al. (2017) in middle school, students showed that there was a difference in favor of male students, but this difference was not statistically significant (2). Similarly, in some studies, it was determined that the physical activity levels of boys were higher than girls (22). This situation could be attributed to the fact that boys preferred activities that were more active than girls.

According to the sports branches of the participants, it was determined that there was no statistically significant difference between the cognitive behavioral physical activity and multiple intelligence levels of the athletes between the sub-dimensions of result expectation, self-regulation, personal barriers, naturalist intelligence, internal intelligence. Semerci (2021) reported that athletes in different branches (Basketball, Football, Handball) differed statistically in terms of multiple intelligence and sub-dimensions (23). Erturan et al. (2005) reported that the physical intelligence domains of students who exercised and students who did not exercise were different from each other (24). In studies based on multiple intelligence theory, conducted by many researchers, it was concluded that social intelligence was significant in terms of sporting activities (25-27). In another study, it was revealed that the musical intelligence domains of students who exercised and those who did not exercise were quite close to each other (28). In the studies conducted by Hoşgörür and Katrancı (2007), Tekin and Taşkın (2008) and Cengiz (2008), it was concluded that those who exercised had high naturalistic intelligence levels (29-31). In the studies of Hoşgörür and Katrancı (2007) and Tekin (2009), it was concluded that the level of internal intelligence was positive in favour of those who exercise (27,29). It was revealed that the logical intelligence domains of the students who exercised and those who did not exercise were quite close to each other. It was stated that individuals with logical intelligence were very sensitive to logic rules, cause-effect relationships, making and questioning assumptions, and similar abstract operations (32).

If the physical skills and abilities of the athletes in different sports branches were close to each other, it was seen that the athletes with higher mental skills were more successful in general (33). Aktaş et al. (2020) concluded that there was a significant difference between pre-competition physical activity status and the mental resilience of students in different branches (34). Semerci (2021), on the other hand, could not find any statistically significant difference in the physical activity levels of athletes in different branches (Basketball, Football, and Handball) (23).

As a result, it was found that individuals with high levels of cognitive behavioral physical activity

have high levels of multiple intelligence. This result suggested that especially sedentary individuals should be directed to physical activities starting from adolescence. Thus, they can contribute to the development of multiple intelligences.

References

1. Öncü MA, Çatı K, Özbay G. Hızlı yiyecek işletmelerinin tercihinde etkili olan faktörler. Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi 2007; s. 9(1), 317-336.
2. Hazar Z, Demir GT, Namlı S, & Türkeli A. Ortaokul Öğrencilerinin Dijital Oyun Bağımlılığı ve Fiziksel Aktivite Düzeyleri Arasındaki İlişkinin İncelenmesi. Beden Eğitimi Ve Spor Bilimleri Dergisi 2017; 11 (3), 320-332.
3. Eskiler E, Küçükibiş F, Gülle M, Soyer F. Bilişsel davranışçı fiziksel aktivite ölçeği: geçerlik ve güvenirlik çalışması. Journal of Human Sciences 2016; 13(2): 2577-2587.
4. Schembre SM, Durand, CP, Blissmer BJ, Greene GW. Development and validation of the cognitive behavioral physical activity questionnaire. American Journal of Health Promotion 2015; 30(1), 58-65.
5. Gür H, Küçükoğlu S. Yaşlılık ve fiziksel aktivite. 9. Roche Yayınları, İstanbul 1992
6. Sibley BA, Etnier JL. The relationship between physical activity and cognition in children: a meta-analysis. Pediatric exercise science 2003; 15(3), 243-256.
7. Özekes M. Peabody Resim Kelime Testi 3.01-3.12 Yaş Aralığı İzmir Bölgesi Standardizasyonu Çalışması. Ege Eğitim Dergisi 2013; 14(1), 90-107.
8. Piaget J. Play, dreams, and imitation in childhood. New York: Norton 1952.
9. Gardner H, Moran S. The science of multiple intelligences theory. A response to Lynn Waterhouse. Educational psychologist 2006; 41(4), 227-232.
10. Köroğlu H, Yeşildere S. İlköğretim yedinci sınıf matematik dersi tamsayılar üzerinde çoklu zekâ teorisi tabanlı öğretimin öğrenci başarısına etkisi.GÜ, Gazi Eğitim Fakültesi Dergisi 2004; 24(2), 25-41.
11. Gardner H. Frames of Mind. New York: Basic Books Inc. 1983
12. Öngören H, Şahin A. Çoklu zekâ kuramı tabanlı öğretimin öğrencilerin fen bilgisi başarılarına etkileri. Pamukkale Üniversitesi Eğitim Fakültesi Dergisi 2008; 23(23), 24-35.
13. Gardner H. Zihin Çerçeveleri Çoklu Zekâ Kuramı. 3. Baskı, Alfa Yayıncılık Çev: Ebru Kılıç, İstanbul 2004
14. Güllü M, Tekin M. Spor Lisesi Öğrencileri İle Genel Lise Öğrencilerinin Çoklu Zekâ Alanlarinin Karşilaştirilmasi. Beden Eğitimi ve Spor Bilimleri Dergisi 2009; 3 (3), 247-258.
15. Karasar N. Bilimsel araştırma yöntemleri: kavramlar, teknikler ve ilkeler (27. Baskı). Ankara: Nobel Yayınevi 2014
16. Gardner H. Art education and human development. Getty Publications 1990; Vol. 3
17. Selçuk Z, Kayılı H, Okut L. Çoklu zekâ uygulamaları (2. Baskı). Ankara: Nobel Yayın Dağıtım 2003
18. Gülle M. Investigation of the Effect of Cognitive Behavioral and Physical Development Levels on the Multiple Intelligence of University Students. Asian Journal of Education and Training 2019; 5(4), 510-517.
19. Loori A. Multiple Intelligences: A Comparative Study between the Preferences of Males and Females, Social Behavior and Personality. Society for Personality Research 2005; 33 (1), ss. 77–78.
20. Çinkılıç İ, Soyer F. Beden eğitimi öğretmen adaylarının çoklu zekâ alanları ile problem çözme becerileri arasındaki ilişkinin incelenmesi. Spor Yönetimi ve Bilgi Teknolojileri Dergisi 2013; 8(1), 4-16.
21. Furnham A, Hosoe T, Tang TLP. Male hubris and female humility? A crosscultural study of ratings of self, parental, and sibling multiple intelligence in America, Britain, and Japan. Intelligence 2001; 30(1), 101-115.
22. Kudaş S, Ülkar B, Erdogan A, Çırçı E. Ankara ili 11-12 yaş grubu çocukların fiziksel aktivite ve bazı beslenme alışkanlıkları. Spor Bilimleri Dergisi 2005; 16 (1): 19-29.
23. Semerci, A. Farklı branştaki sporcuların bilişsel davranışçı ve fiziksel düzeylerinin çoklu zekâ üzerine etkisinin incelenmesi, Yayınlanmamış Yüksek Lisans Tezi, Hatay Mustafa Kemal Üniversitesi, Sağlık Bilimleri Enstitüsü 2021
24. Erturan G, Dundar U, Constructor A, Cakir H, Bozyigit E. Comparison of the primary school students' field of fitness and sports fitness. 14th National Educational Sciences Congress 2005; Denizli, 1001
25. Katz J, Mirenda P, Auerbach S. Instructional strategies and educational outcomes for students with developmental disabilities in inclusive "multiple intelligences" and typical inclusive classrooms. Research and Practice for Persons with Severe Disabilities 2002; 27(4), 227-238.
26. Bayrak C, Celiksoy MA, Celiksoy S. The relationship between students' intelligence profiles and practice talent entrance examinations regarding multiple intelligence theory. Paper presented at the 4th National Physical Education and Sports Teaching Symposium 2005; June 10-11, Bursa
27. Tekin M,. Individual and team sports in boys and girls athletes comparing the level of different types of intelligence. Atatürk University Journal of Physical Education and Sport Sciences 2009; 11(4): 29-51
28. Bümen TN. Child intelligence theory in school. Ankara: Pegem Publishing 2004
29. Hoşgörür V, Katrancı M. The dominant field of the students in the department of elementary education and physical education and sports (A sample of education faculty of university of Kırıkkale). Ondokuz Mayıs Üniversitesi Eğitim Fakültesi Dergisi, 2007; 24: 33-42.
30. Tekin M, Taşğın Ö. Investigation of the relationship between creativity and multiple intelligence areas of students who do sports and not do sports in secondary education. Niğde University Journal of Physical Education and Sports Sciences 2008; 2(3): 206-214.
31. Cengiz Ş. The distribution of 8-10 years old children in multiple intelligence types and effects of football education

on multiple intelligence levels. PhD Thesis. Gazi University, Institute of Health Sciences, Ankara 2008
32. Campbell B. The research results of a multiple intelligences classroom. New Horizons for Learning on the Beam 1990; 11(1): 254-261.
33. Weinberg RS, Gould D. Introduction to psychological skills training. Foundations of sport and exercise psychology. Champaign: Human Kinetics 2015; 247-271.
34. Aktaş Ö, Gülle M, Büyüktaş B. Liseli Basketbolcuların Müsabaka Öncesi Hazırlıkları ve Mental Dayanıklılıklarının İncelenmesi. Kilis 7 Aralık Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi, 2020; 4(1), 30-37.

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