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Smartphone addiction and perceived pain among nursing students: a cross-sectional study

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ABSTRACT

This study investigates smartphone addiction among nursing students, the levels of perceived pain in the upper extremity, and the relationship between them. A cross-sectional study was conducted with 259 nursing students in a Turkish state university, who agreed to participate in the research. Study data were collected online using the introductory questionnaire, smartphone addiction scale-short version (SAS-SV), and numeric rating scale (NRS). The data were evaluated by descriptive statistics and simple linear regression analysis. The SAS-SV score of students included in the study was 25.71 ± 7.49. It was determined that all of the students experienced burning in the ears, pinkie, elbow, shoulder, wrist, eye, hand and neck pain due to telephone use. In the study, it was determined that the SAS-SV scores of the students were found to be higher 7.4 times in those with the highest level of headache; 6.8 times in those with the highest level of ear pain; 8.4 times in those with the highest level of shoulder pain; 8.2 times in those with the highest level of low back pain. The study established that students were experiencing a low level of smartphone addiction; however, various health and social problems associated with phone use and smartphone addiction caused pain in certain extremities.

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KEYWORDS
Smartphone; pain perception; students; nursing; addictive

Introduction

Today, the use of the internet and smartphones has increased in the world with the developing technology. The use of the Internet and smartphones makes human life easier and provides many facilities. Although such features that make life easier have made them an inseparable part of our lives, they have also led to the emergence of some types of technological addiction. It has been reported that excessive smartphone use and problematic internet use negatively affect both physical and psychological health in university students (Alsalameh et al., 2019; I. Chen et al., 2020a; Elserty et al., 2020; Kim et al., 2020; Yang et al., 2018). In the literature, it is seen that there are many studies evaluating the internet and smartphone addiction status of university students with different scales (Leung et al., 2020; Chen et al., 2020b; Lin et al., 2019).

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The prevalence of smartphone addiction and increase in the associated musculoskeletal problems, especially among young people, is known worldwide. Several studies conducted with university students have found an association between smartphone addiction and symptoms of the musculoskeletal problems (Al-Hadidi et al., 2019; Choi, 2018; Csibi et al., 2019; Elserty et al., 2020; Kamel et al., 2020; Kim & Kim, 2015; Namwongsa et al., 2018; Yang et al., 2017), of which the common problems mentioned in the literature include upper extremity problems of neck, shoulders, arms, hands, and wrists (Yılmaz et al., 2017; Alruzayhi et al., 2018; Alsalameh et al., 2019; Chan et al., 2020).

Moreover, musculoskeletal problems, especially upper extremity pain, are currently among the common problems among healthcare workers (Freimann et al., 2013; Hämmig, 2020). A systematic review of musculoskeletal disorders among nurses determines that nurses often experience pain in the waist, neck, shoulders, back, legs, arms, hands, wrists, and knees (Erdoğan & Örsal, 2019). Santos et al. (2017) establishes that 96.9% of nurses suffer from musculoskeletal pain in at least one part of their body within the last 12 months. Attar (2014) demonstrates that approximately 85% of nurses experience at least one symptom of the musculoskeletal disorder, with the most common symptoms being in the waist (65.7%), ankles or feet (41.5%), and shoulders (29%). Similarly, Oliveira et al. (2017) with their study on nursing students, report the most common symptoms of the musculoskeletal disorder within the last 12 months to be in the back (73.8%), waist (67.1%), and shoulders (52.3%). Furthermore, Elsayed (2019) establishes that more than half of nursing students experience pain in the neck (52.2%), shoulders (56.5%), and waist (71.1%). These results are pertinent for nursing students yet to face professional risks directly. Relevant studies highlight that further research is needed on musculoskeletal problems especially among nursing students, and information regarding risk factors and formation is required. Therefore, it is important to assess smartphone addiction, known to cause musculoskeletal problems, in terms of risk reduction (Oliveira et al., 2017).

Studies conducted with students, who will become healthcare workers of the future, found that smartphone addiction is prevalent and that students experience pain particularly related to the upper extremities, such as neck, waist, shoulder, hand and wrist (Alsalameh et al., 2019; Chan et al., 2020; Elserty et al., 2020). Previous studies have determined a relationship between the frequency of physical symptoms and high levels of smartphone addiction among nursing students (Dan et al., 2015; Yılmaz et al., 2017). Since the nursing profession requires physical effort along with mental exertion, physical problems experienced during student days are believed to worsen the health of students or to adversely affect the quality of nursing care when they start their professional life.

The widespread use of smartphones nowadays suggests that nursing students may be more severely affected in terms of musculoskeletal disorders. The present study examines smartphone addiction among nursing students in a state university, the levels of perceived pain in upper extremities, and the relationship between them.

Study questions

- What are the features of the smartphone and the manner of smartphone use among nursing students?
- What is the distribution of smartphone addiction scale scores among nursing students?

- What is the level of pain perceived by nursing students due to phone use?

Study hypothesis

H1: There is a linear relationship between nursing students' smartphone addiction and perceived pain.

Methods

Design and setting

This was a cross-sectional study.

Participation

The study was conducted with nursing students in the 1st, 2nd, 3rd, and 4th grades in the School of Nursing, Faculty of Health Sciences, Ordu University. The participants were determined on the basis of the main criterion of an active attendance in the theory and practice of applied courses during the spring semester.

Sample size

The study population consisted of 422 students during the 2019–2020 academic year. The study sample size was calculated as 259 at a 95% confidence interval based on an effect size of 0.2 and a study power of 0.80. In the study, 61% of the population was reached.

The study used the stratified sampling method to select the individuals composing the study sample. First, each grade was divided as one stratum, and the stratum's weight was calculated as 259/422 = 0.61 by the sample/population procedure. Thereafter, the number of students in each grade was multiplied by 0.61 to determine the sample size for each grade. Further, a grade list was created to determine the students to be included in the sample group, and each student was given a sequence number starting at 1. Since the population/sample was 422/259 = 1.62, the student selection was started by adding 2 to the sequence number of a randomly determined student. Student selection was terminated when the sample size was reached.

Inclusion criteria for the study group

Among the students of the School of Nursing, Faculty of Health Sciences, Ordu University, the study included those:

- Without any acute or chronic disease related to the musculoskeletal system,
- In 1st, 2nd, 3rd, and 4th grades,
- Using smartphones,
- Volunteered to participate in the research.

Instruments used

Study data were collected using the introductory questionnaire, smartphone addiction scale-short version (SAS-SV), and numeric rating scale (NRS).

Introductory questionnaire

The introductory questionnaire was prepared by researchers based on literature review (Alruzayhi et al., 2018; Alsalameh et al., 2019; Choi, 2018; Elserty et al., 2020; Kamel et al., 2020; Kim & Kim, 2015; Namwongsa et al., 2018). It consisted of three parts comprising questions on the socio-demographic characteristics of participants (7 questions), smartphone features and manner of smartphone use (11 questions), and problems related to smartphone use and upper extremity (2 questions).

Numeric rating scale

The NRS, used to determine the severity of pain, allows people to express their pain with numbers. It includes 'no pain' on the far left and 'unbearable pain' on the far right, with numbers from 0 to 10 at equal intervals. Patients are asked to rate the amount of their pain at the time of evaluation by using the representative number (Hawker et al., 2011). NRS is a reliable and valid method that evaluates subjective pain intensity and does not require verbal or literacy skills. This scale is a numerical scoring, easy to use and widely used internationally (Al-Hadidi et al., 2019; Yeşilyurt & Faydalı, 2020).

Smartphone addiction scale-short version

The SAS-SV, a 10-item scale developed by Kwon et al. (2013) to establish the risks of mobile phone addiction for adult adolescents, is a 6-point Likert (1 = Strongly Disagree; 6 = Strongly Agree) type instrument. The highest and lowest possible scores of the scale are 60 and 10, respectively. The level of addiction increases with higher scores. The scale has a single-factor structure with no sub-dimensions. The authors calculated the internal consistency coefficient of the scale as 0.91. The scale was adapted into Turkish by Noyan et al. (2015), who reported a reliability coefficient of 0.86 for the scale. In the present study, Cronbach's alpha of the scale was found to be 0.81.

Data collection

Prior to data collection, an introductory questionnaire was distributed to 10 nursing students, who were not included in the sample group, for comprehensibility; thereupon, incomprehensible parts were revised and the final version was obtained. Online forms were designed such that each participant could fill out only once. The aim and goal of the research were explained to each participant through social media groups belonging to the students before submitting the link and a description section provided with the link. The forms comprised a confirmation box indicating that students agree to participate in the research; accordingly, those who marked that box were included in the study. Data were collected using data collection forms through a link sent to students via social media accounts

between May 15 and 1 June 2020. The students filled out the questionnaire whenever and wherever they wanted (in their own homes or dormitories, etc.). In order not to affect the reliability of the data, the data were collected outside the exam week and close to it.

Data analysis

The study used percentage and number for the analysis of students' descriptive characteristics. Normal distribution of the data was analyzed using the Shapiro–Wilk test. The SAS-SV scale scores and perceived pain levels were analyzed using mean, standard deviation, median, and minimum–maximum values. A ordinal regression analysis was employed to determine the extent to which pain levels could be predicted by the smartphone addiction among students. The significance level was accepted as $p < 0.05$.

Ethical considerations

Before initiating the study, approvals from the Ethics Committee (Date-Number: 03.12.2020-36) and the Head of Department of Ordu University were obtained. Approvals were also taken from the authors of the scales used in the study. Furthermore, information regarding the purpose, plan, and duration of the study were explained to the participants and their informed consent were obtained. Written permission also was obtained from the students, and photographs of pinkie finger deformation were used with the consent of the interviewed students. For the students, photographs that did not include their faces were used.

Results

Among study participants, 57.1% of the students were aged 18–20 years, 80.7% were female, and all were single. Of students, 77.6% stated that their income met their expenses; 92.3% had health insurance, while 96.9% were not working at any job; and 73% were staying in a dormitory (Table 1).

The mean smartphone addiction scale score of the students included in the study was 25.71 ± 7.49. Smartphone features and smartphone use-related manners of students are presented in Table 2. Accordingly, 83.8% of students had a phone with a screen size above 5 inches and 47.9% had a phone with a weight over 160 grams. Of the students, 73.4% had been using a smartphone for 3–7 years, 44.0% spent 3–5 hours a day on their phone, and 84.9% were using their phone to access social media or networking sites. Moreover, 43.2% of students stated that they used their phone within the first half hour of waking up in the morning, while 50.6% used their phone immediately before they went to sleep. Of the students, 43.2% stated that they held the phone with their pinkie while supporting with other fingers when they were looking at the phone; whereas, 53.3% held the phone with fingers other than the pinkie when they were talking. Among students, 86.1% held the phone with their right hand, while 84.6% looked at the phone at a distance of less than 40 cm. (Table 2).

Subjective issues reported by students regarding smartphone use are presented in Figure 1. Depending on phone use, all students expressed that they were experiencing a burning sensation in the ears (Figure 1).

Table 1. The distribution of sociodemographic characteristics nursing students (N = 259).

Variables	n	%
Age		
18–20	148	57.1
21–23	111	42.9
Gender		
Female	209	80.7
Male	50	19.3
Marital status		
Single	259	100.0
Income status		
Personal income cover the expense	201	77.6
Personal income doesn't cover the expense	58	22.4
Health insurance status		
Yes	239	92.3
No	20	7.7
Working status		
Working	8	3.1
Not working	251	96.9
Place of Residence		
Home	70	27.0
Dormitory	189	73.0

The distribution of the perceived pain levels of students is presented in Figure 2. The most common problems experienced by students depending on phone use were pain in pinkie, elbows, shoulders, wrists, hands, neck, and lower back (Figure 2).

Ordinal regression analysis between the students' perceived pain level averages and the SAS-SV scale score is given in Table 3. There is no statistically significant difference between the eye, neck, elbow, wrist, hand, and Pinky pain levels of the students in terms of the total score of SAS-SV ($p > 0.05$). There is a statistically significant difference between the head, ear, shoulder, and lower back pain levels of the students in terms of the total score of SAS-SV ($p < 0.05$). Accordingly, it was determined that the SAS-SV scores of the students were found to be higher 7.4 times in those with the highest level of headache; 6.8 times in those with the highest level of ear pain; 8.4 times in those with the highest level of shoulder pain; 8.2 times in those with the highest level of low back pain.

Discussion

The use of smartphones is increasing worldwide with each passing day. Previous studies have reported that some age groups are at greater risk for smartphone addiction. Young people are particularly considered one of the high-risk groups in terms of addictive behavior, and it is stated that the focus should be on this group in prevention studies (Csibi et al., 2019). Therefore, it is highly important to determine the level of addiction in this group. Several relevant studies from various countries have established low or moderate levels of smartphone addiction among young people (Noyan et al., 2015; Yang et al., 2018; Tateno et al., 2019; Yang et al., 2019; Chen et al. 2020a). Yılmaz et al. (2017) conducted a study on nursing students and found a mean total SAS-SV score of 23.3 ± 10.2, which is low. The present study determined a low level of smartphone addiction with a mean score of 25.71 ± 7.49, which is consistent with previous studies.

Table 2. Distribution of students according to their characteristics regarding smartphone and smartphone use.

Variables	n	%
Smartphone usage time 6.41 ± 2.07		
Phone screen size		
Under 5 inches	42	16.2
5 inches and above	217	83.8
Phone weight		
160 g and below	135	52.1
Over 160 g	124	47.9
Time spent using the phone in one day		
1–3 hours	62	24.0
3–5 hours	114	44.0
5 hours or more	83	32.0
Telephone use purpose*		
Video and voice call	120	46.8
Messaging	176	67.9
Accessing social networking sites	220	84.9
Accessing the internet/website	150	57.9
Playing games	183	70.6
Music/podcasts/radio	160	61.7
Take a photo/video	175	67.5
Watching videos/tv/movies	179	69.1
Reading books/magazines	172	27.7
Map/navigation	177	68.3
e-mail	181	69.8
When you wake up in the morning it's time to use the phone		
When I wake up	74	28.6
In the first half hour	112	43.2
Within the first hour	45	17.4
After the first hour	28	10.8
It's time to use the phone before going to sleep at night		
Just before going to sleep	131	50.6
Last half hour	88	34.0
Last hour	29	11.2
Before 1 hour	11	4.2
Holding position while looking to the phone		
Holding by supporting with little finger and other fingers	73	28.2
Holding with other fingers except the little finger	112	43.2
Holding with other fingers except the little finger	74	28.6
Grabing position of the phone while talking		
Holding on little finger with supporting	114	44.0
Grasping with all other fingers except the little finger	138	53.3
Different holding styles	7	2.7
The hand that uses the phone most often		
Right hand	223	86.1
Left hand	12	4.6
Both hands	24	9.3
The distance to look the phone		
Less than 40 cm	219	84.6
More than 40 cm	40	15.4

*More than one answer was given.

This study found that most students (83.8%) had a phone with a screen size above 5 inches and almost half (47.9%) had a phone weighing above 160 grams. A previous study established a positive correlation between back pain and the liquid crystal display size of the smartphone (Kim & Kim, 2015). Although hand pain in particular is associated with many causes (Kamel et al., 2020), the high values of phone screen size and weight among the majority of students, use of phone at a close distance, and use of the pinkie for holding the phone while looking (28.2%) or talking (44%) might have caused pain in the wrist, pinkie, elbows, shoulders, neck, lower back, including the hand.

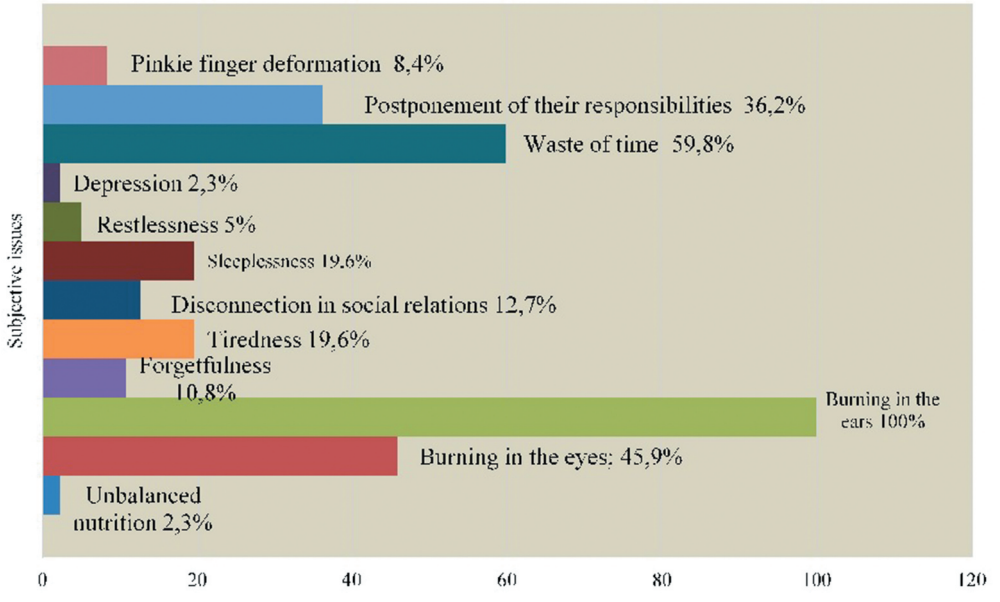


Figure 1. Subjective issues reported by students regarding smartphone use.

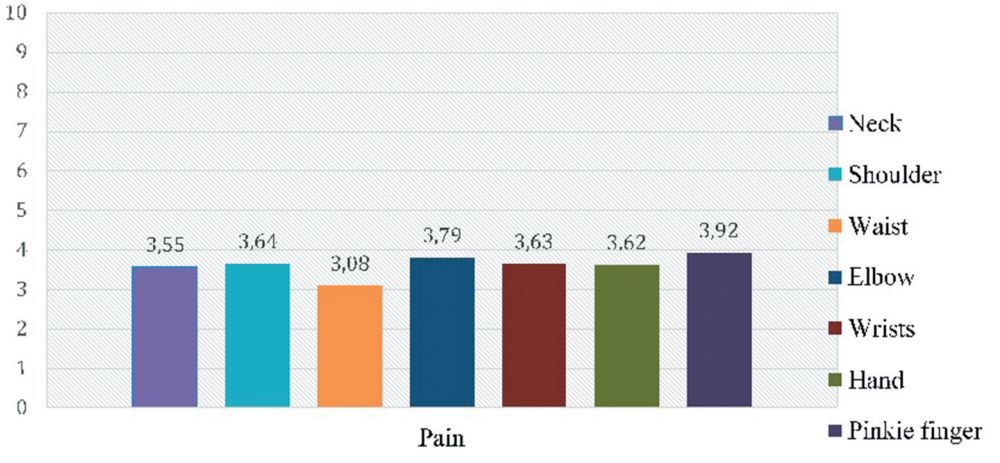


Figure 2. Distribution of the perceived pain levels of students.

Additionally, the literature reports several physical and psychosocial problems associated with smartphone use (Elserty et al., 2020; Kim et al., 2020; Shoukat, 2019). In the present study, the most common subjective problems related to smartphone use among students were burning sensation in ears (100%) and eyes (45.9%), headache (37.8%), and fatigue and lack of sleep (19.6%). The majority of students stated that smartphone use caused a waste of time (59.8%) and postponement of their responsibilities (36.2%). All of these problems are believed to adversely affect the physical and psychosocial health of students while being factors that may negatively affect their vocational training in theory and clinical applications that require intense attention. Finally, pinkie finger deformation

Table 3. The distribution of the perceived pain levels of students and the analysis of Ordinal regression between such levels and the SAS-SV score (N = 259).

Parameter Estimates							Goodness-of-Fit (Pearson)	
Pain Area	Level of Pain	Estimate (β)	S.E.	Wald	p	Confidential Interval (Lower-Upper)	Chi-Square	p
Headache	[Headache level = 0]	1,454	0,418	12,084	0,001	0,634–2,274	311,338	0,046*
	[Headache level = 1]	2,147	0,430	24,971	0,001	1,305–2,989		
	[Headache level = 2]	2,761	0,443	38,814	0,001	1,892–3,629		
	[Headache level = 3]	3,948	0,480	67,735	0,001	3,008–4,888		
	[Headache level = 4]	4,687	0,517	82,174	0,001	3,673–5,700		
	[Headache level = 5]	5,355	0,573	87,214	0,001	4,231–6,479		
	[Headache level = 6]	6,068	0,675	80,725	0,001	4,744–7,392		
	[Headache level = 7]	7,465	1,099	46,114	0,001	5,311–9,620		
Location	SAS-SV total	0,069	0,016	19,400	0,001	0,038–0,099		
Earache	[Earache level = 1]	3,561	0,817	18,974	0,001	1,959–5,163	232,005	0,001*
	[Earache level = 2]	4,180	0,841	24,697	0,001	2,531–5,828		
	[Earache level = 3]	4,826	0,881	29,974	0,001	3,098–6,554		
	[Earache level = 4]	5,693	0,986	33,370	0,001	3,762–7,625		
	[Earache level = 5]	6,802	1,283	28,131	0,001	4,289–9,316		
Location	SAS-SV total	0,046	0,028	2,644	0,104	−0,009–0,101		
Eye Pain	[Eye pain level = 1]	1,686	0,432	15,214	0,001	0,839–2,533	335,781	0,109
	[Eye pain level = 2]	2,430	0,446	29,646	0,001	1,555–3,305		
	[Eye pain level = 3]	3,128	0,463	45,565	0,001	2,220–4,037		
	[Eye pain level = 4]	3,478	0,474	53,888	0,001	2,549–4,407		
	[Eye pain level = 5]	4,229	0,504	70,439	0,001	3,241–5,216		
	[Eye pain level = 6]	5,098	0,566	81,251	0,001	3,990–6,207		
	[Eye pain level = 7]	5,941	0,681	76,140	0,001	4,606–7,275		
	[Eye pain level = 8]	6,641	0,847	61,501	0,001	4,982–8,301		
	[Eye pain level = 9]	7,337	1,106	44,035	0,001	5,170–9,505		
Location	SAS-SV total	0,064	0,016	16,263	0,001	0,033–0,095		
Neck Pain	[Neck pain level = 1]	2,997	0,500	35,983	0,001	2,018–3,976	251,789	0,793
	[Neck pain level = 2]	3,632	0,517	49,273	0,001	2,618–4,647		
	[Neck pain level = 3]	4,291	0,539	63,412	0,001	3,235–5,347		
	[Neck pain level = 4]	4,819	0,559	74,190	0,001	3,722–5,915		
	[Neck pain level = 5]	5,602	0,603	86,291	0,001	4,420–6,785		
	[Neck pain level = 6]	6,521	0,698	87,347	0,001	5,153–7,888		
	[Neck pain level = 7]	7,455	0,890	70,156	0,001	5,710–9,199		
	[Neck pain level = 8]	8,152	1,139	51,266	0,001	5,920–10,383		
Location	SAS-SV total	0,091	0,018	26,387	0,001	0,056–0,126		
Shoulder Pain	[Shoulder pain level = 1]	3,945	0,604	42,654	0,001	2,761–5,129	333,253	0,006*
	[Shoulder pain level = 2]	4,569	0,625	53,434	0,001	3,344–5,794		
	[Shoulder pain level = 3]	4,960	0,640	60,113	0,001	3,706–6,214		
	[Shoulder pain level = 4]	5,502	0,664	68,686	0,001	4,201–6,803		
	[Shoulder pain level = 5]	6,475	0,733	78,015	0,001	5,038–7,912		
	[Shoulder pain level = 6]	6,827	0,773	77,974	0,001	5,312–8,342		
	[Shoulder pain level = 7]	7,349	0,857	73,578	0,001	5,670–9,028		
	[Shoulder pain level = 8]	8,454	1,184	51,004	0,001	6,134–10,774		
Location	SAS-SV total	0,101	0,020	24,317	0,001	0,061–0,141		
Backache	[Backache level = 1]	4,839	0,854	32,149	0,001	3,167–6,512	267,988	0,001*
	[Backache level = 2]	5,477	0,880	38,762	0,001	3,753–7,202		
	[Backache level = 3]	6,040	0,911	43,946	0,001	4,254–7,826		
	[Backache level = 4]	7,592	1,115	46,392	0,001	5,407–9,776		
	[Backache level = 5]	8,287	1,324	39,162	0,001	5,692–10,883		
Location	SAS-SV total	0,095	0,028	11,839	0,001	0,041–0,149		

(*Continued*)

Table 3. (Continued).

Parameter Estimates							Goodness-of-Fit (Pearson)	
Pain Area	Level of Pain	Estimate (β)	S.E.	Wald	p	Confidential Interval (Lower-Upper)	Chi-Square	p
Elbow Pain	[Elbow pain level = 1]	3,968	0,765	26,875	0,001	2,468–5,468	200,416	0,959
	[Elbow pain level = 2]	4,445	0,782	32,304	0,001	2,912–5,978		
	[Elbow pain level = 3]	5,041	0,811	38,672	0,001	3,452–6,630		
	[Elbow pain level = 4]	5,381	0,833	41,692	0,001	3,748–7,015		
	[Elbow pain level = 5]	5,870	0,879	44,560	0,001	4,147–7,594		
	[Elbow pain level = 7]	6,389	0,953	44,916	0,001	4,521–8,258		
	[Elbow pain level = 8]	7,497	1,257	35,575	0,001	5,033–9,960		
Location	SAS-SV total	0,070	0,026	7,400	0,007	0,020–0,120		
Wrist Pain	[Wrist pain level = 1]	3,220	0,562	32,817	0,001	2,119–4,322	267,711	0,939
	[Wrist pain level = 2]	3,794	0,579	42,983	0,001	2,660–4,928		
	[Wrist pain level = 3]	4,388	0,599	53,603	0,001	3,214–5,563		
	[Wrist pain level = 4]	4,958	0,626	62,685	0,001	3,730–6,185		
	[Wrist pain level = 5]	5,625	0,675	69,500	0,001	4,303–6,948		
	[Wrist pain level = 6]	5,922	0,706	70,379	0,001	4,538–7,305		
	[Wrist pain level = 7]	6,335	0,763	68,883	0,001	4,839–7,831		
	[Wrist pain level = 8]	6,627	0,816	65,896	0,001	5,027–8,227		
	[Wrist pain level = 9]	7,734	1,155	44,863	0,001	5,471–9,998		
Location	SAS-SV total	0,078	0,019	16,023	0,001	0,040–0,116		
Hand Paint	[Hand pain level = 1]	3,107	0,529	34,512	0,001	2,071–4,144	252,846	0,779
	[Hand pain level = 2]	3,653	0,544	45,051	0,001	2,586–4,720		
	[Hand pain level = 3]	4,433	0,571	60,349	0,001	3,315–5,552		
	[Hand pain level = 4]	5,000	0,596	70,318	0,001	3,832–6,169		
	[Hand pain level = 5]	5,679	0,643	78,075	0,001	4,419–6,938		
	[Hand pain level = 6]	5,801	0,654	78,717	0,001	4,520–7,083		
	[Hand pain level = 7]	6,284	0,710	78,342	0,001	4,893–7,676		
	[Hand pain level = 8]	7,213	0,897	64,717	0,001	5,456–8,970		
Location	SAS-SV total	0,084	0,019	20,509	0,001	0,048–0,120		
Pinkie Finger Pain	[Pinkie finger pain level = 1]	2,129	0,506	17,711	0,001	1,137–3,120	284,811	0,791
	[Pinkie finger pain level = 2]	2,668	0,517	26,611	0,001	1,654–3,681		
	[Pinkie finger pain level = 3]	3,156	0,530	35,407	0,001	2,116–4,195		
	[Pinkie finger pain level = 4]	3,630	0,548	43,894	0,001	2,556–4,704		
	[Pinkie finger pain level = 5]	3,860	0,559	47,697	0,001	2,764–4,955		
	[Pinkie finger pain level = 6]	4,146	0,576	51,874	0,001	3,018–5,275		
	[Pinkie finger pain level = 7]	5,365	0,712	56,781	0,001	3,969–6,760		
	[Pinkie finger pain level = 8]	6,066	0,870	48,587	0,001	4,360–7,772		
	[Pinkie finger pain level = 9]	6,764	1,121	36,370	0,001	4,565–8,962		
Location	SAS-SV total	0,045	0,018	6,120	0,013	0,009–0,080		

*p < 0,05

(smartphone pinkie) of 8.4% is relatively low when compared to other problems experienced by students, but this is still a remarkable finding considering the development of a deformity (Photograps 1).

The increased use of smartphones has led to various problems in the upper extremities. Many previous studies established a relationship between the problematic smartphone use and the symptoms of the upper extremities. Kim and Kim (2015) demonstrate that the most painful body areas after smartphone use were the shoulders and the neck. Similarly, Alsalameh et al. (2019) determine the most frequent areas of pain due to smartphone addiction to be the neck (60.8%), waist (46.8%), and shoulders (40.0%). In the study of Yang et al., 52% of the adolescents had neck, 46.4% shoulder, 24.5% upper back, 37.4% lower back, 13.3% elbows, 16.2% wrists and hands problems and the duration of talking on the phone was found to be associated with upper back pain (Yang et al., 2017). They also found a significant relationship between musculoskeletal pain in certain areas of the body (neck, wrist, hands, and knees) and smartphone addiction (Alsalameh et al., 2019). Further, Ahmed et al. (2019) demonstrate neck pain among 46.9% and thumb pain among 29.2% of the participants due to prolonged use of smartphones. Similarly, phone overuse was found to enlarge the median nerve, cause pain in the thumb, and reduce the grip strength and hand functions (Inal et al., 2015). Likewise, studies conducted with nursing students determined a relationship between smartphone and Internet addiction levels and upper extremity functional activity levels (Yılmaz et al., 2017). In a study that evaluated the relationship between smartphone use and neck pain, the prevalence of neck pain was found significantly higher in physiotherapy and nursing students than other students (26.5%, 26.1%, respectively), and prolonged use of smartphones was associated with the presence of neck pain (Chan et al., 2020). The study by Choi (2018), in turn, found that 39.1% of students experienced physical pain during smartphone use, while the most common pain areas were wrist, fingers, and neck. In the present study, students also suffered most from head, ear, shoulder and backache caused by phone use ($p < 0,05$).

Nursing profession cannot be replaced by machines; it requires the use of hands and involves communicative and emotional dimensions. Smartphone addiction and the associated problems are believed to have negative effects both on the health of nursing students during their professional practice and the quality of nursing care in the future. In fact, it is reported that shoulder, neck, wrist, and back pain are common among nurses during patient care (Lin et al., 2020). The matter of smartphone use appears as a preferential subject to be addressed in nursing education to minimize risks and protect the health of nurses, who constitute a high-risk group in terms of musculoskeletal disorders.

Conclusions

In conclusion, the study found that although nursing students had a low level of smartphone addiction, they experienced many problems related to smartphone use. Further, it was determined that smartphone addiction was associated with physical pain in certain areas of the body. The study has important findings for improving smartphone addiction and physical pain symptoms among nursing students. The results of this study are considered important in terms of improving the health of nursing students as well as protecting their health in terms of future musculoskeletal system problems.

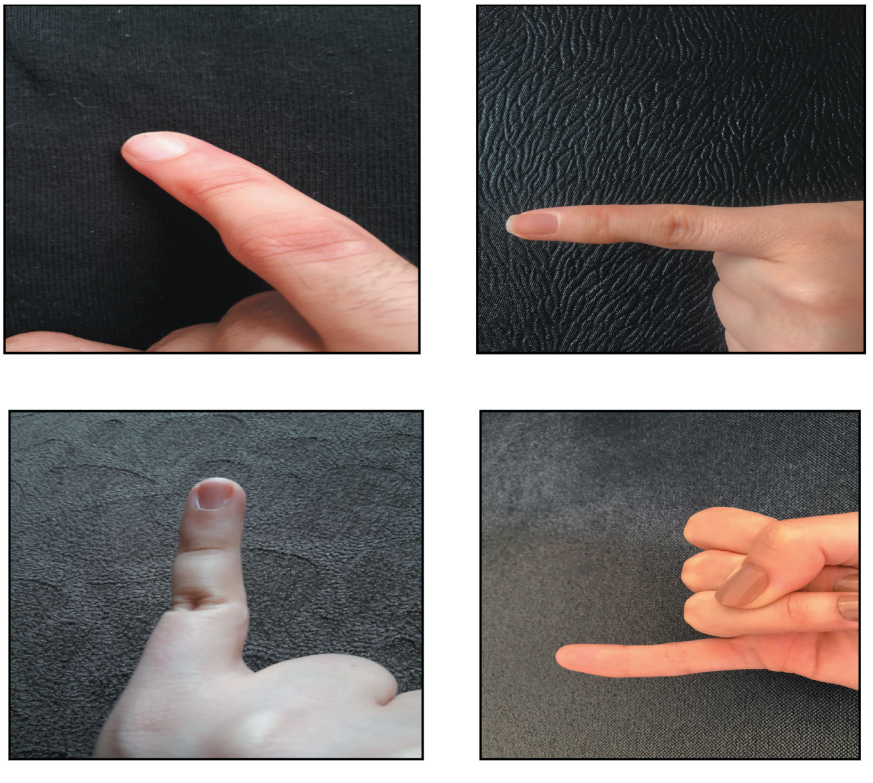
Minimizing these problems related to smartphone use during studentship is also important in terms of the quality of patient-care services in the future. Therefore, it is recommended to address smartphone use and associated risks during undergraduate education to develop positive phone use behaviors among nursing students.

Longitudinal studies that examine the effect of smartphone use and addiction in terms of musculoskeletal disorder experienced during professional life will contribute to elucidate the issue. Performing experimental studies and including interventions in nursing curriculum can be recommended for solving current problems experienced by students due to smartphone use.

Given that the phone features such as weight, screen size, etc., have an effect on problems due to smartphone use, it is highly important to conduct multidisciplinary studies with biomedical, industrial design, and ergonomics fields regarding the development and use of devices specific to nurses, who are among the occupational groups with the highest risk for musculoskeletal disorders. Thus, the present study is believed to guide the future studies.

Limitations of the study

The research was conducted with nursing students in the School of Nursing, Faculty of Health Sciences, Ordu University located in a Turkish city. Therefore, the study findings are limited to the sample consisting of nursing students in the city where the research was conducted. Furthermore, the pain assessment was based on self-reports of pain complaints and other postural issues that might be pain-related were not examined, which are important limitations of the study.



Photograph 1. Examples of Pinkie finger deformations. * Photographs of the students who hold the phone by supporting it with the little finger while talking and looking at it and report that they use the phone for 5–11 hours a day. These students expressed the deformation that developed in the little fingers related to the phone use, collapsed, collapsed and bent.

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