The Prevalence and Risk Factors of Musculoskeletal Discomfort Among Selected Students at Caraga State University, Butuan City, Caraga Region, Philippines

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Abstract

Musculoskeletal discomfort (MSD) can affect a person's ability to perform their job effectively, resulting in missed workdays and lower productivity. Prolonged periods of immobility can cause excessive strain on muscles and joints, particularly in the neck, back, and shoulders, resulting in symptoms such as headaches, backaches, neck pain, and shoulder discomfort. This study explored how common musculoskeletal discomfort (MSD) is and identified the factors that may contribute to it. Also, associate these risk factors among 1st-year students officially enrolled in 1st semester, A.Y. 2022–2023 in Caraga State University-Main Campus, Ampayon, Butuan City, Agusan del Norte. A total of 341 students from all seven colleges participated in the survey. Results revealed a high prevalence of MSD in the neck, shoulders, lower and upper back, wrists/hands, and elbows over the previous 12 months and a high prevalence during the last seven days in the shoulders, upper, and lower back. Also, there is a significant association between MSD and respondents' age, gender, and college course. Females were more likely to experience MSD than males. Laptop/computer usage and time spent on electronic devices were significant risk factors for MSD. In contrast, physical activity engagement did not show a significant relationship with MSD over the previous 12 months, except for upper back discomfort during the last seven days. Consequently, the prevalence of musculoskeletal discomfort (MSD) and its associated risk variables are significantly correlated among first-year students at Caraga State University (CSU). To reduce the impact of MSDs on the student body, implementing a comprehensive strategy that addresses both environmental and human aspects is suggested.

Keywords

Epidemiology; ergonomics; musculoskeletal pain; repetitive movement; strain

Introduction

The universal occurrence of musculoskeletal pain becomes a multidimensional phenomenon that covers an individual's physical, sensory, and emotional aspects (Paixão et al., 2013). The emergence of musculoskeletal problems has increased worldwide due to different factors that contribute to the problem. Individuals suffering from musculoskeletal conditions increased by 25% over the past decade, making up 2% of the disease burden globally (Borhany et al., 2018). Musculoskeletal discomfort (MSD) refers to self-reported musculoskeletal aches and pains that are a sign of clinically established health events (Scuffham et al., 2010).

The level of musculoskeletal complaints in a community can be evaluated by prevalence, and prevention and treatment strategies are based on risk factors for musculoskeletal complaints (Xie et al., 2017). The prevalence of many musculoskeletal conditions can relate to computer and internet usage reported by several studies with 12-month prevalence rates of musculoskeletal pain in the neck at 55–69% (Borhany et al., 2018), back at 31–54%, and upper extremities at 15–52% (Oha et al., 2014). The escalating issue of musculoskeletal problems in various countries can be attributed to the widespread use of smartphones (Namwongsa et al., 2018). An epidemiological study conducted in Korea revealed that 18.8% of smartphone users (n = 185) experience musculoskeletal complaints in at least one area of their body. According to Tantawy et al. (2017), MSDs are frequently associated with physical risk factors that strain joints and soft tissues more. They may result in injuries, such as repetitive tasks, vibration exposure, poor posture, and static work situations. However, variables, including the frequency, length, and intensity of physical exposure, affect how severe these injuries are.

Students who experience musculoskeletal pain experience discomfort, which might reduce their free time and raise their stress levels (Prajapati & Purohit, 2021). Kamalia et al. (2024) reviewed multiple articles, and in doing so, they found that students often experience MSDs, particularly in the lower back, neck, and shoulders, due to workplace ergonomics, individual traits, and organizational and psychosocial factors. This underscores the influence of physical, behavioral, and organizational elements on MSD development in students (Kamalia et al., 2024). MSDs have a substantial impact on the disease burden in Asia, resulting in diminished productivity, quality of life, financial implications, and reduced work participation, which in the Philippines ranked among the top ten causes of years lived with disability (Intia et al., 2022).

Since the COVID-19 pandemic began a few years back, students in the Philippines were already exposed to online classes, which were seen as reasons for intermittent usage of gadgets and sitting for long hours at their work desks (Bare et al., 2021). These musculoskeletal disorders are caused by bad posture, repetitive tasks, and too much sitting. The Philippines has a low supply of school materials, equipment, and facilities and lacks utilities and resources to fit the recommended ratio of amenities per child (Gumasing et al., 2021). Kandasamy et al. (2024) found a high prevalence of musculoskeletal pain (MSP) among university students linked to trauma history, family history of musculoskeletal disorders, device usage posture, duration, and regular exercise. Increased physical activity significantly improves musculoskeletal health and reduces pain. Universities are encouraged to implement educational programs and health screenings to highlight the impact of device use on MSK health and the benefits of regular exercise (Kandasamy et al., 2024).

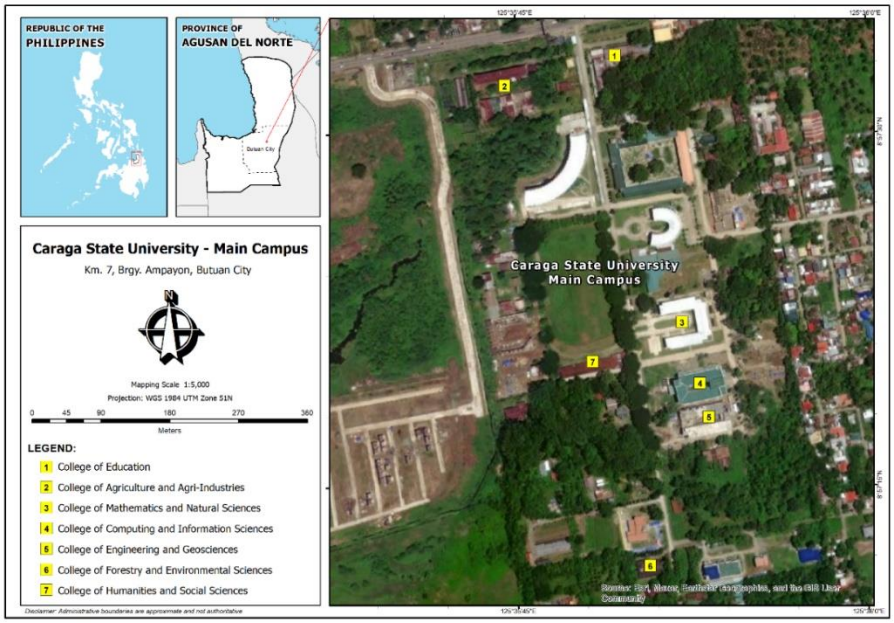
The presence of musculoskeletal pain among students might eventually develop into an acute condition. However, this study aims to determine the prevalence and risk factors associated with musculoskeletal discomfort (MSD) among first-year college students enrolled in Caraga State University (CSU) Main Campus. That said, the objective is to describe students' sociodemographic profile, estimate the prevalence of MSD, and the exposure to risk factors, in addition to analyzing the association of these variables with the occurrence of MSD. It indicates a need for specific treatments, such as ergonomic assessments, training programs, health education, and regular exercise and breaks. Parents, students, instructors, and schools are encouraged to collaborate in promoting proper posture and healthy behaviors. This study also offers a reference framework for upcoming scholarly investigations into MSD.

Materials and methods

Research design

This study used a descriptive survey design to determine the prevalence and risk factors of musculoskeletal discomfort (MSD) among selected students in Caraga State University-Main Campus, 1st semester, A.Y. 2022–2023. One questionnaire comprising three sections was designated to the survey respondents to amass the required quantitative data.

Figure 1: The Geographical Location of Caraga State University-Main Campus, Ampayon, Butuan City



Note: Adapted from Google Maps. (2023). [Google map of Caraga State University, Ampayon Butuan City] https://maps.app.goo.gl/Tdngd8ATj5HLhUj58

Locale of the study

As shown in Figure 1, the Caraga State University-Main Campus (CSU) is a higher education institution in Km. 7, Brgy. Ampayon, Butuan City, Agusan del Norte, Philippines. The CSU campus is strategically positioned along the Phil-Japan Friendship Highway, which begins in

Butuan City and extends through various cities such as Surigao City, Bayugan City, and Cabadbaran City. It also passes through the provinces of Agusan del Norte, Agusan del Sur, Surigao del Norte, and Surigao del Sur. The campus has 232 hectares, 32 hectares designated for academic buildings and support facilities, and the remaining 200 hectares for production, research, and extension projects. Comprising with seven colleges which are: the College of Computing and Information Sciences (CCIS), College of Mathematics and Natural Sciences (CMNS), College of Education (CEd), College of Forestry and Environmental Science (CoFES), College of Humanities and Social Sciences (CHaSS), College of Engineering and Geo-Sciences (CEGs), and College of Agriculture and Agri-Industries (CAA).

Sampling design

This study used purposive sampling through Google Forms to gather the respondents. A total of 2,940 1st year enrolled in 1st semester, A.Y. 2022–2023. The required sample size was calculated using Cochran's formula. With a confidence level of 95%, a 5% margin of error, and a population proportion of 50%, the sample size (n) was calculated where N is the total population (N = 2,940), and n is the new population size. Therefore, the sample size was estimated to be 340 (n = 340). There are 346 respondents, 341 of whom chose to continue the survey, and four did not.

Participants of the study

The participants of this study must be officially enrolled in 1st semester A.Y. 2022–2023. Selected undergraduate 1st year students at all seven colleges of CSU were chosen to participate in the survey. The seven colleges were the College of Computing and Information Sciences (CCIS), with 612 enrolled students; College of Mathematics and Natural Sciences (CMNS) with 289 enrolled students; the College of Education (CEd) with 504 enrolled students; College of Forestry and Environmental Science (CoFES) with 359 enrolled students, College of Humanities and Social Sciences (CHaSS) with 394 enrolled students, College of Engineering and Geo-Sciences (CEGs) with 480 enrolled students, and College of Agriculture and Agri-Industries (CAA) with 302 enrolled students. Students who are enrolled as regular or irregular students, and those who are returnees, are eligible to participate in the survey.

Survey instrument

The questionnaire is composed of four sections: Section One: the survey inform-consent; section two: sociodemographic profile (age, sex, height, weight, marital status, educational background); section three: possible risk factors of MSDs (use of laptop/computer, use of mobile phone, physical activities) which adapted from different conducted studies; and section four: Nordic Musculoskeletal Questionnaire (NMQ) which is adapted from Crawford (2007) to identify the discomfort of the respondents in different body parts (neck, shoulders, elbows, wrist/hands, upper back, lower back, hips/thighs, knee, ankle/feet). The NMQ assesses the respondents' discomfort during the previous 12 months if they were prevented from carrying out everyday activities (e.g., job, housework, hobbies) for the last 12 months, and the 7-day recall period of the respondents if they experienced MSD in any parts. It should be answered even if they never had trouble with any body parts of the body mentioned.

Data gathering and ethical statement

The survey was carried out between January to February 2023. The draft questionnaire was sent with the permission letter for review to acquire approval and validation from the Ethics Committee of Caraga State University. Participants were pre-informed about the research before being given the survey links and allowed a month to complete it. Participants were free to leave at any point in the survey and were informed that their responses were anonymous and confidential. They could access the survey questionnaire and complete it anywhere they had internet access. They were also informed that their participation was voluntary, that no incentives were offered, and that it was carried out for academic and not for commercial purposes.

Statistical analysis

When the survey closed, the questionnaires were collected and analyzed statistically. The descriptive analysis was used to identify the association between the prevalence of MSD and the risk factors. Frequencies and percentages were used to determine the respondents' sociodemographic profile and the prevalence of MSD. The chi-square test of independence was used to determine the significant association between MSD and the risk factors tested at a 0.05 level of significance. Statistical data underwent consultation and data analysis at the Mathematical Computing and Research Center (MSCRC), and certification was issued after.

Results

Sociodemographic profile of the respondents

A total of 341 first-year students agreed and participated in this study. Most respondents are females, 205 (60.12), and the rest are males, 126 (36.95). The age of the respondents ranged from 16–18 years old with 109 (31.96), 19–21 years old with 210 (61.58), and 22 years old and above with 22 (6.45). In terms of college-wise distribution, most participants were from the College of Computing and Information Science (CCIS) with 77 (22.58), followed by the College of Education (CEd) with 75 (21.99); the fewest respondents were from the College of Forestry and Environmental Sciences were 28 (8.21) (Table 1).

Table 1: Distribution of the Respondents Grouped According to Sociodemographic Profile

Sociodemographic	*n** (%)
Sex *n* (%)	
Male	126 (36.95)
Female	205 (60.12)
Prefer not to say	10 (2.93)
Age	
16–18 years old	109 (31.96)
19–21 years old	210 (61.58)
22 years old and above	22 (6.45)
Marital status n (%)	
Single	340 (99.71)

Sociodemographic	*n** (%)
Married	1 (0.29)
College n (%)	
CCIS	77 (22.58)
ChaSS	27 (7.92)
CAA	31 (9.09)
CMNS	41 (12.02)
CEGs	62 (18.18)
Ced	75 (21.99)
CoFES	28 (8.21)

*Note: *n = 341*

Prevalence of musculoskeletal discomfort among students

The most common discomfort experienced by the respondents is shoulder pain, 221 (64.81). During the previous 12 months, 120 (35.19) respondents reported no pain in their shoulder, but 107 (31.38) reported that they were prevented from carrying out everyday activities such as work, housework, or hobbies. During the preceding seven days, 151 (44.48) respondents reported experiencing shoulder trouble during the preceding seven days. The second most common body discomfort experienced by the respondents is neck, 216 (63.34). Results revealed that most respondents experienced neck discomfort during the previous 12 months, and 77 (22) respondents reported having trouble carrying out everyday activities for the past 12 months. Lower back discomfort, 208 (61.00), was also noted as commonly experienced by the respondents in the previous 12 months. There were 153 (44.87) who experienced lower back pain within 7 days of the survey.

Although the respondents experienced lower back discomfort, 246 (72.14) agreed they had not had trouble carrying out everyday activities for the previous 12 months. It was also reported that 167 (48.87) respondents experienced physical discomfort related to their wrists and hands over the past 12 months. Interestingly, the least reported body pain is elbow, 42 (12.32). Most respondents agreed that during the previous 12 months, even if they experienced elbow complaints, only 36 (10.56) reported difficulty carrying out their everyday activities. Moreover, only 25 (7.33) respondents reported elbow complaints during the previous seven days (Table 2).

Table 2: Prevalence of Musculoskeletal Discomfort in Body Parts in Standardized Nordic Questionnaire

Body part	Have you at any time during the previous 12 months had troubles (such as aches, pain, discomfort, numbness) in: *n (%)*	During the previous 12 months, have you been prevented from carrying out everyday activities (e.g., job, housework, hobbies) because of this trouble in: *n (%)*	During the previous 7 days, have you had trouble with the following: *n (%)*
Neck			
With MSD	216 (63.34)	77 (22.58)	140 (41.06)
Without MSD	125 (36.66)	264 (77.42)	201 (58.94)
Shoulders			
With MSD	221 (64.81)	107 (31.38)	151 (44.28)

Body part	Have you at any time during the previous 12 months had troubles (such as aches, pain, discomfort, numbness) in: *n (%)*	During the previous 12 months, have you been prevented from carrying out everyday activities (e.g., job, housework, hobbies) because of this trouble in: *n (%)*	During the previous 7 days, have you had trouble with the following: *n (%)*
Without MSD	120 (35.19)	234 (68.62)	190 (55.72)
Elbows			
With MSD	42 (12.32)	36 (10.56)	25 (7.33)
Without MSD	299 (87.68)	305 (89.44)	316 (92.67)
Wrist/Hands			
With MSD	167 (48.87)	95 (27.86)	83 (24.34)
Without MSD	174 (51.03)	246 (72.14)	258 (75.66)
Upper back			
With MSD	207 (60.70)	81 (23.75)	144 (42.23)
Without MSD	134 (39.30)	260 (76.25)	197 (57.77)
Lower back			
With MSD	208 (61.00)	95 (27.86)	153 (44.87)
Without MSD	133 (39.00)	246 (72.14)	188 (55.13)
Hips/Thigh			
With MSD	137 (40.18)	69 (20.23)	83 (24.34)
Without MSD	204 (59.82)	272 (79.77)	258 (75.66)
Knee			
With MSD	125 (36.66)	55 (16.13)	64 (18.77)
Without MSD	216 (63.34)	286 (83.87)	277 (81.23)
Ankle/Feet			
With MSD	118 (34.60)	73 (21.41)	73 (21.41)
Without MSD	223 (65.40)	268 (78.59)	268 (77.46)

Note: n = 341

Possible risk factors of MSD among students

Of the individuals who participated in this study, 243 (71.26) indicated they own a computer or a laptop. The most common use of a computer/laptop reported by the respondents was for school and work-related activities: 241 (70.67), followed by online work/job (16 [4.69]), workload (25 [7.33]), entertainment (13 [3.81]), online games (14 [4.11]) and using social media (3 [0.88]). Among those who owned a computer or laptop, 142 (41.64) reported using it for 1–3 hours daily. In addition, 76 (22.29) computer/laptop owners use their gadgets for about 4 to 6 hours daily. On the other hand, 6 (1.76) respondents used computers/laptops for extended periods of about 12 hours or more.

Most respondents owned mobile phones; of the 341 respondents, 335 (98.24) regularly used them. This device is commonly used by the respondents for social media (335 [98.24]),

entertainment (283 [82.99]), text messaging (263 [77.13]), phone calls (214 [62.76]), and emailing (202 [59.24]). On the other hand, only a small proportion of the respondents use this device for exercise (69 [20.23]) and school-related activities (4 [1.17]) (Table 3). The average usage of mobile phones was also reported in this survey; most respondents spent 7 to 12 hours per day 127 (37.24) with their phones. Followed by phone usage for 4–6 hours (112 [32.84]) and 12 or more (70 [20.53]). Notably, the least number of respondents spend 1–3 hours per day (32 [9.38]) using their phones.

Also, 338 (99.12) respondents engaged in different physical activities. Among those who engage in physical activity, the most common activities reported were household chores (266 [78.01]), followed by doing various exercises such as jogging, walking, or running (181 [53.98]). Sports, hobbies, and outdoor activities were less commonly reported. In terms of the amount of physical activity, 259 (75.95) of respondents reported engaging in physical activity for 1–3 hours per day, followed by small proportions spending 4–6 hours per day (68 [19.94]), and lastly, 12 hours or more per day (1 [0.29]). A tiny proportion of respondents (3 [0.88]) reported not engaging in physical activity.

Table 3: Chi-square Test of Independence Between the Prevalence of MSD and Respondents' Age

Variable	Have you at any time during the previous 12 months had troubles (such as aches, pain, discomfort, numbness)				During the previous 12 months, have you been prevented from carrying out everyday activities (e.g., job, housework, hobbies) because of this trouble				During the previous 7 days, have you had trouble?			
	16–18 years old	19–21 years old	22 years old and above	*p* value*	16–18 years old	19–21 years old	22 years old and above	*p* value*	16–18 years old	19–21 years old	22 years old and above	*p* value*
Neck												
With MSD (%)	33.33	60.19	6.48	.766	18.18	70.13	11.69	**.003***	30.71	62.86	6.43	.914
Without MSD (%)	29.60	64.00	6.40		35.99	59.09	4.92		32.84	60.70	6.47	
Shoulders												
With MSD (%)	34.84	59.73	5.43	.224	26.17	65.42	8.41	.230	33.11	61.59	5.30	.715
Without MSD (%)	26.67	65.00	8.33		34.61	59.83	5.56		31.05	61.58	7.37	
Elbows												
With MSD (%)	33.33	59.52	7.14	.953	22.22	61.11	16.67	**.021***	24.00	68.00	8.00	.665
Without MSD (%)	31.77	61.87	6.36		33.12	61.64	5.25		32.60	61.07	6.33	
Wrist/Hands												
With MSD (%)	31.74	62.28	5.99	.932	25.26	66.32	8.42	.210	33.74	62.65	3.61	.473
Without MSD (%)	32.18	60.92	6.90		34.55	59.76	5.69		31.40	61.24	7.36	
Upper back												
With MSD (%)	33.33	61.35	5.31	.504	24.70	64.20	11.11	.066	31.25	63.89	4.86	.540
Without MSD (%)	29.85	61.94	8.21		34.23	60.77	5.00		32.49	59.90	7.61	
Lower back												
With MSD (%)	32.69	60.10	7.21	.685	27.37	61.05	11.58	**.044***	33.99	60.13	5.88	.745
Without MSD (%)	30.83	63.91	5.26		33.74	61.79	4.47		30.32	62.77	6.92	
Hips/Thigh												
With MSD (%)	30.66	66.42	2.92	.066	28.99	60.87	10.15	.354	34.94	61.45	3.61	.433
Without MSD (%)	32.84	58.33	8.82		32.72	61.77	5.52		31.01	61.63	7.36	
Knee												
With MSD (%)	32.80	63.20	4.00	.374	25.46	67.27	7.27	.527	28.13	70.31	1.56	.119
Without MSD (%)	31.48	60.65	7.87		33.22	60.49	6.29		32.85	59.57	7.58	
Ankle/Feet												
With MSD (%)	34.75	59.32	5.93	.718	26.03	65.76	8.21	.420	27.40	67.12	5.48	.547
Without MSD (%)	30.49	62.78	6.72		33.58	60.45	5.97		33.21	60.08	6.72	

*Note: * < .05 significant association*

Effect of age on the prevalence of MSD

The result shows no significant relationship between the respondent's age and the prevalence of musculoskeletal discomfort in the neck, shoulders, elbows, wrist/hands, upper back, lower back, hips/thigh, knee, and ankle/feet during the previous 12 months. Similarly, there is no significant relationship between the respondent's age and the prevalence of musculoskeletal discomfort in the neck, shoulders, elbows, wrist/hands, upper back, lower back, hips/thigh, knee, and ankle/feet during the previous seven days. However, there is a significant association for those who are prevented from carrying out everyday activities in the neck (p = .003), elbows (p = .021), and lower back (p = .044) in the previous 12 months (Table 3).

Effect of the respondents' sex on the prevalence of MSD

The significant association with the prevalence of MSD in the shoulders (p = .010), wrist/hands (p = .000), upper back (p = .008), hips/thigh (p = .000), and knee (p = .006) in the previous 12 months between the respondents' sex is also determined (Table 4). It was found that respondents' sex has a significant association with the prevalence of MSD in shoulders (p = .007), wrist/hands (p = .003), upper back (p = .007), lower back (p = .048), and ankle/feet (p = .013) during the previous seven days. In the said body parts, the prevalence rate of MSD is higher in females than in males. Also, there is a significant relationship between the respondents' sex and the prevalence rate of those who were prevented from carrying out everyday activities in the previous 12 months due to MSD in shoulders (p = .002), wrist/hands (p = .000), upper back (p = .002), hips/thighs (p = .047), knee (p = .045) and ankle/feet (p = .000).

Effects of the respondents' chosen college on the prevalence of MSD

There is a significant relationship between the respondents' college and the prevalence of MSD in the neck, shoulders, elbows, wrist/hands, lower back, hips/thighs, and knee over the previous 12 months. Among the colleges, the College of Education (CEd) has the highest prevalent rate of MSD in the neck (p = .011), shoulders (p = .009), elbows (p = .000), wrist/hands (p = .003), lower back (p = .034), hips/thighs (p = .006), and knee (p = .026). There is also a significant relationship between the respondents' college and the prevalence rate of those who were prevented from carrying out everyday activities in the previous 12 months due to MSD in the neck (p = .028), elbows (p = .000), lower back (p = .036), knee (p = .003), and ankle/feet (p = .013). The highest percentage of the students who are prevented from carrying out everyday activities in the previous 12 months due to MSD in all the above-mentioned body parts are CoFES in elbows (p = .001), CEd in the neck (p = .028), lower back (p = .036) and ankle/feet (p = .013). The percentage of the students in CAA, CEGs, CEd, and CoFES was significant in the knee (p = .003).

The respondents' colleges have a significant relationship on the prevalence of MSD in shoulders (p = .008), elbows (p = .010), hips/thighs (p = .018), and knees (p = .016) over the previous seven days. In all these body parts, the College of Education (CEd) has the highest prevalent rate of MSD among the colleges included in this study.

Table 4: Chi-square Test of Independence Between the Prevalence of MSD and the Respondents' Sex

Variable	Have you at any time during the previous 12 months had troubles (such as aches, pain, discomfort, numbness)				During the previous 12 months, have you been prevented from carrying out everyday activities (e.g., job, housework, hobbies) because of this trouble				During the previous 7 days, have you had trouble?			
	Male	Female	Prefer not to say	*p* value*	Male	Female	Prefer not to say	*p* value*	Male	Female	Prefer not to say	*p* value*
Neck												
With MSD (%)	32.87	63.43	3.70	.085	32.47	62.34	5.20	.308	32.14	65.00	2.86	.296
Without MSD (%)	44.00	54.40	1.60		38.26	59.47	2.27		40.30	56.77	2.99	
Shoulders												
With MSD (%)	31.22	65.16	3.62	**.010***	31.78	60.75	7.48	**.002***	29.80	64.90	5.30	**.007***
Without MSD (%)	47.50	50.83	1.67		39.32	59.83	0.86		42.63	56.32	1.05	
Elbows												
With MSD (%)	38.10	57.14	4.76	.728	33.33	61.11	5.56	.579	44.00	48.00	8.00	.184
Without MSD (%)	36.79	60.54	2.68		37.38	60.00	2.62		36.39	61.08	2.53	
Wrist/Hands												
With MSD (%)	25.15	71.26	3.59	**.000***	24.21	68.42	7.37	**.000***	21.69	73.49	4.82	**.003***
Without MSD (%)	48.28	49.43	2.30		41.87	56.91	1.22		41.86	55.81	2.33	
Upper back												
With MSD (%)	30.44	66.18	3.38	**.008***	34.57	56.79	8.64	**.002***	29.86	64.58	5.56	**.007***
Without MSD (%)	47.02	50.75	2.24		37.69	61.15	1.15		42.13	56.85	1.02	
Lower back												
With MSD (%)	32.69	63.94	3.37	.119	30.53	64.21	5.26	.118	30.07	66.01	3.92	**.048***
Without MSD (%)	43.61	54.14	2.26		39.43	58.54	2.03		42.55	55.32	2.13	
Hips/Thigh												
With MSD (%)	24.82	70.07	5.11	**.000***	31.88	60.87	7.25	**.047***	31.33	63.86	4.82	.283
Without MSD (%)	45.10	53.43	1.47		38.24	59.93	1.84		38.76	58.92	2.33	
Knee												
With MSD (%)	26.40	71.20	2.40	**.006***	27.27	65.46	7.27	**.045***	28.13	67.19	4.70	.208
Without MSD (%)	43.06	53.70	3.24		38.81	59.09	2.10		38.99	58.48	2.53	
Ankle/Feet												
With MSD (%)	29.66	66.10	4.24	.095	28.77	61.64	9.59	**.000***	26.03	67.12	6.85	**.013***
Without MSD (%)	40.81	56.95	2.24		39.18	59.70	1.12		39.93	58.21	1.87	

*Note: * < .05 significant association*

Effects of owning a laptop/computer on the prevalence of MSD

Owning a laptop has had a significant effect on the prevalence of MSD over the previous 12 months, particularly in the elbows (p = .001) but not with the other body parts like the neck, shoulders, wrist/hands, upper and lower back, hips/thighs, knee, and ankle/feet. Similarly, owning a laptop significantly affected the prevalence of MSD over the previous week in their elbows (p = .027) and knees (p = 0.043). Also, it was found that owning a laptop/computer can be significantly associated with the prevalence rate of those who were prevented from carrying out everyday activities in the previous 12 months due to MSD in the neck (p = .002), shoulders (p = .008), and elbows (p = .000).

Effects of time spent using laptop/computer on the prevalence of MSD

Time spent using a laptop has had a significant effect on the prevalence of MSD over the previous 12 months, particularly in the elbows (p = .014) but not with the other body parts like neck, shoulders, wrists/hands, upper and lower back, hips/thighs, knee and ankle/feet (Table 5). The amount of time spent using a laptop/computer can be significantly associated with the prevalence rate of those who were prevented from carrying out everyday activities in the previous 12 months due to MSD in the neck (p = .013), shoulders (p = .037) and elbows (p = .009). The time spent using a laptop/computer significantly affects the prevalence of MSD over the previous week in the upper back (p = .000).

Effects of uses of laptops/computers on the prevalence of MSD

The test results showed a significant relationship between the use of laptops/computers and the prevalence of musculoskeletal discomfort over the previous 12 months, particularly in the elbows (p = .017). There is no significant effect on the prevalence of MSD over the last week in all the body parts. Besides that, it was found that using a laptop/computer cannot be significantly associated with the prevalence rate of those prevented from carrying out everyday activities in the previous 12 months due to MSD.

Effect of regular use of mobile phones on the prevalence of MSD

The effect of regular use of mobile phones has no significant association with the prevalence of MSD in all body parts over the previous 12 months. Similarly, regular use of mobile phones has no significant effect on the prevalence of MSD during the last seven days in most body parts except in the shoulders (p = .028). Moreover, regular use of mobile phones can be significantly associated with the prevalence rate of those who were prevented from carrying out everyday activities in the previous 12 months due to MSD in their wrist/hands (p = .032).

Table 5: Chi-Square Test of Independence Between the Prevalence of MSD and Usage of Computer/Laptop in an Average Day

Usage of computer/laptop in an average day	Have you at any time during the previous 12 months had troubles (such as aches, pain, discomfort, numbness)						During the previous 12 months, have you been prevented from carrying out everyday activities (e.g., job, housework, hobbies) because of this trouble						During the previous 7 days, have you had trouble?					
	1–3 hours	4–6 hours	7–12 hours	12 hours or more	None	*p* value *	1–3 hours	4–6 hours	7–12 hours	12 hours or more	None	*p* value *	1–3 hours	4–6 hours	7–12 hours	12 hours or more	None	*p* value *
Neck																		
With MSD (%)	40.74	25.00	4.17	1.85	28.24	.317	29.87	22.08	2.60	2.60	42.86	**.013***	37.86	22.14	6.43	2.14	31.43	.699
Without MSD (%)	44.00	17.60	8.00	1.60	28.80		45.46	22.35	6.44	1.52	24.24		44.78	22.39	4.98	1.49	26.37	
Shoulders																		
With MSD (%)	40.72	21.72	4.10	1.36	31.22	.540	34.58	23.36	2.80	0.94	38.32	**.037***	35.76	21.85	7.29	1.99	33.11	.194
Without MSD (%)	44.17	23.33	6.67	2.50	23.33		45.30	21.80	6.84	2.14	23.93		46.84	22.63	4.21	1.58	24.74	
Elbows																		
With MSD (%)	23.81	16.67	7.14	2.38	50.00	**.014***	19.44	19.44	5.56	2.78	52.78	**.009***	20.00	24.00	8.00	0.00	48.00	.111
Without MSD (%)	44.48	23.08	5.53	1.67	25.42		44.60	22.26	5.58	1.64	25.57		43.67	22.15	5.38	1.90	26.90	
Wrist/Hands																		
With MSD (%)	39.52	22.16	4.79	2.40	31.14	.662	36.84	22.11	3.16	3.16	34.74	.241	44.58	19.28	4.82	1.21	30.12	.904
Without MSD (%)	44.25	22.41	6.32	1.15	25.86		43.90	22.36	6.50	1.22	26.02		41.09	23.26	5.81	1.94	27.91	
Upper back																		
With MSD (%)	40.58	24.16	6.28	1.45	27.54	.741	39.51	22.22	6.17	1.24	30.86	.963	31.25	29.17	8.33	0.00	31.25	**.000***
Without MSD (%)	44.03	19.40	4.48	2.24	29.85		42.69	22.31	5.39	1.92	27.69		49.75	17.26	3.55	3.05	26.40	
Lower back																		
With MSD (%)	40.87	24.52	5.77	1.92	26.92	.756	35.79	23.16	4.21	1.05	35.79	.338	39.22	24.84	6.54	2.61	26.80	.528
Without MSD (%)	43.61	18.80	5.26	1.50	30.83		44.31	21.95	6.10	2.03	25.61		44.15	20.21	4.79	1.07	29.80	
Hips/Thigh																		
With MSD (%)	39.42	21.90	6.57	1.46	30.66	.864	30.44	27.54	4.35	1.45	36.23	.205	40.96	19.28	6.02	0.00	33.74	.475
Without MSD (%)	43.63	22.60	4.90	1.96	26.96		44.85	20.96	5.88	1.84	26.47		42.25	23.26	5.43	2.33	26.74	
Knee																		

Usage of computer/laptop in an average day	Have you at any time during the previous 12 months had troubles (such as aches, pain, discomfort, numbness)						During the previous 12 months, have you been prevented from carrying out everyday activities (e.g., job, housework, hobbies) because of this trouble						During the previous 7 days, have you had trouble?					
	1–3 hours	4–6 hours	7–12 hours	12 hours or more	None	*p* value *	1–3 hours	4–6 hours	7–12 hours	12 hours or more	None	*p* value *	1–3 hours	4–6 hours	7–12 hours	12 hours or more	None	*p* value *
With MSD (%)	35.20	24.80	5.60	0.80	33.60	.234	38.18	18.18	3.64	1.82	38.18	.502	29.69	26.56	4.69	0.00	39.06	.089
Without MSD (%)	45.83	20.83	5.55	2.32	25.46		42.66	23.08	5.94	1.75	26.57		44.77	21.30	5.78	2.17	25.10	
Ankle/Feet																		
With MSD (%)	38.98	23.73	3.39	1.70	32.20	.560	34.25	30.14	1.37	1.37	32.88	.110	36.99	24.66	2.74	1.37	34.25	.510
Without MSD (%)	43.50	21.53	6.73	1.80	26.46		44.03	20.15	6.72	1.87	27.24		43.28	21.64	6.34	1.87	26.87	

*Note: * < .05 significant association*

Effects of the amount of time spent using mobile phones on the prevalence of MSD

The amount of time spent using mobile phones has a significant effect on the prevalence of MSD in the neck (p = .003), shoulders (p = .049), upper (p = .008), and lower (p = .000) back, hips/thighs (p = .034), and ankle/feet (p = .038) during the previous 12 months. Over the last seven days, the present study found that there is a significant effect of time spent using mobile phones on the prevalence of MSD in wrist/hands (p = .034), upper (p = .003), and lower (p = .003) back (Table 6).

Effects of uses of mobile phones on the prevalence of MSD

The use of mobile phones has had a significant effect on the prevalence of MSD over the previous 12 months, particularly in the elbows (p = .024). Similarly, the usage of mobile phones has a significant association with the prevalence of MSD only in elbows (p = .005) during the previous seven days. In addition, there is no significant effect of the use of mobile phones on the prevalence rate of those who were prevented from carrying out everyday activities in the previous 12 months due to MSD.

Effect of engagement in physical activity on the prevalence of MSD

Engagement in physical activity has no significant association with the prevalence of MSD in all body parts under this study over the previous 12 months. In addition, physical activity significantly impacts the likelihood of being prevented from carrying out their routines when they experience discomfort in their hips/thighs (p = .044). Plus, engagement in physical activities has significantly affected the prevalence of MSD in the upper back (p = .042) during the previous seven days.

Effect of average daily amount of time spent in physical activity on the prevalence of MSD

There is no significant association between the average daily amount of time spent in physical activity and the prevalence of musculoskeletal discomfort in all the body parts during the previous 12 months. This suggests that the amount of time spent in physical activity does not significantly reduce the prevalence rate of MSD in various parts of the body. Similarly, there is no significant association between the prevalence of MSD in all the body parts over the previous seven days and no significant effect on those prevented from carrying out everyday activities during the last 12 months.

Effect of kinds of physical activity the respondents are engaged in on the prevalence of MSD

The kind of physical activity the respondents are engaged in is only significantly correlated with the prevalence of MSD in the wrist/hands (p = .013) during the previous 12 months. Meanwhile, the kind of physical activity the respondents are engaged in is also significantly associated with the prevalence of MSD in the elbows (p = .011) during the previous seven

days, and no significant association was found for those who were prevented from carrying out everyday activities.

Table 6: Amount of Time Spent Using Mobile Phones and the Prevalence of MSD

Usage of mobile phones in an average daily	Have you at any time during the previous 12 months had troubles (such as aches, pain, discomfort, numbness)					During the previous 12 months, have you been prevented from carrying out everyday activities (e.g., job, housework, hobbies) because of this trouble					During the previous 7 days, have you had trouble?				
	1–3 hours	4–6 hours	7–12 hours	12 hours or more	*p* value*	1–3 hours	4–6 hours	7–12 hours	12 hours or more	*p* value*	1–3 hours	4–6 hours	7–12 hours	12 hours or more	*p* value*
Neck															
With MSD (%)	6.9	28.2	40.3	24.5	**.003***	13.0	32.5	33.8	20.8	.636	5.7	30.0	42.1	22.1	.120
Without MSD (%)	13.6	40.8	32.0	13.6		8.3	33.0	38.3	20.5		11.9	34.8	33.8	19.4	
Shoulders															
With MSD (%)	8.1	30.8	36.2	24.9	**.049***	10.3	33.6	31.8	24.3	.476	5.3	32.5	37.7	24.5	.074
Without MSD (%)	11.7	36.7	39.2	12.5		9.0	32.5	39.7	18.8		12.6	33.2	36.8	17.4	
Elbows															
With MSD (%)	7.1	16.7	50.0	26.2	.075	8.3	30.6	38.9	22.2	.978	12.0	20.0	40.0	28.0	.505
Without MSD (%)	9.7	35.1	35.5	19.7		9.5	33.1	37.0	20.3		9.2	33.9	37.0	19.9	
Wrist/Hands															
With MSD (%)	9.6	26.9	38.9	24.6	.098	10.5	28.4	40.0	21.1	.740	8.4	20.5	47.0	24.1	**.034***
Without MSD (%)	9.2	38.5	35.6	16.7		8.9	34.6	36.2	20.3		9.7	36.8	34.1	19.4	
Upper back															
With MSD (%)	6.8	28.5	40.6	24.2	**.008***	4.9	32.1	39.5	23.5	.416	3.5	29.2	43.8	23.6	**.003***
Without MSD (%)	13.4	39.6	32.1	14.9		10.8	33.1	36.5	19.6		13.7	35.5	32.5	18.3	
Lower back															
With MSD (%)	5.8	26.9	43.8	23.6	**.000***	4.2	32.6	44.2	18.9	.131	5.2	26.8	45.8	22.2	**.003***
Without MSD (%)	15.0	42.1	27.1	15.8		11.4	32.9	34.6	21.1		12.8	37.8	30.3	19.1	
Hips/Thigh															
With MSD (%)	8.0	24.8	44.5	22.6	**.034***	8.7	26.1	43.5	21.7	.530	7.2	27.7	42.2	22.9	.487
Without MSD (%)	10.3	38.2	32.4	19.1		9.6	34.6	35.7	20.2		10.1	34.5	35.7	19.8	
Knee															
With MSD (%)	9.6	26.4	40.8	23.2	.277	14.5	25.5	40.0	20.0	.377	9.4	26.6	45.3	18.8	.485
Without MSD (%)	9.3	36.6	35.2	19.0		8.4	34.3	36.7	20.6		9.4	34.3	35.4	20.9	
Ankle/Feet															
With MSD (%)	8.5	23.7	45.8	22.0	**.038***	12.3	31.5	37.0	19.2	.803	6.8	26.0	49.3	17.8	.116
Without MSD (%)	9.9	37.7	32.7	19.7		8.6	33.2	37.3	20.9		10.1	34.7	34.0	21.3	

*Note: * < .05 significant association*

Discussion

Prevalence of musculoskeletal discomfort among students

Common complaints of musculoskeletal discomfort among university students are in the neck, arm, and shoulder (Bruls et al., 2013). A study carried out in Slovenia on university students who work showed that most students had musculoskeletal complaints, with 57.1% reporting back pain and 50% reporting shoulder pain in the past 12 months (Legan & Zupan, 2020).

Nordin et al. (2014) reported that approximately 40% of undergraduate students suffered from lower back pain in their study of health sciences students at Universiti Kebangsaan Malaysia (2014). The prevalence of lower backache incidence among health sciences students was also studied by Alshayhan and Saadeddin (2017). Both studies showed low back pain to be quite common (48.8%). Since only a small number of participants reported having pain in the elbow in the last 12 months and the last 7 days, these data suggest that elbow pain might be less common than shoulder pain. In a study by Yngve et al. (2013), the prevalence of elbow pain was 7.5%, less than that of shoulder pain documented in the same study. Kenny et al. (2017) also had similar findings where only 33% of their respondents reported that the discomfort interfered with their ability to perform their usual tasks.

Possible risk factors of MSD among students

Arshad and colleagues (2020) emphasized the importance of laptops and computers for people of all ages and professions, including both adults and college students. Their research points out that students frequently rely on these devices for a range of tasks, like finishing assignments and putting together presentations. This idea is echoed by Penglee et al. (2019), who noted that mobile phones can also play a role in students' activities. However, excessive entertainment and social media use may negatively affect their physical health. According to Chen et al. (2016), teenagers use mobile phones frequently, particularly for browsing the internet, watching videos, and playing video games.

According to a study by Sihawong et al. (2015), inactivity was substantially linked to a higher risk of musculoskeletal pain in the neck, shoulders, upper back, and lower back. Hendi et al. (2019) stated that physical activity prevents disabling diseases and musculoskeletal discomfort. Conversely, physical inactivity may increase the risk of developing MSDs.

Effect of age on the prevalence of MSD

Hosseini et al. (2021) found no significant association between age and the prevalence of musculoskeletal disorders in any body parts among Iranian nurses. In contrast, Calik et al. (2014) revealed that individuals under 21 years are more prone to experiencing musculoskeletal discomfort (MSDs) in their neck and lower back regions. Alghadir and Anwer (2015) found that age was a significant predictor of both the prevalence of musculoskeletal pain and the level of disability experienced by workers with neck, elbow, and lower back pain. These findings hold considerable importance compared to the research done by Reuter and Fichthorn (2019), who discovered that American university students commonly experience body pain in the neck, followed by the back and elbows.

Effect of the respondents' sex on the prevalence of MSD

Keeratisiroj and Siritaratiwat (2018) discovered that musculoskeletal disorders (MSDs) are quite common among students, with a notable prevalence over both the past week and the last year. This issue tends to affect females more frequently, particularly in areas like the neck, shoulders, ankles, feet, and back. Similarly, Vasseljen et al. (2015) and Bubric and Hedge (2016) found that female college students reported significantly more discomfort in their necks and shoulders compared to their male counterparts. Additionally, participants indicated they experienced higher stress levels and lower physical activity, factors that could play a role in the onset of MSDs.

Hooftman et al. (2004) stated that women reported higher levels of pain and disability compared to men with similar disorders in the upper extremities. Paixão et al. (2013) conducted a study indicating that females are more susceptible to experiencing issues in various body parts than males. This disparity can be attributed to several factors, including muscle mass, body composition, and size differences.

Effects of the respondents' chosen college on the prevalence of MSD

Mohammed et al. (2019) investigated the prevalence and risk factors for musculoskeletal pain among university students in Ethiopia. These results show that the lower back, neck, and shoulders were the most affected body parts, which aligns with the present study's findings. Abledu and Offei (2015) discovered that college students are more likely to suffer from musculoskeletal disorders (MSDs) in various parts of their bodies. This is largely due to the long hours they spend sitting in class, often in awkward positions, and their increasing dependence on computers for their studies. Meanwhile, Santoshi et al. (2019) found a notable link between coaching students in fields like engineering, medicine, and law and the occurrence of neck, knee, and ankle/foot pain. However, they didn't find the same connection for other areas, such as the shoulders, wrists/hands, upper back, and hips/thighs. Alsaadi (2022) also showed that the reported body part of half of the undergraduate students of health, engineering, humanities, and science affected the neck and lower back in public universities of Saudi Arabia in the past 12 months and the past 7 days.

Effects of owning a laptop/computer on the prevalence of MSD

Regiani-Bueno et al. (2019), who investigated the relationship between laptop use and musculoskeletal symptoms among Japanese university students, found that laptop use was associated with an increased risk of musculoskeletal symptoms in various body parts, including the neck, shoulders, wrists, and lower back. Rakhadani et al. (2017) reported that neck pain, shoulder, finger, lower back, and general body pain are the most common musculoskeletal issues the students at the University of Venda, South Africa, associated with computer use, which prevented them from being comfortable and lessen their time because of the discomfort. Wami et al. (2020) likewise revealed that only the lower back showed a significant association with MSD (musculoskeletal disorders), while no significant associations were found in other body parts such as the wrist/hands, upper back, hips/thighs, and knee.

Effects of time spent using laptop/computer on the prevalence of MSD

Obembe et al. (2013) found a significant association between academic majors and musculoskeletal pain among laptop/computer users. Bakir et al. (2019) looked at the prevalence of musculoskeletal problems among Turkish university students and the relationship with computer use. According to the study, more extended computer use was significantly linked to a higher prevalence of musculoskeletal pain in the neck, shoulders, upper and lower back, wrists, and hands. The research conducted by Gautam and Chacko (2017) showed no significant association in the body areas like hips/thighs, ankles/feet, and lower back, which can also be found in the current study.

Effects of uses of laptops/computers on the prevalence of MSD

Jacobs et al. (2011) also found that one associated body part is the elbows, followed by the upper back and wrist/hands. In contrast, Hasan et al. (2018) showed a significant result in the neck among medical students but not in other body parts like elbows found in the current study. It is because the neck is more strained because of the long hours of time screen and computer use for academic and entertainment of the students. Dockrell et al. (2015) added that it was a predictable outcome as written coursework tasks are now usually turned in as either electronic or printed hard copies, disregarding their computer usage for leisure and social activities.

Effect of regular use of mobile phones on the prevalence of MSD

Singh et al. (2017) stated that using mobile phones could contribute to developing MSD, especially when having a long hour of the same posture and straining specific body parts (neck, shoulders, wrist pain). Zheng et al. (2017) found that in China, mobile phone use was associated with an increased risk of neck and shoulder pain, especially among young adults. However, Mustafaoglu et al. (2021) found no significant association in areas like elbows, lower back, hips/thighs, knees, and ankles/feet among the young population.

Effects of the amount of time spent using mobile phones on the prevalence of MSD

Lin et al. (2018) discovered a notable link between the time young adults spend on mobile devices and the occurrence of musculoskeletal disorders (MSDs) in areas like the neck, shoulders, wrists, and hands. Similarly, Berolo et al. (2011) identified a significant relationship between how long students use their mobile phones and the development of MSDs, particularly affecting the left and right shoulders and the neck. The discomfort is attributed to texting, emailing, browsing, and leisure activities requiring extended time spent using mobile devices. However, Woo et al. (2016) showed no significant association between time spent on mobile phone use and the prevalence of MSD among university students in the areas of knees, wrists/hands, and elbows.

Effects of uses of mobile phones on the prevalence of MSD

Chen et al. (2016) found a significant association between mobile phone use and MSDs in the upper back and elbows. In contrast with the current findings, Kim and Kim (2015) reported pain in the neck and shoulders associated with mobile phone use and the prevalence of MSD but not in other body parts. This suggests that prolonged mobile phone use might impact these specific body parts. However, the current study does not find a significant association between mobile phone use and the prevalence of MSD-related limitations in any body part studied among university students. Zirek et al. (2020) found no significant association in wrists/hands, shoulders, lower back, ankle/feet, knee, and hips/thighs. However, they found a significant association between mobile phone use and the prevalence of MSD highest in the neck and upper back areas. The finding suggests that regardless of how the students use their mobile phones, whether for texting, browsing, or gaming, it does not significantly affect the prevalence of MSD alone.

Effect of engagement in physical activity on the prevalence of MSD

Rhim et al. (2022) found that physical activity was associated with a lower prevalence of upper back pain in college students. Physical activity may effectively reduce upper back pain in this population. In contrast, a study conducted by Hendi et al. (2019) found that the lower back was the region most reported, followed by the neck and upper back. Likewise, Roggio et al. (2021) found a more significant result in areas like the neck and lower back but not in areas like shoulders, hips/thighs, wrists/hands, knees, ankles/feet, and upper back. They also added that students who engaged in physical activity for less than 150 minutes per week may have been more susceptible to experiencing most neck pain and other body parts.

Effect of average daily amount of time spent in physical activity on the prevalence of MSD

There was no significant association between the time spent in physical activity and the prevalence of musculoskeletal discomfort (MSD) over the past 12 months or seven days, nor was it impacted by everyday activities during the past year. This means that the present study did not find sufficient evidence to suggest that increasing or decreasing the amount of time spent in physical activity would significantly impact the likelihood of experiencing MSD in those specific body parts. This finding contradicts Kokic et al. (2019), which found a significant prevalence of MSD and physical activity among students in the neck, upper back, and lower back. This suggests that physical activity alone may not be the sole factor influencing MSDs in medical students, according to a study by Hendi et al. (2019).

Effect of kinds of physical activity the respondents are engaged in on the prevalence of MSD

There is a significant association between musculoskeletal disorders and the level of physical activity; students individuals who engaged in physically demanding work tasks had a higher prevalence of MSD (Hendi, 2019). Ekpenyong et al. (2013) added that there is a significant association between MSD and those who are inactive in physical activity. According to Tigli et al. (2020), university students indicated a lack of engagement in physical activities and an excessive amount of time spent on screen-based activities due to the impact of the pandemic.

Alyahya et al. (2018) found a significant result in wrists/hands, which can be found in the current study.

Conclusion

Musculoskeletal discomfort is prevalent among first-year students at CSU, and its risk factors are diverse. It also revealed a high prevalence of musculoskeletal discomfort (MSD) among students. The correlational findings of this study showed significant relationships between various demographic and behavioral factors and the prevalence of musculoskeletal discomfort (MSD). The occurrence of musculoskeletal disorders (MSD) in various body areas was closely linked to the sex of the respondents. Females reported experiencing more discomfort in their shoulders, upper backs, hips/thighs, wrists/hands, and knees over the past week and the last year. Among the College of Education students, the rates were particularly high, and this college also showed a strong connection to MSDs, especially affecting the neck, shoulders, elbows, wrists/hands, lower back, hips/thighs, and knees. Having a laptop or computer was notably tied to elbow MSDs over the past year and week, with frequent use correlating with a rise in issues in the neck, shoulders, and upper back. While regular mobile phone use had limited connections, significant effects were observed mainly in the shoulders and wrists/hands. Extended screen time on laptops and mobile phones was significantly linked to a higher incidence of MSDs in the neck, shoulders, back, and hips/thighs, indicating that spending too much time on these devices could lead to increased physical discomfort.

This study underscores the urgent need for interventions targeting students' ergonomic practices, particularly regarding prolonged device use. It is recommended that ergonomics education and regular physical activity be integrated into student health programs to mitigate the risks of MSD. Universities should provide ergonomically optimized study environments and raise awareness about the risks associated with improper device usage. Further research should include more extensive, diverse populations, such as students from different academic levels and teaching staff, to comprehensively understand MSD prevalence and risk factors in educational settings. The scientific relevance of this study lies in its contribution to identifying key factors associated with MSD in young adults, serving as a foundation for developing preventive strategies and shaping policies to foster healthier academic environments.

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References

Abledu, J. K., & Offei, E. B. (2015). Musculoskeletal disorders among first-year Ghanaian students in a nursing college. *African Health Sciences, 15*(2), 444–449. https://doi.org/10.4314/ahs.v15i2.18

Alghadir, A. H., & Anwer, S. (2015). Prevalence of musculoskeletal pain in construction workers in Saudi Arabia. *Scientific World Journal*, Article 529873. https://doi.org/10.1155/2015/529873

Alsaadi, S. M. (2022). Musculoskeletal pain in undergraduate students is significantly associated with psychological distress and poor sleep quality. *International Journal of Environmental Research and Public Health, 19*, Article 13929. https://doi.org/10.3390/ijerph19211329.

Alshayhan, F. A., & Saadeddin, M. (2017). Prevalence of low back pain among health sciences students. *European Journal of Orthopaedic Surgery & Traumatology, 28*(2), 165–170. https://doi.org/10.1007/s00590-017-2034-5

Alyahya, F., Algarzaie, K., Alsubeh, Y., & Khounganian, R. (2018). Awareness of ergonomics and work-related musculoskeletal disorders among dental professionals and students in Riyadh, Saudi Arabia. *Journal of Physical Therapy Science, 30*(6), 770–776. https://doi.org/10.1589/jpts.30.770

Arshad, M. A., Shamsudin, M. Z., & Mustafa, M. J. A. (2020). Laptop use and upper extremities musculoskeletal disorders among higher learning students. *MAEH Journal of Environmental Health*, *2*(2), 1–4. https://jurnal.maeh4u.org.my/index.php/home/article/view/1

Bakir, E., Bagcivan, G., Yagci, N., & Yazar, F. (2019). Prevalence of musculoskeletal disorders among university students and its effects on daily activities. *International Journal of Rheumatic Diseases, 22*(3), 420–426. https://doi.org/10.1142/S1013702521500037

Bare, M. A. D., Castro, F. M. F., Quimio, G. L. G., & Gumasing, M. J. J. (2021, August 2–5). *Effects of computer-based work on the musculoskeletal discomfort among college students* [Paper presentation]. International Conference on Industrial Engineering and Operations Management, Rome, Italy. https://ieomsociety.org/proceedings/2021rome/506.pdf

Berolo, S., Wells, R. P., & Amick, B. C. (2011). Musculoskeletal symptoms among mobile hand-held device users and their relationship to device use: A preliminary study in a Canadian university population. *Applied Ergonomics, 42*(2), 371–378. https://doi.org/10.1016/j.apergo.2010.08.010

Borhany, T., Shahid, E., Siddique, W., & Ali, H. (2018). Musculoskeletal problems in frequent computer and internet users. *Journal of Family Medicine and Primary Care*, *7*(2), 337–339. https://doi.org/10.4103/jfmpc.jfmpc_326_17

Bruls, V. E., Bastiaenen, C. H., & de Bie, R. A. (2013). Non-traumatic arm, neck and shoulder complaints: Prevalence, course, and prognosis in a Dutch university population. *BMC Musculoskeletal Disorders, 14*(1), Article 8. https://doi.org/10.1186/1471-2474-14-8

Bubric, K., & Hedge, A. (2016). Differential patterns of laptop use and associated musculoskeletal discomfort in male and female college students. *Work*, *55*(3), 663–671. https://doi.org/10.3233/WOR-162419

Calik, B. B., Yagci, N., Gursoy, S., & Zencir, M. (2014). Upper extremities and spinal musculoskeletal disorders and risk factors in students using computers. *Pakistan Journal of Medical Sciences, 30*(6), 1361–1366. http://dx.doi.org/10.12669/pjms.306.5022

Chen, M.-D., Yang, S.-Y Huang, Y.-C., Lin, C.-Y., & Chang, J.-H. (2016). Association between smartphone use and musculoskeletal discomfort in adolescent students. *Journal of Community Health, 42*(3), 423–430. https://doi.org/10.1007/s10900-016-0271-x

Dockrell, S., Bennett, K., & Culleton-Quinn, E. (2015). Computer use and musculoskeletal symptoms among undergraduate university students. *Computers & Education, 85*, 102–109. https://doi.org/10.1016/j.compedu.2015.02.001

Ekpenyong, C. E., Daniel, N. E., & Aribo, E. O. (2013). Association between academic stressors, reaction to stress, coping strategies, and musculoskeletal disorders among college students. *Ethiopian Journal of Health Sciences*, *23*(2), 98–112. https://www.ethjhealths.org/associations-between-academic-stressors-reaction-stress-coping-strategies-and-musculoskeletal

Gautam, D., & Chacko, N. (2017). Impact of laptop usage on symptoms leading to musculoskeletal disorders. *Journal of Applied and Natural Science*, *9*(3), 1687–1690. https://doi.org/10.31018/jans.v9i3.1422

Google Maps. (2023). *Google Maps: Caraga State University, Main Campus Ampayon Butuan City.* https://maps.app.goo.gl/Tdngd8ATj5HLhUj58

Gumasing, M. J. J., dos Santos, E., & Villanueva, B. R. D. (2021, April 26–29). *Predictive model affecting the musculoskeletal discomfort of occupants of state universities in Manila City* [Paper presentation]. 2021 IEEE 8th International Conference on Industrial Engineering and Applications (ICIEA), Chengdu, China (pp. 115–119). IEEE. https://doi.org/10.1109/ICIEA52957.2021.9436752

Hasan, M. M., Yaqoob, U., Ali, S. & Siddiqui, A. A. (2018). Frequency of musculoskeletal pain and associated factors among undergraduate students. *Case Reports in Clinical Medicine, 7*(02), 131–145. https://doi.org/10.4236/crcm.2018.72011

Hendi, O. M., Abdulaziz, A. A., Althaqafi, A. M., Hindi, A. A., Khan, S. A., & Atalla, A. A. (2019). Prevalence of musculoskeletal disorders and its correlation to physical activity among health specialty students. *International Journal of Preventive Medicine, 10*(1), 48. https://doi.org/10.4103/ijpvm.IJPVM_436_18

Hooftman, W. E., van Poppel, M. N., van der Beek, A. J., Bongers, P. M., & van Mechelen, W. (2004). Gender differences in the relations between work-related physical and psychosocial risk factors and musculoskeletal complaints. *Scandinavian Journal of Work, Environment & Health, 30*(4), 261–278. https://doi.org/10.5271/sjweh.794.

Hosseini, E., Daneshmandi, H., Bashiri, A. & Sharifian R. (2021). Work-related musculoskeletal symptoms among Iranian nurses and their relationship with fatigue: a cross-sectional study. *BMC Musculoskeletal Disorders, 22*, Article 629. https://doi.org/10.1186/s12891-021-04510-3

Intia, G. R., Lenon, J. C., Mitra, K. I., Añonuevo, B. A., & Ong, N. R. (2022). Musculoskeletal disorders: Associated risk factors of laptop usage among engineering students in the University of Santo Tomas. *12th Annual International Conference on Industrial Engineering and Operations Management*. https://doi.org/10.46254/an12.20220567

Jacobs, K., Foley, G., Punnett, L., Hall, V., Gore, R., Brownson, E., Ansong, E., Markowitz, J., McKinnon, M., Steinberg, S., Ing, A., Wuest, E., & Dibiccari, L., (2011). University students' notebook computer use: Lessons learned using e-diaries to report musculoskeletal discomfort. *Ergonomics, 54*(2), 206–219. https://doi.org/10.1080/00140139.2010.544764.

Kamalia, N., Pramita, I., & Antari NKAJ, (2024). Prevalence and risk factors of musculoskeletal disorders among undergraduate students. *Kinesiology and Physiotherapy Comprehensive, 3*(2), 41–46. https://doi.org/10.62004/kpc.v3i2.40

Kandasamy, G., Almanasef, M., Almeleebia, T., Orayj, K., Shorog, E., Alshahrani, A. M., Prabahar, K., Veeramani, V. P., Amirthalingam, P., Alqifari, S. F., Alrashidi, F., Aldurum, M., Almutiri, F., Alzaidi, A., & Almutairi, F. (2024). Prevalence of musculoskeletal pain among undergraduate students. *Frontiers in Medicine, 11*, Article 1403267. https://doi.org/10.3389/fmed.2024.1403267

Keeratisiroj, O., & Siritaratiwat, W. (2018). Prevalence of self-reported musculoskeletal pain symptoms among school-age adolescents: Age and sex differences. *Scandinavian Journal of Pain*, *18*(2), 273–280. https://doi.org/10.1515/sjpain-2017-0150

Kenny, D. T., Driscoll, T. R., Ackermann, B. J., & Murgatroyd, D. F. (2017). Prevalence and consequences of musculoskeletal symptoms in symphony orchestra musicians vary by gender: A cross-sectional study. *Medical Problems of Performing Artists, 32*(1), 12–20. https://doi.org/10.1186/1471-2474-12-223

Kim, H. J., & Kim, J. S. (2015). The relationship between smartphone use and subjective musculoskeletal symptoms and university students. *Journal of Physical Therapy Science, 27*(3), 575–579. https://doi.org/10.1589/jpts.27.575

Kokic, I. S., Znika, M., & Brumnic, V. (2019). Physical activity, health-related quality of life and musculoskeletal pain among students of physiotherapy and social sciences in Eastern Croatia-Cross-sectional survey. *Annals of Agricultural and Environmental Medicine*, *26*(1), 182–190. https://doi.org/10.26444/aaem/102723

Legan, M., & Zupan, K. (2020). Prevalence of mobile device-related musculoskeletal pain among working university students: a cross-sectional study. *International Journal of Occupational Safety and Ergonomics, 28*(2), 734–742. https://doi.org/10.1080/10803548.2020.1827561

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

Namwongsa, S., Puntumetakul, R., Neubert, M. S., & Boucaut, R. (2018). Factors associated with neck disorders among university student smartphone users. *Work, 61*(3), 367–378. https://doi.org/10.3233/WOR-182819

Nordin, N. A. M., Singh, D. K. A., & Kanglun, L. (2014). Low back pain and associated risk factors among health science undergraduates. *Sains Malaysiana, 43*(3), 423–428. https://ukm.my/jsm/english_journals/vol43num3_2014/vol43num3_2014p423-428.html

Obembe, A. O., Johnson, O. E., Tanimowo, T. O., Onigbinde, A. T., & Emechete, A. A. (2013). Musculoskeletal pain among undergraduate laptop users in a Nigerian University. *Journal of Back and Musculoskeletal Rehabilitation, 26*(4), 389–395. https://doi.org/10.3233/BMR-130397

Oha, K., Animägi, L., Pääsuke, M., Coggon, D., & Merisalu, E. (2014). Individual and work-related risk factors for musculoskeletal pain: A cross-sectional study among Estonian computer users. *BMC Musculoskeletal Disorders, 15*(1), Article 181. https://doi.org/10.1186/1471-2474-15-181

Paixão, M. D. S., Tassitano, R. M., & de Siqueira, G. R. (2013). Prevalence of musculoskeletal discomfort and associated factors in college students. *Brazilian Journal in Health Promotion*, *26*(2), 236–244. https://doi.org/10.1142/S1013702521500037

Penglee, N., Christiana, R. W., Battista, R. A., & Rosenberg, E. (2019). Smartphone use and physical activity among college students in health science-related majors in the United States and Thailand. *International Journal of Environmental Research and Public Health, 16*(8), Article 1315. https://doi.org/10.3390/ijerph16081315

Prajapati, S. P., & Purohit, A. (2021). Prevalence of musculoskeletal disorder among college students in times of COVID-19 pandemic - An observational study. *International Journal of Health Science Research, 11*, 214–218. https://doi.org/10.52403/ijhsr.20211028

Rakhadani, P. B., Goon, D. T., & Mandeya, A. (2017). Musculoskeletal problems associated with university students computer users: A cross-sectional study. *Online Journal for Health Allied Sciences, 16*(2), 7. http://www.ojhas.org/issue62/2017-2-7.html

Regiani-Bueno, G., Garcia, L. F., Marques Gomes Bertolini, S. M., & Rodrigues Lucena, T. F. (2019). The head down generation: Musculoskeletal symptoms and the use of smartphones among young university students. *Telemedicine Journal and E-Health, 25*(11), 1049–1056. https://doi.org/10.1089/tmj.2018.0231

Reuter, P. R., & Fichthorn, K. R. (2019). Prevalence of generalized joint hypermobility, musculoskeletal injuries, and chronic musculoskeletal pain among American university students. *PeerJ*, *7*, Article e7625. https://doi.org/10.7717/peerj.7625

Rhim, H. C., Tenforde, A., Mohr, L., Hollander, K., Vogt, L., Groneberg, D. A., & Wilke, J. (2022). Association between physical activity and musculoskeletal pain: an analysis of international data from the ASAP survey. *BMJ Open*, *12*(9), Article e059525. https://doi.org/10.1136/bmjopen-2021-059525

Roggio, F., Trovato, B., Ravalli, S., Di Rosa, M., Maugeri, G., Bianco, A., & Musumeci, G. (2021). One year of COVID-19 pandemic in Italy: Effect of sedentary behavior on physical activity levels and musculoskeletal pain among university students. *International Journal of Environmental Research and Public Health*, *18*(16), Article 8680. https://doi.org/10.3390/ijerph18168680

Santoshi, J. A., Jain, S., Popalwar, H. J., & Pakhare, A. (2019). Musculoskeletal disorders and associated risk factors in coaching students: A cross-sectional study. *Journal of Family Medicine and Primary Care*, *8*(3), 929–929. https://doi.org/10.4103/jfmpc.jfmpc_54_19

Scuffham, A. M., Legg, S. J., Firth, E. C., & Stevenson, M. A. (2010). Prevalence and risk factors associated with musculoskeletal discomfort in New Zealand veterinarians. *Applied Ergonomics, 41*(3), 444–453. https://doi.org/10.1016/j.apergo.2009.09.009

Sihawong, R., Sitthipornvorakul, E., Paksaichol, A., & Janwantanakul, P. (2015). Predictors for musculoskeletal discomfort in office workers, adjusted for personal and work-related factors: A cross-sectional study. *PLOS ONE, 10*(10), Article e0139718. https://doi.org/10.1016/j.apergo.2016.11.004

Singh, R., Mani, K., Khanna, P., & Kaur, M. (2017). Musculoskeletal disorders associated with mobile phone use: A review. *Journal of Back and Musculoskeletal Rehabilitation, 30*(2), 283–289. https://doi.org/10.1142/S1013702518300010

Tantawy, S. A., Abdul Rahman, A., & Abdul Ameer, M. (2017). The relationship between the development of musculoskeletal disorders, body mass index, and academic stress in Bahraini University students. *The Korean Journal of Pain, 30*(2), 126–133. https://doi.org/10.3344/kjp.2017.30.2.126

Tigli, A., Altintas, A., & Aytar, A. (2020). Effects of posture and ergonomics training for students receiving distance education during the COVID-19 pandemic on musculoskeletal pain, exercise behavior decision-making balance, and physical activity level. *Journal of Exercise Therapy and Rehabilitation*, *7*(2), 137–144. https://doi.org/10.3233/BMR-230279

Vasseljen, O., Woodhouse, A., Bjørngaard, J. H., & Leivseth, L. (2015). Natural course of acute neck and low back pain in the general population: The HUNT study. *Journal of Back and Musculoskeletal Rehabilitation*, *28*(4), 681–689. https://doi.org/10.1016/j.pain.2013.03.032

Wami, S. D., Mekonnen, T. H., Yirdaw, G., & Abere, G. (2020). Musculoskeletal problems and associated risk factors among health science students in Ethiopia: A cross-sectional study. *Journal of Public Health, 29*, 943–949. https://doi.org/10.1007/s10389-020-01201-6

Woo, E. H. C., White, P., & Lai, C. W. K. (2016). Musculoskeletal impact of the use of various types of electronic devices on university students in Hong Kong: An evaluation by means of a self-reported questionnaire. *Manual Therapy, 26,* 47–53. https://doi.org/10.1016/j.math.2016.07.004

Xie, Y., Szeto, G., & Dai, J. (2017). Prevalence and risk factors associated with musculoskeletal complaints among users of mobile handheld devices: A systematic review. *Applied Ergonomics, 59*, 132–142. https://doi.org/10.1016/j.apergo.2016.08.020

Yngve, R., Soberg, H. L., Bautz-Holter, E., & Østensjø, S. (2013). A systematic review of measures of shoulder pain and functioning using the international classification of functioning, disability, and health (ICF). *BMC Musculoskeletal Disorders, 14*(1), Article 73. https://doi.org/10.1186/1471-2474-14-73

Zheng, Y., Pan, Y., Lu, Y., Hu, Y., Li, X., & Chen, L. (2017). Association between mobile phone use and the risk of neck pain: A systematic review and meta-analysis of recent observational studies. *Clinical spine surgery, 30*(6), 222–229. https://doi.org/10.1371/journal.pone.0217231

Zirek, E., Mustafaoglu, R., Yasaci, Z., & Griffiths, M. D. (2020). A systematic review of musculoskeletal disorders related to mobile phone usage. *Musculoskeletal Science and Practice, 49,* Article 102196. https://doi.org/10.1016/j.msksp.2020.102196