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POLISH JOURNAL OF PHYSIOTHERAPY

OFICJALNE PISMO POLSKIEGO TOWARZYSTWA FIZJOTERAPII

THE OFFICIAL JOURNAL OF THE POLISH SOCIETY OF PHYSIOTHERAPY

NR 5/2023 (23) KWARTALNIK ISSN 1642-0136



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POLSKI WYBIERASZ I WSPIERASZ



# Work related musculoskeletal disorders in school teachers: risk factors, prevalence, and association with health-related quality of life in Emirate of Sharjah, United Arab Emirates

*Zaburzenia mięśniowo-szkieletowe związane z pracą u nauczycieli szkolnych: czynniki ryzyka, wskaźnik występowania oraz związek z jakością życia związaną ze zdrowiem w Emiracie Szardża, w Zjednoczonych Emiratach Arabskich*

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## Abstract

**Introduction.** This study aimed to determine the prevalence of work-related musculoskeletal pain (MSP) and correlations between associated risk factors, physical activity levels, stress, and quality of life among schoolteachers in Sharjah, United Arab Emirates. **Materials and methods.** A cross-sectional study using SPSS version 23.0 for the statistical analysis, was conducted using the Shapiro–Wilk test, independent t-test and one-way ANOVA test to compare the quality of life scores and stress level scores based on variables. **Results.** In total, 342 teachers working in private and public schools were recruited. Our results showed a high prevalence of MSP among teachers. The most reported areas were the lower back, shoulder, and neck, followed by the upper back. The suggested causes are long hours spent on devices, as the average hours spent on devices range from 6 to 9 hours, heavy load of teaching from 16 to 30 classes per week, old age in most participants (35 years and above), and low physical activity. Moreover, quality of life is low among teachers with known chronic medical conditions and teachers working in private schools. Stress was moderate when all variables were tested. **Conclusion.** Work-related MSP are highly prevalent among schoolteachers in the UAE. A high prevalence is associated with older age, longer teaching hours, higher teaching load, poor quality of life, and moderate stress.

## Keywords

musculoskeletal pain, stress, quality of life, teachers

## Streszczenie

**Wstęp.** Celem tego badania było określenie wskaźnika występowania bólu mięśniowo-szkieletowego (MSP) związanego z pracą oraz korelacji między czynnikami ryzyka, poziomem aktywności fizycznej, stresem i jakością życia wśród nauczycieli szkolnych w Szardży, Zjednoczone Emiraty Arabskie.

**Materiały i metody.** Przeprowadzono badanie przekrojowe wykorzystujące wersję 23.0 programu SPSS do analizy statystycznej. Użyto testu Shapiro-Wilka, niezależnego testu t oraz jednoczynnikowej analizy wariancji ANOVA do porównania wyników jakości życia i poziomu stresu w zależności od zmiennych.

**Wyniki.** W sumie do badania rekrutowano 342 nauczycieli pracujących w szkołach prywatnych i publicznych. Wyniki wykazały wysoką częstość występowania MSP wśród nauczycieli. Najczęściej zgłaszane obszary to dolna część pleców, ramię i szyja, a następnie górna część pleców. Sugerowane przyczyny to długie godziny spędzane przed urządzeniami, przy średniej 6 do 9 godzin dziennie, duże obciążenie nauczania od 16 do 30 klas tygodniowo, starszy wiek większości uczestników (35 lat i więcej) oraz niska aktywność fizyczna. Co więcej, jakość życia jest niska wśród nauczycieli z znanymi przewlekłymi schorzeniami oraz pracujących w szkołach prywatnych. Stres był umiarkowany, gdy testowano wszystkie zmienne.

**Wnioski.** Bóle mięśniowo-szkieletowe związane z pracą są bardzo częste wśród nauczycieli szkolnych w ZEA. Wysokie występowanie jest związane ze starszym wiekiem, dłuższym czasem nauczania, większym obciążeniem dydaktycznym, słabą jakością życia i umiarkowanym stresem.

## Słowa kluczowe

ból mięśniowo-szkieletowy, stres, jakość życia, nauczyciele

## Introduction

Work-related musculoskeletal (MSK) disorders are common worldwide and should be considered in future studies. Few studies have been conducted to highlight the causes and risk factors of musculoskeletal pain concerning stress and quality of life in schoolteachers, and there is no research on this topic in the United Arab Emirates (UAE).

This study aimed to measure the prevalence of musculoskeletal pain (MSP) and its factors associated with quality of life and stress. Research suggests that long hours of teaching can cause some medical conditions, such as musculoskeletal pain [1]. Ergonomics are considered one of the risk factors that cause musculoskeletal pain for teachers in Saudi Arabia, specifically lower back, shoulder, and the least common, elbow pain, and results indicate that it is more common in females than males [2]. Moreover, prolonged sitting, standing, sharp desk corners, use of laptops or touchpads, and inadequate height of the monitor or screen have been proven to cause lower back, neck, and shoulder pain in Brazil [3]. Some studies have shown that more than ten classes per week can cause neck pain in female teachers [4]. Research has shown that if teachers teach more than 20–30 classes per week, it results in back, leg, and neck pain [5]. Other research from Brazil associated chronic MSP among teachers in the upper limb with the number of workplaces, number of students, and carrying teaching materials [6]. Another study from Saudi Arabia mentioned that female schoolteachers above the age of 40 who do not engage in regular exercise are predicted to have significant MSP in different areas such as the lower back, knee, shoulder, neck, elbow, and wrist [7].

In addition, upper limb disorders and MSP are increasingly suspected in teachers who write in class using a whiteboard, spend multiple working hours on a computer, and have incorrect posture while teaching and correcting papers [8]. A study conducted in China to assess the prevalence of neck-shoulder pain and lower back pain reported that associated factors, such as individual, ergonomic, and occupational, were linked to MSP [9]. However, it has been reported that teachers in Saudi Arabia spend long hours using computers and lack ergonomically caused work-related MSP [10]. On the other hand, an Iranian study conducted to represent the prevalence of work-related health problems reported that primary and secondary school teachers complained of leg, back, neck, and shoulder pain, including health problems such as voice disorder, headache, anxiety, varicose veins in the lower limb, and sleep problems [11].

Another study conducted in Saudi Arabia with a sample of female teachers reported that there is a high prevalence of MSP among teachers associated with different factors, such as body mass index, vitamin D deficiency, teaching level, and presence of chronic diseases [12]. In Saudi Arabia, other studies have reported that females tend to have MSP in areas of the lower back, shoulder, and knees more than males [13]. Years of experience have been reported in Nigerian research, which shows that teachers with more than 10 years of experience and those aged between 35–50 are suggested predictors of musculoskeletal disorders [14]. In Pakistan, research reports females having MSP in relation to a high number of children

and includes factors that increase the cause of MSP, such as prolonged standing, sitting, and carrying heavy weights [15]. A laboratory study conducted on young females after the use of devices for 10 min and exposure to different types of stressors, such as glare and ergonomic factors, showed that psychological stress while working on computers for multiple hours contributes to neck pain and discomfort [16]. The association between physical, psychosocial, and perceived stress has been found to cause neck pain and disability, and affect work productivity [17]. Another study showed that psychosocial factors, such as concentration, emotional stress, anxiety, and depression, can cause nonspecific neck pain [18]. During the pandemic, a study in Belgium reported that teachers were stressed while providing lessons online, which resulted in neck, shoulder, and upper back pain [19]. Self-reported lower back and neck/shoulder pain is associated with psychological distress and psychosocial factors among secondary school teachers in Malaysia [20]. A study related psychosocial factors, such as depression, to MSP and reported a significant relationship among schoolteachers with MSP in different areas of their body to such factors [21]. In Chile, one study reported that neck and shoulder pain affected teachers' mental and physical quality of life [22]. A study from Slovakia aimed to assess pain prevalence during the pandemic of COVID-19, and found that 74% of the participants had cervical pain, 67% had lower back pain, and 60% had vertebral pain; the risk factors were lack of physical activity, having more than five classes per week, compliance with ergonomics, moderate to severe stress, and sitting for a long time [23]. The significance of this study is that it measures the prevalence of MSP among schoolteachers in the emirates of Sharjah and its associated factors.

## Materials and Methods

Ethical approval was obtained from the University of Sharjah, Sharjah, United Arab Emirates (UAE). The second approval for distributing the survey link was from the Ministry of Education and sent through email by the Emirates School Establishment. All participants conformed to the consent form, which was sent, and voluntarily agreed to answer the questionnaire. The researcher's email was mentioned in the consent form for further explanation and data collection was handled confidentially.

The sample targets in this research were schoolteachers working under the Ministry of Education with a minimum of 2-years' experience and aged between 20 and 60 years. There are no exclusion criteria focused on this study because researchers tend to broaden their research and not limit it to those who have musculoskeletal disorders.

The questionnaire consisted of five parts. The first part included demographic data, such as age/gender/pregnancy/nationality/marital status/number of children/years of teaching/location of teaching/school type/load of teaching/teaching level/grades taught/subject taught/additional responsibilities on teaching/chronic diseases/hours spent on devices. The second part addressed musculoskeletal pain, and the participants answered the location of musculoskeletal pain using the NORDIC questionnaire. The third part addressed the quality of life

using the World Health Organization Quality of Life questionnaire. The fourth part included the Global Physical Activity questionnaire and the fifth part included the Perceived Stress Scale.

The Musculoskeletal Nordic Questionnaire (NORDIC) has good validity and reliability in addition to high sensitivity, range between 66–92% and specificity between 71–88% [24]. The World Health Organization Quality of Life questionnaire demonstrated good internal consistency, with a Cronbach Alpha of 0.84 and good validity and reliability [25]. The Global Physical Activity Questionnaire [GPAQ] reliability ranges from 0.83–0.96 while the long-term test and re-test reliability ranges from 0.53–0.83, which demonstrates acceptable reliability [26]. The Perceived Stress Scale (PSS) has a high reliability (0.84–0.86), Cronbach's alpha (0.90), and excellent content validity (0.94) [27].

Using an unlimited population sample size with a confidence interval of 95% and a margin of error of 5%, the estimated population of teachers in the Emirates of Sharjah was 384. The sample size was 342 teachers who completed the consent form and agreed to participate in the questionnaire. The Cluster Sampling Technique was used in this questionnaire, equally targeting 128 participants from Sharjah City, 128 from Middle Sharjah, and 128 from East Sharjah. The age categories were (20–40) and (41–60). Due to variations in the number of schools in each area and the number of participants, data were not equally collected. Data were collected from 203 Sharjah City respondents, 44 from Middle Sharjah, and 95 from East Sharjah.

The cross-sectional questionnaire was in the form of an online self-administered questionnaire in Microsoft Forms, and a link to the questionnaire was sent to the Emirates School Establishment through an official email to all Sharjah school principals and teachers, and principals forwarded it to their schoolteachers. Frequent reminders were sent weekly via email to each principal. Data collection began at the end of the last semester of April 2022 and finished at the end of September 2022. The participants' data were anonymized in consideration of the confidentiality of the participants. Data were uploaded in the form of an Excel sheet, coded by the investigator, and analyzed by the second investigator using the SPSS program.

### Statistical Analysis

SPSS version 23.0 was used for statistical analysis. The normality test was conducted using the Shapiro–Wilk test. Demographic variables were presented using descriptive statistics such as frequency, percentage, mean, and standard deviation. Prevalence was computed by dividing the number of participants who reported musculoskeletal discomfort in each body location by the total number of the study participants. Independent t-tests and one-way ANOVA tests were used to compare the quality of life scores and stress level scores based on sex, age, marital status, teaching experience, teaching level, school type, teaching load, musculoskeletal pain, and the presence of known chronic medical conditions. Statistical significance was set at  $p \leq 0.05$ .

**Table 1. Participant Characteristics**

		Number (%)
Gender	Males	85 (24.85%)
	Females	257 (75.14%)
Marital Status	Single	55 (16.08%)
	Married	287 (83.91%)
Pregnancy		7 (2.04%)
Nationality	Local	120 (35.08%)
	Non-Local	222 (64.91%)
Years of Teaching Experience In Years	0-5	65 (19.00%)
	6-10	64 (18.71%)
	11-20	130 (38.01%)
	More Than 20	83 (24.26%)
	Average Experience	14 Years
Teaching Load Class Per Week	0-15	50 (14.61%)
	16-30	272 (79.53%)
	31-36	20 (5.84%)

		Number (%)
Average Hours Spent On Devices		6-9 Hours A Day
Musculoskeletal Pain		186 (54.22%)
Known Chronic Medical Conditions	Diabetes Mellitus	14 (4.09%)
	Hypertension	12 (3.50%)
	Known Chronic Heart Diseases	4 (1.16%)
	Known Chronic Lung Diseases	4 (1.16%)
	Other Chronic Diseases	14 (4.09%)
Total		48 ( 14% )

## Results

As shown in Table 1, most of the participants were females and married. Approximately 2% of the female participants were pregnant. In addition, a high percentage of teachers were non-local and had 11–20 years of teaching experience. Moreover, there was a greater percentage of teachers with more than 20 years of experience in the Ministry of Education, with

an average of 14 years of experience. A large number of participants had 16 to 30 classes per week, and the average hours spent on devices ranged from 6 to 9 hours per day. Half of the participants responded with MSP; 14% had known chronic medical conditions, most of them having diabetes mellitus and other diseases such as hypertension, while a smaller number of participants complained of known heart and lung diseases.

**Table 2. Number of Participants (% Suffering with Musculoskeletal Pain Different Body Locations)**

Area of Pain	No Pain Number (%)	Pain and Discomfort Number (%)
Neck	210 (61.40%)	132 (38.59%)
Shoulder	201 (58.77%)	141 (41.22%)
Upper Back	224 (65.49%)	118 (34.50%)
Elbow	275 (80.40%)	67 (19.59%)
Wrist / Hand	253 (73.97%)	89 (26.02%)
Lower Back	194 (56.72%)	148 (43.27%)
Hips / Thighs	262 (76.60%)	80 (23.39%)
Knees	230 (67.25%)	112 (32.74%)
Ankle and Feet	240 (70.17%)	102 (29.82%)

Table 2 presents different areas of MSP. It is mainly observed that the lower back, shoulders, neck, and upper back are the most reported areas of pain, also knees, ankles and

feet. The participants reported that hips, thighs, wrists, hands, and elbows are the body areas that are least likely to have MSP.

**Table 3. Number and (%) of Participants Based On Physical Activity Categories**

Categories	Number (%)
Low 0-2500 MET Minutes per Week	299 (87.42%)
Moderate 2500-500 MET Minutes per Week	18 (5.26%)
High >5000 MET Minutes per Week	25 (7.30%)



Table 3 shows physical activity categories where there is clear evidence that the majority of the participants have low physical activity levels with around 87% of them ranging from 0 to

2500 metabolic equivalent tasks (MET) per week, whereas the minority of participants had moderate and high physical activity levels.

**Table 4. Comparison of Quality-Of-Life Scores and Stress Level Scores Based on Demographic Characteristics Using ANOVA and Independent T-Test.**

Variable	N (%)	Physical Domain (Mean ± SD)	Psychological Domain (Mean ± SD)	Social Domain (Mean ± SD)	Environmental Domain (Mean ± SD)	Perceived Stress Scale Scores
<b>Total Gender</b>						
Male	85 (24.85%)	49.41 ± 10.86	59.41 ± 11.30	67.64 ± 18.29	61.39 ± 14.35	16.96 ± 4.53
Female	257 (75.14%)	48.47 ± 7.14	58.31 ± 6.91	62.35 ± 14.30	57.46 ± 10.85	17.71 ± 3.72
P value		0.361	0.288	0.006*	0.008*	0.128
<b>Marital Status</b>						
Single	55 (16.08%)	50.25 ± 8.12	58.25 ± 6.73	61.51 ± 12.77	59.14 ± 11.72	17.70 ± 3.60
Married	287 (83.91%)	48.40 ± 8.21	58.65 ± 8.48	64.08 ± 15.99	58.30 ± 11.97	17.49 ± 4.012
P value		0.126	0.745	0.262	0.633	0.713
<b>Teaching Experience</b>						
<10 years	129 (37.71%)	49.25 ± 7.13	58.94 ± 5.98	63.37 ± 12.90	58.98 ± 10.26	17.70 ± 3.63
11-20 years	130 (38.01%)	47.77 ± 8.09	57.78 ± 9.22	62.69 ± 15.70	56.80 ± 12.44	17.33 ± 4.19
>20 years	72 (21.05%)	49.25 ± 10.27	59.43 ± 9.93	65.50 ± 19.39	60.19 ± 13.72	17.23 ± 4.18
P value		0.285	0.335	0.463	0.120	0.658
<b>Teaching Level</b>						
Participants Teaching at Kindergarten	39 (11.40%)	46.97 ± 5.76	58.22 ± 3.88	61.75 ± 11.58	56.65 ± 8.54	17.43 ± 5.19
Participants Teaching at Cycle 1 Primary School	66 (19.29%)	48.53 ± 7.16	58.39 ± 7.32	63.00 ± 16.86	57.62 ± 11.92	18.16 ± 3.18
Participants Teaching at Cycle 2 Secondary School	98 (28.65%)	47.48 ± 9.37	56.25 ± 10.24	61.90 ± 15.23	56.79 ± 11.93	17.60 ± 4.20
Participants Teaching at Cycle 3 High School	139 (40.64%)	50.12 ± 8.24	60.43 ± 7.51	65.76 ± 15.94	60.49 ± 12.51	17.20 ± 3.67
Total	342 (100%)	48.70 ± 8.22	58.58 ± 8.22	63.66 ± 15.53	58.44 ± 11.92	17.52 ± 3.94
P value		0.044*	0.002*	0.211	0.065	0.435
<b>Musculoskeletal MSK Pain</b>						
Have Musculoskeletal Pain	186 (54.38%)	47.00 ± 6.96	57.10 ± 7.13	60.08 ± 14.76	56.06 ± 10.12	17.52 ± 3.68
Not Having Musculoskeletal Pain	156 (45.61%)	50.73 ± 9.12	60.36 ± 9.06	67.94 ± 15.38	61.27 ± 13.24	17.53 ± 4.24
P value		0.001**	0.001**	0.001**	0.001**	0.968



Variable	N (%)	Physical Domain (Mean ± SD)	Psychological Domain (Mean ± SD)	Social Domain (Mean ± SD)	Environmental Domain (Mean ± SD)	Perceived Stress Scale Scores
<b>Know Chronic Medical Conditions</b>						
There is known chronic disease	48 (14.03%)	47.76 ± 8.85	55.81 ± 8.92	58.15 ± 19.02	56.70 ± 12.79	17.43 ± 4.84
There is no known chronic disease	294 (85.96%)	48.85 ± 8.11	59.04 ± 8.02	64.56 ± 14.72	58.72 ± 11.76	17.54 ± 3.78
P value		0.395	0.012*	0.008*	0.277	0.862
<b>School Type</b>						
Public	238 (69.59%)	49.23 ± 9.30	58.59 ± 9.66	65.26 ± 17.79	60.01 ± 13.29	17.42 ± 4.45
Private	104 (30.40%)	47.49 ± 4.71	58.57 ± 3.00	60.01 ± 7.09	54.83 ± 6.71	17.75 ± 2.38
P value		0.071	0.982	0.004*	0.001**	0.476
<b>Teaching Load</b>						
0-15 Class per Week	49 (14.32%)	48.54 ± 5.64	57.22 ± 6.57	63.43 ± 14.31	57.52 ± 9.48	18.16 ± 3.41
16-30 Class per Week	273 (79.82%)	48.62 ± 8.24	58.85 ± 8.45	63.46 ± 15.69	58.37 ± 12.23	17.53 ± 3.87
31-36 Class per Week	20 (5.84%)	50.17 ± 12.55	58.33 ± 8.65	67.08 ± 16.55	61.56 ± 12.98	15.85 ± 5.54
P value		0.711	0.441	0.600	0.436	0.086

Table 4 provides details of the comparison of quality of life scores and stress level scores based on demographic characteristics such as sex, age, marital status, teaching experience, teaching level, school type, teaching load, MSP, and the presence of known chronic medical conditions using ANOVA and independent t-tests.

There were no statistically significant differences between females and males in physical health, psychological health, or perceived stress scale scores. However, there is a significant difference between male and female participants when social and environmental domains are compared ( $p = 0.006$ ), where males have better relationships and social support in the social domain with a mean and standard deviation (SD) of  $67.64 \pm 18.29$  and females present a mean and SD of  $62.35 \pm 14.30$ . In addition, there is a statistical difference in the environment domain ( $p = 0.008$ ) where males have better quality of life, with means and SD of  $61.39 \pm 14.35$  compared to the females  $57.46 \pm 10.85$ .

There was a slight statistical difference between the age groups in the physical health domain ( $p = 0.048$ ), where participants aged less than 35 years had better physical health, presenting with a mean and SD of  $50.39 \pm 8.06$  compared to participants aged more than 35 years who presented a mean and SD of  $48.24 \pm 8.21$ . There was no statistical difference between age groups in the psychological, social, and environmental domains. Furthermore, there was no statistical difference in perceived stress scores between the age groups.

In marital status, teachers present moderate scores in the per-

ceived stress score, with means and SD of  $17.70 \pm 3.60$  for single and  $17.49 \pm 4.012$  for those who are married. There were no statistically significant differences when the quality of life domains were compared. Moreover, single teachers present a better score in the physical domain than married teachers, with a mean and SD of  $50.25 \pm 8.12$  and, when comparing the social domain, married teachers present good results with a mean and SD of  $64.08 \pm 15.99$ , while the psychological and environmental domains show no differences between the two groups. In summary, both groups presented with good quality of life scores.

There was no statistical difference between years of teaching in all results of the Perceived Stress Scale, suggesting that stress is moderate regardless of years of experience in teaching. Teachers with less than 10 years of experience presented a mean and SD of  $17.70 \pm 3.63$ , those with 11 to 20 years of experience presented a mean and SD of  $17.33 \pm 4.19$  and participants with more than 20 years of experience presented a mean and SD of  $17.23 \pm 4.18$ . On the other hand, all years of experience represented good quality of life.

Around (5.84%) teachers are on a teaching load of 31 to 36 classes per week, and they present the lowest score on the perceived stress scale with a mean and SD of  $15.85 \pm 5.54$ . Other teaching loads present with moderate stress; the majority of teachers are on loads of 16 to 30 classes per week (79.82%) and they report a result of mean and SD of  $17.53 \pm 3.87$ , while teachers on loads of 0 to 15 classes per week represented around 14.32% of the participants and also reported a score of mode-

rate stress with mean and SD of  $18.16 \pm 3.41$ . In comparison to the teaching load in quality of life, teachers who are on a load of 0–15 classes per week present good quality of life scores.

There was a statistical difference in the teaching level in the physical health domain ( $p = 0.044$ ), where teachers teaching at kindergarten reported lower scores, and teaching in high schools reported high scores in the physical domain. There was also a statistical difference in the psychological domain ( $p = 0.002$ ), where teachers working in secondary schools had lower scores, and teachers working in high schools showed better scores. There was no significant difference in social relationships, environment, and perceived stress scale, but there was a slight difference in the domain of environment, where there is a suggestion that has the best environment domain with a mean and SD of  $60.49 \pm 12.51$ . In comparison, stressed teachers working in primary schools reported the highest score in stress with a mean and SD of  $18.16 \pm 3.18$ , suggesting moderate stress.

There was a statistically significant difference in MSP on all quality of life domains ( $p < 0.001$ ), more than 54.38% reported having MSP, as represented by mean and SD of  $47.00 \pm 6.96$ . There is a relationship between physical health and MSP, while teachers who have good physical health do not complain of MSP representing a mean and SD of  $50.73 \pm 9.12$ . Teachers in the psychological domain who reported having MSP showed a lower mean and SD ( $57.10 \pm 7.13$ ), and teachers who did not have MSP tended to have a better mean and SD ( $60.36 \pm 9.06$ ). Social health was better among teachers who did not have MSP, whereas teachers who complained of MSP tended to have a lower mean and SD ( $60.08 \pm 14.76$ ). The environmental domain showed better results of mean and SD ( $61.27 \pm 13.24$ ) in teachers who did not complain of MSP. In conclusion, teachers with MSP tended to have a lower quality of life. There was no statistical difference in the perceived stress scale; teachers who had MSP and those who did not have MSP had moderate stress scores.

The prevalence of teachers complaining about known chronic medical conditions was approximately 14.03%, which is the lowest among the data. There were no statistical differences in known chronic medical conditions in terms of physical health, environment, and stress. There was a statistical difference in the psychological domain ( $p = 0.012$ ) and teachers who had known chronic medical conditions tended to have low psychological health mean and SD ( $55.81 \pm 8.92$ ). Teachers who had known chronic medical conditions had low quality in social relationships ( $p = 0.008$ ), mean and SD ( $58.15 \pm 19.02$ ). Both groups had moderate stress scores on the perceived stress scale.

There was no significant difference in school type, regardless of whether it was private or public, on physical, psychological, or stress health. However, teachers who were working in public schools had better physical health as represented by mean and SD ( $49.23 \pm 9.30$ ), while there was a significant difference in the social domain ( $p = 0.004$ ). When comparing the mean and SD for social health, teachers in public schools had better relationships than teachers who were working in private schools ( $65.26 \pm 17.79$ ). In addition,

the environmental domain ( $p < 0.001$ ) compared to the mean and SD ( $60.01 \pm 13.29$ ) suggests that public school teachers have better environmental health than private school teachers.

## Discussion

This cross-sectional study was conducted to determine the prevalence of work-related musculoskeletal pain and its associated risk factors and correlate it with quality of life, physical activity, and stress among schoolteachers working in the Emirate of Sharjah, United Arab Emirates. Utilizing the technologies and devices in the education scene is encouraged according to the UAE's vision, which is to fulfil the 21<sup>st</sup> century's skills, improve the quality of learning, and develop best practices in the education system.

### Musculoskeletal Pain and Hours Spent on Devices

There is a high prevalence of MSP among schoolteachers. Most reported affected areas were the lower back, shoulders, neck, and upper back, which are in line with previous studies conducted in Saudi Arabia, Brazil, China, and Slovakia, where teachers consistently reported pain in the same areas. Suggested causes of pain are prolonged hours of sitting, standing, usage of devices, individual postures, ergonomics, and occupational factors such as high numbers of classes per week, which may cause MSP in areas such as the lower back, upper back, shoulders, and neck [2, 3, 9, 23]. This is in line with this research, as most teachers in this study had 16–30 classes per week. Upper limb pain can also be caused by multiple workplaces which require from the participant to work in two schools or more and travel between schools to attend another classes for teaching, a large number of students, and teaching materials. These causes have been suggested in a study conducted in Brazil [6]. Moreover, this research highlights the hours spent on devices such as laptops, iPads, and monitors, and the average hours are from six to nine hours a day, which is also suggested to be a cause of MSP among teachers, as previously mentioned in other studies conducted in Iran and Saudi Arabia. A laboratory study has shown that long hours spent on devices can cause neck, shoulder, and back pain [8, 10, 16]. In addition, a laboratory study was conducted on females for 10 min to determine the causes related to psychosocial factors, such as stress during computer work, discomfort exposure to glare, and feelings of discomfort. This showed that multiple hours of working on a computer result in neck pain. This is in line with other research conducted in Belgium that teachers were stressed when giving online lessons using devices, which is in line with this study, as the majority of teachers use devices for teaching [16, 19].

### Load of Teaching

In previous literature, the load of teaching has been shown as a cause of MSP in teachers, where 10 classes per week have been a cause of MSP, specifically neck pain in female teachers, in addition, other studies have shown that more than 20–30 classes per week cause MSP in the lower back, legs and neck [4, 5]. In this research, 79.82% of teachers taught from 16 to 30 class per week, which can be a cause of MSK pain as re-

search suggests that there is a correlation between stress and MSP [7,19], it results in high scores for stress ( $17.53 \pm 3.87$ ), in addition 5.84% of teachers in this study teach 31 to 36 classes per week and they tend to have the highest score of stress with mean and SD of  $15.85 \pm 5.54$ , but it was surprising that teachers on lighter teaching loads of 0 to 15 class per week also have high stress results of mean and SD of  $18.16 \pm 3.41$ , this is because teachers on lighter loads have more extra-curricular activities other than teaching. Other literature also suggests that having more than five classes per week in a prolonged setting can also cause moderate to severe stress, which results in MSP [23].

### Teaching Level

Teaching level factors can affect MSP as studies from Iran and Saudi Arabia show, suggesting that teachers working in primary and secondary schools tend to have more MSP, and the reasons suggested are voice disorder, headache, anxiety, varicose veins in the lower limb, sleep problems, body mass index, and vitamin D deficiency [11, 12]. Which is in line with this research when comparing the quality of life factor, where results represent lack of physical health ( $p = 0.044$ ) such as having pain and discomfort, less sleep and rest, fatigue and lower energy levels in teachers who work kindergarten ( $46.97 \pm 5.76$ ), primary ( $48.53 \pm 7.16$ ) and secondary ( $47.48 \pm 9.37$ ) schools. In addition, teachers who work in such schools also represent low psychological health ( $p = 0.002$ ), participants having problems with thinking, learning, memory, and concentration, low self-esteem, body image, and negative feelings, where teachers working in secondary schools tend to have the lowest psychological health with a mean of  $56.25 \pm 10.24$ . This is in line with the literature conducted in Malaysia, suggesting that psychological distress and psychosocial factors are a result of lower back and neck pain in teachers who work in secondary schools [20].

### Demographic Characteristics

Age can be a factor that can cause MSP in teachers; 78.65% of the participants were aged 35 years or older and 21.34% of the participants were less than 35 years. In comparing the means of the participants in quality of life, there were significant differences in the physical health domain ( $p = 0.048$ ), where participants aged 35 and older tended to have low physical health quality ( $48.24 \pm 8.21$ ), complaints of pain and discomfort, low sleep quality, less energy and fatigue, low mobility, dependence on medicine and medical aids, and low work capacity, which is in line with Nigerian research, which presents the results of teachers who are aged between 35 and 50 who are suggested to have musculoskeletal disorders [14]. Adding research from Saudi Arabia suggests that females aged 40 years and who do not engage in regular exercise are predicted to have MSP in the lower back, knees, shoulders, neck, elbows, and wrists [7]. This research also highlights the lack of physical activity, according to the results 87.42% of participants reported low physical activity, from 0 to 2500 MET minutes per week, 5.26% of participants reported a moderate physical activity from 2500 to 5000 MET minutes per week and 7.30% of participants reported high physical activity abo-

ve 5000 MET minutes per week. There is a predictable factor that low physical activity may cause MSP in teachers in relation to age and low quality of life, in addition other research also correlates and proves that a lack of physical activity is linked to MSP among teachers [23].

Regarding gender and marital status, 24.85% of participants are male and 75.14% of participants are female with 16.08% being single and 83.91% being married. Marital status and gender factors can play a role in MSP or, in contrast, can improve quality of life. To specify more in relation to the gender factor to quality of life, this study shows no statistically significant difference between females and males in the domain of physical health ( $p = 0.361$ ) and psychological health ( $p = 0.288$ ), which suggest there is no differences between male and female teacher's lifestyles. The literature suggests that psychosocial factors and depression are related to MSP equality for males and females [21]. This study predicted that this may be the cause of MSP. However, to cover the other quality of life domains, there was a significant difference between male and female participants when social ( $p = 0.006$ ) and environmental ( $p = 0.008$ ) domains were compared, where males had better personal relationships and social support than females, and males had a good environment, including freedom, physical safety and security, better home environment, financial resources, health and social care, and better accessibility to opportunities for acquiring new information and skills, participation and opportunities for recreational leisure activity, and a good physical environment where there is no pollution, noise, and traffic. Looking at the perceived stress scale score in gender ( $p = 0.128$ ), there was no significant difference between the means of males ( $16.96 \pm 4.53$ ) and females ( $17.71 \pm 3.72$ ); in marital status ( $p = 0.704$ ), both categories had high scores of stress in the perceived stress scale, where single teachers scored a mean of  $17.70 \pm 3.60$  and married teachers had a mean of  $17.49 \pm 4.012$ , suggesting that teaching is a stressful job regardless of gender or marital status, and it can cause MSK pain for both groups equally, as suggested in the literature that psychosocial factors such as concentration, emotional stress, anxiety, and depression can cause non-specific neck pain [18]. Other studies have suggested that female teachers with a higher number of children tend to experience MSK pain [15]. In summary, both sex and marital status can be predictive factors for MSP, but not the main cause.

### Known Chronic Medical Conditions

A study conducted only on female teachers proposed that the presence of chronic medical conditions can be a cause of MSP in Saudi Arabia [12], this research spotlighted the known chronic medical conditions and their relation to quality of life, as a previous study done in Chile, representing teachers reporting neck and shoulder pain, their quality of life was low [22]. The results of the current study showed that 14.03% of the participants had known chronic medical conditions, and that there were no statistical differences in known chronic medical conditions in terms of physical health, environment, and stress. There was a statistically significant difference in the psychological domain ( $p = 0.012$ ), where teachers who had known chronic medical conditions tended to have low psychological



health mean and SD ( $55.81 \pm 8.92$ ), additionally teachers who had known chronic medical conditions had low quality in social relationships ( $p = 0.008$ ), mean and SD ( $58.15 \pm 19.02$ ). This is consistent with the previous two literatures [12, 22]. Both groups had high stress scores on the perceived stress scale.

### School Type

To widen the results, this research also focuses on private and public schoolteachers, which has not been done before in the literature. In the UAE, private schools have a different educational system than public schools; other factors are discussed further. In this study 69.59% of the participants worked in public schools and 30.40% worked in private schools. To compare the results of quality of life, there is no significant difference in physical health ( $p = 0.071$ ) and psychological health ( $p = 0.982$ ) domains, which suggest that teachers from private schools and public schools have the same lifestyle, but there is a significant difference in social health ( $p = 0.004$ ), where teachers from public schools have better means ( $65.26 \pm 17.79$ ) than private school teachers ( $60.01 \pm 7.09$ ) which suggest that public school teachers have better social relationships and better social support, also in the environmental domain there is a significant difference ( $p = 0.001$ ) between private school teachers and public school teachers, where private school teachers tend to have lower means ( $54.83 \pm 6.71$ ) than public school teachers ( $60.01 \pm 13.29$ ), which suggest that teachers in private schools have less freedom, physical safety and security, a bad home environment, less financial resources, low accessibility and quality in health and social care than teachers who work in public schools. Additionally, 64.91% of teachers are non-local, and only 35.08% of the participants are from the UAE, which can predict why social and environmental domains are low in private schools, as most private school teachers are non-local.

### Conclusion

The prevalence of MSP is high, the majority of participants complained of MSK pain in different areas, with the most reported areas being the lower back, shoulders, neck, and upper back. Suggested causes include long hours spent on devices, heavy teaching loads, older age, and low physical activity. In addition, quality of life results shows that females, who form more than half of the participants, have lower quality in social and environmental domains than males, additionally, teachers who have known chronic medical conditions reported results of low quality of life in the psychological and social domains. Furthermore, this research presents a study of private and public schoolteachers, and the results show that private schoolteachers tend to have a low quality of life in the social and environmental domains, while teachers in public schools are better in those domains. In addition, most participants had moderate stress levels.

### Limitation

The number of participants in our study did not reach the estimate. To ensure accurate results, some questionnaires required responses based on the past two months and teachers were on summer break from mid-July until the end of August, the data were accurate until September. It is difficult to generalize the results to other emirates because of the environmental factors of Sharjah's emirate, in addition to the Sharjah private school sector. In addition, due to rapid changes in the mode of lesson delivery after COVID-19, it is difficult to investigate stress as teachers returned to school after quarantine.

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