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Research Article

The Relationship between Exercise Perception, Pain, and Smartphone Addiction among First Year Physiotherapy Students

Fizyoterapi Birinci Sınıf Öğrencilerinin Egzersiz Algısı ile Muskuloskeletal Ağrı ve Akıllı Telefon Bağımlılık Düzeyi Arasındaki İlişki

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ABSTRACT

Purpose: We think that possible inactivity and a high risk of smartphone addiction may increase the potential musculoskeletal disorders in physiotherapy and rehabilitation students before beginning their professional lives. To draw attention to this issue, we aimed to investigate the relationship between exercise perception, musculoskeletal pain, and smartphone addiction. **Material and Methods:** Demographic data form, Exercise Benefit/Barrier Scale (EBS), Cornell Musculoskeletal Disorder Questionnaire (CMDQ), and Smartphone Addiction Scale (SAS) were filled out online by 45 volunteer students from the Physiotherapy and Rehabilitation Department of Kırklareli University's Faculty of Health Sciences. **Results:** It was found that those who regularly exercised had lower EBS (p=0.031), exercise benefit (p=0. 029) and exercise barrier (p=0.251) scores, higher right forearm pain scores (p=0.035), higher median values for the CMDQ total score (p=0.052) and lower median SAS total scores (p=0.101) than those who did not. **Discussion:** There was no statistically significant correlation between exercise perception, musculoskeletal pain, and smartphone addiction. However, it has been found that students who have the habit of exercising regularly have a lower level of exercise perception, a higher level of musculoskeletal pain, especially a higher level of forearm pain, and a lower risk of smartphone addiction.

Anahtar Kelimeler: Exercise; Pain; Smartphone; Addiction; Physiotherapist.

ÖZ

Amaç: Fizyoterapi ve rehabilitasyon öğrencilerinde meslek hayatına başlamadan önce olası hareketsizliğin ve akıllı telefon bağımlılığı riskinin yüksek olmasının kas-iskelet sistemi rahatsızlıklarını artırabileceğini düşünmekteyiz. Bu konuya dikkat çekmek için egzersiz algısı, kas-iskelet sistemi ağrısı ve akıllı telefon bağımlılığı arasındaki ilişkiyi araştırmayı amaçladık. **Gereç ve Yöntem:** Demografik veri formu, Egzersizin Yararları/Engelleri Ölçeği, Cornell Kas-İskelet Rahatsızlığı Anketi ve Akıllı Telefon Bağımlılığı Ölçeği, Kırklareli Üniversitesi Sağlık Bilimleri Fakültesi Fizyoterapi ve Rehabilitasyon Bölümü'nden 45 gönüllü öğrenci tarafından çevrimiçi olarak doldurduldu. **Sonuçlar:** Düzenli egzersiz yapanların düzenli egzersiz yapmayanlara göre Egzersizin Yararları/Engelleri Ölçeği (p=0.031), egzersiz yararı (p=0.029) ve egzersiz engeli (p=0.251) puanlarının daha düşük, sağ önkol ağrı puanlarının (p=0.035) ortanca değerlerin daha yüksek olduğu, Cornell Kas-İskelet Rahatsızlığı Anketi toplam puanının daha yüksek (p=0.052) ve Akıllı Telefon Bağımlılığı Ölçeği toplam puanının ortanca değerinin daha düşük (p=0.101) olduğu bulundu. **Tartışma:** Egzersiz algısı, kas-iskelet ağrısı ve akıllı telefon bağımlılığı arasında istatistiksel olarak anlamlı bir ilişki yoktu. Ancak düzenli egzersiz yapma alışkanlığı olan öğrencilerin egzersiz algılarının daha düşük, kas-iskelet ağrısı düzeylerinin daha yüksek olduğu, özellikle ön kol ağrısı düzeylerinin daha yüksek olduğu ve egzersiz yapan gruplarda akıllı telefon bağımlılığı riskinin daha düşük olduğu bulunmuştur.

Anahtar Kelimeler: Egzersiz; Ağrı; Akıllı telefon; Bağımlılık; Fizyoterapistler.

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The physical activity behavior of people is greatly influenced by their perception of exercise. This issue is influenced by the individual's level of knowledge, socio-cultural framework, and beliefs. Exercise perception is classified into two categories: exercise benefit perception and exercise barrier perception. A high level of obstacle perception promotes inactivity, whereas a high level of benefit perception promotes physical activity (Wang et al. 2023). The most essential factor in regular physical activity and making it a habit is the relationship between the perception of barriers and benefits (Frederick et al., 2022). The term "smartphone addiction" has been used in the literature to characterize people who use their smartphones so much that they disregard other areas of life. According to the studies, smartphone addiction may vary depending on the gender of the students, family income level, education level of the parents, and the branch of science in which the students are educated (Alotaibi et al., 2022). Smartphone addiction has been linked to a lack of physical activity and a high body mass index, as it reduces or eliminates activities such as going out, walking, and other sorts of physical activity (Zhao et al., 2022).

We can say the increase in neck pain in people is an example of the negative effect of smartphone addiction on physical health. Increased neck pain may lead to a reduction in people's daily life activities and functional capacity (Kazeminasab et al., 2022). Because the person maintains a posture with the head in flexion and the shoulder in protraction for an extended period when using a smartphone. In addition, tilting the head forward may cause decreased cervical lordosis in the lower cervical vertebrae and increased kyphosis in the upper thoracic vertebrae. Repeating this posture can lead to musculoskeletal disorders (Yang et al., 2022). Furthermore, physiotherapists may be at risk of musculoskeletal injury as a result of physical factors such as trunk flexion, rotation, heavy lifting, and prolonged standing while performing their duties (Glowinski et al., 2021). We think that possible inactivity and a high risk of smartphone addiction may increase the potential musculoskeletal disorders in physiotherapy and rehabilitation students before beginning their professional lives. In other words, physiotherapy and rehabilitation students may begin their careers with musculoskeletal pain due to their low exercise perception benefit level and high risk of smartphone addiction. We intended to investigate whether there is a link between exercise perception, musculoskeletal pain, and smartphone addiction to raise awareness of this issue among first-year physiotherapist candidates.

MATERIAL AND METHODS

Our study was performed between November 2021 and June 2022, with 45 volunteer students from the Physiotherapy and Rehabilitation Department of Kırklareli University's Faculty of Health Sciences having participated (Figure 1).

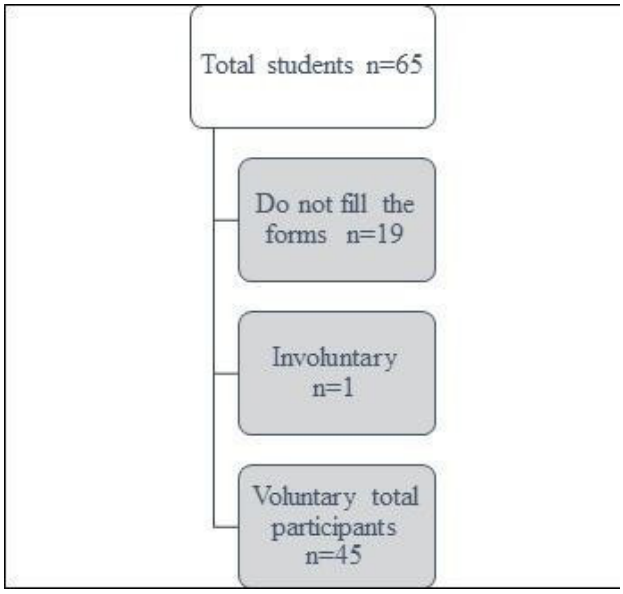

Figure 1. Flow chart of participants

The questionnaires were created using Google forms and distributed online to the students in this study, where data was gathered by analyzing the survey results. Demographic data forms including personal information of students, Exercise Benefit/Barrier Scale (EBS) measuring exercise perception level, Cornell Musculoskeletal Disorder Questionnaire (CMDQ) assessing musculoskeletal system pain, and Smartphone Addiction Scale (SAS) measuring smartphone addiction risk were used.

Exercise Benefit/ Barrier Scale (EBS): It was developed by Sechrist, Walker, and Pender (1987). Turkish reliability and validity study made by Ortabağ et al. (Ortabag et al., 2010). The scale consists of 43 items in total. The scale has 4 answers including strongly agree, agree, disagree strongly disagree respectively that are scored from 4 to 1. The scale's overall rating ranges from 43 to 172. Lower scores indicate better exercise perception. It has two subgroups, exercise benefit, and exercises barrier, and these groups can be used independently. The benefits scale's scoring range is 29–116, whereas the disability scale's scoring range is 14–56.

Cornell Musculoskeletal Disorder Questionnaire (CMDQ): By Erdinç et al., the scale was translated into Turkish in 2008 (Erdinc et al., 2011). This scale assesses the frequency, intensity, and impact of pain, soreness, or discomfort and whether it interferes with the ability to work in 11 different body areas (neck, shoulder, back, upper arm, wrist, forearm, wrist, hip, upper leg, knee, and lower leg) over the last seven days. Based on frequency, severity, and reactions to work inhibition, weight scores are calculated. The person's musculoskeletal disorder level increases as the overall score rises.

Smartphone Addiction Scale (SAS): The validity and reliability of the scale created by Kwon et al. were investigated in Turkey by Noyan et al (2015) (Noyan et al., 2015). It is a scale that measures the risk of smartphone addiction, consists of 10 items, and is evaluated with a six-point Likert scale. Scores for scale items range from 1 to 6. The scale's ratings range widely from 10 to 60. According to the statement, as test scores rise, so does the risk of smartphone addiction. There are no subscales and the scale only has a single factor.

Statistical analysis

Continuous variables were expressed as mean ± standard deviation and/or median, and demographic data as numbers and percentages. The comparison of demographic data was analyzed with Chi-Square Test and Fisher's Exact Test. Normality analyzes of continuous variables were performed using the Kolmogorov-Smirnov Goodness of Fit test. T-test was used in the independent groups in the analysis between the two groups that were suitable for normal distribution, and the Mann-Whitney U test was used in the analysis of the variables that were not by the normal distribution between the two groups. Analyzes were performed with IBM SPSS version 26.0 (IBM Corporation, Armonk, NY, USA) and the statistical significance level was accepted as $p<0.05$. Reaching all current students at Kırklareli University in the Physiotherapy and Rehabilitation Department was the study's goal. The 58 active students were all invited to take part in the study. As a result, 45 students in all voluntarily participated in the study. The power of the study was found to be 0,71 according to the findings of the post-hoc power analysis carried out using the EBS total scores between groups.

RESULTS

The 45 participants tested for this study had a mean age of 19.42+/-0.97 years, 64.4 % of them were female and 35.6 % were male. Among the participants, 20 % reported exercising regularly, whereas the other 80 % reported not doing so. With 31.1 %, "being bored when exercising and having poor motivation" was regarded as the primary barrier to regular exercise, followed by "I don't have time" with 22.2 %. While all of the participants said they used a smartphone, 86.7 % said they had no pain in their body for more than 3 months (Table 1).

Table 1. Demographic data and scores of scales.

Parameters		n	%
Gender	Female	29	64.4
	Male	16	35.6
Smoking	Yes	6	13.3
	No	39	86.7
Alcoholism	Yes	6	13.3
	No	39	86.7
Regularly exercise	Yes	9	20.0
	No	36	80.0
Reason for not regularly exercising	Lack of time	10	22.2
	Being bored when exercising and having poor motivation	14	31.1
	No suitable location	7	15.6
	Little knowledge about the benefits of exercise	2	4.4
Do you have pain in your body for more than 3 months?	Yes	6	13.3
	No	39	86.7

Table 1 (continued)

Scales	Mean±SD	Median (min-max)
EBS* exercise barrier	30.98±4.43	31 (19-42)
EBS exercise benefit	57.87±10.48	59 (31-91)
EBS	88.84±13.02	90 (57-127)
CMDQ*	30.4±62.27	7,5 (0-282)
SAS*	28.87±7.67	27 (13-47)

n: Number of Participants, %: Per cent, SD: Standard Deviation, Min: Minimum, Max: Maximum, EBS: Exercise Benefit/Barrier Scale, CMDQ: Cornell Musculoskeletal Disorder Questionnaire, SAS: Smartphone Addiction Scale

No statistically significant link was found between the scales (Table 2).

Table 2. Correlation between EBS, CMDQ and SAS.

CMDQ*		EBS* exercise barrier	EBS exercise benefit	EBS			
	r	0.052	-0.251	-0.170	0.135	0.006*	0.366
	p	0.736	0.097	0.263	0.032	0.408	0.446

p<0.05; Spearman correlation test; EBS: Exercise Benefit/Barrier Scale, CMDQ: Cornell Musculoskeletal Disorder Questionnaire, SAS: Smartphone Addiction Scale, r: Spearman's Correlation Coefficient

It was found that those who regularly exercised (regular exercise group-REG) had lower EBS (p=0.031), exercise benefit (p=0.029), and exercise barrier (p=0.251) scores than those who did not (non-regular exercise group-NREG), and that this difference was statistically significant. Right forearm pain scores (p=0.035) were found to be higher in REG than in NREG, and the difference was statistically significant. It was found that REG had higher median values for the CMDQ total score (p=0.052) than NREG, and the difference was quite near to the statistically significant level. It was revealed that REG had lower median SAS total scores (p=0.101) than NREG, but the difference was not statistically significant (Table 3).

Table 3. Comparison of participants' EBS, EBS exercise barrier scale, EBS exercise benefit scale, Neck pain, Shoulder pain, Back pain, Upper arm pain, Forearm pain, Wrist pain, CMDQ, SAS scores according to regular exercise status

	REG	NREG	*p*
EBS* (Mean±SD)	80.56±12.63	90.92±12.43	**0.031***
EBS exercise barrier (Mean±SD)	29.44±4.1	31.36±4.49	0.251*
EBS exercise benefit (Mean±SD)	51.11±10.55	59.56±9.89	**0.029***

Table 3 (continued)

Neck pain [Median (min-max)]	8.61±13.56	2.01±3.02	0.436**
Left shoulder pain [Median (min-max)]	4.78±7.38	2.36±6.10	0.294**
Back pain [Median (min-max)]	5.44±7.12	3.63±9.25	0.215**
Right upper arm pain [Median (min-max)]	7.33±13.93	0.97±2.68	0.292**
Right forearm pain [Median (min-max)]	3.78±6.12	0.38±1.41	**0.035****
Right wrist pain [Median (min-max)]	4.44±7.54	0.68±1.79	0.110**
CMDQ* [Median (min-max)]	12 (3-282)	5 (0-153)	0.052**
SAS* (Mean±SD)	25.11±9.16	29.81±7.08	0.101*

*p<0.05; *Independent t Test; **Mann Whitney U Test; REG: Regular Exercise Group; NREG: Non-regular Exercise Group; SD: Standard Deviation; EBS: Exercise Benefit/Barrier Scale; CMDQ: Cornell Musculoskeletal Disorder Questionnaire; SAS: Smartphone Addiction Scale*

DISCUSSION

In our study, we found that among first-year students of physiotherapy and rehabilitation, there was no statistically significant correlation between exercise perception, musculoskeletal pain, and smartphone addiction. However, it has been found that REG has a lower level of exercise perception, a higher level of musculoskeletal pain, especially a higher level of forearm pain, and a lower risk of smartphone addiction when the groups that REG or NREG are compared.

NREG had a high perception of exercise, a low level of musculoskeletal pain, and a high risk of smartphone addiction. Because of boredom, a lack of motivation, and a lack of time, we believe that the group had a strong belief in exercising but was unable to integrate it into their daily routine along with other regular activities. In a study on the reasons why university students don't exercise, it was found that there isn't enough time, there isn't enough will, and there isn't enough energy (DiSerio, 2021). Many research identified gender, age, lifestyle, socioeconomic situation, and lack of time as barriers to exercise and physical activity (Thwaite et al., 2020; Martins et al., 2021; Pedersen et al., 2021). NREG have a positive perception of exercise, which means that they are mindful of its advantages. Even though they did not routinely add exercise to their life, we can guess from the low level of musculoskeletal pain that they could still stay away from other situations that could cause musculoskeletal problems. We think daily phone use may be within certain limits given the high risk of smartphone addiction and the low musculoskeletal pain pattern. According to one study, a high prevalence of musculoskeletal pain in the neck, shoulders, and wrists/hands was strongly related to smartphone use for more than six hours per day. A high prevalence of musculoskeletal pain in the neck and wrists/hands was also observed to be strongly related to smartphone ownership for more than nine years (Mustafaoglu et al., 2021). Participants were not questioned about what they thought about the source of the pain they felt, what methods they used to cope with pain, or how many times they felt pain during the day/week. Despite the high level of smartphone addiction of the participants in this group, we think that since they have a high perception of exercise, they may have stopped using their smartphones when they felt pain, thus reducing the feeling of pain. Perhaps the source of the pain felt in this group may not be the smartphone.

Particularly in the REG, it was shown that exercise perception was low, musculoskeletal pain was high, and the risk of smartphone addiction was low. This can suggest that the activity is not long-term or that the appropriate type of exercise has been selected. Since the group that exercised regularly was not asked which exercises, how often, or for how long, it is unknown whether the exercise performed by the individuals is suitable or long-term. Exercise can have either short-term or long-term consequences on the human body, as is well known. According to a study, regional musculoskeletal adaptations and associated dysfunction can be reduced by long-term (approximately 4–16 weeks) exercise training (Laurin et al., 2019). This may help explain why musculoskeletal discomfort, particularly forearm pain, is still present despite regular exercise and a low risk of smartphone addiction. In addition, although the risk of smartphone addiction is low in this group, the high level of pain may suggest that students may use technologies other than smartphones (computer, television, PlayStation, etc.) to spend their spare time. In REG, we found that

the perception of exercise was low despite the fact that he was exercising regularly, and the level of pain was high although the risk of smartphone addiction was low. These suggest that there may not be a relationship between pain level and smartphone use in this group as well.

It was found that there was no statistical correlation between the scales when analyzing their correlation however Chovatiya et al. showed that there was a moderately positive relationship between the risk of smartphone addiction and musculoskeletal pain (Chovatiya et al., 2021). Since our study was a cross-sectional study involving first year students of Kırklareli University physiotherapy and rehabilitation department, we could only reach 45 students. However, Chovatiya et al conducted their study with 100 students (Chovatiya et al., 2021). We can say that the reason why no correlation was found between the scales we used in the study was the low number of people.

When we look at the general compatibility of our study with the literature, while some studies used questionnaires that question only upper extremity pain (Shah and Sheth, 2018; Baabdullah et al., 2020) together with the smartphone addiction questionnaire, we preferred to use the questionnaire that inquires about pain in the whole body (Alsalameh et al., 2019; Mustafaoglu et al., 2021) in our study. Because Özdinç and Turan have shown us that mobile phone use is also associated with all body parts except the neck and right shoulder in their study (Özdinç and Turan, 2019).

The risk of smartphone addiction has usually been studied in line with the theory of physical exercise in the literature. According to many researchers, after starting university, students found it challenging to decide between sedentary and physical activities (Carballo-Fazanes et al., 2020; Cahuas et al., 2020; Chacón-Cuberos et al., 2019). We suggest students recognize their bodies properly, select the most appropriate activity, and exercise at the appropriate time, and it should be planned sustainably for this reason. Thus, we think that their exercise perception can increase positively. It is reasonable to anticipate a decline in the risk of smartphone use leading to musculoskeletal pain. In other words, if the potential benefit of exercise improves, so may the rate of performing health-protective activities.

The main strength of this study is having no relationship among exercise perception and smartphone addiction. People can also practice their exercise at home or at work by using their smart phone by watching the video. However, this period of time when people exercise is also counted as the time spent on the phone during the day. Because smartphone usage was asked in general terms in the scale. In our opinion, with the addition of some special questions (exercising with exercise video, cooking with video recipe, doing research about hobby and watching videos), a more accurate inference can be reached by examining the purpose of people's smartphone use. In short, we can say that there is no correlation between the risk level of smartphone addiction and exercise perception in our participants for this reason.

The limitation of the study is no asking regular exercise details such as which exercise, how often, or since when. In addition, since we did not question the anxiety and depression levels of the individuals participating in our study, we could not determine whether the pain felt was psychological or physical. In future studies, the evaluation of the detailed of exercise program on regular exercise will be very valuable and needed.

In conclusion, there was no statistically significant correlation between exercise perception, musculoskeletal pain, and smartphone addiction. However, it has been found that students who have the habit of exercising regularly have a lower level of exercise perception, a higher level of musculoskeletal pain, especially a higher level of forearm pain, and a lower risk of smartphone addiction when the groups that do or do not exercise regularly are compared.

Ethical Approval

Ethical approval was obtained from Kırklareli University Health Sciences Ethics Committee (Protocol number: PR0360R0/2).

Authors' Contribution

Conceptualization, B.Ö.; methodology, B.Ö.; formal analysis, B.Ö. and B.Ç.; investigation, B.Ö. and O.G.; resources, B.Ö. and O.G.; data curation, B.Ö. and O.G.; writing-original draft preparation, B.Ö.; writing-review and editing, B.Ö., O.G. and B.Ç.; supervision, B.Ö and B.Ç.; project administration, B.Ö.

Conflicts of Interest

The authors declare no conflict of interest.

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Alotaibi, M. S., Fox, M., Coman, R., Ratan, Z. A., & Hosseinzadeh, H. (2022). Smartphone addiction prevalence and its association on academic performance, physical health, and mental well-being among university students in Umm Al-Qura

University (UQU), Saudi Arabia. Int J Environ Res Public Healt, 19(6), 3710. doi: 10.3390/ijerph19063710.

Alsalameh, A. M., Harisi, M. J., Alduayji, M. A., Almutham, A. A., & Mahmood, F. M. (2019).Evaluating the relationship between smartphone addiction/overuse and musculoskeletal pain among medical students at Qassim University. J Family Med Prim Care, 8(9), 2953-2959. doi: 10.4103/jfmpc.jfmpc_665_19

Baabdullah, A., Bokhary, D., Kabli, Y., Saggaf, O., Daiwali, M., & Hamdi, A. (2020). The association between smartphone addiction and thumb/wrist pain: a cross-sectional study. *Medicine (Baltimore),* 99(10), e19124. doi: 10.1097/MD.0000000000019124.

Cahuas, A., He, Z., Zhang, Z., & Chen, W. (2020). Relationship of physical activity and sleep with depression in college students. *J Am Coll Health*, 68(5), 557-564. doi: 10.1080/07448481.2019.1583653.

Carballo-Fazanes, A., Rico-Díaz, J., Barcala-Furelos, R., Rey, E., Rodríguez-Fernández, J. E., Varela-Casal, C.,et al. (2020). Physical activity habits and determinants, sedentary behaviour and lifestyle in university students. *Int J Environ Res Public Health,* 17(9), 3272. doi: 10.3390/ijerph17093272.

Chacón-Cuberos, R., Zurita-Ortega, F., Olmedo-Moreno, E. M., & Castro-Sánchez, M. (2019). Relationship between academic stress, physical activity and diet in university students of education. *Behav Sci (Basel),* 9(6), 59. doi: 10.3390/bs9060059

Chovatiya, N. K., Chaudhary, H. S., & Kanabar, N. S. (2021). Correlation of smartphone addiction with musculoskeletal discomfort and neck disability among college students. *Int J Community Med Public Health,* 8(9), 4357. doi: https://doi.org/10.18203/2394-6040.ijcmph20213536

DiSerio, A. M. (2021). Barriers to physical activity in university students referred to an exercise is medicine on campus program. *Theses and Dissertations*. 1361. doi: https://doi.org/10.30707/ETD2021.20210719070603173447.85

Erdinc, O., Hot, K., & Ozkaya, M. (2011). Turkish version of the Cornell Musculoskeletal Discomfort Questionnaire: cross-cultural adaptation and validation. *Work*, 39(3), 251-260. doi: 10.3233/WOR-2011-1173.

Frederick, G. M., Williams, E. R., Castillo-Hernández, I. M., & Evans, E. M. (2022). Physical activity and perceived benefits, but not barriers, to exercise differ by sex and school year among college students. *J Am Coll Health,* 70(5), 1426-1433. doi: 10.1080/07448481.2020.1800711.

Glowinski, S., Bryndal, A., & Grochulska, A. (2021). Prevalence and risk of spinal pain among physiotherapists in Poland. *PeerJ*, 9, e11715. doi: 10.7717/peerj.11715.

Kazeminasab, S., Nejadghaderi, S. A., Amiri, P., Pourfathi, H., Araj-Khodaei, M., Sullman, M. J. M., et al. (2022) Neck pain: global epidemiology, trends and risk factors. *BMC Musculoskelet Disord,* 23(1), 26. doi: 10.1186/s12891-021-04957-4.

Laurin, J. L., Reid, J. J., Lawrence, M. M., & Miller, B. F. (2019). Long-term aerobic exercise preserves muscle mass and function with age. *Curr Opin Physiol*, 10, 70-74. doi:10.1016/j.cophys.2019.04.019

Martins, L. C. G., Lopes, M. V. D. O., Diniz, C. M., & Guedes, N. G. (2021). The factors related to a sedentary lifestyle: a meta-analysis review. *J Adv Nurs,* 77(3), 1188-1205. doi: 10.1111/jan.14669..

Mustafaoglu, R., Yasaci, Z., Zirek, E., Griffiths, M. D., & Ozdincler, A. R., (2021). The relationship between smartphone addiction and musculoskeletal pain prevalence among young population: a cross-sectional study. *Korean J Pain,* 34(1), 72-81. doi: 10.3344/kjp.2021.34.1.72.

Noyan, C. O., Darcin, A. E., Nurmedov, S., Yilmaz, O., & Dilbaz, N. (2015). Akıllı Telefon Bağımlılığı Ölçeğinin kısa formunun üniversite öğrencilerinde türkçe geçerlilik ve güvenilirlik çalışması. *Anadolu Psikiyatri Derg*, 16(S1), 73-82. doi: 10.5455/apd.176101

Ortabag, T., Ceylan, S., Akyuz, A., & Bebis, H. (2010). The validity and reliability of the Exercise Benefits/Barriers Scale for Turkish military nursing students. *SAJR SPER,* 32(2), 55-70. doi:10.4314/sajrs.v32i2.59297

Özdinç, S., & Turan, F.N. (2019). Sağlık bilimleri fakültesi öğrencilerinde kas iskelet sistemi problemleri ile fiziksel aktivite ve stres düzeyi arasındaki ilişkinin incelenmesi. *HSP,* 6(2), 247-255. doi: 10.17681/hsp.434594

Pedersen, M. R. L., Hansen, A. F., & Elmose-Østerlund, K. (2021). Motives and barriers related to physical activity and sport across social backgrounds: implications for health promotion. *Int J Environ Res Public Health,* 18(11), 5810. doi: 10.3390/ijerph18115810.

Shah, P. P., & Sheth, M. S., (2018).Correlation of smartphone use addiction with text neck syndrome and SMS thumb in physiotherapy students. *Int J Community Med Public Health,* 5(6), 2512–2516. doi:https://doi.org/10.18203/23946040.ijcmph20182187

Thwaite, T. L., Heidke, P., Williams, S. L., Vandelanotte, C., Rebar, A. L., & Khalesi, S. (2020). Barriers to healthy lifestyle behaviors in Australian nursing students: a qualitative study. *Nurs Health Sci,* 22(4), 921-928. doi: 10.1111/nhs.12749.

Wang, Y., Zhang, M., Wu, J., Zhang, H., Yang, H., Guo, S., et al. (2023). Effects of the interactive features of virtual partner on individual exercise level and exercise perception. *Behav Sci (Basel),* 13(5), 434. doi: 10.3390/bs13050434.

Yang, Y., Zeng, J., Liu, Y., Wang, Z., Jia, N., & Wang, Z., (2022). Prevalence of musculoskeletal disorders and their associated risk factors among furniture manufacturing workers in guangdong, china: a cross-sectional study. *Int J Environ Res Public Health*, 19(21), 14435. doi: 10.3390/ijerph192114435.

Zhao, Z., Zhao, S., Wang, Q., Zhang, Y., & Chen, C., (2022). Effects of physical exercise on mobile phone addiction in college students: the chain mediation

effect of psychological resilience and perceived stress. *Int J Environ Res Public Health*, 19(23), 15679. doi: 10.3390/ijerph192315679.