

NORMAL GELİŞEN KİLOLU VE OBEZ ERGENLERDE CİNSİYETİN İNCE VE KABA MOTOR BECERİLERE ETKİSİ

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ÖZ

Bu araştırmanın amacı, normal gelişen fazla kilolu ve obez ergenlerde kız ve erkeklerin ince ve kaba motor becerilerini karşılaştırmaktır.

Çalışmaya 12-18 yaş aralığındaki 18'i kız ve 28'i erkek olmak üzere toplam 46 fazla kilolu ve obez ergen katılmıştır. Katılımcıların vücut kütle indeksleri hesaplanmıştır. Çalışmaya katılan ergenlerin ince ve kaba motor becerilerini değerlendirmek için Bruininks-Oseretsky Test of Motor Proficiency Testinin kısa formu (BOT-2 KF) kullanılmıştır.

Kız ve erkeklerin BOT-2 KF toplam puanlarında fark bulunmamıştır ($p>0.05$). Ancak BOT-2 KF'in bazı test maddeleri için kız ve erkekler arasında fark saptanmıştır. İnce motor beceriyi değerlendiren para transferi ($p>0.05$) dışındaki diğer tüm testlerde kızların puanları erkeklerin puanlarından daha yüksek bulunmuştur ($p<0.05$). Kaba motor becerilerini değerlendiren test maddelerinden ayak ve parmak vurma testi puanının kızlarda, top sürme ve yakalama, mekik, tek ayaküstünde yerinde sıçrama ve bilateral koordinasyon sıçraması maddelerinin puanlarının ise erkeklerde daha yüksek olduğu görülmüştür ($p<0.05$).

Bu araştırmanın sonuçları, normal gelişen fazla kilolu ve obez ergenlerde kız ve erkeklerin ince ve kaba motor becerilerinde farklılık olduğunu düşündürmüştür. Ergenlerde vücut ağırlığı fazla ve obez olan kızların ince motor, erkeklerin ise kaba motor beceri performansları daha iyidir.

Anahtar Kelimeler: Motor gelişim, Obez, Fazla kilolu, Cinsiyet, Ergen

GENDER DIFFERENCES IN FINE AND GROSS MOTOR SKILLS OF NORMALLY DEVELOPING OVERWEIGHT AND OBESE ADOLESCENTS

ABSTRACT

The purpose of this research is to compare girls' and boys' fine and gross motor skills in normally developing overweight and obese adolescents.

18 girls and 28 boys with 12-18 age range, in totally 46 overweight and obese adolescents participated in the study. Body mass index of participants were calculated. Fine and gross motor skills of adolescents were assessed by Short Form Bruininks-Oseretsky Test of Motor Proficiency (BOT-2 SF).

There was no differences between girls and boys for BOT-2 SF total scores ($p>0.05$), but it was found differences in several items of BOT-2 SF. Scores of test items for fine motor scores in the girls were higher than the boys ($p<0.05$) except transferring pennies test ($p>0.05$). Gross motor skill tests including jumping in place, dribbling a ball, sit-ups, one- legged stationary hop test scores were higher in the boys, while tapping feet and fingers test score was higher in the girls ($p<0.05$).

Our results suggested that there is differences between girls' and boys' fine and gross motor skills in normally developing overweight and obese adolescents. Girls have better fine motor skill performance while boys have better gross motor skill performance in overweight and obese adolescents.

Key words: Motor development, Obese, Overweight, Gender, Adolescents

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INTRODUCTION

Motor skills are intentional movements involving a muscular component, that must be learned and voluntarily produced to adequately perform a goal-oriented task (1). Motor development is a serial developmental milestones and children pass next one after able to before step (2). There are two different type of motor skills as gross and fine motor skills. Gross motor skills are movements which movements performing with large muscles of the body such as walking, running, hooping, cycling, catching ball, throwing ball etc. In the early years of life, gross motor skills are developed and this type of development is needed for the stability and control of the body (3,4). Fine motor skills are performed with using small muscles that needed for manipulating objects (3). Fine motor skills are necessary for many activities of daily life such as dressing and feeding ones self, writing and drawing. Writing, drawing, cutting paper, dressing, button up and tie shoelace are samples of fine motor skills (4,5).

The rate of obesity in western countries has grown at an alarming rate. Several different studies in Turkey showed that more than a 20 percent prevalence in 5 to 18 ages (6). Potential consequences of obesity include a decrease in physical activity, and an increase in Type II diabetes, psychological problems, cardiovascular disease, and earlier death

MATERIAL AND METHOD

This study was a cross sectional study. A total of 46 overweight and obese adolescents participants including 18 girls and 28 men in the 12-18 age range were the study sample. The participants with typical development were attending high school and did not play any sports. The study excluded adolescents with any diseases and injury which affect the

(7). According previous studies, there is differences in motor skills in children with normal body weight compared to children who are overweight or obese and it was showed that there is a negative relationship between excessive body weight and motor performance (8,9,10,11).

Fundamental Movement Skills (FMS) is divided into three categories; locomotor movements (walking, running etc.), manipulative movement tasks (kicking and striking) and stabilising movement tasks (balance). These are key motor skills. In sport, leisure activities and daily living activities, FMS is the basis for many of the specific motor skills (12). Therefore, it is important to identify the inadequacy in FMS for participating sport, leisure activities and daily living activities. Motor skills are affected by gender in normally developing children (12,13,14). Best of our knowledge, there is no study to compare of between girls' and boys' fine and gross motor skills in normally developing overweight and obese adolescents. If there is differences between sexes inadequacy in motor skills types, these information shows which motor skills should be developed in obese adolescents to physical educators. The purpose of this research is to compare between girls' and boys' fine and gross motor skills in normally developing overweight and obese adolescents.

development diseases such as metabolic, cardio-respiratory system, musculo-skeletal system and metabolic diseases. Written consent was obtained from all the study participants and their parents and school administrators, who were informed about the aim and method of this research. All procedures were in accordance with the ethical standards of the Faculty of Medicine, Pamukkale University.

Anthropometric characteristics of the sample

Height and body weight of participants were measured. Body mass index (BMI) was calculated as the body mass in kilograms divided by the height in metres squared (kg/m²). According to CDC BMI standards for age and sex, adolescents with percentile greater or equal 85 and less than 94 defined overweight and greater or equal 95 defined as obese (15).

Test of Bruininks-Oseretsky Test of Motor Proficiency

Fine and gross motor skills of the participants were assessed by Bruininks-Oseretsky Test of Motor Proficiency,

second edition short form (BOT-2). BOT-2 is a valid and reliable method which evaluates motor functions of children and adolescents between the ages of 4 and 21 years.

In this study the short form of the BOT-2 was used. The short form of BOT-2 (BOT-2 SF) contains 14 different items from 8 subtests and 14 items. The highest score of the test is 88 and higher score shows higher performance. The BOT-2 assesses proficiency in four motor-area composites including fine manual control, manual coordination, body coordination and strength and agility (16). Table 1 shows motor-area composites, subtests and items of the BOT-2 SF.

Table 1. Motor-area composites, subtests and items of the BOT-2 SF.

Composite	Subtest and items
Fine manual control	Fine motor precision Drawing lines Folding paper Fine motor integration Copying a square Copying a star
Manual coordination	Manual dexterity Transferring pennies Upper-limb coordination Dropping and catching a ball Dribbling a ball
Body coordination	Bilateral coordination Jumping in place Tapping feet and fingers Balance Walking forward on a line Standing on balance beam
Strength and agility	Running speed and agility One legged stationary hop Strength Knee push-ups Sit-ups

Analyses of the data

The data were analyzed using the SPSS (16.0 version) statistics package software. Descriptive data were stated as average, standard deviation and percentage. The test of homogeneity variance was used to test the

homogeneity of variables. Mann Whithney U test used to compare the BOT_2 sub-tests and total scores obtained by adolescents with normally developing overweight and obese. A value of $p \leq 0.05$ was accepted as statistically significant.

RESULTS

Demographic characteristics of participants including age, height body weight and BMI are given at Table 2. Distribution of overweight and obese adolescents rates in girls and boys are presented Table 2. Percentage of obese adolescents was higher compared with overweight adolescents in both girls and boys (Table 3).

There was no differences between girls and boys for BOT-2 SF total scores ($p>0.05$), but it was found differences in several subtests of BOT-2 SF. Scores of

test items for fine motor scores in girls were higher than boys ($p<0.05$) except transferring pennies test ($p>0.05$). Gross motor skill tests including jumping in place, dribbling a ball, sit-ups, one- legged stationary hop test scores were higher in boys, while tapping feet and fingers test score was higher in girls ($p<0.05$). There was no difference between girls and boys in the other test items for gross motor skill including walking forward on a line, standing on balance beam, knee push-ups tests ($p>0.05$).

Table 2. Demographic characteristics of participants

Characteristics	Girls (n=18) Mean±SS	Boys (n=28) Mean±SS	z	p*
Age (yr)	14.11±4.05	15.04±4.11	-1.73	0.08
Height (cm)	158.06±4.92	168.25±11.25	-3.78	0.000
Weighth (kg)	61.61±11.50	75.43±16.84	-2.74	0.000
BMI(kg/m2)	24.61±4.05	26.38±4.11	-1.30	0.19

p*: Mann Whithney U Test- analysis

Table 3. Distribution of overweight or obese participants

	Overweigh n (%)	Obese n(%)	Totaln(%)
Girls	7(38.9)	11(61.1)	18(100)
Boys	7(25%)	21 (75%)	28(100)
Total	14(30.4%)	32(69.6)	46 (100)

Table 4. BOT-2 SF items and total scores and summary of the Mann Whithney U Test- analysis

BOT-2 items	Girls grup (n=18) Mean±SS	Boys (n=28) Mean±SS	z	p
Fine motor items				
Drawing lines	5,94 ± 1,21	4,93 ± 1,58	-2.32	0.02
Folding paper	6,72 ± ,75	6,29 ± ,85	-2.16	0.03
Copying a square	4,61 ± ,60	3,50 ± 1,59	-2.60	0.00
Copying a star	4,89 ± ,32	4,00 ± 1,05	-3.74	0.00
Transferring pennies	7,33 ± 1,08	7,07 ± 1,05	-1.12	0.25
Gross motor items				
Jumping in place	2,83 ± ,70	3,00 ± ,00	-1.24	0.21
Tapping feet and fingers	3,89 ± ,32	3,00 ± 1,63	-1.98	0.04
Walking forward on a line	4,00 ± ,00	4,00 ± ,00	0.00	1.00
Standing on balance beam	3,67 ± ,84	3,89 ± ,31	-0.69	0.48
Dropping and catching a ball	4,83 ± ,51	4,89 ± ,31	-0.10	0.91
Dribbling a ball	6,06 ± ,80	6,54 ± ,57	-2.07	0.03
Sit-ups	5,11 ± 1,02	6,00 ± 1,27	-2.34	0.01
Knee push-ups	4,11 ± ,90	4,54 ± ,99	-1.50	0.13
One legged stationary hop	6,22 ± 2,01	7,36 ± 1,25	-2.33	0.01
Total BOT-2 SF	70.22±5.03	69.00±6.69	-0.82	0.41

BOT-2 SF: Bruininks-Oseretsky Test of Motor Proficiency, short form

DISCUSSION

Fine and gross motor skills of normally developing overweight and obese adolescents were evaluated and compared with BOT-2 SF to investigate the effect of gender the motor skills. We found that gender has effect on fine and gross motor skills in normally developing overweight and obese adolescents. Girls have better fine motor skill performance while boys have better gross motor skill performance in overweight and obese adolescents.

The effect of gender on motor skill are often reported in the literature. Boys have higher levels of motor proficiency compared to their female peers (14). A study by Gaul, it was investigated fine motor skill proficiency of primary school children between the age of 6-12 years with used the BOT-2 and the results of the study showed that gender has effect on fine motor skills, boys have higher levels of motor skill proficiency compared to girls (17). Similarly, Okely and Booth have a study about fundamental movement skills in children from years 1 through 3 grade and they reported that boys had significantly better performance than girls in the run and in the four object-control skills (throw, catch, kick, and strike) whilst girls performed better than boys in the skip (12). There is no physiological reason why boys should perform better than girls in terms of motor skills (3). Gender differences might be explain by biological, environmental and societal factors (18). Having less opportunities to practice, encouragement and endorsements that girls motor competence is lower and this is environmental influences (12,19). It is thought that a major factor is cultural expectations for motor skill proficiency. It is expected to higher physical activity participation in males compared with girls in the community (20) and motor skill proficiency is often more valued and encouraged in boys than in girls (17).

However, during puberty, girls and boys are demonstrated equal motor skill competence (3) with the possible exception of activities relating to strength (21).

In the current study, we found that girls have better fine motor skill performance while boys have better gross motor skill performance in overweight and obese adolescents. Turkish culture could be effect on our results. Like as other culture, there are the different expectations for boys and girls. Boys are participated physical activity more than girls in Turkey (22). This finding could explain why boys has more competence in gross motor skills in the our study. On the other hand, we did not ask and compare the participation physical activity in the study. This is the limitation of the study.

The competency of certain FMS are needed for functioning in activities of daily living and participation in sport specific activities (4). Childrens live in frustration and have difficulties to learn more advanced skills due to inproficiency in FMS (23). It was found that children with inproficient FMS had low level of health related fitness and less participating in organised sports and PA compared with children who have proficient motor skills (12,23).

CONCLUSION

Our results suggest that there is gender differences in fine and gross motor skills of normally developing overweight and obese adolescents. Girls have better fine motor skill performance while boys have better gross motor skill performance in overweight and obese adolescents. In the light of this result, it should be considered gender differences when preparing a program for aiming to improve in motor skills of overweight and obese adolescents.

REFERENCES

1. Connolly, B.H., Montgomery, P. Therapeutic exercise in developmental disabilities. In Montgomery (Eds.) *New Jersey: SLACK Incorporated*. pp. 2-225, 2005.
2. Haywood, K.M., Getchell, N. *Life span motor development* 5th ed., Champaign, Illinois: Human Kinetics, p.4, 2009.
3. Gallahue, D., Ozmun, J. *Understanding motor development: infants, children, adolescents, adults*. 6th ed., New York: Mc Graw Hill, pp: 53, 287-327, 2006.
4. Cools, W., Martelaer, De K., Samaey, C., Andries, C. Movement skill assessment of typically developing preschool children: a review of seven movement skill assessment tools. *Journal of Sports Science & Medicine*; 8(2):154-168, 2009.
5. Summers, J., Larkin, D., Dewey, D. Activities of daily living in children with developmental coordination disorder: dressing, personal hygiene, and eating skills. *Human movement science*, 27(2), pp.215-229, 2008.
6. Daştan, İ., Çetinkaya, V., Delice, M.E. İzmir ilinde 7-18 yaş arası öğrencilerde obezite ve fazla kilo prevalansı. *Bakırköy Tıp Dergisi* 2014;10:139-146. [In Turkish]
7. Reilly, J.J., Kelly, L., Montgomery, C., Williamson, A., Fisher, A., McColl, J.H., Conte, L.R., Paton, Y.J., Grant, S. Physical activity to prevent obesity in young children: cluster randomised controlled trial. *BMJ*, 18;333(7577):1041, 2006.
8. Okely, A.D., Booth, M.L., Chey, T. Relationships between body composition and fundamental movement skills among children and adolescents. *Res Q Exerc Sport*, 75(3):238-47, 2004a.
9. Krombholz H. Motor and cognitive performance of overweight preschool children. *Percept Mot Skills*, 116(1):40-57, 2013.
10. Gentier I, D'Hondt E, Shultz S, Deforche B, Augustijn M, Hoorne S, Verlaecke K, De Bourdeaudhuij I, Lenoir M. Fine and gross motor skills differ between healthy-weight and obese children. *Res Dev Disabil*, 34(11):4043-51, 2013.
11. Prskalo, I., Badrić, M., Kunješić, M. The percentage of body fat in children and the level of their motor skills. *Coll Antropol*, 39 Suppl 1:21-8, 2015.
12. Okely, I., Booth, M.L. South Wales: prevalence and sociodemographic distribution. *J Sci Med Sport*; 7:3:358-372, 2004b.
13. Gidley Larson, J.C., Mostofsky, S.H., Goldberg, M.C. Effects of gender and age on motor exam in typically developing children. *dev neuropsychol*, 32(1): 543-562, 2007.
14. Barnett, L.M., Beurden, E., Morgan, P.J. O., Brooks, L., Beard, J.R. Gender differences in motor skill proficiency from childhood to adolescence. *Research Quarterly for Exercise and Sport*, 81(2), 162-170, 2010.
15. Krebs, N.F., Himes, J.H., Jacobson, D., Nicklas, T.A., Guilday, P., Styne, D. Assessment of child and adolescent overweight and obesity. *Pediatrics*, 120:(suppl 4) S193-S228, 2007.
16. Bruininks, R.H., Bruininks, B.D. Bruininks-Oseretsky test of motor proficiency. *examiners manual (2nd ed.)*. Circle Pines MN: American Guidance Service Inc., 2005.
17. Gaul, D. Fine motor skill performance in Irish childre. Dublin City University, Master of Sciences Thesis, 2014.
18. Maitland, C., Stratton, G., Foster, S., Braham, R., Rosenberg, M. A place for play? The influence of the home physical environment on children's physical activity and sedentary behaviour. *The International Journal of Behavioral Nutrition and Physical Activity*, 10: 99-120, 2013.
19. Hume, C., Okely, A., Bagley, S. Does weight status influence associations between children's fundamental movement skills and physical activity? *Research Quarterly for Exercise and Sport*, 79(2): 158-165, 2008.
20. Thomas, J.R., French, K.E. Gender differences across age in motor performance a meta-analysis. *Psychological Bulletin*, 98(2), pp.260-282, 1985.
21. Beunen, G., Thomis, M. Muscular strength development in children and adolescents. *Pediatric exercise science*, 12, 174-197, 2000.
22. Ercan, S., Dallar, Y.B., Onen, S., Engiz, O. Prevalence of obesity and associated risk factors among adolescents in Ankara, Turkey. *J Clin Res Pediatr En doocrinol*, 4(4):204-207, 2012.
23. Stodden, D.F., Goodway, D.J., Langendorfer, J.S., Robertson, A.M., Rudisill, E.M. Garcia, C., Garcia, E.L. A developmental perspective on the role of motor skill competence in physical activity: an emergent relationship. *Quest*, 60(2):290-306, 2008.