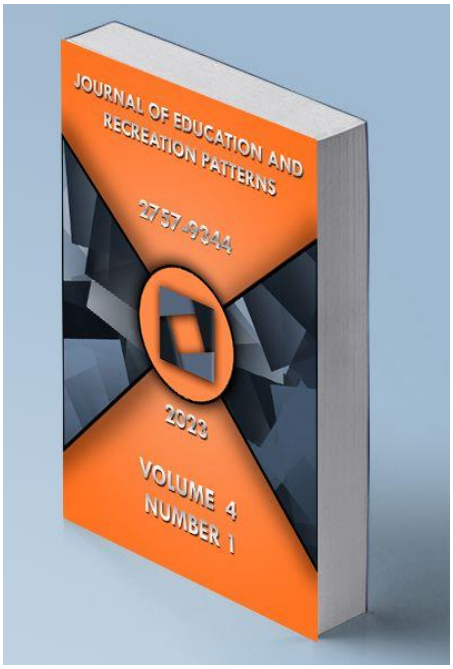

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Investigation of the Relationship Between Physical Activity Level and Sleep Quality of Secondary School Students

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ABSTRACT
This study aims to examine the relationship between physical activity levels and students' sleep quality at the secondary school level. A total of 334 students, 176 female, and 158 male students, studying in Elazığ province participated in the study. The "Physical Activity Scale for Adolescents" and the "Pittsburgh Sleep Quality Index" were used as data collection tools. In the analysis of the data, the independent-sample T-test, one-way ANOVA, and Pearson correlation analysis were used. In the examination of physical activity level and sleep quality in terms of the gender variable, the physical activity level and sleep quality of male students were found to be significantly better than the physical activity level and sleep quality of female students. In the examination of physical activity and sleep quality in terms of the school type variable, it was found that the physical activity levels and sleep quality of Sports High School students were significantly higher than those of Anatolian High School and Science High School students. A medium-level significant relationship was found in examining the relationship between physical activity level and sleep quality scale scores (r=-0.478, p=0.000). It has been determined that increasing the level of physical activity increases sleep quality. After all; a medium-level significant relationship was found between the physical activity level and sleep quality of the students studying at the secondary education level.

Keywords: Physical Activity, Secondary Education, Sleep Quality, Student

INTRODUCTION

The fact that people feel energetic, healthy, and fit when they wake up in the morning shows that they have a quality sleep period and good sleep quality. Sleep quality is examined in two sub-dimensions, quantitative and qualitative. The frequency of waking up, sleep duration, and sleep latency are called the quantitative dimension of sleep quality, while the depth of sleep and the restfulness of sleep are called the qualitative dimension of sleep quality. According to research, it has been determined that between 15% and 35% of people have sleep problems such as maintaining sleep and falling asleep. Low sleep quality and the multiplicity of problems experienced with sleep are accepted as symptoms of important diseases, so increasing sleep quality is very important for human health today (Üstün & Yücel, 2011). As a result of clinical applications and research, sleep quality's importance and value in health are revealed. There are many studies that reveal that the relationship between people's psychological and physical health and sleep quality is linked (Aysan, Karaköse, Zaybak & İsmailoğlu, 2014). Sleep quality is affected by many psychological, physiological, environmental, and social factors. These factors can be grouped under various headings according to gender, whether married, diet, physical activity, lifestyle, social environment, diseases, substance drug, alcohol use, and exercise (Demir, 2011). The quality of sleep and the associated quality of healthy life of people are affected by psychological, physiological, and sociological factors. These factors, which determine wakefulness and sleep rhythm, affect sleep duration and sleep depth, causing sleep to be interrupted at regular intervals and reducing sleep quality (Yi, Shin & Shin, 2006).

There are two different stages of the sleep process, light sleep, and deep sleep. These two phases follow each other from light sleep to deep sleep. Slow-wave sleep, called light sleep, is defined as the sleep phase in which there are no rapid eye movements (NREM), and paradoxical sleep, called deep sleep, is defined as the sleep phase in which there are rapid eye movements (REM). In healthy individuals, the sleep phase begins with NREM and continues with REM. In people who have reached adulthood, the REM phase accounts for 25% of total sleep time. It lasts around 10-40 minutes and repeats every 90-100 minutes (Source and Juniper, 2011). It is known that people who regularly do sports or are physically active during the day have better quality and easier sleep. At the end of a tiring day, the onset of the REM sleep phase is shortened, while the duration of the REM phase is prolonged as the rest period increases. While the physically low level of fatigue facilitates the process of sleeping, the transition to sleep at the end of a stressful and psychologically overly busy day is challenging (Lopes, Robaina, & Rotenberg, 2012).

Physical activity is called physical movements that cause the human body to spend more energy than its normal state with the contraction of muscle groups (Özer, 2006). Physical activity is called physical movements that cause the human body to spend more energy than its normal state with the contraction of muscle groups (Özer, 2006). The basis of the movement system of the human body is to expend the energy received from the outside through food. There is a parallel relationship between spending the energy available in the body and physical movements. If there is a positive difference between the amount of energy taken during the day and the amount of energy spent, it is understood that the person is a physically active individual. In order for this difference to occur, individuals must be in a physically active lifestyle (Hekim, 2014). Today, the fact that people continue their daily lives without moving too much causes an increase in various health problems and this problem increases the importance of physical mobility (İlhan, 2018). Physical activity can serve as a tool to help promote excellence (Kibaek, et al., 2022). Even if the concept of physical activity or physical fitness has similar meanings to the term sport, there are differences in scope between these two terms. While simple movements that are counted in daily life can be included in the scope of physical activity, the fact that the movements applied within the scope of sports are regular, canonical, and aimed at

a special purpose distinguishes these two concepts from each other (Yüksel, Hekim, & Gürkan, 2014). Regular physical activity or training within the framework of a certain branch reveals the need for rest in the human body. For this reason, the need for sleep arises in the body after the activity or training. Sleep replaces the energy consumed in the body after the activity and repairs the damaged tissues (Driver & Taylor, 2000). Sleep problems or sleep disorders have recently increased considerably in individuals at a young age (Yang, et. al., 2003). It has been determined in the research that people who state that they have sleep problems feel physically and mentally bad (Lafçı, 2009). In addition, it has been determined that people with high physical activity levels have high sleep quality and do not have many sleep problems (Aktaş et al., 2015).

This study was conducted to find an answer to a problem arising from the uncertainty of whether the physical activity levels of secondary school students have a relationship with their sleep quality and whether some variables will affect this condition.

In line with the information provided, the aim of the study was determined as the examination of the relationship between the physical activity level and sleep quality of the students studying at the secondary school level.

Hypotheses:

H1. The increase in the physical activity levels of secondary school students positively affects their sleep quality.

H2. Physical activity levels of secondary school students; It differs according to gender, age, grade level, and type of school.

H3. Sleep quality of secondary school students; It differs according to gender, age, grade level, and type of school.

METHOD

Research Model

In this study, in order to determine the relationship between the physical activity level and sleep quality of secondary school students studying in Elazığ city center; relational screening model and descriptive screening model were used. The relational screening model is called the screening approach, which aims to determine the presence of change between two and more variables (Karasar, 2011). Descriptive screening is research conducted on large groups, in which the opinions and attitudes of the individuals in the group about a phenomenon and event are taken, and the facts and events are trying to be described (Karakaya, 2012).

Ethics of Research

This study was conducted by the Fırat University Non-Invasive Research Ethics Committee; Based on the application numbered 425459 on 24.09.2022, it was decided by a majority of votes that it conforms to the ethical rules. The subject of the study was explained to the participants and it was stated that the personal data obtained would only be used for scientific study purposes. Participants in the study were informed that they have the right to withdraw from the study if they wish during the study phase.

Study Group

The population of the study consisted of 2570 secondary school students studying in sports high schools (210), science high schools (790), and Anatolian high schools (1570) in

Elazığ city center. To determine the most appropriate sample volume for the research in which the simple random sampling method is used; n is the sample size; N is the volume of the universe; The Cochran Formula was used with t being the table value of the reliability level, p and q being the probabilities of seeing and not seeing the event of interest, respectively, and d being the sensitivity level. (Gürbüz ve Şahin, 2016).

Sample size n = N.(t2.p.q) / (d2.(N-1) + (t2.p.q)

According to this formula, the lowest sample lower limit for 2570 students was determined as 332. The sample group consisted of 334 students, including 158 female students and 176 male students in these secondary education institutions. The descriptive statistics of the sample group are given in table 1.

Table 1. Sample Group Descriptive Statistics Table

Variables	Group	n	%
Gender	Male	158	47,3
	Female	176	52,7
Age	14 years	92	27,5
	15 years	99	29,6
	16 years	77	23,1
	17 years	66	19,8
Grade Level	9th grade	92	27,5
	10th grade	99	29,6
	11th grade	77	23,1
	12th grade	66	19,8
School Type	Sports High School	95	28,4
	Anatolian High School	126	37,7
	Science High School	113	33,8

When the table is examined, 158 of the 334 students who participated in the research were female (47.3%) and 176 were male (52.7%). The 14-age group consists of 92 people (27.5%), the 15 age group consists of 99 people (29.6%), the 16 age group consists of 77 people (23.1%), and the 17 age group consists of 66 people (19.8%). The number of 9th-grade participants was 92 (27.5%), the number of 10th-grade participants was 99 (29.6%), the number of 11th-grade participants was 77 (23.1%), and the number of 12th-grade participants was 66 (19.8%). The number of participants in Sports High School was 95 (28.4%), the number of participants in Anatolian High School was 126 (37.7%), and the number of participants in Science High School was 113 (33.8%).

Data Collection Tools

Personal Information Form

Personal information form created by researchers; consists of gender, age, grade level and school type variables.

Pittsburgh Sleep Quality Index

The Pittsburgh sleep quality index, developed by Buysse in 1989, is a self-report scale that evaluates sleep disorders and sleeps quality over the past month. The adaptation, reliability, and validity of the scale to Turkish were made by Ağargün et al. in 1996. Pittsburgh Sleep Quality Index consists of a total of 23 questions and 7 components. 18 of the questions were filled by the participant himself, and 5 questions were asked to be filled in in consultation with their families because the participants were students. Question 19 was not included in the scale

scoring. In the evaluation of the scale, scores from 7 components were calculated: sleep delay, use of sleep medication, sleep duration, sleep disturbance, subjective sleep quality, habitual sleep activity, and daytime dysfunction. Each component was evaluated over 0-3 points and the total Pittsburgh Sleep Quality Index score was calculated. The total score on the scale is 0-21. A score of 5 and below indicates that sleep quality is good, while a score above 5 indicates poor sleep quality.

Physical Activity Scale for Adolescents

The scale of physical activity for adolescents was developed by Kowalski et al. (2004). The study on the adaptation of the scale to Turkish, reliability, and validity was carried out by Sert ve Temel (2013). The scale consists of 9 items. The scale aims to determine the level of physical activity of the participant in the last week. The scale is five points Likert type. The lowest 1 point and the highest 5 points can be obtained from the scale items. As a result of the scale scoring, the lowest 8 and the highest 40 points can be obtained. When the total score approaches 8, it is considered a low activity level, and when it approaches 40, it is considered a high activity level. Question 9 of the scale was not included in the evaluation. It is a question item created to determine whether a situation that interferes with physical activity has occurred. Cronbach's alpha coefficient, which is the Turkish reliability and validity coefficient of the scale, was reported as 82.

Data Analysis

The SPSS 22.0 program was used in the statistical analysis of the data. Skewness and Kurtosis values were examined for normal distribution values of the data. The value range is +1.5, -1.5 is accepted. For this reason, it was deemed appropriate to use parametric tests in statistical analysis. In the comparison of the obtained data, the Dependent-Sample T-test and the One Way Anova tests were applied. Pearson Correlation Analysis was applied to examine the relationship between physical activity level and sleep quality. The significance level was determined as $p<0.05$ in the study.

Table 2. Skewness and Kurtosis Values of Physical Activity Level and Sleep Quality Data

Measured values	n	X	Sd	Skewness	Sd	Kurtosis	Sd
Level of physical activity	334	19,009	0,229	0,503	0,133	-0,027	0,266
Sleep quality	334	5,323	0,083	0,014	0,133	-0,484	0,266

X: Mean; Sd: Standard deviation

FINDINGS

In this part of the study, the findings as a result of the analysis of the data obtained are mentioned.

Table 3. Comparison of Physical Activity Level and Sleep Quality Values in terms of Gender Variable

Measured values	Gender	n	X	Sd	t	p
Level of physical activity	Female	158	17,582	3,928	-6,223	0,000*
	Male	176	20,289	4,007		
Sleep quality	Female	158	5,829	1,350	6,064	0,000*
	Male	176	4,869	1,523		

*p<,05

Dependent-Sample T test was used to compare physical activity level and sleep quality values in terms of gender variable. When the data were examined, the mean physical activity level of female students was found as 17±582±3,928 and the mean physical activity level of male students was 20289,4,007. In the statistical comparison of the means, a significant difference was found according to the significance level of p<0.05 (p=0.000). As a result, it was determined that male students had higher physical activity levels than female students. When the average sleep quality values were examined, the average of female students was 5±829.1.350 and the average of male students was 4±869.1.523. In the statistical comparison of sleep quality measurement values of female and male students, a significant difference was found according to p<0.05 significance level (p=0.000). As a result, it was determined that male students had higher sleep quality than female students.

Table 4. Comparison of Physical Activity Level and Sleep Quality Values in terms of School Type Variable

Measured values	**School type**	**n**	**X**	**Sd**	F	p
Level of physical activity	Sports High School	95	22,852	3,967	95,944	0,000*
	Anatolian High School	126	18,309	3,158		
	Science High School	113	16,557	2,945		
Sleep quality	Sports High School	95	4,915	1,635	4,942	0,008
	Anatolian High School	126	5,515	1,500		
	Science High School	113	5,451	1,382		

*p<,05

One Way Anova test was applied to compare physical activity level and sleep quality values in terms of the school type variable. When the physical activity level measurement averages were examined, the average of Sports High School students was 22±852.3.967, the average of Anatolian High School students was 18±309.3.158, and the average of Science High School students was 16±557.2.945. When the findings were examined, the type of school with the highest physical activity level was determined as Sports High School and the type of school with the lowest physical activity level was determined as Science High School. In the statistical analysis of the data, a significant difference was found between school types according to the level of significance of p<0.05 (F=95,944,p=0,000). When the average measurement of sleep quality level was examined, the average of Sports High School students was 4,915±1,635, the average of Anatolian High School students was 5,515±1,500, and the average of Science High School students was 5±451,1,382. In the statistical comparison of the mean of sleep quality levels, significant differences were found according to the significance level of p<0.05(F=4.942, p=0.008). Tukey test data were examined and tabulated to determine which groups caused the statistical differences between school types in physical activity level and sleep quality level comparisons (Table 5).

Table 5. Examination of Differences Between Types of Schools

Measured values	(I) School type	(J) School type	Mean Difference (I-J)	Sd	p
Level of physical activity	Sports High School	Anatolian High School	4,543	0,454	0,000*
		Science High School	6,295	0,465	0,000*
	Anatolian High School	Sports High School	-4,543	0,454	0,000*
		Science High School	1,752	0,433	0,000*
	Science High School	Sports High School	-6,295	0,465	0,000*
		Anatolian High School	-1,752	0,433	0,000*
Sleep Quality	Sports High School	Anatolian High School	-0,600	0,204	0,010*
		Science High School	-0,535	0,209	0,029*
	Anatolian High School	Sports High School	0,600	0,204	0,010*
		Science High School	0,064	0,194	0,941
	Science High School	Sports High School	0,535	0,209	0,029*
		Anatolian High School	-0,064	0,194	0,941

*p<,05

Tukey test data were examined to determine which school types were the statistical differences detected in the examination of physical activity level and sleep quality index values in terms of the school type variable. As a result of the examination of the data, it was determined that there was a statistical difference in physical activity level values between all groups in the Sports High School, Anatolian High School, and Science High School groups. While there was a difference between Sports High School and Anatolian High School and Science High School in sleep quality index values, no significant difference was detected between Science High School and Anatolian High School.

Table 6. Examination of the relationship between physical activity level and Sleep Quality Index

		Sleep Quality
Level of physical activity	r	-0,478*
	p	0,000*
	n	334

*p<,05 level of significance

Pearson Correlation Analysis was used to determine the relationship between physical activity level and sleep quality. When the findings were examined, a medium-level negative (r=-0.478) and significant (p=0.000) relationship was found between physical activity level and sleep quality. As a result, as the physical activity level of the students increased, the quality of sleep increased.

DISCUSSION AND CONCLUSION

The research conducted to examine the relationship between the physical activity level and sleep quality of students studying in secondary education institutions was examined within the framework of the literature. In the study, students' physical activity levels and sleep quality levels were examined in terms of gender variable and school-type variables.

In the examination of the physical activity level in terms of gender variable, the mean physical activity level of female students was found to be 17±582.3.928 and the mean physical

activity level of male students was 20±289.4.007. A statistically significant difference was found in the comparison of the averages. It was found that male students had higher physical activity levels than female students. In the literature review on the subject, Parlaktaş (2018) found that female students have lower physical activity levels than male students in her research on secondary school students. In their research, Talema and Yang (2000) determined that male students had higher levels of physical activity than female students. Karaaslan and Çelebioğlu (2018) found that in their study investigating the healthy lifestyles of high school students, the mean physical activity scores of female students were lower than male students. Melnyk et al. (2009) determined in their research that young individuals with high body fat percentage values have less physical activity levels and spend less time on physical activity. Ölcücü et al. (2015) stated in their research that the physical activity levels of male students were higher than female students in their research examining the relationship between physical activity levels and depression of secondary school students and that this situation could be because the social roles of female students were more rigid than male students or physical characteristics. The studies found as a result of the literature search show parallels with the research. In the examination of the physical activity level in terms of the school type variable, the mean scale score of Sports High School students was found as 22±3.967, the average scale score of Anatolian High School students was 18.309±3.158, and the mean scale score of Science High School students was found as 16±557.2.945. When the findings are examined, it is seen that the students of Sports High School have the highest average, the average of the students of Anatolian High School second, and finally the average of the students of Science High School. A statistically significant difference was found between school types. In the literature review on the subject, Adak (2021) found significant differences between school types in the comparison of physical activity levels in terms of school type in his research in which he examined the factors preventing high school student's participation in physical activity. While the physical activity levels of Sports High School students had the highest average, the type of school with the lowest average was determined as Science High School. Doğan(2021) found a significant difference in physical activities in the school-type variable examination and stated that sports high schools had more physical activity levels than other high schools in his research, examining the participation of high school students in recreational activities.

In the examination of the sleep quality index measurement results in terms of gender and school type variable, the mean sleep quality measurement of female students was found as 5±829±1,350 and the average sleep quality measurement of male students was found as 4869,1,523. It was found that the sleep quality level of male students was significantly better than that of female students when the findings were examined. In terms of the school type variable, the mean of sleep quality measurement was found as 4,915±1,635 in Sports High School students, 5,515±1,500 in Anatolian High School students, and 5±451,1,382 in Science High School students. The average sleep quality values of sports high school students were found to be significantly better than those of Anatolian High School and Science High School students. There was no significant difference between the sleep quality measurement results of Anatolian High School and Science High School students. In the literature review on the subject, Liu et al. (2008) found that female students had more sleep problems than male students in studies investigating the sleep problems of adolescents living in China. Şenol et al. (2012) found that the Pittsburgh Sleep Quality Index average score of female students was 6.64 and the Pittsburgh Sleep Quality Index average score of male students was 6.01 in their studies investigating the factors affecting sleep quality in adolescents. Burgard and Ailshire (2013) explained that females have lower sleep quality than males due to females' social place in society, emotional changes caused by hormonal changes, and their role in the family. Yaman (2020) examined the relationship between exam anxiety and the sleep quality of different types of high school students and found a significant difference between sleep quality and the sleep hours of students studying in different types of schools. In the statistical examination of the

relationship between physical activity level and sleep quality, a significant difference was found (p=0.000). It was determined that there was a medium-level relationship when the Pearson correlation coefficient was examined (r=-0.478). In this negative relationship, it was found that Pittsburgh Sleep Quality Index scores decreased as physical activity scale scores increased, so the sleep quality of students with high physical activity levels increased. In the literature review on the subject, Wu et al. (2015) found a significant relationship between sleep quality and activity level in their research. Yang et al. (2012) determined that sleep quality increased as the level of exercise increased in young individuals in their research examining the relationship between exercise intensity and sleep quality. ZubiaVeqar (2012) found that low physical activity reduced sleep quality in their studies investigating the effect of physical exercise on sleep. There is a parallel between the literature review and research findings.

After all; A medium-level significant relationship was found between the physical activity level and sleep quality of the students studying at the secondary education level. As the physical activity levels of the students increased, their sleep quality also increased.

As a suggestion, In order to lead a healthy life, the individual needs a well-defined physical activity program. Afterward, it should support this with a quality sleep pattern. In particular children's participation in physical activity in secondary education should be supported and education should be given periodically. Sporting and recreational organizations should be made to encourage students to participate in physical activity. In addition, the use of mass media, which is one of the biggest problems of today, for students should be limited by families. Thanks to these limitations, students' participation in physical activity increases and one of the factors that prevent them from sleeping until late is eliminated. In this way, physical activity and sleep quality are balanced.

Limitations of Research

This research is limited to the students participating in the study in sports high schools, science high schools and Anatolian high schools in Elazığ city center. Research results are limited to data collection tools.

REFERENCES

Adak, S.v(2021). *Examination of the factors that prevent high school students from participating in academic self-efficacy and physical activities.* Master's Thesis. Necmettin Erbakan University, Institute of Educational Sciences, Department of Physical Education and Sports. Konya.

Ağargün, M. Y., Kara, H., & Anlar, O. (1996). Validity and reliability of the Pittsburgh sleep quality index. *Turkish Journal of Psychiatry, 7*(2), 107-115.

Aktaş, H., Şaşmaz, C. T., Kılınçer, A., Mert, E., Gülbol, S., Külekçioğlu, D., ... & Demirtaş,A. (2015). Investigation of factors associated with physical activity level and sleep quality in adults. *Mersin University Journal of Health Sciences, 8(2), 60-70.*

Aysan, E., Karaköse, S., Zaybak, A., & İsmailoğlu, E. G. (2014). Sleep quality and influencing factors in college students. *Electronic Journal of Dokuz Eylül University Faculty of Nursing, 7(3), 193-198.*

Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research,* 28(2), 193-213.

Demir Y. (2011). *Sleep and sleep-related practices Basic Concepts and Skills in Health Practices*. (3rd Edition). Nobel Medical Bookstores. Istanbul.

Doğan, K. (2021). *The tendency of high school students to recreational activities and the factors that prevent their participation in recreational activities (Malatya province example).* Master's Thesis, İnönü University, Institute of Health Sciences,

Malatya.Driver, H. S., & Taylor, S. R. (2000). Sleep and exercise. *Sleep Med Rev, 4*, 387-402.

Gürbüz, S., ve Şahin, F. (2016). Sosyal Bilimlerde Araştırma Yöntemleri , Ankara: Seçkin Yayıncılık.

Hekim, M. (2014). The importance of physical activity in preventing health problems caused by a sedentary lifestyle, which is a global problem, and health problems arising from sedentary lifestyle. II. International Davraz Congress. 29- 31 May 2014, Isparta. 2363-2371.

İlhan, A. (2018). *Examination of the relationship between social support and physical activity levels of high school students.* Master's Thesis. Batman University, Institute of Social Sciences. Batman.

Karaaslan, M. M. ve Çelebioğlu, A. (2018). Determination of healthy lifestyle behaviors of high school students. *Journal of Human Sciences*, s.355-1361.

Karakaya, İ. (2012). Bilimsel araştırma yöntemleri. A. Tanrıöğen (Edt.) Bilimsel araştırma yöntemleri. Ankara: Anı.

Karasar, N. (2011). Bilimsel Araştırma Yöntemleri. Ankara: Nobel Yayınları.

Kibaek, K. I. M., Pickett, A. C., Stokowski, S., & Jinwook, H. A. N. (2022). Promoting Educational Outcomes Through Openness to Diversity: An Exploration of Sport and Physical Activity. *Journal of Education and Recreation Patterns*, *3*(2), 60-76. DOI: https://doi.org/10.53016/jerp.v3i2.52

Kowalski, K. C., Crocker, P. R., & Donen, R. M. (2004). The physical activity questionnaire for older children (PAQ-C) and adolescents (PAQ-A) manual. *College of Kinesiology, University of Saskatchewan*, *87*(1), 1-38.

Lafçı, D. (2009). *The effect of music on the sleep quality of cancer patients.* Master's Thesis. Cukurova University, Institute of Health Sciences, Adana.

Liu, X., Zhao, Z., Jia, C., Buysse, D.J. (2008). Sleep patterns and problems among Chinese adolescents. *Pediatrics*, 121; 1165–73.

Lopes, C., Robaina, J. R., & Rotenberg, L. (2012). Epidemiology of insomnia: prevalence and risk factors. *In Can't sleep*, 1-21.

Melnyk, B.M, Jacobson, D., Kelly, S., O'haver, J., Small, L., Mays, M.Z. (2009). İmproning the mental jealt helty life styl choice and physical healt of hispanic adolescent: A randomized controlled pilot study. Journal Of School Health. 9, 575-584. Nord J Psychiatry. 62, (47), 25– 29.

Ölçücü, B., Vatansever, Ş., Özcan, G., Paktaş, Y., Çelik, A. (2015). The relationship between physical activity level and depression and anxiety in secondary school students. *International Journal of Turkish Educational Sciences.* 58-67.

Özer, K. (2006). *Physical fitness.* Ankara: Nobel Publishing Distribution.

Parlaktaş, Y. (2018). *The Relationship Between Physical Activity Level and Academic Achievement in Secondary School 8th Grade Students (The Case of Kırıkkale Province).* Master's Thesis. Kırıkkale University, Kırıkkale.

Şenol, V., Soyuer, F., Akça, R.P. ve Argün, M. (2012). Sleep quality and influencing factors in adolescents. Kocatepe Medical Journal. 14; 93-102.

Sert, Z. E., & Temel, A. B. (2014). Adaptation of the physical activity questionnaire for primary school students to Turkish society: a study of validity and reliability. *Dokuz Eylül University Faculty of Nursing Electronic Journal*, *7*(2), 109-114.

Telama, RISTO ve Yang, X. (2000). Decline in physical activity from youth to young adulthood in Finland. *Medicine and Science in Sports and Exercise*, 1617-1622.

Üstün, Y., & Yücel, S. Ç. (2011). Examination of sleep quality of nurses. Maltepe University Journal of Nursing Science and Art, 1(4), 29-38.

Wu, X., Tao, S., Zhang, Y., Zhang, S., & Tao, F. (2015). Low physical activity and high screen time can increase the risks of mental health problems and poor sleep quality among Chinese college students. *PloS one*, *10*(3), e0119607.

Yaman, N. (2020). *The relationship between exam anxiety and sleep quality of high school seniors of different types of high school.* Master's Thesis. Biruni University, Institute of Graduate Education, Department of Guidance and Psychological Counseling, Istanbul.

Yang, C. M., Wu, C. H., Hsieh, M. H., Liu, M. H., & Lu, F. H. (2003). Coping with sleep disturbances among young adults: a survey of first-year college students in Taiwan. *Behavioral medicine*, *29*(3), 133-138.

Yang, P. Y., Ho, K. H., Chen, H. C., & Chien, M. Y. (2012). Exercise training improves sleep quality in middle-aged and older adults with sleep problems: a systematic review. *Journal of physiotherapy*, *58*(3), 157-163.

Yi, H., Shin, K., & Shin, C. (2006). Development of the sleep quality scale. *Journal of Sleep Research*, 15(3), 309-316.

Yüksel, Y., Hekim, M., Gürkan, O. (2014). Examination of Healthy Life Behavior Patterns of Secondary School Students According to Participation in Physical Activity and Some Variables. III. Educational Research Congress in Sakarya. 12 June 2014, Sakarya University, Turkey. 12, 326-333.

ZubiaVeqar, M. E. (2012). Sleep quality improvement and exercise: A Review. *International Journal of Sciencific and Research Publications, 2*(8), 1-8.

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