



COMPARISON OF PHYSICAL ACTIVITY LEVELS OF MIDDLE SCHOOL AND HIGH SCHOOL STUDENTSⁱ

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Abstract:

The aim of this study is to compare the physical activity levels of middle school and high school students in Çanakkale province. The study included 426 female and 417 male students aged 10-17 years who voluntarily participated. The PAQ survey developed by Kowalski et al. was used to determine physical activity levels of students participating in the study. The responses of students to the survey questions had mean and standard deviation calculated and the T test used for analysis with SPSS. For middle school students, the mean age of female students was 12.16 ± 1.23 and the mean age of male students was 12.23 ± 1.24 years. For high school, the mean age of female students was 16.31 ± 1.17 and the mean age of male students was 16.32 ± 1.29 years. In terms of BMI, the value for female middle school students was 18.95 ± 3.13 and for male middle school students was 19.18 ± 3.78 , while for female high school students it was 20.92 ± 3.31 and for male high school students it was 22.21 ± 5.36 . The physical activity scores for female and male middle school students were 2.71 ± 0.79 and 2.93 ± 0.77 , respectively. The physical activity scores for female and male high school students were 1.88 ± 0.61 and 2.36 ± 0.73 , respectively. For middle school students the physical activity scores were found to be high for both genders compared to high school students. Physical activity scores for female students were lower compared to males in both school types.

Keywords: physical activity; movement, middle school and high school students

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1. Introduction

Obesity is an energy metabolism disorder occurring due to excessive fat deposition on the body that may cause physical and mental problems (Gürel and İnan 2001; Zitsman et al., 2014). Obesity beginning in the childhood and adolescent periods may cause respiratory, cardiovascular, hormonal, orthopedic and psychiatric disorders in the adult period so early diagnosis and treatment approaches are important (Han et al., 2010). The MONICA study by the World Health Organization in 6 different regions of Asia, Africa and Europe lasting 12 years reported a 10-30% increase in the obesity prevalence over 10 years. While the obesity rate globally was 400 million in 2008, the overweight rate was 1.4 billion. These rates were determined as 700 million obese and 2.3 billion overweight in 2015 (WHO 2015).

Childhood obesity has increasing disease rates, especially in developed countries, but also throughout the world. Those who are obese in the childhood period have increased rates of disease and death in adulthood, while 50% of those who are obese entering the adolescent period are obese in adulthood. This forms a significant health problem as the majority of the time both families and clinicians do not see it as a disease requiring treatment (Gürel and İnan, 2001). The American Collage of Sport Medicine (ACSM) recommends a mean of 30 minutes exercise every day. This level of activity represents 840 kJ (200 kCal) energy consumption. According to the ACSM, the aim should be to have daily physical activity with at least 60 minutes moderate exercise (ACSM 2009). Research has shown that individuals with high activity and physical fitness have lower risk of diseases like high blood pressure, type 2 diabetes, cardiovascular problems and colon cancer, compared to their inactive peers (Culos-Reed, 2002).

Physical activity is defined as bodily motions produced by contraction of the skeletal muscles requiring energy consumption above basal levels (Özer, 2016). Protecting individual health, and as a result social health, with fun, low cost and high yield gains like physical activity habits may be used as an effective tool to reduce health spending with increasing costs and forming a high share of national budgets (Sayın, 2014). Scientific research has found physical activity is associated with up to 22% reduction in all causes of death. It is reported that physically active individuals have life expectancy lengthened by 1.5-2 years (İşleğen, 2009). Thus, it is considered that spending for health will be less (Katzmarzyk et al., 2000).

Currently, technology is a reality that makes life easier. However, the visible reduction in exercise habits of children and adults causes serious health problems (WHO, 2003). Individuals who are physically active in the childhood period have less possibility of encountering these problems compared to those who are inactive. As a result, it is necessary to search for the cause and solution to the problem in childhood habits (Dükkancı, 2008). It is necessary to increase the variety of activity to increase participation in physical activity in the childhood period. A study assessing the activity of school-age children identified that 44% did not do any dance, aerobic and gymnastic activities, while 90% occasionally participated in these activities. The activity with

highest participation was cycling, with football in second place and activities like skipping, tag and chasing in third place. Physical activity tools like skates, skateboards and scooters were not commonly used, with the most common daily cycling at 43% and the most common occasional activity identified as swimming (Şahin et al., 2011).

The aim of this study is to compare the physical activity levels of middle school and high school students.

2. Methodology

The study included volunteers of 426 female and 417 male students aged from 10-17 years. The PAQ survey developed by Kowalski et al. was used to determine physical activity levels of students participating in the study. The responses of students to the survey questions were analyzed with mean and standard deviation calculated and the T test used with the SPSS program.

3. Results

Table 1: Distribution according to class and gender

| Class | Female | | Male | | Total |
|---------|--------|-------|------|-------|-------|
| | N | % | N | % | |
| 5 | 57 | 49.14 | 59 | 50.86 | 116 |
| 6 | 56 | 50.91 | 54 | 49.09 | 110 |
| 7 | 54 | 50.94 | 52 | 49.06 | 106 |
| 8 | 54 | 49.09 | 56 | 50.91 | 110 |
| 9 | 50 | 50.00 | 50 | 50.00 | 100 |
| 10 | 54 | 52.94 | 48 | 47.06 | 102 |
| 11 | 53 | 57.61 | 39 | 42.39 | 92 |
| 12 | 48 | 44.86 | 59 | 55.14 | 107 |
| General | 426 | 50.53 | 417 | 49.47 | 843 |

A total of 426 female and 417 male students participated in the study with 59 females and 59 males from 5th class, 56 females and 54 males from 6th class, 54 females and 52 males from 7th class, 54 females and 56 males from 8th class, 50 females and 5s males from 9th class, 54 females and 48 males from 10th class, 53 females and 39 males from 11th class and 48 females and 59 males from 12th class.

Table 2: Mean and Standard Deviation of Anthropometric and Physical Activity scores of Middle and High School Students

| | Middle school | | | | High school | | | | Total | | |
|--------------------------------|---------------|-------|-------|-------|-------------|-------|--------|-------|-------|--------|--------|
| | Female | | Male | | Female | | Male | | N | Mean | Sd |
| | Mean | Sd | Mean | Sd | Mean | Sd | Mean | Sd | | | |
| Age | 12.16 | 1.23 | 12.23 | 1.24 | 16.31 | 1.17 | 16.32 | 1.29 | 844 | 14.15 | 2.39 |
| Height (cm) | 155.9 | 10.2 | 156.3 | 11.8 | 164.5 | 6.3 | +175.5 | 7.3 | 812 | 162.84 | 12.12 |
| Weight | 45.31 | 10.92 | *48.4 | 13.15 | 56.29 | 10.05 | +67.99 | 12.64 | 821 | 54.21 | 15.38 |
| BMI (kg/m ²) | 18.95 | 3.13 | 19.18 | 3.78 | 20.92 | 3.31 | +22.21 | 5.36 | 805 | 20.27 | 4.18 |
| Activity type | #2.00 | 0.69 | *2.08 | 0.63 | 1.49 | 0.38 | +1.7 | 0.54 | 842 | 1.83 | 0.62 |
| Weekday activity scores | #2.88 | 1.01 | *3.09 | 0.99 | 2.00 | 0.85 | +2.5 | 0.96 | 825 | 2.63 | 1.04 |
| Physical Activity scores (PAQ) | #2.71 | 0.79 | *2.93 | 0.77 | 1.88 | 0.61 | +2.36 | 0.73 | 843 | 2.48 | 0.8313 |

* Middle school males higher compared to females (p<0.05).

+ High school males higher compared to females (p<0.05).

Middle school females and males higher compared to high school females and males (p<0.05).

For middle school students, the mean age of female students was 12.16±1.23 and the mean age of male students was 12.23±1.24 years. For high school, the mean age of female students was 16.31±1.17 and the mean age of male students was 16.32±1.29 years. The mean height of middle school students was 155.9±10.2 cm for females and 156±11.8 cm for males. For high school students, the mean height of females was 164.5±6.3 cm and mean height of males was 175.5±7.3 cm. The mean weight of middle school students was 45.31±10.92 kg for females and 48.4±13.15 kg for males. For high school students, the mean weight of females was 56.29±10.05 kg and mean weight of males was 67.99±12.64 kg. In terms of BMI, the value for female middle school students was 18.95±3.13 and for male middle school students was 19.18±3.78, while for female high school students it was 20.92±3.31 and for male high school students it was 22.21±5.36. In terms of activity types, these were 2.00±0.69 for middle school girls and 2.08±0.63 for middle school boys, 1.49±0.38 for high school girls and 1.7±0.54 for high school boys. In terms of weekday physical activity scores, these were 2.88±1.01 for middle school girls and 3.09±0.99 for middle school boys, 2.00±0.85 for high school girls and 2.5±0.96 for high school boys. The physical activity scores for female and male middle school students were 2.71±0.79 and 2.93±0.77, respectively. The physical activity scores for female and male high school students were 1.88±0.61 and 2.36±0.73, respectively. There were significant differences found between female and male middle school students in terms of weight, activity type, weekday activity scores and physical activity scores (p<0.05). Between female and male students attending high school, there were significant differences between height, weight, body mass index, weekday activity scores and physical activity scores (p<0.05). There were significant differences between middle school and high school students in terms of activity type, weekday activity scores and physical activity scores (p<0.05).

Table 3: Distribution of Body Mass Index according to Category

| BMI Category | Female | | Male | | Total | |
|--------------|--------|-------|------|------|-------|-------|
| | F | % | F | % | F | % |
| Underweight | 7 | 1.7 | 10 | 2.5 | 17 | 2.1 |
| Healthy | 216 | 53.6 | 186 | 46.4 | 402 | 50.0 |
| Overweight | 114 | 28.3 | 116 | 28.9 | 230 | 28.6 |
| Obese | 66 | 16.4 | 89 | 22.2 | 155 | 19.3 |
| Total | 403 | 100.0 | 401 | 100 | 804 | 100.0 |

When students are assessed in terms of body mass index, for girls, 1.7% were underweight, 53.6% were healthy, 28.3% were overweight and 16.4% were obese. Among boys, 2.5% were underweight, 46.4% were healthy, 28.9% were overweight and 22.2% were obese.

Table 4: Mean and Standard deviation Values for Anthropometric and Physical Activity scores of Middle and High School Students

| | School | N | Mean | Sd |
|--------------------------------|--------|-----|---------|-------|
| Height (cm) | Middle | 417 | 156.12 | 11.01 |
| | High | 395 | *169.93 | 8.74 |
| Weight (kg) | Middle | 430 | 46.84 | 12.16 |
| | High | 391 | *62.06 | 12.80 |
| Bmi (kg/m ²) | Middle | 414 | 2.43 | 0.73 |
| | High | 390 | *2.89 | 0.82 |
| Activity type | Middle | 441 | +2.04 | 0.66 |
| | High | 401 | 1.59 | 0.47 |
| Weekday activity scores | Middle | 434 | +2.99 | 1.00 |
| | High | 391 | 2.24 | 0.94 |
| Physical activity scores (paq) | Middle | 442 | +2.82 | 0.79 |
| | High | 401 | 2.12 | 0.71 |

* High school students higher for height, weight and BMI ($p < 0.05$).

+ Middle school students higher in terms of activity variety, weekday activity scores and total physical activity scores

When middle and high school students are assessed without differentiating for gender, the mean height of middle school students was 156.12 ± 11.01 with mean height of high school students 169.93 cm. Mean weight of middle school students was 46.84 ± 12.16 kg and mean weight of high school students was 62.06 ± 12.80 kg. For middle school students mean BMI was 2.43 ± 0.73 and for high school students mean BMI was 2.89 ± 0.82 . In terms of activity type, it was 2.04 ± 0.66 for middle school students and 1.59 ± 0.47 for high school students. Weekday physical activity scores were 2.99 ± 1.00 for middle school students and 2.24 ± 0.94 for high school students, while total physical activity scores were 2.28 ± 0.79 for middle school students and 2.12 ± 0.71 for high school students. There were significant differences between middle school and high school students in terms of height, weight, body mass index, activity type, weekday activity scores and physical activity scores ($p < 0.05$).

4. Discussion

In our study, significant differences were found between middle school and high school students in terms of height and BMI ($p < 0.05$). Students attending high school had high mean height and BMI compared to middle school students. There were significant differences between middle school and high school students in terms of activity variety, weekday activity scores and total physical activity scores ($p < 0.05$), with students attending middle school having higher scores compared to students attending high school.

Of those attending middle school, there were significant differences between male and female students in terms of weight, activity type, weekday activity scores and physical activity scores ($p < 0.05$). Male middle school students were heavier than female students, participated in more varied activities, were more active on weekdays and had higher physical activity levels.

There were significant differences between male and female students attending high school in terms of height, weight, BMI, activity type, weekday activity scores and physical activity scores ($p < 0.05$). Male high school students were taller and heavier than female students with higher BMI, participated in more varied activities, were more active on weekdays and had higher physical activity levels.

There were significant differences between female and male middle school students and female and male high school students in terms of activity type, weekday activity scores and physical activity scores ($p < 0.05$). Middle school students participated in more varied activities, were more active on weekdays and had higher general physical activity levels compared to high school students.

A study by Beighle et al. stated that 9-10-year-old children had higher non-school physical activity levels (Beighle et al., 2012). Physical activity habits may show variables according to gender (Pate et al., 1995; Shi et al., 2006). Another study identified that male children were more active both at school and during free time. Outside of school, 76.1% of male children were physically active while 34% of female children were physically active. Within school hours, the differences between the two genders was larger, with 94.6% of males and only 17% of females participating in physical activities. In conclusion, the physical activity levels of girls was shown to be lower compared to boys both within school hours and outside of school time (Kudaş et al., 2005). Currently, children and youngsters find it easier to watch television and play computer games rather than participate in physical activities. Further, due to a variety of financial problems, schools do not have the necessary resources for physical education lessons, play areas and after-school physical activity programs. Which contributes to the immobile lifestyle of school children (Pangrazi and Corbin, 1990; Pangrazi et al., 1996). As a result, the basic element of a happier and more meaningful life of physical fitness is ignored (Francis, 1991:405-414). Burke et al. in a study investigating the compliance rates with the recommendations from the Center for Disease Control (CDC) and American Center for Sports Medicine (ACSM) of moderate exercise lasting at least 30 minutes at least five days per week found the rates were higher for females (48.2%) than

for males (31.1%) (Burke et al., 2005). Additionally, it was recommended that for children to obtain health-related benefits, they should have moderate or high levels of physical activity for 60 minutes most days each week. The appearance of physically active children is different to their peers (Grissom, 2005:11-25).

Our research findings appear to be in parallel with the literature.

5. Conclusion

The results of this study found that middle school students have higher physical activity levels, weekday activity scores and physical activity scores compared to high school students.

References

1. ACSM. (2009). *ACSM's Guidelines for Exercise Testing and Prescription*. Edited by Franklin BA, Whaley MH, Howley ET. Philadelphia.
2. Beighle, A., Erwin, H., Morgan, C. F., & Alderman, B. (2012). Children's in school and out-of-school physical activity during two seasons. *Research quarterly for exercise and sport*, 81(1), 103-107.
3. Burke S. M., Carron A. V., Eys M. A. Physical activity context and university student's propensity to meet the guidelines Centers for Disease Control and Prevention/American College of Sports Medicine. *Med Sci Monit*. 2005;11:CR171-176.
4. Culos-Reed, & Nicole. S. (2002). Physical activity and cancer in youth: a review of physical activity's protective and rehabilitative functions. *Pediatr Exerc Science*(14), 248-258.
5. Dükkancı, Y. (2008). Çocuklarda fiziksel aktivite ve sağlıkla ilişkili fiziksel uygunluk özelliklerinin değerlendirilmesi. *Muğla Üniversitesi Yüksek Lisans Tezi*.
6. Francis, K. T. (1991), Status Of The Year 2000 Health Goals For Physical Activity Fitness, *Phys Ther*. 79(4):405-14.
7. Grissom, J. B. (2005), Physical Fitness and Academic Achievement, *Journal of Exercise Physiology*.8(1),11-25.
8. Gürel S, İnan G. (2001) Çocukluk çağı obezitesi tanı yöntemleri, prevalansı ve etyolojisi. *ADU Tıp Fakültesi Dergisi*; 2(3):39-46.
9. Han, J. C., Lawlor, D. A., & Kimm, S. Y. (2010). Childhood obesity. *The Lancet*, 375(9727), 1737-1748.
10. İşleğen, Ç. (2009). Fiziksel Aktiviteyle Yaşam Süresinin Uzatılması. *Türkiye Klinikleri Journal of Medical Sciences*, 29(5), 80-83.
11. Katzmarzyk P. T., Gledhill, N., & Shephard, R. J. (2000). The Economic Burden of Physical Inactivity in Canada. *Canadian Medical Association*, 163(11), 1435-1440.
12. Kowalski, K. C. (2018, 3 6). *The physical activity questionnaire for older children (PAQ-C) and adolescents (PAQ-A) manual*,.

https://www.academia.edu/27632739/The_Physical_Activity_Questionnaire_for_Older_Children_PAQ-C_and_Adolescents_PAQ-A_Manual?auto=downloaded.

13. Kudaş, S., Ülkar, B., & Erdoğan, A. (2005). Ankara İli 11-12 Yaş Grubu Çocukların Fiziksel Aktivite Ve Bazı Beslenme Alışkanlıkları. *Spor Bilimleri Dergisi*, 19-29.
14. Özer, M. K. (2016) Fiziksel Uygunluk. (Gözden geçirilmiş 6. Basım) Nobel Akademik Yayıncılık, Ankara
15. Pangrazi, R. P., Corbin, C. B. (1990), Age as a Factor Relating to Physical Fitness Test Performance, *RQES*. 61(4):410-414.
16. Pangrazi, R. P., Corbin, C. B., Welk, G. J. (1996), Physical Activity For Children And Youth, *JOPERD*.67(4): 38-43.
17. Pate R. R., Pratt M., Blair S. N., et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA*. 1995;273:402-407
18. Sayın, N. (2014). *15-17 yaş grubu gençlerin fiziksel aktivite düzeyleri ile fiziksel uygunlukları arasındaki ilişki*. Ankara: Yüksek Lisans Tezi, Selçuk Üniversitesi Sağlık Bilimleri Enstitüsü.
19. Shi Z., Lien N., Kumar B. N., et al. Physical activity and associated socio-demographic factors among school adolescents in Jiangsu Province, China. *Prev Med*. 2006;43:218-221.
20. Şahin, G., Uğurlu, E., Özer, M. K., & Özgider, C. (2011). Okul Çocuklarımız Ne Kadar Aktif? *Uluslararası Spor Araştırmaları Dergisi*, 3(2).
21. WHO. (2003). Diet, Nutrition and the Prevention of Chronic Diseases. *Technical Report Series*, 13-29.
22. WHO. (2015, 4 8). *Obesity and Overweight*. WHO: Received from; <http://www.who.int/mediacentre/factsheets/fs311/en/>
23. Zitsman J. L., Inge T. H., Reichard K. W., et al. (2014). Pediatric and adolescent obesity: Management, options for surgery, and outcomes. *J Pediatr Surg*. 49(3): 491-4.

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