Clinical and Experimental Health Sciences

The Relationship between Smartphone Addiction and Functional Neck Disability among University Students during COVID-19 Pandemic

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ABSTRACT

Objective: This study aimed to determine the prevalence of smartphones addiction, and to investigate the relationship between smartphones addiction and functional neck disability among the students of Taif University during a Covid-19 pandemic.

Methods: A 1060 students from Taif University participated in this study. The smartphones addiction was evaluated by using the short version of the smartphones addiction scale (SAS-SV) and functional neck disability was measured by the neck disability index (NDI).

Results: About 83 % of the students reported smartphones addiction, 50% were suffering from mild neck disability, and 84% used their smartphones for more than 4 hours/day. Female students represented one and half times more than male to develop a smartphones addiction ($p< 0.05$). There was a significant association between smartphones addition and neck disability ($p< 0.05$). Moreover, female students had a functional neck disability significantly greater than male students ($p= 0.001$). Students with smartphones addiction represented three times more than students without addiction to develop functional neck disability ($p= 0.001$), and female students represented two times more than male students to develop functional neck disability ($p= 0.001$).

Conclusion: During a COVID-19 pandemic, more than four-fifth of the students showed smartphones addiction. The female students are more predictive to smartphones addiction than male. The smartphones addiction and female students were found to be the predictors for functional neck disability.

Keywords: Functional disability, neck pain, smartphones addiction, students

1. INTRODUCTION

Before 2 or 3 decades smartphones had a limited role that was only about receiving calls and messages, but this role has progressively developed over time to give people various benefits from smartphones through utilizing and the development of technology. Smartphones have become a very reliable resource of information for almost everyone. They are used in many ways, such as communication, learning, and playing games (1).

Nowadays, personal computers and smartphones are widely used in homes and businesses (2). Before COVID-19 pandemic research, Saudi Arabia ranked third in the world in terms of smartphone usage, with 72.8% of the population using them (3). Besides, 27.2% of Saudi university students spend more than 8 hours per day (h/day) on using their smartphones (4).

Smartphones offer many benefits, but also it has a bad impact after prolonged use, upsetting aspect is such as smartphone addiction. Smartphone addiction is a phenomenon of smartphone uncontrollable excessive use. People with this problem experience social, psychological and health problems (5). The prevalence of smartphone addiction is much higher among teenagers than adults (6). Before a COVID-19 pandemic a study conducted on undergraduate students reported that the smartphone addiction was slightly higher among males (30.3%) in comparison to females (29.3%) (7). In Saudi Arabia, 21.6% of the participants are suffering from headache, 4% sleep disturbance, 3.9% tension, 3% fatigue and 3% dizziness (8).

Furthermore, subjects with smartphone addiction had fewer sleeping hours, lack of energy the next day and there was a great impact of smartphone addiction on their academic achievement (9), and an increased risk of musculoskeletal problems, due to the excessive use of smartphones (10). The rates for shoulder disorders ranged from 46 to 52%, and 68% for neck symptoms (11). Furthermore, a 40% of 2575 young mobile phone users suffering from neck and shoulder pain (12).

During a COVID-19 pandemic, the smartphone usage increased dramatically, which was understandable due to the adoption of “lockdown” and “work from home” strategies

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to limit the virus transmission. People spent their time by searching the internet, utilizing social media, watching television shows, playing games, chatting with friends and/or family and shopping online (13). The prevalence of smartphone addiction is higher among people aged from 20 to 34 years (14). Moreover, recent studies showed an association between smartphone use and musculoskeletal symptoms among medical residents (15), and university students(16).

However, during the crisis, it seems there is no enough research that has investigated the relationship between musculoskeletal disorders and smartphone addiction among university students. Furthermore, it is worthy to study the physical disorders associated with smartphone use and identify whether they are a risk factor for musculoskeletal disabilities or not, with consideration of the students' gender, age (7,9,11,15,17), and college categories as, most of the previous studies were conducted on medical students (3,4,7,15,18–20). So, the aim of this study was to determine the prevalence of smartphone addiction and to investigate the relationship between smartphone addiction and functional neck disability among the students of Taif University during a COVID-19 pandemic.

2. METHODS

2.1. Participants

The sample size was calculated initially to be 374 participants according to Yamane formula n= [N/ (1+N (e) 2](21), Where: n signifies the sample size, N signifies the population under study, e signifies the margin error (0.05). The number of Taif University students was (N= 13579). About 5000 students received the link of the questionnaire through E-mail and social media application that was made in Google form. A valid responses of 1060 students were received and analyzed (461 male and 599 female).

The study was conducted between February and June of 2021. The students were recruited from Taif University, their age ranged from 17 to 35 years. The exclusion criteria were; students with cervical or shoulder pain before the COVID-19 pandemic, upper extremity trauma or spinal cord injury, which were verified via phone call before sending the link to the questionnaire. Additionally, some participants were excluded; 74 students off Taif university campus, 84 participants above 35 years old, 11 participants failed to complete the questionnaire, 37 participants did not mention their university or college, and 3 secondary school students (Fig. 1).

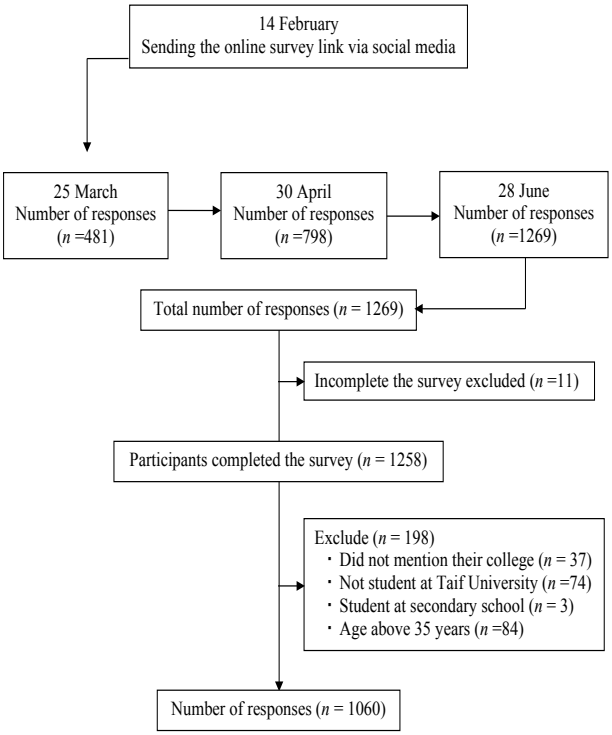

Figure 1. *Flow diagram of the study*

2.2. Ethical Considerations

Prior the commencement of the study, the students received a clear explanation of the study aim and procedure, confidentiality of the data obtained, and their legal rights, who provided an informed written consent. An ethical approval was taken from the Taif University's Ethical Committee (No. 2021-42-0102).

2.3. Assessment procedure

The data were gathered through the questionnaire which was split into three sections; the first section concerned with participants' demographic data; age, sex, height, weight, university, faculties, department and specialty. The second section was the scale-short version of the smartphone addiction scale (SAS-SV) that was used to discover the prevalence of smartphone addiction, and the third section was neck disability index (NDI) that used to assess the effect neck pain on functional disability.

Smartphone addiction scale (SAS): The SAS is a self-report scale that is used to evaluate smartphones addiction. It is a ten-item survey with a six-point Likert scale ranging from one to six , with 1 indicating strong disagreement and 6 indicating strong agreement. Higher scores imply addiction. The overall score goes from 10 to 60, and the cutoff values of smartphone addiction are 31 for male, and 33 for female (10). It was reported to be a valid instrument and has excellent reliability (22). Appendix 1.

Neck disability index (NDI): It is the most frequently used and validated instrument for evaluating the impact of neck pain on patients' functional activities and measuring outcomes in

clinical and research settings. For usage in a foreign language, the NDI questionnaire has been suitably translated, culturally adjusted and verified (23). The NDI in Arabic is a dependable, valid, and responsive instrument. Because it is made up of basic and easily understandable terms. It can be used to assess neck pain among Arabic-speaking patients in various Arabic nations (23). The Oswestry low back pain disability questionnaire was used to develop NDI. It is made up of ten questions. The first four categories are about subjective symptoms (pain intensity, headache, concentration, sleeping), the next four are about activities of daily living (ADL) (lifting, work, driving, recreation), and the final two are about discrete ADL (personal care, reading) (24). Appendix 2.

Each item is graded on a scale of zero (no disability) to five (total disability), with a maximum score of 50. NDI, on the other hand, is typically normalized to 100 and expressed as a percentage. A higher NDI score indicates a greater neck disability. To demonstrate the severity of neck impairment, the following criteria were followed: No neck disability is 0-4 points; mild neck disability is 5-14 points; moderate neck disability is 15-24 points; severe neck disability is 25-34 points; and full neck disability is > 34 points (25).

2.4. Statistical analysis

The version 20 of the Statistical Package for Social Sciences (SPSS. Armonk, NY, IBM Corp.) was used to analysis the collected data. The association between smartphone addiction, functional neck disability, college categories, gender and age were determined by Chi-square test (χ^2). Moreover, the multivariable logistic regression analysis was conducted. Odds ratios (ORs) with 95% confidence intervals (CIs) were expressed relative to a reference baseline category. The significance level (p< 0.05) was used for all tests.

3. RESULTS

A total of 1060 students (461 male and 599 female, 43.5% and 56.5%, respectively) from Taif University participated in this study. Their age ranged from 17 to 35 years (991; aged from 17-25 years and 69; aged from 26-35 years). A16.2% of students used their smartphone for less than 4 h/day, 28.9% used it for a duration ranging from 4-7 h/day, and 54.9% used it for more than 7 h/day. Four-hundred eighty of the students (45.3%) belonged to the medical colleges, 153 (14.4%) belonged to the humanities and education colleges, 180 (17.0%) belonged to the laws and administration colleges, and 247 (23.3%) belonged to the sciences and engineering colleges.

The percent of students who reported smartphone addiction was significantly higher than students with no smartphone addiction (p= 0.001, X^2 value= 451.57). The smartphone addiction percent was 82.6% (876; 363 male and 513 female) and the non-addiction percent was 17.4% (184; 98 male and 86 female). There was no significant association between smartphone addiction and college categories (p= 0.477). There was a significant association between smartphone addiction, and both gender and age (p= 0.003, 0.009 respectively), as shown in table 1.

Table 1. *The association between smartphone addiction and college categories, gender and age*

		Smartphone addiction		X^2 value	p-value
		Addicted, n (%)	Non-addicted, n (%)		
College categories	Medical colleges	401 (44.8)	79 (42.9)	2.49	0.477
	Humanities and education	129 (14.7)	24 (13.0)		
	Laws and administration	150 (17.1)	30 (16.3)		
	Sciences and engineering	196 (22.4)	51 (27.7)		
Gender	Male	363 (41.4)	98 (53.3)	8.65	0.003
	Female	513 (58.6)	86 (46.7)		
Age	17 to 25 years	8.11 (81.8)	180 (18.2)	6.88	0.009
	26-35 years	65 (94.2)	4 (5.8)		

X^2: Chi-square; n: number; p-value < 0.05 means significant difference

Female students are 1.58 more than male students to develop a smartphone addiction (OR: 1.58; 95% CI: 1.153-2.189; p = 0.005) and students aged from 26-35 years are three times more than 17 to 25 years to develop a smartphone addiction (OR: 3.499; 95% CI: 1.256-9.744; p = 0.017). Table 2 shows the multivariate analysis involving college categories, gender and age.

Table 2. *The predictors of smartphone addiction among the university students*

R^2 = 0.026	B	S.E.	Df	p-value	Odds ratio	95% CI for OR	
						Lower	Upper
Gender (1)	0.463	0.163	1	0.005	1.58	1.153	2.189
Age (1)	1.252	0.523	1	0.017	3.499	1.256	9.744
Constant	1.263	0.118	1	0.001	3.536		

R^2: Nagelkerke R Square value; B: Unstandardized regression weight; SE: standard error, df: degrees of freedom, CI: confidence interval; OR: odds ratio; p-value < 0.05 means significant difference

Fifty percent of the students (531; 209 male and 322 female) were suffering from a mild neck disability; 36% (383; 212 male and 171 female) had no neck disability; 11% (117; 33male and 84 female) had a moderate neck disability, 2.4% (25; 5 male and 20 female) had a severe neck disability and 0.4% (4;2 male and 2 females) had complete neck disability. Table 3. showed a significant association between smartphone addiction and neck disability (p= 0.001). Meanwhile, female students had a functional neck disability significantly greater than male students (p= 0.001). The was no significant association between age category and functional neck disability (p= 0.477).

Table 3. *The association between smartphone addiction and functional neck disability*

		Functional neck disability		X^2 value	p-value
		No disability, n (%)	Disability, n (%)		
Smartphone addiction	Non addicted	106 (57.6)	78 (42.4%)	44.50	0.001
	Addicted	277 (31.6))	599 (68.4%)		
Gender	Male	212 (46.0%)	249 (54.0)	34.33	0.001
	Female	171 (28.5)	428 (71.5)		
Age	17 to 25 years	361 (36.4)	630 (63.6)	0.58	0.447
	26-35 years	22 (31.9)	47 (68.1)		

X^2: Chi-square; n: number; p-value < 0.05 means significant difference

The students with smartphone addiction are 2.785 more than students with no smartphone addiction to develop a functional neck disability (OR: 2.785; 95% CI: 1.999-3.879; p = 0.001), and female students are two times more than male students to develop a functional neck disability (OR: 2.034; 95% CI: 1.568-2.638; p = 0.001). Finally, students age was not a significant predictor for the development of functional neck disability (OR: 1.017; 95% CI: 0.595-1740; p= 0.951). Table 4 shows the multivariate analysis involving SAS, gender and age.

Table 4. *The predictors of functional neck disability among the university students*

R^2 = 0.09	B	S.E	df	p-value	Odds ratio	95% CI for OR	
						Lower	Upper
Smartphone addiction	1.024	0.169	1	0.001	2.785	1.999	3.879
Gender (1)	0.710	0.133	1	0.001	2.034	1.568	2.638
Age	0.017	0.274	1	0.951	1.017	0.595	1.740
Constant	-0.648	0.165	1	0.001	0.523		

R^2: Nagelkerke R Square value; B: Unstandardized regression weight; SE: standard error, df: degrees of freedom, CI: confidence interval; OR: odds ratio; p-value < 0.05 means significant difference

4. DISCUSSION

In the current study about 83% of the participants reported smartphone addiction, which was higher than the rates reported in previous studies in Saudi Arabia 36.5%, and 27.2% (3,26), 44.6% in Lebanon (27), 31.7% in Tunis (28), 10% in Belarus (14), 24.8% in South Korea (10), 29.8% in China (7), 17.3% in Sudan and 8.6% in Yemen and Jordan was 59.8% (26). Although Sethuraman et al. (18) conducted their study before the COVID-19 pandemic on 192 medical students, their findings were nearly similar to the present results as they reported that the addiction rate was 85.40%.

The higher level of the smartphone addiction in the current study could be attributed to the COVID-19 pandemic, which led to lower levels of social connection and well-being (29). Furthermore, the reason for the higher percent of smartphones user could be owing to the lack of other sources of outdoor entertainment among university students and preoccupied with studying and academic activities which make smartphone the only means of entertainment to relieve stress and anxiety. Adding to that, there is a constant obsession among the young population about taking a selfie and posting them on social media, besides various applications of chatting, gaming and social interaction (18).

The wide variation of smartphone addiction between different researches could be attributed to various sample sizes, as well as different age, sex, level of education and culture of Saudi population, the extent of 4G Wi-Fi coverage and the use of several techniques for determining the severity of smartphone addiction. Another viewpoint, suggested that the inconsistency between the previous researches could be referred to the variation in smartphone addiction liability could be due to the personality traits of individuals such as playing sports, schooling and purpose of using smartphone (30).

This study revealed the prevalence of females smartphone addiction is higher than males (41.4% males, 58.6% females) which was supported by previous studies (31,32). These findings are consistent with a number of international studies were conducted to evaluate the prevalence of smartphone addiction among students, which have revealed that females reported higher percent of smartphone addiction in comparison to males (31,33,34). However, the finding of Kwon et al. (10) disagreed with the current findings which may be explained by their small sample size (197 participants), their participants age ranged from 18 to 53 years, or may be due to conduction of their study before the COVID-19 pandemic, through the period from November 2011 to January 2012. The present study was conducted during the crisis, where the use of electronic learning and smartphone has dramatically increased. In the same context, many studies which had been conducted before the crisis, showed no differences in the incidence of smartphone addiction between females and males (7,10).

The contradiction with the findings of Chen et al.(7) may be explained by recruitment of medical students only, without consideration of other tertiary education, while the sample of the current study was recruited from all colleges of the university. Moreover, their study was conducted in September 2016 before the COVID-19 Pandemic, whereas, e-learning has not expanded as much as it is now. Moreover, Aljomaa et al.(35) concluded that smartphone addiction was significantly associated with the male gender. Contrary to the present study, many studies reported that smartphone addiction was not related to gender (5,7,36). However, Abo-Jedi (37) reported that 26% of Jordanian university students showed smartphone addiction and the number of females with smartphone addiction was twice that of males, which was slightly greater than the current findings.

In addition, the pattern of smartphone using of males and females is different. As voice chats, text messages and social media are the most problematic applications for females, but

males' usage is more diversified, including text messages, voice conversations and gaming application (38). The result of this study matching with the nature of the society of Saudi Arabia, as males more active than a females who spent most of the daytime at home. Moreover, a study conducted on undergraduate students showed that the use of game apps, anxiety and poor sleep quality were linked to smartphone addiction among male students, and the use of multimedia programs, use of social networking sites, sadness, anxiety and poor sleep quality were significant factors for female students (7).

The current study demonstrated an increased prevalence of smartphone addiction (81.8%) in the participants aged from 17 to 25 years, which was backed up with the evidence of Csibi et al.(14) who showed the age group of 20-34 years old has received the highest score in SAS. However, Lane et al.(39) found that the smartphone use is more common among older people with higher education. It appears that this elder age group uses smartphone largely to communicate with family and friends.

The results of this study showed that no relationship between the smartphone addiction and college categories, which comes against the findings of most of the previous studies (3,7,19); Eldesokey et al.(19) reported that the prevalence of smartphone addiction was 53.6% of the undergraduate students, which was common among medical students. Chen et al. (7) found a low percent of smartphone addiction (29.8%), although they concluded that the smartphone addiction was common among the medical college students. Moreover, a study conducted on the sixth-year medical students, King Abdulaziz University, Saudi Arabia showed that the prevalence of smartphone addiction was higher among medical students. They attributed this finding to longer duration of daily smartphone usage (3). This contradiction could be attributed to the COVID-19 pandemic, which prompted all students to use smartphone excessively.

Other research studies (40,41) reported that using the smartphone for a duration exceeding the 4h daily is considered as a smartphone addiction, which could lead to musculoskeletal disorders. Thus, individuals are more likely to show smartphone addiction if they spend more time on smartphones (3,35,40,42). The present study showed that during the COVID-19 Pandemic, a 83.8% of students used their smartphone for a duration exceeding 4h/day. This finding coincides with Aljomaa et al.(35) who found a significant increase in the smartphone addiction in students used smartphone for more than 4h/day. In Saudi Arabia, 34.2% of students spent more than 8h/day (9) and 55.8% used smartphone more than 5h/day (3). Sixty-six percent of the students use their smartphones for a duration longer than 3h/day in Malaysia (20), while the Indian study showed that 30% of the students use smartphones for more than 3h/day (43). Also, Walsh et al.(44) reported that there are increases in the number of smartphone users who tend to gain the latest devices and applications, which make them unable to live without smartphones and spend more time in smartphone use. This means that smartphone addiction is likely to become one of the most common types of addiction in the future. Alhazmi et al.(3) indicated a significant correlation between smartphone addiction and daily smartphone usage hours. Moreover, one-third of students who had smartphone addiction spent 4 to 5 h/day using their devices, and half of those who had the addiction spent more than 5 h/day using them.

The current study found a relation between smartphone addiction and functional neck disability. This finding comes in line with the findings of a Saudi Arabian survey of adolescents (45), which discovered a relation between smartphone addiction, and various degrees of neck pain. Moreover, Shah et al.(46) reported an association between smartphone addiction and musculoskeletal disorder among physical therapy students aged from 20 to 25 years. A study conducted on 2435 participants in Saudi Arabia, their ages ranged from 14-18 years old, found a positive correlation between neck pain, dysfunction and smartphone addiction (47).

Furthermore, the current finding was supported by Gustafsson et al.(17) who conducted a longitudinal cohort research with Swedish young adults aged from 20 to 24 years. The information was gathered using a web-based questionnaire at the baseline (n= 7092) and five years later (n= 7092), its results revealed long-term effects on musculoskeletal disorders of the neck and its function. In addition, a cross-sectional Indian study conducted upon 306 medical students; their ages ranged from 21to 23 years, showed that using smartphones takes a prevalent part in the daily lives of medical students and would affect ADL (48), which agreed with the current study in relation to the ADL around the neck region.

Additionally, during the COVID-19 epidemic, the smartphone addiction is linked to a higher prevalence of musculoskeletal pain in the neck, shoulders, elbows, wrists/hands, lower back, and upper back (15). However, the findings of Akodu et al.(34) did not concur the result of the current study, which could be attributed to conduction of their study before a COVID-19 pandemic. Another reason for this contradiction may be the recruitment a medical student only, while the sample of the current study was collected from all colleges of Taif university. Finally, the increased functional neck disability due to smartphone use was assigned to the respondents' poor positioning, which decreased the neck angle, and assumed the forward head posture which led to higher pain-related disability of the neck (49).

This study was limited to the following. First, it was conducted on Taif University students without consideration of other universities in Saudi Arabia, or other age categories. Second, the results were surveyed-based outcomes due to the COVID-19 pandemic that pushed people to social distancing. Therefore, the addition of functional outcomes could be helpful to detect the musculoskeletal adverse effects of smartphone addiction. Third, this study explored the effect of the smartphone on functional disability without

investigating its effect on shoulder, hand function and hand grip strength. So, future studies may wish to examine the physical and mental health, social and psychological variables related to smartphones addiction during the COVID-19 pandemic. Fourth, the sample was convenient. Moreover, it did not accurately represent the population from which it was drawn. As a result, given the potential of recruiting a selected sample, the extremely high prevalence of smartphone addiction should be highlighted. Also, caution should be implemented when applying the current study's findings to other situations. Fifth, because the participants were not examined directly, they may have indicated more or less disabled than was actually the case. Sixth, anxiety, depression, general motor or cognitive impairments and relational difficulties were not taken into account. More research will be looked-forward to study the adverse effect of smartphones addiction on the students' satisfaction about the learning and teaching process, which was in need to be improved before the COVID-19 pandemic, especially students of medical sciences (50). Future research is needed to look into the impact of a home-exercise program on the students' functional neck disabilities.

5. CONCLUSION

During the COVID-19 pandemic, more than four-fifth of the students reported smartphones addiction ion. Fifty percent of the students were suffering from mild neck disability. About 84% used their smartphones for more than 4h/day, and 50% utilized them for more than 7 h/day. The smartphones addiction was higher in female than male, especially in the age group ranged from 17 to 25 years. Also, the smartphones addiction is associated with functional neck disability, with female students experiencing it at a higher rate than male students. Therefore, the university should incorporate awareness programs directed to students to learn how to use smartphones properly to avoid its negative physical effects during the COVID-19 pandemic. Which will decrease the prevalence of smartphone addiction, and its related functional neck disability, which will improve the well-being of the university students.

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Appendix 1. *Smartphone addiction scale*

No.	Items	Strongly disagree (1)	Disagree (2)	Weakly disagree (3)	Weakly agree (4)	Agree (5)	Strongly agree (6)
1	Missing planned work due to smartphone use						
2	Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use						
3	Feeling pain in the wrists or at the back of the neck while using a smartphone						
4	Won't be able to stand not having a smartphone						
5	Feeling impatient and fretful when I am not holding my smartphone						
6	Having my smartphone in my mind even when I am not using it						
7	I will never give up using my smartphone even when my daily life is already greatly affected by it.						
8	Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook						
9	Using my smartphone longer than I had intended						
10	The people around me tell me that I use my smartphone too much.						

Appendix 2. *Neck disability index*

Section 1: Pain Intensity		Section 2: Personal Care (Washing, Dressing, etc.)	
1	□ I have no pain at the moment.	1	□ I can look after myself normally without causing extra pain
2	□ The pain is very mild at the moment	2	□ I can look after myself normally, but it causes extra pain
3	□ The pain is moderate at the moment	3	□ It is painful to look after myself and I am slow and careful
4	□ The pain is fairly severe at the moment	4	□ I need some help but can manage most of my personal care
5	□ The pain is very severe at the moment	5	□ I need help every day in most aspects of self-care
6	□ The pain is the worst imaginable at the moment	6	□ I do not get dressed, I wash with difficulty and stay in bed
Section 3: Lifting		**Section 4: Reading**	
1	□ I can lift heavy weights without extra pain	1	□ I can read as much as I want to with no pain in my neck
2	□ I can lift heavy weights, but it gives extra pain	2	□ I can read as much as I want to with slight pain in my neck
3	□ Pain prevents me lifting heavy weights off the floor, but I can manage if they are conveniently 4placed, for example on a table	3	□ I can read as much as I want with moderate pain in my neck
4	□ Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned	4	□ I can't read as much as I want because of moderate pain in my neck
5	□ I can only lift very light weights	5	□ I can hardly read at all because of severe pain in my neck
6	□ I cannot lift or carry anything	6	□ I cannot read at all
Section 5: Headaches		**Section 6: Concentration**	
1	□ I have no headaches at all	1	□ I can concentrate fully when I want to with no difficulty
2	□ I have slight headaches, which come infrequently	2	□ I can concentrate fully when I want to with slight difficulty
3	□ I have moderate headaches, which come infrequently	3	□ I have a fair degree of difficulty in concentrating when I want to
4	□ I have moderate headaches, which come frequently	4	□ I have a lot of difficulty in concentrating when I want to
5	□ I have severe headaches, which come frequently	5	□ I have a great deal of difficulty in concentrating when I want to
6	□ I have headaches almost all the time	6	□ I cannot concentrate at all
Section 7: Work		**Section 8: Driving**	
1	□ I can do as much work as I want to	1	□ I can drive my car without any neck pain
2	□ I can only do my usual work, but no more	2	□ I can drive my car as long as I want with slight pain in my neck
3	□ I can do most of my usual work, but no more	3	□ I can drive my car as long as I want with moderate pain in my neck
4	□ I cannot do my usual work	4	□ I can't drive my car as long as I want because of moderate pain in my neck
5	□ I can hardly do any work at all	5	□ I can hardly drive at all because of severe pain in my neck
6	□ I can't do any work at all	6	□ I can't drive my car at all
Section 9: Sleeping		**Section 10: Recreation**	
1	□ I have no trouble sleeping	1	□ I am able to engage in all my recreation activities with no neck pain at all
2	□ My sleep is slightly disturbed (less than 1 hr sleepless)	2	□ I am able to engage in all my recreation activities, with some pain in my neck
3	□ My sleep is mildly disturbed (1-2 hrs sleepless)	3	□ I am able to engage in most, but not all of my usual recreation activities because of pain in my neck
4	□ My sleep is moderately disturbed (2-3 hrs sleepless)	4	□ I am able to engage in a few of my usual recreation activities because of pain in my neck
5	□ My sleep is greatly disturbed (3-5 hrs sleepless)	5	□ I can hardly do any recreation activities because of pain in my neck
6	□ My sleep is completely disturbed (5-7 hrs sleepless)	6	□ I can't do any recreation activities at all