ORIGINAL RESEARCH ARTICLE

Public Health Concerns in The Gaming World: Investigating Association of Insomnia and Neck Disability

Vinosh Kumar Purushothaman[1,2*], Vinodhkumar Ramalingam[3], Alisha Ahmed[4], Arun Vijay Subbarayalu[5], Ambusam Subramaniam[6], Mariam Abdulmoniem Ameer[7], Rajkumar Krishnan Vasanthi[8]

[1,3]Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences, Chennai, India
[2,4,8]INTI International University, Nilai, Negeri Sembilan, Malaysia
[5]Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia
[6]Universiti Tunku Abdul Rahman, Jalan Sungai Long, Bandar Sungai Long, Kajang, Selangor, Malaysia
[7]College of Applied Medical Sciences, Jouf University, Sakaka, Al-Jouf, Saudi Arabia; Cairo University, Cairo, Egypt

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ABSTRACT

Background: Extended electronic devices used for video games can harm adolescent health. Therefore, this study investigates the association between neck pain severity and Insomnia and between sociodemographic variables and neck disability among video gamers in the Malaysian adult population.

Methods: A cross-sectional study was adopted. 325 active video gamers were selected via snowball sampling. Neck pain severity and disability were measured with Numerical pain rating scale and Neck disability index, respectively. Insomnia is assessed with the Insomnia Severity Index. Data analysis was performed using SPSS 27.0 at a significant level of 5%.

Results: Of the respondents, 48.6% experienced severe neck disability with 50.5% were classified as moderate insomnia. Furthermore, there is a significant association between neck pain severity and Insomnia in video gamers ($p<0.05$). In addition, sociodemographic variables (gender, age, BMI, type of occupation) exhibit a significant association with neck disability ($p<0.05$).

Conclusion: About half of the participating video gamers who suffered from moderate neck pain and disability had moderate clinical Insomnia. There is a significant association between the severity of neck pain and insomnia, as well as between sociodemographic variables such as gender, age, BMI, occupation and neck disability among video gamers in the Malaysian adult population.

Keywords: Neck Pain, Young adults, Video gaming, Health risks, Insomnia

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***Correspondence:** Vinosh Kumar Purushothaman (Email: vinoshmpt@yahoo.com)

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INTRODUCTION

One of the most popular leisure activities worldwide is playing video games.[1] Indeed, current forms of entertainment for children and young people seem to be converging around various electronic games. In 2021, around 3.24 billion people played video games worldwide.[2] Most scholarly research in this area has focused on the scope of video gaming and the variety of contexts associated with it. While some studies have highlighted the benefits of gaming and even suggested using it as a type of therapy, others have been intrigued by the possible risks.[3,4] Like watching TV, using a computer, or using a smartphone, playing video games is a screen-based activity. This type of activity is characterized by prolonged periods of inactivity and prolonged sitting.[5] Compared to active video gaming, non-active gaming is a sedentary behavior that increases the number of sugary snacks consumed and has negative health effects such as weight gain. Sedentary behavior refers to any waking behavior with an energy consumption of 1.5 metabolic equivalents.[6]

A literature reveals that increased screen time, particularly while playing computer games, is associated with higher rates of neck pain and musculoskeletal problems in adolescents, affecting both men and women who play video games.[7] A previous meta-analytic study also shows that gaming disorders are associated with physical health problems such as somatization, discomfort and insomnia, with higher gaming volume leading to more fatigue and insomnia in adults.[8] On the other hand, researchers hypothesized that sleep disorders are extremely widespread and common not only among gamers but also in the general population.[9] However, other studies have suggested that long-term electronic media use is associated with shorter sleep duration. Furthermore, sleep disorders have been identified as comorbidity and represent a major problem when gaming.[10,11] Previous research has found a link between prolonged violent video gaming and less effective sleep-in adolescents.[12] Additionally, excessive video game playing leads to poor sleep quality and insomnia.[13]

Although most studies examined the effects of playing video games on playtime, sleep quality, and other psychological factors. However, there is little evidence on whether demographic characteristics and pain have an impact on neck disability and insomnia among video gamers in the adult Malaysian population. Therefore, the current study examined the association between neck pain severity and insomnia among video gamers in the Malaysian adult population. Subsequently, this study also aimed to examine the association and differences between neck disability and demographic characteristics.

METHODOLOGY

Study Design: A cross-sectional study design was adopted to determine the association between neck pain severity and insomnia and neck disability and demographic characteristics among video gamers in the Malaysian adult population.

Study settings and participants: The study focused on the Malaysian adult population who are active video gamers (who play video games for more than 4 hours a week over the past 6 months) between the ages of 18 and 40 years of both genders and living in the city of Klang Valley in Malaysia. Participants were excluded if there was a predominant diagnosis of clinical insomnia, a history of neck trauma-related injury in the past 6 months, or a history of cervical fracture or surgery. Ethical approval was obtained from the University Research and Ethics Committee (INTIIU/FHLS-RC/BPHTI/7NY12021/001) and all participants were asked to sign an informed concern form before participating in this study.

Sampling Methods: As the total number of Malaysians in Klang valley aged 18 to 40 years could not be accurately predicted, the required sample size is calculated based on the formula for estimating the sample size for an infinite population, i.e., $Z^2 * p (1-p) / C2$ [Z score for 95% confidence level = 1.96; p = percentage of population assumed as 50% or 0.50 and c = confidence interval or margin of error = 0.05 or 5%]. With a 95% confidence interval and a 5% margin of error, the expected sample size is 385. However, the final sample size for this study was 325 after reducing incomplete survey forms.

Outcome Measures

Level of Insomnia: Insomnia among video gamers was screened using the Insomnia Severity Index (ISI).[14] The ISI is a 7-item self-report questionnaire that assesses the type, degree, and frequency of insomnia in the previous month. The specific items assess the severity of problems with trouble falling asleep, staying asleep, and waking up too early; sleep dissatisfaction; interference of sleep issues with typical daytime performance; observation of sleep difficulties by a second person; and distress brought on by sleep difficulties. Each item is evaluated using a scale based on a 5-point system. The ISI scale measures insomnia severity in a range of 0 to 28. Scores between 0 and 7 indicate no clinically insignificant insomnia, while scores between 8 and 14 indicate subthreshold insomnia. Moderate clinical insomnia is represented by scores between 15 and 21, and severe clinical insomnia is represented by scores between 22 and 28.[15] The test-retest reliability of the ISI, measured by the intra-class correlation coefficient (ICC2.1), provided good results with a coefficient of 0.84. In addition, the internal consistency of the ISI, determined by Cronbach α, was also impressive with a coefficient of 0.8424.[16]

Level of Pain and neck disability: The numerical pain rating scale (NPRS) was utilized to evaluate the severity of neck pain experienced by video gamers.[17] The individual characterizes his or her pain intensity using an ordinal 11-point NPRS (0 - no pain, 10 -

most intense pain) and is divided into mild pain (score between 1 and 3), moderate pain (score between 4 and 6) and severe pain (score between 7 and 10). The test-retest reliability of the NPRS has been shown to range from 0.67 to 0.96. When correlated with VAS, the convergent validity of the NPRS is estimated to be between 0.79 and 0.95. [18]

The participants' level of disability was determined using the Neck Disability Index (NDI). The Neck Disability Index is one of the most effective screening tools with high convergent and divergent validity and reliability and is an excellent outcome measure of self-reported level of neck disability.[19] The item set consists of six different statements representing increasing pain or limitations in activities. The scoring system ranges from zero, indicating the absence of pain or limitation, to five, indicating severe pain or limitation or the highest level of pain and limitation. The total score of the NDI is between 0 and 50 points. The reliability of the questionnaire was reported to be between 0.63 and 0.95. Furthermore, the questionnaire was found to be valid due to its significant association with all eight domains of the SF36 measure ($p<0.001$).[20]

Procedures: Data was collected through Google Forms by contacting various private gaming centers in the Klang Valley in Malaysia. Since there are many video gamers who play games at home, a snowball sampling approach was adopted in which gamers who played at the gaming centers were asked to share the online questionnaire to their friends and colleagues who met the inclusion criteria. Accordingly, the online questionnaire was distributed via various platforms such as emails and WhatsApp applications. Participants were required to complete a consent form after thoroughly understanding the requirements and conditions of the study. Participants were given a specific time frame to complete the questionnaire and data were collected between January 2023 to March 2023 and analyzed.

Data analysis: Statistical Package for the Social Sciences (SPSS window version 27.0) was utilized to analyze the data. Demographic data, including age and BMI, as well as total NPRS, NDI, and ISI scores were summarized and reported using descriptive statistics. The Chi-Square test is employed to examine the association between neck pain and insomnia among video gamers. In addition, both t-test and ANOVA were applied to examine the differences in the mean of neck pain disability and selected sociodemographic factors. The significant value was set at p value <0.05.

RESULTS

Demographics details and preferences towards gaming habits: Table 1 displays the frequencies and distribution of participant characteristics. Out of the total number of participants, 56% were male.

Table 1: Demographic characteristics and gaming preferences(n=325)

Variables	Participants (%)
Gender	
Male	182 (56)
Female	143 (44)
Age	
18 – 25	260 (80.0)
26 - 40	65 (20.0)
Mean age ± SD	23.39 ±2.56
Body Mass Index (BMI)	
Underweight	5 (1.50)
Normal	119 (36.6)
Overweight	137 (42.2)
Obese	64 (19.7)
Mean BMI ± SD	23.26 ± 2.26
Education Level	
Undergraduate	298 (91.7)
Postgraduate	27 (8.3)
Occupation	
Student	258 (79.4)
Academician	9 (2.8)
Office Worker	28 (8.6)
Technology / IT Professional	16 (4.9)
Health Care Professional	14 (4.3)
Gaming Device Used	
Television	68(10.9)
Screen Monitor	175 (28)
Smart Phone	156 (25)
Tablet	96 (15.4)
Laptop	130 (20.8)
Gaming Console Used	
PlayStation Console System	117 (22.7)
Xbox console system	61 (11.8)
Nintendo console system	116 (22.5)
PC system	212 (41.2)
Atari 2600	9 (1.7)
Type of Chair Used for Gaming Session	
Ergonomic gaming chair	96 (29.5)
Chair without backrest or armrest	22 (6.8)
Chair with backrest but no arm rest	90 (27.7)
Chair with backrest and arm rest	117 (36)
Rest between gaming sessions	
Yes	133 (40.9)
No	192 (59.1)
No of hours spend playing in a day	
1-2 hours	27 (8.3)
3-4 hours	118 (36.3)
5-6 hours	136 (41.9)
7-8 hours	50 (12.3)
>9hours	4 (1.2)

Additionally, a majority of gamers (80%) fell into the young adult age group, specifically between 18 and 25 years old. The average age of the participants was 23.39 ± 2.5 years, with an average BMI of 23.26 ± 2.26. Regarding gaming preferences and habits, the majority of gamers (28%) opt for a screen monitor, while 41.2% utilize a PC system game console. The chair with a backrest and armrest is the most prevalent type of chair, accounting for 36% of usage. It is closely followed by the ergonomic chair, which makes up 29.5% of usage. A majority of participants, specifically 59.1%, do not take breaks between games, while 41.9% of gamers dedicate 5-6 hours per day to playing computer games.

Table 2: Neck pain, neck disability and insomnia score of the video gamers

Variables	Cases (%)
Neck pain severity	
Mild Pain (Score 1 to 3)	81 (24.9)
Moderate Pain (Score 4 to 6)	1156 (48)
Severe Pain (Score 7 to 10)	88 (27.1)
Neck disability	
Mild Disability	46 (14.2)
Moderate Disability	121 (37.2)
Severe Disability	158 (48.6)
Mean score ± SD	28.10 ± 7.87
Insomnia	
Subthreshold insomnia	63 (19.4)
Clinical Insomnia (Moderately Severe)	164 (50.5)
Clinical Insomnia (Severe)	98 (30.2)
Mean score ± SD	19.54 ± 4.97

Neck Pain, Neck disability and Insomnia amongst the Malaysian Video Gamers: According to Table 2, the majority of respondents (27.1%) reported experiencing moderate pain together with severe neck disability (48.6%), whereas half of the participants (50.5%) had clinically moderate insomnia.

Association between Neck pain severity and insomnia amongst the video gamers: The current study revealed a significant association between neck pain severity and insomnia among video gamers ($p<0.05$), as shown in Table 3. A high percentage of players with moderate neck pain experienced moderate insomnia (66.5%), and those with severe neck pain also reported severe insomnia (66.3%), suggesting a relationship between the severity of neck pain and the extent of insomnia.

Sociodemographic variables and gaming preferences with neck disability amongst the video gamers: Table 4 shows the association between sociodemographic variables and neck disability observed in video gamers. The analysis showed a significant association between gender ($p < 0.05$) and neck disability, with a higher prevalence observed in men (32.3%).

Table 3: Association between neck pain severity and insomnia amongst the video gamers

Neck pain severity	Level of insomnia			P value
	Sub-threshold Insomnia (%)	Clinical Insomnia (Moderately Severe) (%)	Clinical Insomnia (Severe) (%)	
Mild	45 (71.4)	34 (20.7)	2 (2)	0.001*
Moderate	16 (25.4)	109 (66.5)	31 (31.6)	
Severe	2 (3.2)	21 (12.8)	65 (66.3)	

*p<0.05

Table 4: Association between demographic variables and neck disability in video gamers

Demographic variables (n= 325)	Neck disability Index			P value
	Mild disability (%)	Moderate disability (%)	Severe disability (%)	
Gender				0.001*
Male (182)	22 (6.8)	55 (16.9)	105 (32.3)	
Female (143)	24 (7.4)	66 (20.3)	53 (16.3)	
Age				0.001*
18-25	46 (14.2)	81 (24.9)	133 (40.9)	
26-40	0 (0.0)	40 (12.3)	25 (7.7)	
BMI				0.211
Underweight	0 (0.0)	4 (1.2)	1 (0.3)	
Normal	18 (5.5)	38 (11.7)	63 (19.4)	
Overweight	17 (5.2)	54 (16.6)	66 (20.2)	
Obese	11 (3.4)	25 (7.7)	28 (8.5)	
Education Level				0.637
Undergraduate	40 (12.3)	112 (34.5)	146 (44.8)	
Postgraduate	6 (1.9)	9 (2.8)	12 (3.7)	
Occupation				0.032*
Student	28 (1.6)	93 (20.5)	137 (50.8)	
Academician	0 (0.0)	5 (44.4)	4 (33.3)	
Office Worker	7 (0.0)	14 (46.4)	7 (39.3)	
Technology / IT Professional	8 (6.3)	2 (25)	6 (37.5)	
Health Care Professional	3 (7.1)	7 (50.0)	4 (35.7)	
Type of Chair Used for Gaming				0.97
Ergonomic gaming chair	5 (1.5)	63 (19.4)	28 (8.6)	
Chair without backrest or armrest.	4 (1.2)	5 (1.5)	13 (4.0)	
Chair with backrest but no armrest.	23 (7.1)	23 (7.1)	44 (13.5)	
Chair with backrest and arm rest	14 (4.3)	30 (9.2)	73 (22.6)	
Rest between gaming sessions				
Yes	16 (1.5)	40 (22.6)	77 (52.6)	0.591
No	30 (2.1)	81 (26.6)	81 (44.8)	

*p<0.05, BMI- Body mass index

Table 5: Comparison of differences in mean neck pain disability in relation to selected demographic variables among video gamers

Demographic variables (n= 325)[a]	Neck disability Index (Mean ± SD)	t/F value	p value
Gender		4.96	0.001*[a]
Male (182)	25.90 ± 7.32		
Female (143)	29.83 ± 7.88		
Age (23.39 ± 2.56)		3.05	0.041* [a]
18-25	28.22 ± 7.90		
26-40	26.54 ± 7.82		
Education Level		0.631	0.89 [a]
Undergraduate	28.18 ± 7.88		
Postgraduate	27.19 ± 7.93		
Rest between gaming sessions.		0.408	0.094 [a]
Yes	28.32 ± 7.45		
No	27.95 ± 8.17		
BMI			
Underweight	21.83 ± 3.06	2.65	0.044*[b]
Normal	27.91 ± 8.06		
Overweight	29.21 ± 7.66		
Obese	26.82 ± 7.83		
Occupation		4.63	0.001* [b]
Student	28.90 ± 7.67		
Academician	25.67 ± 8.44		
Office Worker	24.75 ± 7.16		
Technology / IT Professional	28.18 ± 9.15		
Health Care Professional	21.71 ± 7.30		
Type of Chair Used for Gaming		0.209	0.89 [b]
Ergonomic gaming chair	28.48 ± 7.98		
Chair without backrest or armrest.	27.45 ± 7.95		
Chair with backrest but no armrest.	27.70 ± 7.43		
Chair with backrest and arm rest	28.10 ± 7.88		

*p<0.05, BMI- Body mass index, a- t-test, b- ANOVA

Age (p < 0.05) also showed a significant association with neck disability, with severe disability occurring between 18 and 25 years (40.9%). In the occupational category, students showed a significant association (p< 0.05) with neck disability, with 50.8% having a severe disability. Other sociodemographic variables such as BMI, education level, type of chair used during gaming, and rest periods between games show no association with neck disability.

Table 5 shows a significant difference in the mean score of neck pain disability as perceived by video gamers in relation to selected demographic variables in the Malaysian adult population. Among the demographic variables examined, gender (p=0.001), age (p=0.041), BMI (p=0.044) and occupation (p=0.001) showed a significant difference in the mean neck pain disability experienced by the video gamers in Malaysia.

DISCUSSION

In this study, the authors attempted to uncover the association between neck pain severity and insomnia and between sociodemographic variables and neck disability among video gamers in the Malaysian adult population. Specifically, the results showed a significant association between neck pain intensity and level of insomnia (p<0.05). Over 60% and almost half of the participants in our study endorsed moderate levels of insomnia and pain, respectively. Previous research has shown that sleep quality predicts pain, perhaps because poor sleep quality might exacerbate the sensation of pain. The likelihood of insomnia increased with pain duration and intensity. A likely mechanism explaining this association is that pain and sleep have comparable neurobiological pathways and that changes in these pathways could account for the observed association.[21] It is noteworthy that serotonin is known to play a crucial regulatory role as a neurotransmitter in the sleep-wake cycle and in pain modulation. Previous studies have hypothesized that the primary cause of pain and poor sleep is a failure of serotonergic signaling.[22]

Chronic pain is often accompanied by sleep problems. Subjective fatigue appears to correlate less strongly with insomnia than chronic musculoskeletal pain. Lobbezoo et al.[23] demonstrated that both patients with widespread pain and those with persistent cervical spine pain often have sleep disturbances, as is the case with video gamers suffering from chronic neck pain. The amount of gaming was strongly negatively correlated with overall sleep quality in adults, which may be related to the underlying mechanisms of screen exposure and arousal. Game volume significantly predicted sleep latency, sleep efficiency, and sleep medication use.[24]

A recent study by Purushothaman et al. found that 73.3% of laptop users and 53.3% of tablet users predominantly had severe forward head posture (FHP), which resulted in neck pain. This study shows that

over 36% of participants preferred to use both laptops and tablets.[25] When playing video games through these devices, the player may be at greater risk of acute and overuse injuries, including upper extremity overuse syndrome, delayed onset muscle soreness, and acute muscle strains. The posterior kinetic chain can be affected by chronic musculoskeletal disorders resulting from prolonged video game playing with poor posture and high alertness. Moreover, gamers may experience acute or persistent neck, shoulder and/or back pain when using gaming stations that are not ergonomically designed for their height. The posterior neck, shoulder and trunk muscles may be affected after initially complaining of general discomfort while awake. The initial pain complaint was generalized due to weak posterior scapular muscles, tight anterior pectoral muscles, and inadequate scapular control. Musculoskeletal examinations often show a slumped posture with forward shoulders. There may be slight deficiencies in strength. On examination, winging of the scapula may be obvious and may become more apparent during shoulder abduction during simple movements such as wall push-ups. The posterior neck, shoulder and trunk muscles may exhibit positive impingement symptoms while awake.[26] All these physical changes can be considered a major cause of chronic pain and insomnia and can also cause anxiety/mood/sleep problems.[26]

The authors also uncovered the association between socioeconomic factors and the neck disability experienced by video gamers. A study conducted by Gentile et al[27] showed that too much video gaming interferes with sleep or academic work and affects physical integrity. Adolescents and children who had a computer, games console and television in their bedroom were more than twice as likely to play games for more than 15 hours per week [28], and it is consistent with the observation of this present study that there is a significant association between student community and the presence of neck disability, although there is no significant relation between the educational level and neck disability. A study conducted by Gull et al[28] showed that students are at high risk of mechanical neck pain when reading and using computers and mobile phones for video games. In contrast, a study conducted by Genebra et al[29] showed that the high prevalence of neck pain is associated with subjects who have low educational levels.

The authors also reveal the association between gender and occurrence of neck pain disability among video gamers. The finding showed a significant association between gender and neck disability, with more males than females affected, and it is consistent with the findings of earlier studies.[30] This could be due to the fact that boys are more likely to play video games and are ten times more likely than girls to play for 15 hours a week, which could have increased their risk of physical problems such as neck pain. Children and adolescents are the largest group of video gamers, and parents, teachers and school counselors are increasingly reporting that children and adolescents are seeking professional help for excessive video gaming that results in wrist pain, neck pain, headaches, and blurred vision. [30,31] This result is consistent with the result of our study, which found a significant association between age and neck disability, especially in the age range between 18 and 25 years.

Although the association between playing more video games and higher BMI and between playing more video games and neck pain was demonstrated in a previous study,[32] the results of this study showed a non-significant association between BMI and neck disability and further investigation is warranted to clarify this issue. On the other hand, gamers may experience acute or persistent neck, shoulder and/or back pain when using gaming stations that are not ergonomically designed for their body size. [26] Additionally, although the results of our study did not show a significant association between the type of chair used for gaming sessions and rest time with neck disability, taking breaks to rest and focus on certain physical aspects of gaming can help prevent many physical problems[26] and examining the influence of this factors affecting neck pain severity and disability are beyond the scope of this study and future studies should pay more attention to these aspects.

Another notable observation from this study is the demonstration of a significant difference in video gamers' perceptions of neck pain disability across age, gender, BMI, and occupation (Table 5). The 18-25 age group is particularly at risk due to their developing musculoskeletal system, which can lead to neck pain and disability.[33] People in this age group also tend to use games as a coping mechanism, which can lead to longer gaming sessions and poor posture, suggesting that this age group is also at significant risk.[34] Regarding gender in relation to video gaming and the occurrence of neck pain disability, prolonged and poor posture is a common problem among gamers, but women may be more affected due to their higher sensitivity to pain and higher likelihood of suffering from comorbid medical conditions.[33,35] Psychosocial factors also play an important role; Women are more likely to experience greater levels of catastrophic pain and kinesiophobia, which correlate strongly with increased neck pain and disability.[36] Regarding BMI, it has been shown that individuals with neck pain (NP) and low back pain (LBP) have a higher degree of disability when their BMI is high, indicating overweight or obesity.[37] This could be due to the sedentary lifestyle prevalent among gamers, which can lead to disruption of the vascular, metabolic and autonomic systems, further increasing the risk of neck pain and disability.[38]

LIMITATIONS

The present study has a few limitations. First, data

from a self-reported survey of video game players without objective measurement of the outcome variables were collected and reported in this study. Second, the present study is a cross-sectional study based on the perceptions of video game players from the Klang Valley in Malaysia. However, these results cannot be generalized to the whole of Malaysia. Third, adopting snowball sampling and including a smaller sample size of video gamers than the expected minimum might restrict the generalization of the outcomes. Future work should include a more comprehensive survey of video game players in the Malaysian adult population.

Conclusion

This study demonstrated an association between neck pain severity and insomnia ($p < 0.05$) among video gamers, where 66.5% of those experiencing moderate neck pain are prone to moderately severe clinical insomnia, and 31.6% experienced severe clinical insomnia. The study has uncovered a significant association between neck disability among video gamers and selected demographic variables such as gender, age, BMI, and occupation. A noticeable difference was found among occupational groups that play video games. Over 50% of students, particularly those aged 18 to 25, are more prone to severe neck pain disability compared to other professional groups that play video games in Malaysia. This highlights the importance of maintaining a healthy lifestyle and being aware of the health risks that come with long gaming sessions.

Recommendations

Future research could focus on identifying the risk factors associated with prolonged usage of video games among different occupational groups in the Malaysian population. Additionally, experimental studies could be conducted to develop a wellness intervention and ergonomic support program to study their impact on the severity of neck pain and disability among video gamers. Finally, a similar study could be conducted among other occupational groups to investigate the effects of prolonged video game use on neck pain, disability, and sleep quality.

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