LOW XIN YUEN POSTURAL AWARENESS, SEDENTARY BEHAVIOUR 2022

ASSOCIATION BETWEEN POSTURAL AWARENESS, SEDENTARY BEHAVIOUR, AND BACK PAIN DURING THE HYBRID STUDY AMONG UNDERGRADUATE STUDENTS

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BACHELOR OF PHYSIOTHERAPY (Honours)

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By

LOW XIN YUEN

A Research project submitted to the Department of Physiotherapy,
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ASSOCIATION BETWEEN POSTURAL AWARENESS, SEDENTARY BEHAVIOUR, AND BACK PAIN DURING THE HYBRID STUDY AMONG UNDERGRADUATE STUDENTS

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ABSTRACT

Background and Objective: Low back pain is one of the most prevalent health issues affecting individuals of all ages, including children and the elderly. Approximately 85% of people have experienced it at least once in their lives. Thus, the low back pain issue should be addressed, and its associated factors, which are postural awareness and sedentary behaviour should be studied thoroughly. Hence, this study aims to investigate the association between postural awareness, sedentary behaviour, and back pain during the hybrid study among undergraduate students.

Methods: This is a cross-sectional quantitative design study. A self-reported questionnaire was distributed to undergraduate students in UTAR Sungai Long and Kampar campuses through Google Forms. The Postural Awareness Scale, Sedentary Behavior Questionnaire, and The Quebec Back Pain Disability Scale were utilized to examine the participants' postural awareness level, sedentary behaviour, and back pain, respectively.

Results: Data from 390 participants were analyzed. Spearman's rho test revealed no significant association between postural awareness ($p = 0.747$) and back pain ($p = 0.747$) during the hybrid study among undergraduate students. Besides that, no significant association was found between sedentary behaviour ($p = 0.339$) and back pain ($p = 0.339$) during the hybrid study among undergraduate students.

Conclusion: There is no significant association between postural awareness, sedentary behaviour, and back pain during the hybrid study among undergraduate students. This may be because back pain can be due to other risk factors such as gender, age, faculty, year of study, smoking, drinking alcohol, physical activity level, etc. In order to avoid this catastrophe, the government, general public, school administration, parents, and students should put in place some preventative measures.

Keywords: Association, Postural Awareness, Sedentary Behaviour, Back Pain, Hybrid Study, Undergraduate Students

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APPROVAL SHEET

This Research project entitled "**ASSOCIATION BETWEEN POSTURAL AWARENESS, SEDENTARY BEHAVIOUR, AND BACK PAIN DURING THE HYBRID STUDY AMONG UNDERGRADUATE STUDENTS"** was prepared by LOW XIN YUEN and submitted as partial fulfillment of the requirements for the degree of Bachelor of Physiotherapy (Honours) at Universiti Tunku Abdul Rahman.

Approved by:

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PERMISSION SHEET

It is hereby certified that **LOW XIN YUEN** (ID No: **19UMB03908**) has completed this Research project entitled "ASSOCIATION BETWEEN POSTURAL AWARENESS, SEDENTARY BEHAVIOUR, AND BACK PAIN DURING THE HYBRID STUDY AMONG UNIVERSITY STUDENTS under the supervision of MR MARTIN EBENEZER CHELLAPPAN (Supervisor) from the Department of Physiotherapy, M. Kandiah Faculty of Medicine and Health sciences.

Yours truly,

_____

(LOW XIN YUEN)

DECLARATION

I hereby declare that the Research project is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

Signature:

Name: LOW XIN YUEN

Date: 27/12/2022

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LIST OF ABBREVIATIONS

Abbreviations	
ASBQ	Adult Sedentary Behaviour Questionnaire
BackPEI	Back Pain and Body Posture Evaluation Instrument
BMI	Body Mass Index
BPAI	Branson's Posture Assessment Instrument
CD	Compact Disc
COVID-19	Corona Virus Disease 2019
DVD	Digital Versatile Disc
FAM	Faculty of Accountancy and Management
FAS	Faculty of Arts and Social Science
FBF	Faculty of Business and Finance
FCI	Faculty of Creative Industries
FEGT	Faculty of Engineering and Green Technology
FICT	Faculty of Information and Communication Technology
FSC	Faculty of Science
ICS	Institute of Chinese Studies
IIUM	International Islamic University Malaysia
IPAQ	International Physical Activity Questionnaire
LKC FES	Lee Kong Chian Faculty of Engineering and Science
M	Means
MBBS	Bachelor of Medicine and Bachelor of Surgery
MBE	Mind-Body Exercises
MET	Metabolic Equivalents
MK FMHS	M. Kandiah Faculty of Medicine and Health Sciences

MSD	Musculoskeletal Disorders
NMQ-E	Nordic Standardized-E Musculoskeletal Questionnaire
PAS	Postural Awareness Scale
PEO	Portable Ergonomic Observation Method
SAQ	Sedentary Behaviour Questionnaire
SERC	Scientific and Ethical Review Committee
SPSS	Statistical Package for Social Software
SD	Standard Deviations
UTAR	Universiti Tunku Abdul Rahman
VCR	Videocassette Recorder

CHAPTER 1

INTRODUCTION

1.1 Background of Study

The American Academy of Orthopedics (1947) defined body posture as protecting the body structures from harm and gradual distortion by aligning the body parts regularly and in a balanced manner (Zagyapan et al., 2012). Body posture is also the circumscription of the arrangement of skeletal components with respect to one another and their surroundings at a given moment and how each joint in the body affects this position. As the proverbs said, "every coin has two sides", so as for body posture. The human body posture can be good or bad. A person is said to have a good posture when he or she can maintain the body's stability and balance with the greatest amount of effectiveness and the least amount of effort (Akulwar-Tajane et al., 2021). Besides, a good posture can ensure the body muscles work together with the musculoskeletal and nervous systems harmoniously without any issues. Furthermore, we can examine a proper posture through the location of the spine. Our spine consists of four natural curves in the vertebral column. They are the cervical, thoracic, lumbar, and sacral curvature (Benjamin, 2021).

On the other hand, a bad posture can be characterized by an alteration of muscle tone, impairment of body orientation symmetry, congenital anomalies, and inappropriate posture while performing functional activities (Glista et al., 2014). For example, lying down while reading, walking with hunched back etc. Consequently, odd postures such as cervical

hyperlordosis, thoracic hyperkyphosis, and lumbar hyperlordosis will be formed. Other than that, poor posture can lead to instability of the spine and elicit pain in different intensities at different parts of the body while doing activities of daily living. This is because bad posture can place undesirable pressure on other body components. For instance, the nervous system and the respiratory system. Our body organs are strongly correlated with each other such as the brain, spinal cord, and total body function with the spine. Thus, bad posture not only affects the spine but also provokes a wider range of consequences on the whole body due to their close relationship. For example, poor posture can lead to depression, musculoskeletal disorders, and cardiovascular health issues.

Developing posture against gravity and preserving balance are both aspects of postural control. It makes it possible to maintain posture during active motions and to regain equilibrium after a perturbation. Postural control is associated with the perception or sense of joint angles and muscle tensions toward movement and balance. Furthermore, postural awareness is associated with proprioception awareness. Postural awareness is defined as an individual conscious awareness of his or her own body posture when the central nervous system receives proprioceptive signals from the body's periphery (Cramer et al., 2018). Posture is one of the most crucial elements that influence the health of human beings physically and mentally. However, according to the survey conducted by Akulwar-Tajane et al. (2021), they found that (69%) of the participants acknowledged that they adopted a poor posture, while (31.8%) of the participants engaged in activities of daily living with these odd postures.

There are many factors that contribute to the formation of bad posture behaviour in public. The risk factors are surrounding factors, psychological factors, lifestyle, physical

activity level, ergonomics, technology and etc. Poor ergonomics, such as using a laptop without a laptop stand and an office chair without lumbar support, will lead to awkward posture for laptop users. Hence, Kanaparthy et al. (2015) conducted a study to explore some methods for maintaining a good posture. First, ergonomics is essential for us to ensure our body parts are doing their jobs in the correct position with maximum efficiency and safety. In addition, postural awareness techniques should be combined with ergonomics to establish a better outcome. Moreover, people with inappropriate lifestyles should be modified by accommodating various postures and changing their working positions frequently in order to distribute the burden among the muscle groups over the spine, upper limbs, and lower limbs (Finsen et al., 1998).

Sedentary behaviour is an activity that requires little effort and is conducted in a sitting or recumbent position (Mahdavi & Kelishadi, 2020). For instance, watching television, total time spent sitting, total screen time, and office work. These are all linked to individuals engaging in less physical activity. Furthermore, sedentary behaviour is distinguished as energy consumption of less than 1.5 metabolic equivalents (MET) while performing a various activity (Katzmarzyk et al., 2009). In 2019, sedentary behaviour became a cause for worry because of the COVID-19 outbreak. Most people are forced to stay at home, which leads to the increment of sedentary behaviour globally.

Although sedentary lifestyles established a tremendous negative impact on quality of life and health among the public, there are still many people who ignore the detrimental effects and act in their like. According to the study by Aleixo et al. (2019), a prolonged sitting period can impair the lumbar spine musculoskeletal system and induce muscle atrophy. Moreover, a

static sitting posture can decrease blood circulation in the lower part of the body. Thus, oedema can occur at the feet and ankles of the individual. Additionally, this bad attitude can significantly impact our metabolic profiles, endocrine levels, and cardiorespiratory function (Rahman et al., 2020). For instance, a decline in our muscle insulin sensitivity, endurance level, aerobic performance, and alterations in body weight (Gallè et al., 2020). This erroneous behaviour can be due to personal and environmental factors such as being young, a student, coming from a high-level household, and residing in metropolitan areas. However, there are still ways to overcome this problem. Chen et al. (2020) suggested the public carry out leisure pursuits and indoor physical activity. Exercises that involve balancing, stretching, or strengthening are also acceptable. For example, tandem walking, single-leg stance, cobra pose, child pose, bridging, squatting, and plank are some other exercises to try. Likewise, the benefits of mind-body exercises (MBE), such as Tai chi, yoga, and Qigong, may reduce the risk of cardiovascular disorders (Mahdavi & Kelishadi, 2020).

Low back pain is one of the most prevalent health issues affecting individuals of all ages, including children and the elderly (Ilic et al., 2021). There is approximately 85% of people have experienced it at least once in their lives (Zainuddin et al., 2022). Ganesan et al. (2017) found that nearly 50% of individuals worldwide suffer from low back discomfort regardless of age. Low back pain is characterized as pain and irritation that is situated below the costal margin and above the lower gluteal folds. The prevalence of low back pain in the younger generations should not be underestimated as it may impair their activity of daily living and quality of life. The government and public should take this issue seriously as there are results showing that the majority of teenagers between the ages of 15 and 19 were reported to have discomfort in their cervical region, thoracic region, lumbar region, and lower limbs

(Ozdemir et al., 2021). Thus, it is crucial for everyone to take prevention and precaution to lower the risk of low back pain among young adults in order to have a better future and life.

In 2019, Wuhan city in China's Hubei Province detected a severe and high mortality rate disease called coronavirus disease 2019 (COVID-19) (Rahman et al., 2020). Since then, the virus has become uncontrollable and spread around the world. Now, COVID-19 is a threat to the world's public health. Due to the COVID-19 situation, all students around the world, including Malaysia were forced to attend lecture classes online. However, after two years of unremitting efforts, the situation has become better, and many universities in Malaysia have implemented hybrid studies where physical classes are combined with online lessons. A hybrid study is enforced to break down the COVID-19 chain and to ensure the students' health and wellness. However, different studies carried out among university students highlighted that students generally consume much time sitting on non-ergonomic chairs and adopting bad posture to attend lecture classes and complete their academic assignments during the COVID-19 pandemic. As a result, students who adopt inappropriate postures while using computers and cell phones for extended periods of time have led to musculoskeletal changes and pain. The students might not be aware of the effects of poor posture, a sedentary lifestyle, and back pain on their health and quality of life. Based on the literature review, the students at Karachi university detected a high prevalence of musculoskeletal disorders due to prolong laptop usage and thus, increased risk of neck pain (Roggio et al., 2021). Therefore, the school and parents should advise and assist the students in improving their postural awareness level and correcting their sedentary lifestyle in order to minimize the risk of low back pain. This is because the progression of these bad habits and their impacts on the students are unpredictable.

In conclusion, the low back pain issue should not be neglected and its major associated factors, which are postural awareness and sedentary behaviour should be studied thoroughly. Thus, this study aims to determine the association between postural awareness, sedentary behaviour, and back pain during the hybrid study among undergraduate students using the Postural Awareness Scale (PAS), Sedentary Behaviour Questionnaire (SAQ), and Quebec Back Pain Disability Scale.

1.2 Research Objectives

The objectives of this study were:

1. To determine the association between postural awareness and back pain during the hybrid study among undergraduate students.
2. To determine the association between sedentary behaviour and back pain during the hybrid study among undergraduate students.

1.3 Hypothesis

H0i) There is no significant association between postural awareness and back pain during the hybrid study among undergraduate students.

H1i) There is a significant association between postural awareness and back pain during the hybrid study among undergraduate students.

H0ii) There is no significant association between sedentary behaviour and back pain during the hybrid study among undergraduate students.

H1ii) There is a significant association between sedentary behaviour and back pain during the hybrid study among undergraduate students.

1.4 Research Questions

1. Is there any association between postural awareness and back pain during the hybrid study among undergraduate students?
2. Is there any association between sedentary behaviour and back pain during the hybrid study among undergraduate students?

1.5 Operational Definition

1. **Postural awareness –** An individual conscious awareness of his/her own body posture when the central nervous system receives proprioceptive signals from the body's periphery.
2. **Sedentary behaviour** – Sedentary behaviour is an activity that requires little effort and is done in a sitting or recumbent position.
3. **Back pain** – Low back pain is characterised as the pain and irritation that is situated below the costal margin and above the lower gluteal folds.
4. **Hybrid study** – A study method where students learn at least fifty percent of the time online and the remaining fifty percent in traditional classroom settings.
5. **Undergraduate students** – College or university students who have not achieved a first degree, particularly a bachelor's degree.

1.6 Rationale of Study

There are many studies conducted about postural awareness, sedentary behaviour, and back pain among undergraduate students around the world. However, these studies have provided less evidence about the association between postural awareness, sedentary behaviour, and back pain during the hybrid study in Malaysia. Due to COVID-19, most of the public and private universities in Malaysia have introduced hybrid teaching and learning to prevent the spread of COVID-19 throughout the community and to protect the health and safety of the students. However, this causes the students to spend more time using electronic gadgets and develop a sedentary lifestyle in order to attend online classes and complete their academic assignments. According to Roggio et al. (2021), due to prolonged electronic gadgets usage and poor postural awareness, such as sitting on non-ergonomic chairs and adopting poor postures while accomplishing the coursework, the students possessed musculoskeletal changes and pain. But, there is no study carried out to see whether levels of postural awareness, sedentary behaviour, and back pain may be re-established after fully recovering from the COVID-19 outbreak. Furthermore, numerous epidemiological studies found that sedentary behaviour and adopting an incorrect posture for a prolonged period of time are both significantly associated with neck pain. However, they did not mention the relationship between sedentary behaviour, poor posture, and back pain. On the other hand, Chen et al. (2009) and Moroder et al. (2011) demonstrated that sedentary behaviour and the prevalence of musculoskeletal pain are unrelated. Hence, this study focuses on determining the association between postural awareness, sedentary behaviour, and back pain during the hybrid study among undergraduate students in Universiti Tunku Abdul Rahman (UTAR), Sungai Long Campus, Selangor, and Kampar Campus, Perak, Malaysia. The outcome of this study can assist physiotherapists in exploring

more specific programs to improve the student's postural awareness level, correct sedentary behaviour, and reduce back pain.

1.7 Scope of Study

The purpose of this study is to determine the association between postural awareness, sedentary behaviour and back pain during the hybrid study among undergraduate students in UTAR. This study focuses on Year 1 to Year 4 undergraduate students who are studying at Universiti Tunku Abdul Rahman (UTAR), Sungai Long Campus, Selangor and Kampar Campus, Perak, Malaysia.

CHAPTER 2

LITERATURE REVIEW

2.1 Prevalence of Postural Awareness Level and Poor Postural Habits

Sarfraz et al. (2013) conducted a cross-sectional survey entitled "Awareness of ergonomic among physiotherapy and medical students". The researchers invited 300 physical therapy and medical final-year students from Baqai University, Ziauddin University, Jinnah Postgraduate Medical Center (JPMC), and Liaquat national school of physical therapy and Medical College to participate in their survey. The purpose of this survey is to examine the student's understanding of ergonomics and its benefits. The results showed that only 28.67% of the students claimed to know the term "ergonomics," yet 82% said they knew about body posture. Besides that, only 37.67% of the participants went for the postural awareness training programs previously, whereas 62.33% of the participants did not have the experience of attending any postural awareness training programs. Other than that, 72.33% of them said yes when they were asked if they had any musculoskeletal issues. This is due to prolonged sitting time during lecture class, prolonged standing, and awkward posture. Various tasks, especially static body posture might cause discomfort in one's posture, which can have an impact on one's overall health and the effectiveness of one's work. In short, it has been determined that physical therapy and medical students in Pakistan have relatively little knowledge of ergonomics. Hence, education about the advantages of ergonomics and postural awareness is essential to make sure the students are practising the correct posture in their lifestyle.

Mitova (2015) formulated a study named “Frequency and prevalence of postural disorders and spinal deformities in children of primary school age”. In this study, 2129 students in primary school aged 6 to 11 years old participated. Mitova has chosen the participants from ten schools in Blagoevgrad, Bulgaria, and conducted a screening to detect spinal abnormalities and postural changes among the students. According to the findings of the studies, there were 504 out of the 2129 students (23.67%) evaluated with spinal abnormalities. On the other hand, the prevalence of postural disorders is 58.85% which is 1253 out of 2129 students are having poor posture, and only 372 (17.47%) have a healthy physique. As a result, the students in the town of Blagoevgrad, Bulgaria have poor postural awareness levels, insufficient physical activity levels, an imbalanced diet, and other negative lifestyles. Consequently, the students have poor muscle power, high body mass index, bad posture, and spinal distortion. In conclusion, it is advised that the general public, health workers, school, and parents give this critical subject their full attention. We should be precise about the student’s health and their postural issues by implementing a healthy lifestyle and educating them on proper postural practices. This approach ought to be introduced to pupils at a young age in order to help them avoid unhealthy behaviours that might cause adverse effects on their future.

Desouzart et al. (2016) conducted an observational study entitled “Postural education: correlation between postural habits and musculoskeletal pain in school-age children.” The authors recruited 300 children and teenagers between the ages of 10 and 18 in the Viseu and Leiria district. The authors employed a body discomfort questionnaire and a postural behaviour questionnaire to observe their postural alterations. From the results, it is notified that the majority of the participants (83.3%) had poor posture, which was much higher than that of the individuals who had optimal posture. In a nutshell, we should not ignore the threat of postural

disorder on the young generations but establish the significance of preventive measures to improve their postural awareness level.

Akulwar-Tajane et al. (2021) designed a study entitled "Effect of COVID-19 Pandemic Lock Down on Posture in Physiotherapy Students: A Cross-Sectional Study". A total of 223 year 1 to year 4 undergraduate, internship, and postgraduate students from Maharashtra University of Health Sciences enrolled in this self-reported questionnaire. This online questionnaire is open for responses from June to July 2020. According to the article's findings, most of the students (77.6%) were using their digital gadgets for more than 4 hours every day. Besides that, the findings showed that most participants did not employ ergonomic precautions. 64.6% of them studied in a bed with a movable table or a typical study table with a chair. Furthermore, 23.3% said they studied comfortably on the couch, 5.4% said they lay down while studying, and 1.4% studied on the floor. These results suggested that the young generation nowadays is prompt to adopt non-ergonomic postural habits. On the other hand, the poll revealed that 69% of the participants acknowledged adopting bad posture while sitting, standing (21%), or lying down (52%). These bad postural habits were carried over from one position to another. For instance, the participants most often read from a sitting position to a lying down position in a bed. In addition, 50.2% of the surveyed participants spent approximately 4 to 8 hours in a sitting position. Consequently, this can lead to postural abnormalities, especially in the cervical and lumbar spine. Moreover, according to the study, 32.6% of the subjects sat with their buttocks tilted, and 7% of them had their backs twisted, with the remainder of individuals' spines either not being supported by their seating or not using the lumbar support pillow. It was also discovered that 63.4% of the people examined sat with their legs crossed, and 13.4% of them sat with their leg hanging. Due to these inappropriate postural habits, poor ergonomics management, and excessive use of digital devices, 46.4% of

the participants detected postural deviations such as protracted shoulders, forward head, lumbar lordosis, and thoracic kyphosis while 65.3% of them were encountering neck and low back pain.

2.2 Prevalence of Sedentary Behaviour

Rahman et al. (2020) conducted an online survey entitled "Physical inactivity and sedentary behaviours in the Bangladeshi population during the COVID-19 pandemic: An online cross-sectional survey". This study was carried out virtually to evaluate the physical activity level and sedentary behaviours among Bangladesh residents during the COVID-19 outbreak. The data was collected using a convenience sampling method by disseminating the Google Form-created questionnaire to the participants over the social media platforms such as WhatsApp and Facebook. The submission window was available for ten days which is from 20 to 30 June 2020. In total, 2083 participants answered the online questionnaire. However, 55 participants were disqualified as they failed to meet the prerequisites for inclusion. Hence, 2028 participants made up the final sample. After the results were analyzed, we discovered that 38% of the participants were physically inactive throughout the COVID-19 epidemic. Furthermore, the prevalence rate of sedentary behaviours (>8h/day) among Bangladesh citizens is reported as 21%. According to the research, there is a significant correlation between high levels of sedentary behaviours and physical inactivity. Besides that, sedentary behaviours were proved to be closely related to gender, educational level, self-reported physical health, and lack of exercise. However, there are a few limitations in this study during the finding's evaluations. Firstly, the online questionnaire used in this study may be subject to biases as memory recall may not be accurate for answering the questionnaire. Moreover, as this is a cross-sectional study, we are unable to draw any conclusions about the relationships between the factors we

examined. Additionally, the majority of the participants were intellectual students and young adults because of the convenience sample method and online questionnaire. This can impact how widely the results may be applied. In summary, it is essential to encourage the public to exercise frequently as part of home quarantine policies and raise public awareness in order to discourage sedentary behaviour during the COVID-19 outbreak effectively.

Gallè et al. (2020) designed a cross-sectional survey named "Sedentary behaviours and physical activity of Italian undergraduate students during lockdown at the time of the COVID-19 pandemic". This study is carried out to compare the sedentary behaviours and physical activity levels among undergraduate students before and after the COVID-19 lockdown in Italy. The participants were selected from three Italian universities which are the Parthenope University of Naples, the Sapienza University of Rome, and the Aldo Moro University of Bari. The total number of students in these three universities is 166703. However, to analyze the indicated variables in the studied student population, a sample of at least 384 participants was needed. Besides demographic data, the online questionnaire included the Adult Sedentary Behaviour Questionnaire (ASBQ) and International Physical Activity Questionnaire (IPAQ). These questionnaires were distributed to the participants in a Google Form format. 1430 out of 166703 students from the three universities responded to the questionnaire. From the review of the literature, it is acknowledged that every sedentary habit grew dramatically while every physical activity declined significantly during the lockout. The biggest increase in time among sedentary activities was seen in utilizing electronic gadgets, which had increased by 52.4 minutes every day. In contrast, the biggest drop in physical activity is walking, which is 365.5 minutes every week during the lockdown. However, there are a few limitations in this research. Firstly, the population of this study cannot represent the entire young population in Italy. This is because the population of this study is selected from three Italian universities and its

population size is too small to represent the whole Italian young people. Besides that, the gender distribution is not equal in this study. There were more female students in the sample than male students. In addition, as this survey is conducted online, there may be some probability that the participants over or underestimate their weight and the amount of time they spent engaging in physical activity and sedentary habits. Thus, it is suggested to utilize measuring devices such as accelerometers and pedometers to produce a more accurate result.

Cheval et al. (2021) performed a research entitled "Relationships between Changes in Self-Reported Physical Activity, Sedentary Behaviour, and Health during the Coronavirus (COVID-19) Pandemic in France and Switzerland". Social media platforms, including Facebook, Twitter, and LinkedIn were used to find volunteers who lived in France or Switzerland and were willing to take part in this study. The participants had to spend roughly 15 minutes completing 2 brief online questionnaires on a secure website run by the University of Geneva in Switzerland. A total of 273 participants answered the first questionnaire, which asked about their typical physical activity and sedentary behaviour. Of those 273 participants, 110 finished the second questionnaire which asked about their health, sedentary behaviour, and physical activity in the previous week. The results showed that before the lockdown, individuals were inactive for an average of 2 hours and 9 minutes each day. However, following the lockout, they increased their daily sedentary time by 77 minutes, or around 3 hours and 25 minutes. Other than that, a rise in leisure-time sedentary behaviour was additionally linked to deteriorating physical, mental, and subjective vitality.

2.3 Prevalence of Back Pain

Alshagga et al. (2013) conducted a cross-sectional study named “Prevalence and Factors Associated with Neck, Shoulder and Low Back Pains among Medical Students in a Malaysian Medical College”. This study consisted of 642 medical students from a private medical college in Selangor, Malaysia. However, there were only 232 students responded to the online self-administered questionnaire between March and October 2010. The questionnaire was revised from the Standardized Nordic Questionnaire before being distributed to the students through Email. According to the study, the musculoskeletal pain incidence was 65.1% in the last year and 45.7% in the last week. The occurrence of low back pain was the highest in the past week (27.2%) and in the previous year (46.1%), with neck discomfort coming in second (24.1% and 41.8% respectively). The students in the clinical years with a history of physical trauma or family history of musculoskeletal illnesses, high body mass indices, and prolonged usage of computer devices each day had a higher prevalence of musculoskeletal discomfort over the last week. From the findings, we can conclude that low back pain is the most prevalent musculoskeletal disorder among medical students. This is presumably due to the fact that the students spent more time standing while clerking, bedside teaching, or watching the surgery. The prolonged static posture may cause strain on the spine and lead to low back pain. Thus, the administration of the medical school should take action to prevent musculoskeletal pain brought on by circumstances associated with the medical school.

AlShayhan & Saadeddin et al. (2018) constructed a cross-sectional study named “Prevalence of Low Back Pain among Health Sciences Students” to identify the incidence of low back pain and its associated factors among health sciences students. The survey was conducted from 2016 to 2017 and comprised 1163 students from 5 health sciences colleges. A self-administered questionnaire that consisted of 4 components was required to be filled up by the participants. The 4 components of the questionnaire were demographic data, risk factors,

Nordic musculoskeletal questionnaire, and Oswestry disability questionnaire. Based on the results, it is observed that the prevalence of low back pain was 56.6% throughout a lifetime, 48.8% over a year, and 21.2% at a single moment in time. The highest lifetime frequency of low back pain was found among dental students (67.6%). Moreover, when compared to women, men were shown to have a greater lifetime prevalence. Besides that, the prevalence of low back pain was significantly correlated with computer or laptop users for more than 10 hours, uncomfortable feeling on the bed, unpleasant college furniture, and carrying a hefty backpack. Additionally, on the Oswestry scale, low back pain was proved to cause minimal impairment in the majority of pupils (90.3%). In summary, this survey revealed a high incidence of low back pain among aspiring medical professionals, especially dental students.

Roggio et al. (2021) designed a cross-sectional study entitled "One Year of COVID-19 Pandemic in Italy: Effect of Sedentary Behaviour on Physical Activity Levels and Musculoskeletal Pain among University Students". A total of 2044 Italian university students replied to the online Google form poll between February 8 and March 21, 2021. The questionnaires were sent to the participants via Facebook, Instagram, WhatsApp, Email, and personal contacts. However, only 1654 replies remain eligible after the outlier has been removed. From the results, the overall prevalence of low back pain was reported by 554 out of 1654 participants (33.5%). In terms of the participants who reported pain, 72.9% said they had endured low back pain during the COVID-19 epidemic. Additionally, 35.4% of the participants reported mild pain, compared to 39.4% who reported moderate pain. Furthermore, the majority of the participants (69.7%) experienced low back discomfort after several hours of study, 50.5% said that sitting in one position causes the most pain, and 30% reported having pain while walking and performing activities of daily living. Next, 22.4% reported the pain intensity rise drastically during the pandemic compared to the beginning of their pain while 47.3% reported

a mild rise. Other than that, 15% do not attribute the onset of their discomfort to the pandemic restriction, while 13% of them first experienced pain during the pandemic. The authors recommended more research be done to see whether levels of physical activity and sedentary behaviour may be re-established after fully recovering from the COVID-19 outbreak.

Casas et al. (2016) conducted an exploratory study to evaluate back pain experienced by the participants using the Nordic Standardized-E Musculoskeletal Questionnaire (NMQ-E). This survey categorizes the pain experience into 3 anatomical regions, recall period, evolution time, pain intensity, restriction or incapability to carry out physical activities, and treatment plans. The results for pain experience revealed an increase in frequency as the memory period increased. Besides that, the 3 anatomical locations' pain experiences were almost the same intensity but the lower back pain was more severe (45%). Moreover, pain-related restrictions on physical activity ranged from 22.7% to 29.8%. In addition, the participants preferred self-medication as the method to relieve pain.

2.4 Risk Factors of Back Pain

Low back pain does not occur instantaneously, both internal and external factors might contribute to its development. Thus, in the following literature review, we will be investigating the various variables that induce back pain.

Samat et al. (2011) constructed a cross-sectional study entitled "Prevalence and Associated Factors of Back Pain among Dental Personnel in the North-Eastern State of Malaysia". From March 2010 to June 2010, this survey was done among dental specialists,

including dentists, dental nurses, dental technicians, and dental surgical assistants, who worked in public dental clinics in Malaysia's North-Eastern State. The body postures of the subjects were assessed utilizing Branson's Posture Assessment Instrument (BPAI) in this survey. A total of 350 out of 420 dental professionals were qualified and took part in this survey, yielding an 83.3% response rate. Based on the findings from the literature review, 45% of dental professionals in Malaysia's northern state reported having back pain in general. The prevalence of dental technicians was 52.4%, which was the highest of all dental specialists. Generally speaking, more than 80% of them reported engaging in repetitive tasks, having aberrant posture, and making excessive motions while performing their duties. Furthermore, after being assessed by the BPAI, it is evident that having bad posture while working and being a dental assistant were substantially connected with back pain. The results showed dental professionals with bad posture had a roughly 3.5 times higher chance of developing back discomfort than dental professionals with good posture. On the other hand, age, gender, body mass index (BMI), repeated tasks, static sitting for a prolonged period, the absence of adjustable chairs and tables, lack of armrests and footrests, poor ergonomics, and excessive movement were not substantially linked to back pain. In summary, dental professionals in Malaysia's North-Eastern State experienced a significant rate of back pain. Besides that, back pain was linked to having bad posture and working as an assistant in a dentist’s office. It is advised to implement all ergonomic and preventive measures as well as targeted therapy programs to address the associated factors for back pain in order to improve the condition.

Moroder et al. (2011) conducted a study on ageing as one of the factors that cause low back pain. This is because long-term exposure to various factors promotes stress and strain on the lower back. It raises injury rates as people get older. Therefore, growing older is viewed as a major factor in developing low back pain.

Sarfraz et al. (2013) performed a study of the respondents who experienced musculoskeletal issues and admitted poor ergonomics as the major factor. The respondents were questioned about various postures to examine the facts. Most of the respondents (38.33%) cited prolonged sitting during lecture classes as the main culprit. The next contributing factor was long-standing time and bending postures (14.33%). Other than that, 10.33% of the respondents complained of wearing high heels as the other source of discomfort. However, there was 13% of the respondents disagreed and 9% of them had no idea how it happened.

Herman (2017) designed a study entitled "Do women Suffer from Back Pain More Frequently than Men". Based on the literature review, the author noticed women have three times more prone than men to experience low back pain. This is because women had a higher risk to suffer from osteoarthritis, degenerative spondylolisthesis, and reduced bone mass.

Ganesan et al. (2017) conducted a research entitled "Prevalence and Risk Factors for Low Back Pain in 1355 Young Adults: A Cross-Sectional Study" to investigate the incidence and different causes of low back pain among individuals in India. In total, 1355 of 1532 young individuals between the ages of 18 and 35 years old participated in this research. The study was conducted in Delhi from August to November 2014. According to the findings, the low back pain incidence was 42.2% per year and 22.8% per week. It was also discovered that low back pain in young individuals was related to marital status, prior history of spine problems, vigorous exercise, satisfaction with present employment position, monotony, stress, number of hours studying daily, and family history of spine problems. According to this study, lumbar spine flexion and static body posture are risk factors for the occurrence of low back pain. So,

sitting for an extended period of time or in an unnatural position and studying for longer than 5 hours might make low back pain worse. Additionally, 31.9% of the individuals said their jobs were monotonous, which was associated with a higher incidence of low back pain. In contrast, this study found no correlation between low back pain and age, gender, cigarette smoking, drunkenness, coffee consumption, mode and duration of travel, nutrition, weightlifting, wearing high heels, learning posture, or frequency and kind of sports activities. In conclusion, the development of acute low back pain into chronic low back pain can be stopped by early detection of these risk factors. Making young adults aware of the risk factors may encourage them to practice healthy lifestyles that will enhance their quality of life and performance because persistent low back pain has the possibility to reduce the personal quality of life and raise the financial burden.

Mahdavi & Kelishadi (2020) conducted a study named "Impact of Sedentary Behaviour on Bodily Pain While Staying at Home in COVID-19 Pandemic and Potential Preventive Strategies". According to the study, a lack of vitamin D can be a contributing factor to low back pain. This is because increased indoor activity, video games, and insufficient sunlight exposure may all be linked to decreased serum vitamin D concentrations in our bodies. Consequently, there is a high percentage of physical discomfort in people with insufficient vitamin D. Other than that, it was observed that consuming too much coffee and smoking cigarettes raised the risk of experiencing chronic low back pain.

Ozdemir et al. (2021) designed a study that concluded education especially tertiary education is the cause of low back pain. This is because students are spending most of their time attending lecture classes and completing their assignments. As a result, students may adopt

sedentary lifestyles, awkward postures, reduce exercise time, insufficient rest time, and stress. All these circumstances can induce the risk of low back pain. Secondly, obesity and high-intensity physical activity can also cause low back pain due to the pressure stress on the vertebral column, causing muscle fatigue and reducing muscle power.

Ilic et al. (2021) formulated a study entitled "Prevalence and correlates of low back pain among undergraduate medical students in Serbia, a cross-sectional study". The researchers used a self-administered questionnaire to gather the data and information. This study was carried out in November and December of 2018 at the Faculty of Medical Sciences, the University of Kragujevac in central Serbia. A total of 499 out of 547 medical students' responses were comprised in the study. According to the article's findings, 104 of the medical students (20.8%) reported having low back pain at the time of the study. However, the study did not find significant variations in the prevalence of low back pain among medical students based on age, gender, secondary education completion, study year, cumulative overall average grade, or level of study. In contrast, cigarette smoking, academic stress, improper sleeping posture, and a family history of low back pain were all significantly associated with a high incidence of low back pain. The rate of smoking was high among students with low back pain (32.7%) compared to students without low back pain (175%). Other than that, poor sleeping posture among medical students can increase compression stress on the spine and lead to a high incidence of low back pain.

Zainuddin et al. (2022) carried out a pilot study titled "The Prevalence of Low Back Pain and Its Associated Risk Factors Among the Medical Imaging Undergraduate Students at the International Islamic University Malaysia (IIUM) Kuantan". The authors obtained the data

by recruiting ninety-two university students to complete the Google Form self-constructed questionnaire. The online questionnaires were sent to the participants via WhatsApp. Based on the literature reviewed, 67 out of 92 students (72%) complained of low back pain. It was discovered that study load, tiredness, poor body posture, mental tension, anxiety, and the year of study were significantly associated with low back pain incidence. Academic assignments and projects in university force students to put in long study hours and adopt sedentary lifestyles. This sedentary lifestyle may lead to fatigue and poor body posture since it reduces muscle strength and the spinal disc's capacity to maintain normal water concentration. Examples of poor body alignments are hunched back, reading in bed and inappropriate posture to pick up heavy objects off the floor. These bad postures put a strain on the disc, the spinal joint, and the muscles. Furthermore, persistent emotional stress might harm the musculoskeletal system. The "fight or flight" phenomenon associated with mental stress increases blood pressure and blood supply. Mental stress is related to the "fight or flight" phenomenon, which raises blood pressure and blood flow. As a result, the person needed to escape from the source of the stress, which caused the muscles surrounding the spine to tense up and spasm. By contrast, there is no significant association between the prevalence of low back pain with the method of travelling to university, the frequency of carrying a large bag to class, the technique used to carry bags, and the amount of time spent working in front of a desktop or laptop.

2.5 Association between Postural Awareness and Back Pain

Murphy et al. (2004) performed a study named "Classroom Posture and Self-reported Back and Neck Pain in School Children" to determine the degree of back pain that 11 to 14-year-old school children reported, as well as the intensity, length of exposure, and frequency

of exposure to physical risk factors that are present in schools. A total of 66 children from 12 schools were recruited in this study. Their sitting postures were captured utilizing the Portable Ergonomic Observation Method (PEO) during regular lessons. According to the results, 29 participants had low back pain in the previous month and 17 had it in the previous week. 23 participants had upper back pain in the previous month and 14 had it in the previous week. The majority of the participants (34) had neck pain in the previous month and 16 had it in the previous week. 13 participants complained of neck pain, upper back pain, and low back pain in the previous month, and 4 participants had these symptoms in the previous week. Besides that, 3% of the participants missed school last month because of neck and low back pain, respectively. Moreover, it was shown that classes lasting longer than an hour and time spent flexing the trunk and neck by more than 20 degrees were substantially linked to a rise in the prevalence of low back pain in the previous month. This is due to the fact that the participants sat on their desks for more than 20 degrees of trunk and neck flexion for about six hours every day. The participants were compelled to bend their backs and necks to reach their work when they were forced to sit on inappropriate furniture, such as a desk that was too low or too high. Additionally, they rotated their bodies when conversing with companions who were sitting next to or behind them and sat unsupported when taking anything off the floor from their school bags. None of the participants used the ergonomics provided which is the lumbar support provided by the chair. As a result, the participants' awkward posture and immobile body position might prolong disc compression and exacerbate musculoskeletal diseases. In a nutshell, in order to lessen the frequency of neck discomfort, upper back pain, and low back pain among students when studying in school, school authorities should consider the length of courses and the design of school furniture. Besides that, the authors recommended looking into the relationship between sitting position and discomfort experienced at various spinal regions as well as the long-term effects of postural discomfort.

Grimes & Legg (2004) constructed a study named “Musculoskeletal Disorders (MSD) in School Students as a Risk Factor for Adult MSD: A Review of the Multiple Factors Affecting Posture, Comfort, and Health in Classroom Environments”. This review's focus is on how posture in the school affects students from kindergarten through university, and how it may increase the risk of musculoskeletal illnesses in adults including neck and low back discomfort later in life. In this review, recommendations for reducing musculoskeletal issues among school students were provided and the 5 risk factors for musculoskeletal problems were examined. It is advised to incorporate ergonomic strategies such as school furniture layout, posture teaching, the weight of the school backpack, educational systems organization, and school activities planning routine. On the other hand, the 5 primary aspects are the learning posture of the students, anthropometrics, and furnishings, technology usage, pain intensity, and eyesight. According to the research, musculoskeletal diseases among school students were linked to all 5 major causes. There is, however, no research showing a direct link between musculoskeletal problems in school and later musculoskeletal problems in adulthood. Hence, it is concluded that there was no convincing data to suggest that poor school posture contributes to the development of neck and low back pain in working-age adults.

Kanaparthy et al. (2015) conducted a study entitled “Postural awareness among dental students in Jizan, Saudi Arabia” to examine the postural awareness level and the association between postural awareness and the risk of musculoskeletal pain among dental students. This research was executed in the College of Dental Sciences Hospital, Jizan, Saudi Arabia. A total of 134 out of 162 students aged 20 to 25 years old were recruited for the survey. The researchers utilized close-ended, self-administered questionnaires to collect the data and information.

Based on the article, the evaluation of the students' postural awareness revealed that 89% of them had poor to moderate levels of postural awareness. This is proved when the students lean their bodies forward without supporting their backs while performing their job. The unsupported back will place an unexpected load on the vertebral column and cause musculoskeletal pain. Furthermore, their feet were not completely contacted with the ground. According to the correlation between postural awareness and the rate of musculoskeletal disorders, musculoskeletal disorders are present in 40% of students with good awareness, 49% of students with moderate awareness, and 75% of students with low awareness. From the study, we can conclude that most of the dentists showed poor to moderate postural awareness levels. Besides that, an important correlation between postural awareness and musculoskeletal pain was found. The study showed a statistically significant high level of postural awareness can reduce the incidence of musculoskeletal pain. Thus, it is necessary for training programs and awareness campaigns to educate the knowledge of ergonomics among the students. Anyhow, there are some limitations found in the study as the study's sample size is limited. A larger sample size with a more thorough questionnaire will be suggested in order to comprehend the students' needs. This will make it possible to organize and carry out suitable training programs to improve the students' posture and reduce the adverse effect brought by bad posture.

Ozdemir et al. (2021) designed a study entitled "Musculoskeletal Pain, Related Factors, and Posture Profiles Among Adolescents: A Cross-Sectional Study From Turkey". Between 16 February and 3 May 2015, this survey was carried out at 12 public high schools in the Kecioren neighbourhood of Ankara, Turkey. A total of 2221 participants enrolled in the study after eliminating the disqualified participants. In the study, the authors employed the BackPEI score to analyze the association between body posture and musculoskeletal pain. According to the findings, 82.5% of the participants had at least one instance of pain during the preceding

month. The low back (73.3%), back (68.4%), and neck (67.2%) were the most often painful areas for the individuals. Furthermore, the participants had inappropriate posture while writing at school desks (96.6%), listening to lecture class (86%), and utilizing a computer (84.4%). Moreover, 38.1% of the participants acknowledged that sitting incorrectly at school is the reason they experienced pain. Besides that, most of the participants complained that carrying school backpacks can also cause musculoskeletal pain. This is due to the participants' improper backpack-carrying technique which has an impact on their posture. It is concluded that there is a statistically significant positive relationship between the BackPEI score for adolescents' posture and the school desk comfort score. Generally, inappropriate sitting position, bending improperly while lifting objects from the floor, and carrying a school backpack asymmetrically can lead to static postural changes and musculoskeletal pain. Apart from that, the authors recommended concentrating on classroom ergonomics and the impact of the complete body supporting furniture on preventing musculoskeletal system pain in further studies.

2.6 Association between Sedentary Behaviour and Back Pain

Moroder et al. (2011) formulated a retrospective study named "Low Back Pain among Medical Students" to investigate the association between the sedentary lifestyle and the prevalence of low back pain among medical students and physical education students. A total of 103 medical students from Paracelsus Medical University in Salzburg and 107 physical education students from the Sports Science Program at the University of Salzburg responded to the online questionnaire. Based on the literature reviewed, medical students (12 hours per day) spent 3 more hours each day sitting than physical education students (9 hours per day). This means that the medical students led a much more sedentary lifestyle. However, the prevalence of both acute and chronic low back pain was lower among medical students (53.4%)

compared to physical education students (60.7%). Despite the medical students' notably more sedentary lifestyle, the findings revealed no statistically significant difference in the rate of low back pain. In conclusion, there is no significant association between a sedentary lifestyle and the prevalence of low back pain among students studying medicine and physical education. The authors suggested to investigate smoking and psychological distress as potential causes of low back pain in future studies.

Casas et al. (2016) conducted a study entitled "Association between the sitting posture and back pain in college students". This study was conducted from June 2009 to December 2009 using a cross-sectional design. A total of five hundred and sixteen undergraduate students of both sexes studying health-related programs such as physical therapy, nursing, nutrition, medicine, and microbiology participated in this study. According to the findings of the literature reviewed, the students' rounded backs, greater kyphosis, and crossed legs while seated were closely related to acute back pain. Besides that, the students' lumbar strain due to reversion of lumbar curvature, feet supported on the floor, and sitting position with their upper backs supported were highly related to chronic back pain. Moreover, spending more than 21 hours a week on the computer might result in both acute and chronic back pain. However, there is no connection between back pain and how the hip and thigh are positioned in the seat. Meanwhile, there are a few limitations found in this study. First and foremost, the data obtained through surveys typically have a bias to record socially desirable actions. Furthermore, only epidemiological relationships can be identified using the cross-sectional methodology rather than etiological factors. Even though, the connections proposed here have already been supported by scientific data and biological validity.

Bontrup et al. (2019) constructed a study entitled “Low Back Pain and Its Relationship with Sitting Behaviour among Sedentary Office Workers”. A total of 70 office workers from a competent call-centre company in Dresden and Leipzig were enrolled in this study. However, only 64 participants successfully participated in these 2 weeks of research. The participants were asked to fill up the Chronic Pain Grade Questionnaire and the German Brief Pain Questionnaire to measure the pain severity and activity impairment due to pain in the past three months and to examine the participants’ acute low back pain in the previous day respectively. The results showed that most of the participants experienced some degree of persistent or severe back pain with an average pain intensity ranging from low to medium and corresponding impairment. Besides that, it is found that call-centre employees with chronic low back pain and associated impairment were correlated with a more static sitting behaviour. It is universally believed that a more static sitting posture has both biological and physiological impacts. For instance, decreased ischemia effects and disc nourishment. In conclusion, there was a strong correlation between sedentary behaviour and chronic low back pain than acute low back pain or disability. This may be because the participants with chronic low back pain are more aware of pain-free sitting posture and pain-inducing motions than people with acute low back pain.

CHAPTER 3

MATERIALS AND METHODOLOGY

This chapter will outline the study's design, study setting, study population, sample size, sampling method, inclusion and exclusion criteria, instrumentation, procedure, statistical analysis, and ethical approval.

3.1 Study Design

This is a cross-sectional quantitative design study. The data were collected through the Google form questionnaire method to determine the association between postural awareness, sedentary behaviour, and back pain during the hybrid study among undergraduate students in UTAR.

3.2 Study Setting

This study was conducted at the Universiti Tunku Abdul Rahman (UTAR) Sungai Long Campus, Selangor, and Kampar Campus, Perak, Malaysia.

3.3 Study Population

The population of this study will be the Year 1 to Year 4 undergraduate students in Universiti Tunku Abdul Rahman (UTAR) Sungai Long Campus, Selangor, and Kampar

Campus, Perak, Malaysia. Furthermore, both male and female students will be recruited for this study equally. All races will be included too.

3.4 Sample Size

The sample size was calculated using the formula by Krejcie and Morgan (1970):

$$n = \frac{\chi 2\, NP(1-P)}{d^2(N-1) + \chi 2\, P(1-P)}$$

n = Sample size

X^2 for 95% confidence level at 1 degree of freedom = 3.841

Population size (Undergraduate students in both Sungai Long and Kampar Campus of UTAR), N = 15000

Population portion, P = 0.5

Desired margin of error, d = 0.05

According to the formula above, the sample size required for this research was 375 participants.

3.5 Sampling Method

The convenience sampling method, which is a non-probability sampling method was used. Year 1 to Year 4 undergraduate students in Universiti Tunku Abdul Rahman (UTAR) Sungai Long Campus, Selangor, and Kampar Campus, Perak, Malaysia who were easy to reach and contact were recruited in this research.

3.6 Inclusion Criteria

1. Year 1 to Year 4 undergraduate students in Sungai Long and Kampar Campus of UTAR
2. Both male and female students
3. All races will be included
4. All full-time students will be included

3.7 Exclusion Criteria

1. Students not willing to participate
2. Students who do not have access to the internet
3. Students with any congenital or acquired postural deformity (Akulwar-Tajane et al., 2020)

3.8 Instrumentation

English-language closed-ended questions were applied in this research to collect the information. A Google form version of the survey to collect the data was created. The questionnaire comprised four categories, demographic information (Appendix I), Postural Awareness Scale (Appendix II), Sedentary Behaviour Questionnaire (Appendix III), and The Quebec Back Pain Disability Scale (Appendix IV). The demographic data consisted of 6 questions, including age, gender, ethnicity, faculty, courses, and year of study. Appendix II is intended to examine the participants' self-awareness of body posture (Cramer et al., 2018). It contains 12 questions and is divided into 2 components. The first component is "ease/familiarity with postural awareness", which denotes an effortless awareness and sense of connectedness. The second component is the "need for attention regulation with postural

awareness", which denotes compelled awareness. This questionnaire is assessed on a 7-point scale (1 - not at all true for me, 2 – rarely true, 3 – sometimes but infrequently true, 4 – neutral, 5 – sometimes true, 6 – usually true, 7 – very true about me). The Cronbach's alpha coefficient indicated a good level of reliability of 0.76 for the overall scale and 0.80 for subscales "ease/familiarity with postural awareness" and 0.79 for subscales "requirement for attention control with postural awareness". This questionnaire has a range of scores of 12 to 84. The higher the scores, the stronger the individual's postural awareness. After flipping the values of items 1, 2, 3, 4, 5, and 12, the scores were calculated by averaging the responses to all the questions. Next, Appendix III measures the amount of time spent by the participants doing nine different kinds of activities during weekdays and weekends. To calculate this survey, all timing was converted to hours. The overall scores of sedentary behaviours can be measured by adding the hours each day individually for weekdays and weekends. The number of hours worked on weekdays is multiplied by five, and the number of hours worked on weekends is multiplied by two to provide weekly estimates. The two-week test-retest reliability was high for total scores. The Intraclass Correlation Coefficient was 0.85 for weekdays and 0.77 for weekends. Besides that, it was fair to good for all components and the total score. The Intraclass Correlation Coefficient range was 0.64 to 0.90 for weekdays and 0.48 to 0.93 for weekends (Rosenberg et al., 2010). The following will be Appendix IV which is The Quebec Back Pain Disability Scale. It has 20 items to investigate the degree of functional disability in people who have back pain. For each item, there is a scale of 0 to 5 which represents 0 – not difficult at all, 1 – minimally difficult, 2 – somewhat difficult, 3 – fairly difficult, 4 – very difficult, and 5 – unable to do. To interpret the scores, it is required to sum up the scores of all questions. 20 is the minimum score and 100 is the highest possible score. Greater disability is correlated with higher scores. The test-retest reliability for this survey was 0.92, and Cronbach's alpha coefficient was 0.96 (Kopec et al., 1995).

3.9 Procedure

After the ethical approval is obtained from UTAR Scientific and Ethical Review Committee (SERC), the process of data collection begins. Year 1 to Year 4 UTAR undergraduate students will be approached through online platforms such as WhatsApp, Microsoft Team, Instagram, and Messenger. Before disseminating the questionnaire, I will explain the research to the participants in order to clear their doubts and ensure they had fulfilled the eligibility criteria. The online questionnaire is shared through a Google Form. The participants were required to fill in the informed consent form (Appendix I), the personal data protection statement (Appendix II), and demographic data (Appendix III) before proceeding to the following questions. The questionnaires used in this study are the Postural Awareness Scale (Appendix IV) (Cramer, Mehling, Saha, Dobos & Lauche, 2018), the Sedentary Behaviour Questionnaire (Appendix V) (Rosenberg et al., 2010), and the Quebec Back Pain Disability Scale (Appendix VI) (Kopec et al., 1995). This questionnaire needs approximately 10 minutes to be completed. After collecting all the responses, the study proceeded to data analysis to investigate the association between postural awareness, sedentary behaviour, and back pain during the hybrid study among undergraduate students in UTAR. Statistical Package for Social Software (SPSS) will be used to analyze the data collected from the Google form.

3.10 Statistical Analysis

Descriptive statistics were established on demographic data, including age, gender, ethnicity, faculty, courses, and year of study. After that, the data will be presented as means (M) and standard deviations (SD).

Statistical analysis will be presented utilizing the IBM Statistical Package for Social Science (SPSS) software version 20 and Microsoft Excel to generate the results of the study.

For continuous variables, means (M) and standard deviation (SD) were calculated instead. The chi-square test was utilized to analyze the association between postural awareness, sedentary behaviour, and back pain during the hybrid study among undergraduate students in UTAR. The statistically significant level was considered significant at $p<0.05$.

3.11 Ethical Approval

This study is subjected to ethical approval by the Scientific and Ethical Review Committee (SERC) of Universiti Tunku Abdul Rahman (UTAR). The participant's information letter makes it clear that participation in the study is entirely voluntary and will not result in any financial benefit to the participants. The participants are free to leave the study at any time without risk of retaliation. Inform consent form (Appendix I) will be given to the participants before they fill in the demographic data. To protect the privacy and anonymity of respondents' responses, the poll will be conducted anonymously. The questionnaire and consent form were secured immediately after being accomplished. The data in password-protected files could only be accessed and used by the researcher.

CHAPTER 4

RESULTS

In this chapter, the results and statistical analysis will be discussed.

4.1 Demographic Data of the Participants

Table 4.1: Demographic Data of the Participants

Variables	Frequency (%)
N	390 (100.0%)
Gender	
Male	154 (39.5%)
Female	236 (60.5%)
Age Group	
18-20	189 (48.5%)
21-23	194 (49.7%)
24-26	6 (1.5%)
27-29	1 (0.3%)
Ethnicity	
Chinese	382 (97.9%)
Malay	1 (0.3%)
Indian	6 (1.5%)
Others	1 (0.3%)

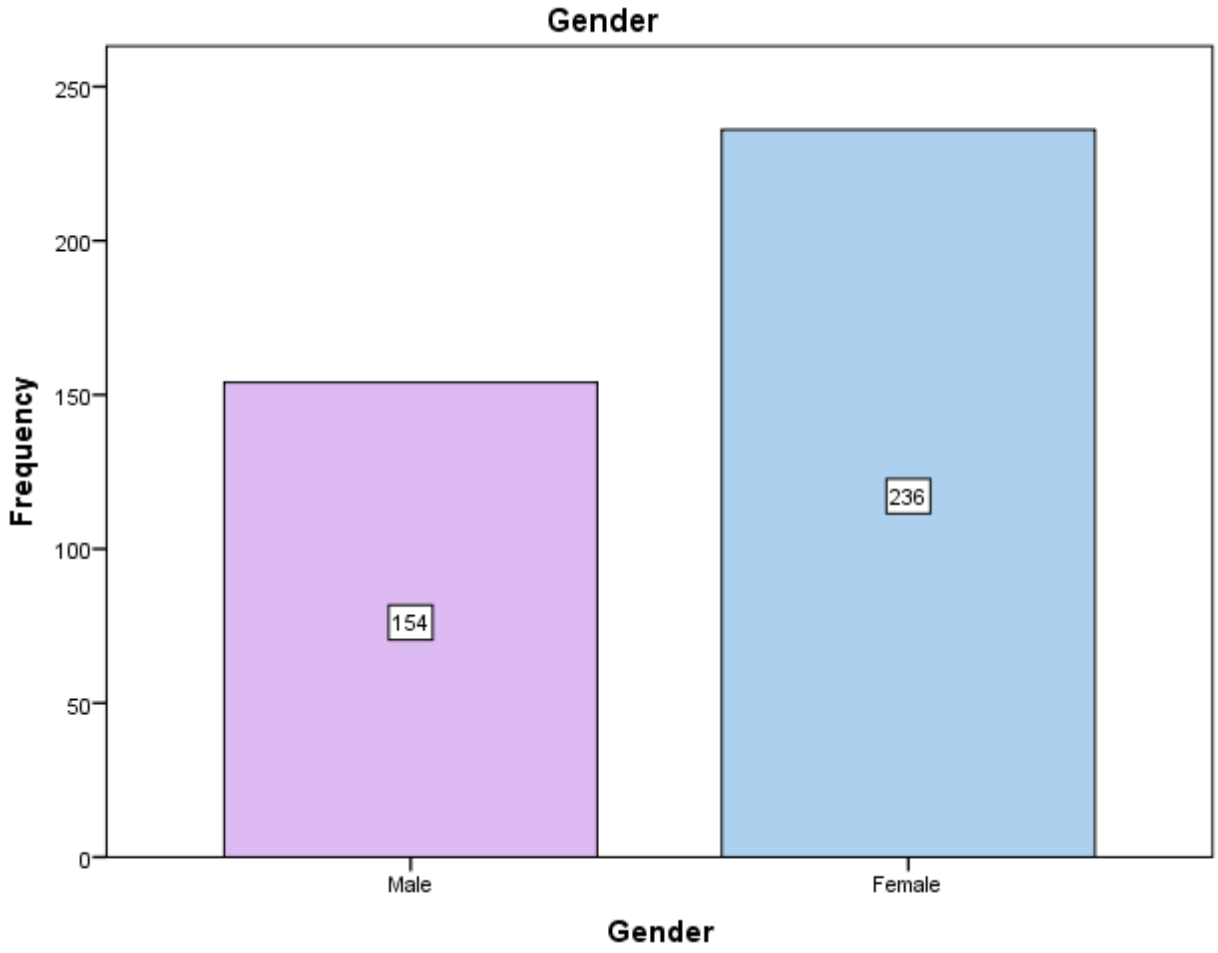
Note: N = total number of participants

Table 4.1: Demographic Data of the Participants (Cont')

Faculty	
Art	198 (50.8%)
Science	102 (26.2%)
Medical	90 (23.1%)
Year of Study	
Year 1	124 (31.8%)
Year 2	110 (28.2%)
Year 3	101 (25.9%)
Year 4	55 (14.1%)

Table 4.1 above lists the frequency and percentage of each participant's response in this current study, broken down by gender, age group, ethnicity, faculty, and year of study. The online questionnaire was disseminated to the participants through social media platforms such as WhatsApp, Microsoft Team, Instagram, and Messenger. After 3 weeks of data collection, a total of 390 replies were successfully obtained for this study. Next, the IBM SPSS Software statistics version 20 was used for the data analysis from 390 respondents, and the current study received a 100% response rate.

Figure 4.1.1 Bar Chart Distribution for Gender of Participants



Bar diagram Figure 4.1.1 above illustrates the gender distribution for the participants recruited in this study. More than half of the participants were female (60.5%) with a frequency of 236 out of 390 participants, while the percentage of male participants was 39.5% with a frequency of 154 out of 390 participants.

Figure 4.1.2 Bar Chart Distribution for Age Group of Participants

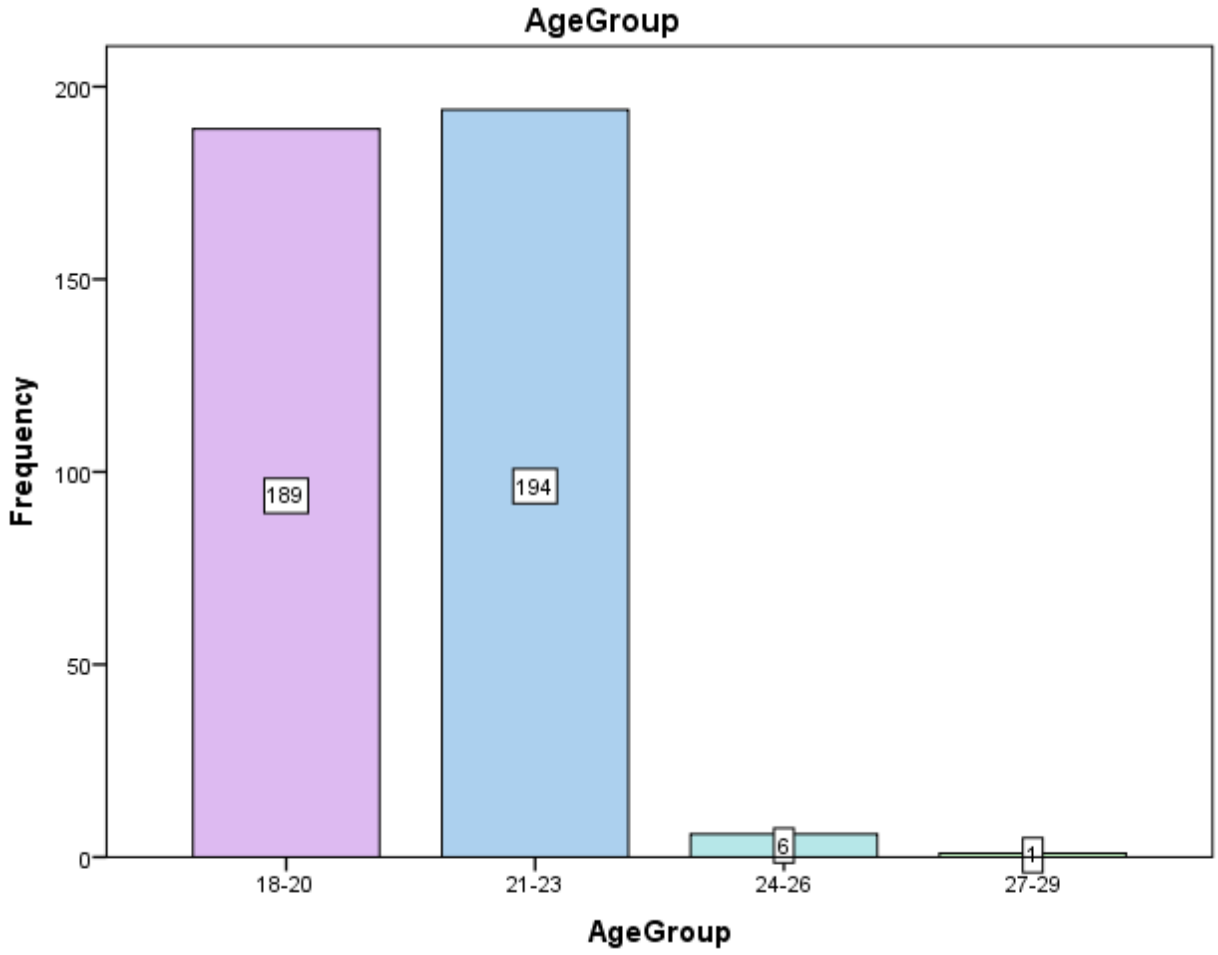


Figure 4.1.2 shows the distribution of age groups for the undergraduate students in this study. Most of the participants were younger than the age brackets of 18 to 20 and 21 to 23. 194 out of the 390 participants, or 49.7%, of them were between the ages of 21 and 23, whereas 189 out of the 390 participants, or 48.5%, of them were between the ages of 18 and 20. Only 6 out of 390 participants, or 1.5%, were between the ages of 24 and 26. Left 1 participant (0.3%) was between the ages of 27 and 29.

Figure 4.1.3 Bar Chart Distribution for Ethnicity of Participants

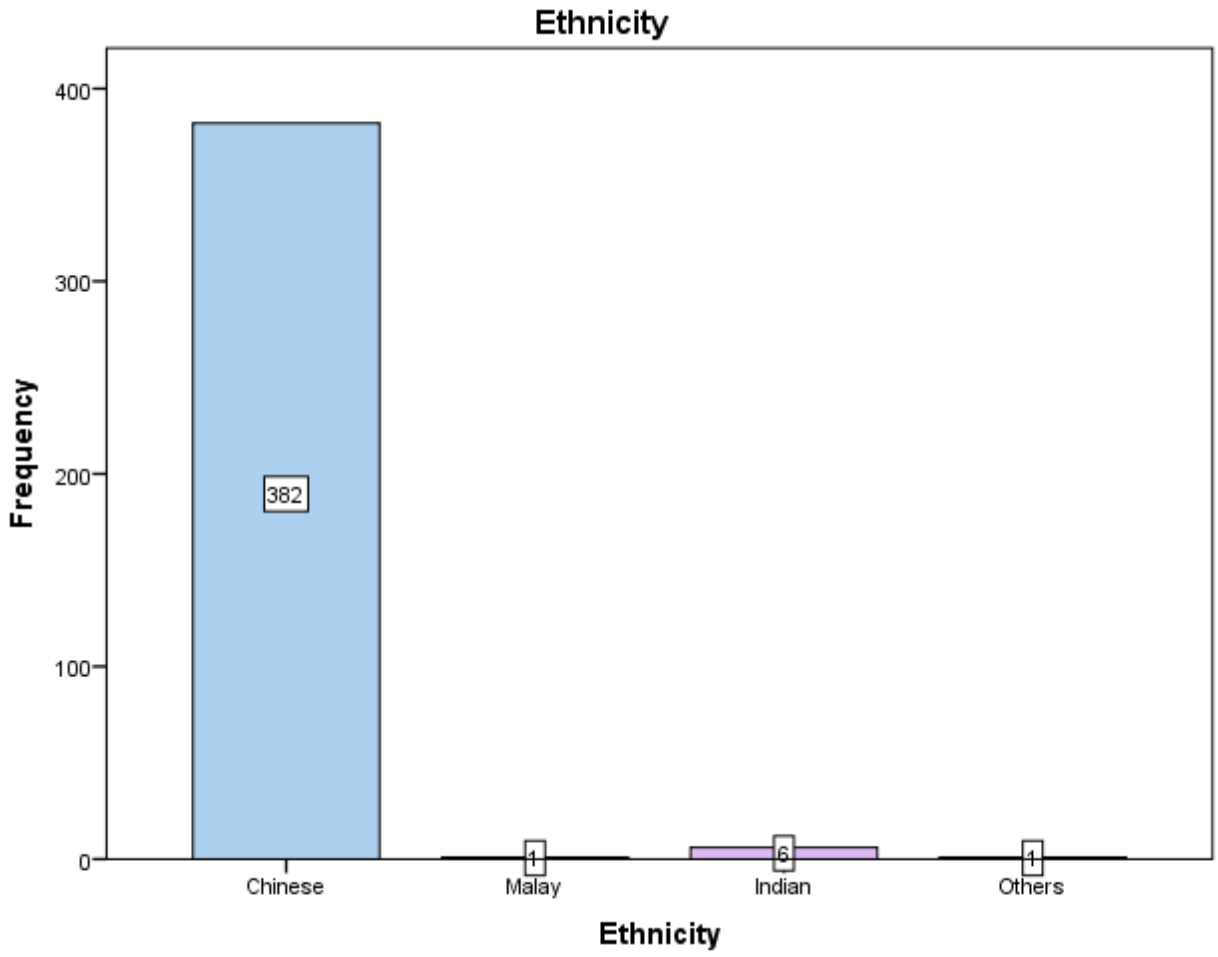


Figure 4.1.3 displays the participants' ethnicity distribution. The height of the bar chart indicates that the majority of the participants who completed the questionnaire for this study were Chinese. 382 out of 390 participants (97.9%) belonged to this ethnicity, while the remaining participants were made up of 6 (1.5%), 1 (0.3%), and 1 (0.3%) each from Indian, Malay, and other groups.

Figure 4.1.4 Bar Chart Distribution for Faculty of Participants

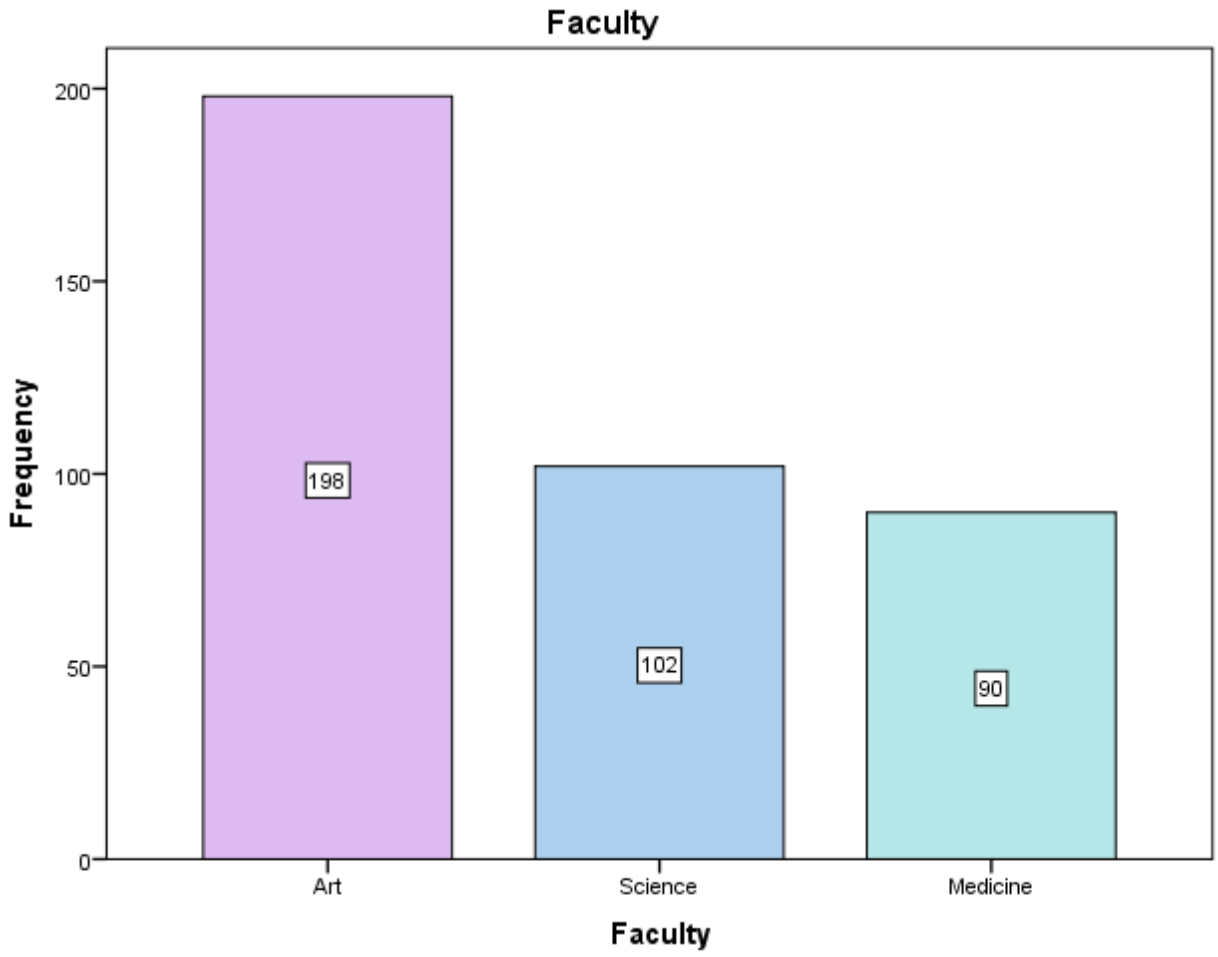


Figure 4.1.4. depicts the distribution of participants' faculties in a bar chart. There was a total of 10 faculties at Universiti Tunku Abdul Rahman, with 4 in Sungai Long, Selangor, and 6 in Kampar, Perak. The faculties that are accessible on the Sungai Long Campus, Selangor include the Faculty of Accountancy and Management (FAM), Faculty of Creative Industries (FCI), M. Kandiah Faculty of Medicine and Health Sciences (MK FMHS), and Lee Kong Chian Faculty of Engineering and Science (LKC FES). On the other hand, the faculties that are housed on the Kampar Campus, Perak include the Faculty of Arts and Social Science (FAS), Faculty of Business and Finance (FBF), Faculty of Engineering and Green Technology (FEGT), Faculty of Information and Communication Technology (FICT), Faculty of Science (FSC), and Institute of Chinese Studies (ICS). According to the features of the 10 faculties, they were

divided into 3 categories which are Art, Medicine, and Science for easy interpretation. Students from MK FMHS will represent Medicine, while those from LKC FES, FEGT, FICT, and FSC will represent Science, whereas students from FAM, FCI, FBF, FICT, and FAS were given the broad heading of “Art”.

Based on the findings from Figure 4.1.4, participants from the art field had the largest percentage, followed by those from science and medicine. More than half of the participants which is 198 out of 390 participants (50.8%) came from the art-majoring faculties, while 102 out of 390 participants (26.2%) came from the science-majoring faculties. Only 90 out of 390 participants (23.1%) came from medically related faculties, including MBBS, physiotherapy, nursing, and Chinese Medicine.

Figure 4.1.5 Bar Chart Distribution for Year of Study of Participants

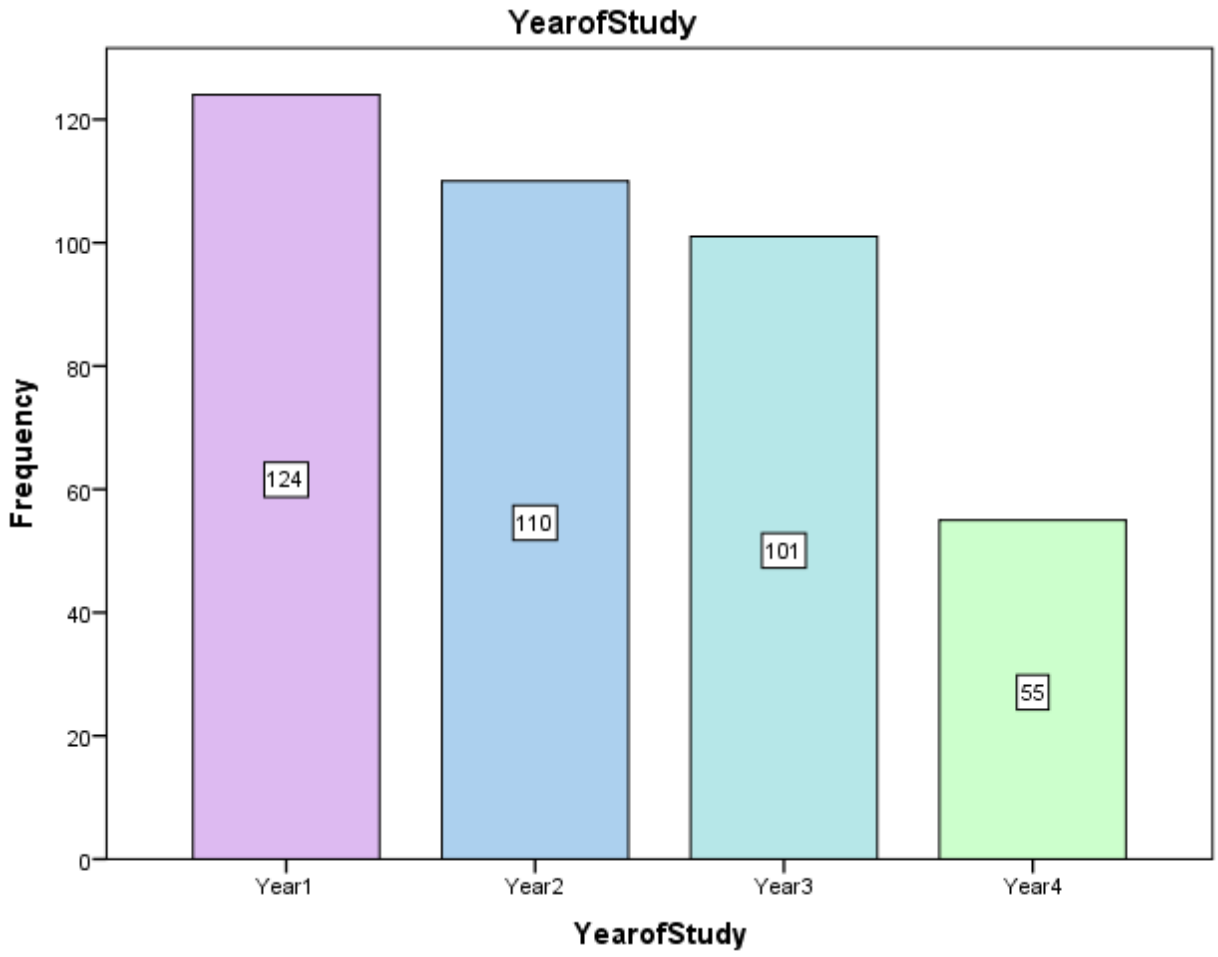


Figure 4.1.5 displays the participants' year of study distribution. Among the 390 participants, 124 (31.8%) of them were in their first year of study. 110 (28.2%) and 101 (25.9%) participants were in Year 2 and Year 3, respectively. Other than that, 55 students (14.1%) recruited in this study were from Year 4.

4.2 Mean and Standard Deviation for Postural Awareness Scale, Sedentary Behaviour Questionnaire, and The Quebec Back Pain Disability Scale

Table 4.2: Mean and Standard Deviation for Postural Awareness Scale, Sedentary Behaviour Questionnaire, and The Quebec Back Pain Disability Scale

	Mean	Standard Deviation
Postural Awareness Scale	3.69	0.71
Sedentary Behaviour Questionnaire	1.02	0.69
The Quebec Back Pain Disability Scale	1.09	0.87

Table 4.2 above presents the mean and standard deviation for the 3 questionnaires employed in this study which are the Postural Awareness Scale, the Sedentary Behaviour Questionnaire, and the Quebec Back Pain Disability Scale. The Postural Awareness Scale consists of 12 questions that will assess the participants' self-awareness of body posture. At the same time, the Sedentary Behaviour Questionnaire measures the amount of time spent by the participants doing 9 different kinds of activities during weekdays and weekends. The Quebec Back Pain Disability Scale consists of 20 questions that will investigate the level of functional disability in participants with back pain.

According to the results, the mean and standard deviation obtained in the Postural Awareness Scale are 3.69 and 0.71, respectively. Furthermore, the Sedentary Behaviour Questionnaire has a mean score of 1.02 and a standard deviation score of 0.69 in this research project. Last but not least, the mean and standard deviation acknowledged in the Quebec Back Pain Disability Scale are 1.09 and 0.87 respectively.

4.3 Postural Awareness Scale

Table 4.3: Frequency and Percentages of Postural Awareness Scale among the Participants

Variables	Not at all true about me n (%)	Rarely true n (%)	Sometimes but infrequently true n (%)	Neutral n (%)	Sometimes true n (%)	Usually true n (%)	Very true about me n (%)
Needs to concentrate for being aware of posture	54 (13.8)	64 (16.4)	107 (27.4)	85 (21.8)	53 (13.6)	22 (5.6)	5 (1.3)
Awareness of bad posture only by pain	46 (11.8)	69 (17.7)	84 (21.5)	67 (17.2)	66 (16.9)	41 (10.5)	17 (4.4)
Slump down when sitting	65 (16.7)	65 (16.7)	87 (22.3)	86 (22.1)	34 (8.7)	41 (10.5)	12 (3.1)
Unaware of posture when focused	82 (21.0)	87 (22.3)	97 (24.9)	54 (13.8)	39 (10.0)	22 (5.6)	9 (2.3)
Difficulties to consciously adopt a posture	37 (9.5)	62 (15.9)	101 (25.9)	81 (20.8)	55 (14.1)	34 (8.7)	20 (5.1)
Often checks posture when working	25 (6.4)	60 (15.4)	85 (21.8)	84 (21.5)	69 (17.7)	44 (11.3)	23 (5.9)
Influences her/his own appeal by posture	12 (3.1)	31 (7.9)	42 (10.8)	125 (32.1)	94 (24.1)	59 (15.1)	27 (6.9)

Table 4.3: Frequency and Percentages of Postural Awareness Scale among the Participants (Cont')

Always aware of sitting or standing posture	17 (4.4)	41 (10.5)	66 (16.9)	88 (22.6)	98 (25.1)	54 (13.8)	26 (6.7)
Often makes her/himself aware of her/his posture	30 (7.7)	55 (14.1)	76 (19.5)	107 (27.4)	63 (16.2)	41 (10.5)	18 (4.6)
Aware of posture even when focused	23 (5.9)	65 (16.7)	79 (20.3)	72 (18.5)	126 (32.3)	16 (4.1)	9 (2.3)
Regulates how she/he feels through posture	12 (3.1)	56 (14.4)	73 (18.7)	114 (29.2)	87 (22.3)	30 (7.7)	18 (4.6)
Needs to concentrate to feel whether a posture benefits her/him or not	27 (6.9)	55 (14.1)	88 (22.6)	105 (26.9)	65 (16.7)	40 (10.3)	10 (2.6)

Table 4.3 reveals the frequency and percentages of the participant's responses on the Postural Awareness Scale. Based on the findings in the study, most of the participants (27.4%, n = 107) said it was occasionally but infrequently true that they needed to focus in order to be aware of their posture, while only 5 participants (1.3%) said it was absolutely true that they needed to focus in order to be aware of their posture.

For the second question in the Postural Awareness Scale, "Awareness of bad posture only by pain", the majority of the participants (21.5%, n = 84) responded sometimes but infrequently true to the statement that they only pay more attention to their poor posture when they experience pain. However, 4.4% of the participants (n = 17) firmly concur that they only became aware of their poor posture when they experienced pain.

The majority of the participants (22.3%, n = 87) then stated that they occasionally but infrequently slouch when they are sitting. Nevertheless, the least number of participants (3.1%, n = 12) firmly concur that they stoop their backs when they sit. 2 groups with the same percentage of participants (16.7%, n = 65) do not agree or rarely agree that they sit with their backs hunched.

Besides that, 24.9% of the participants (n = 97) answered occasionally but inconsistently that they were unaware of their posture when they were concentrating on a particular subject, whereas 9 participants answered extremely true that they were unaware of their posture when focusing on a specific subject. However, many participants neglect (21.0%, n = 82) and rarely agree (22.3%, n = 87) with the statement that they did not concentrate on their body posture when focusing on a certain subject.

Furthermore, the majority of the participants (25.9%, n = 101) indicated that it was occasionally but infrequently difficult for them to adopt a posture intentionally. However, 5.1% of the participants (n = 20) firmly agreed that it was challenging for them to adopt a posture actively.

In addition, in 2 groups with a comparable number of participants, the response to the question "Often examines posture when working" was either occasionally but infrequently true (21.8%, n = 85) or neutral (21.5%, n = 84). By contrast, the participants who strongly agreed that they frequently monitor their posture while working were the fewest (5.9%, n = 23).

Other than that, most of the participants (32.1%, n = 125) responded neutrally to the statement that posture does affect one's appeal, while 12 participants (3.1%) disagreed with the statement in any way.

In response to the Postural Awareness Scale's "Always aware of sitting or standing posture" question, the majority of the participants (25.1%, n = 98) said they were only rarely aware of their sitting or standing posture. However, 4.4% of the participants (n = 17) were not conscious of their sitting or standing position.

The biggest percentage of participants (27.4%, n = 107) gave a neutral response to the statement, "Often makes herself/himself conscious of her/his posture". On the other side, there were the fewest individuals (4.6%, n = 18) who firmly agreed that they were constantly aware of their posture.

Moreover, the majority of participants (32.3%, n = 126) claimed that they were sometimes conscious of their posture, even when they were concentrating on a particular issue. In contrast, only 9 people (2.3%) were aware of their posture even when doing so.

On top of that, the majority of participants (29.2%, n = 114) gave a neutral response to the claim that participants manage their feelings through posture, while 12 participants (3.1%) disagreed with the claim in any way.

Last but not least, most participants (26.9%, n = 105) gave neutral answers to the final question, "Needs to concentrate on feeling whether a position benefits her/him or not,". Comparatively, there were the fewest respondents (2.6%, n = 10) firmly agreed that they must pay attention in order to sense if a position is advantageous to them or not.

4.4 Sedentary Behaviour Questionnaire

Table 4.4: Mean and Standard Deviation of Sedentary Behaviour Questionnaire of the Participants

Variables	Weekday Mean (SD)	Weekend Mean (SD)
Watching television (including videos on VCR/DVD)	0.94 (1.37)	1.24 (1.73)
Playing computer or video games	1.11 (1.47)	1.42 (1.75)
Sitting listening to music on the radio, tapes, or CDs	1.28 (1.57)	1.29 (1.62)
Sitting and talking on the phone	1.06 (1.50)	1.04 (1.53)
Doing paperwork or computer work (office work, emails, paying bills, etc.)	2.49 (2.01)	1.98 (1.90)
Sitting reading a book or magazine	0.79 (1.33)	0.69 (1.21)
Playing a musical instrument	0.26 (0.68)	0.33 (0.79)
Doing artwork or crafts	0.33 (0.87)	0.38 (0.95)
Sitting and driving in a car, bus, or train	0.90 (1.13)	0.78 (0.94)

Note: SD = Standard Deviation

Table 4.4 displays the mean and standard deviation of the participant's responses doing 9 activities during weekdays and weekends. According to the findings, it is observed that the mean and standard deviation of doing paperwork or computer work such as office work, emails, paying bills, and others were the highest during both weekdays and weekends. The mean and standard deviation of doing paperwork and computer work during weekdays are 2.49 and 2.01 while during weekends are 1.98 and 1.90 respectively.

Secondly, the activity that has the least mean and standard deviation is playing a musical instrument. The mean and standard deviation of playing a musical instrument on weekdays are 0.26 and 0.68. On the other hand, the mean and standard deviation enhance minimally to 0.33 and 0.79 on weekends. This may be because some of the participants do not play a musical instrument. Thus, they did not spend time on this activity.

Thirdly, it was noticed that the participants spent more time watching television, including videos on VCR or DVD during weekends compared to weekdays. The mean and standard deviation of watching television during weekdays are 0.94 and 1.37. However, the mean and standard deviation increase slightly to 1.24 and 1.73 during weekends. This may be due to the participants do not need to study or work and having more leisure time during weekends watching television.

Moreover, the participants consume more time playing computer and video games on weekends rather than on weekdays. The mean and standard deviation of playing computer and video games elevates from 1.11 and 1.47 on weekdays to 1.42 and 1.75 on weekends, respectively.

Additionally, the participants have a slightly higher mean time and standard deviation sitting listening to music on the radio, tapes, or CDs on weekends compared to weekdays. The mean and standard deviation of listening to music during weekdays are 1.28 and 1.57, while

the mean and standard deviation of listening to music during weekends are 1.29 and 1.62, accordingly.

Besides that, it was shown that the participants spent more time sitting and talking on the phone on weekdays. The mean and standard deviation of the participants sitting and talking on the phone during weekdays are 1.06 and 1.50. However, the mean and standard deviation decrease slightly to 1.04 and 1.53 during weekends.

Likewise, the participants consume more time sitting and reading a book or magazine on weekdays rather than on weekends. The mean and standard deviation of the participants sitting and reading a book or magazine during the weekdays are 0.79 and 1.33. Nevertheless, the mean and standard deviation of this activity decreases to 0.69 and 1.21 during the weekends, respectively.

Furthermore, the mean and standard deviation of the participants doing artwork or crafts are 0.33 and 0.87 during weekdays. But, the mean and standard deviation of this activity increases slightly on the weekends, which are 0.38 and 0.95, respectively. It can be concluded that the participants spent more time on artwork and crafts during weekends than on weekdays.

Other than that, the mean and standard deviation of the participants spent sitting and driving in a car, bus, or train on weekdays are 0.90 and 1.13. However, the mean and standard deviation decreases on weekends which are 0.78 and 0.94, accordingly. The participants spent more time travelling on weekdays compared to weekends because they needed to travel to

school or work every Monday to Friday. Thus, the mean time consumed on transportation by the participants is longer on weekdays.

4.5 The Quebec Back Pain Disability Scale

Table 4.5: Frequency and Percentages of The Quebec Back Pain Disability Scale among the Participants

Variables	Not difficult at all n (%)	Minimally difficult n (%)	Somewhat difficult n (%)	Fairly difficult n (%)	Very difficult n (%)	Unable to do n (%)
Get out of bed	125 (32.1)	62 (15.9)	51 (13.1)	78 (20.0)	52 (13.3)	22 (5.6)
Sleep through the night	135 (34.6)	105 (26.9)	62 (15.9)	50 (12.8)	30 (7.7)	8 (2.1)
Turn over in bed	189 (48.5)	78 (20.0)	48 (12.3)	52 (13.3)	17 (4.4)	6 (1.5)
Ride in a car	195 (50.0)	79 (20.3)	56 (14.4)	34 (8.7)	17 (4.4)	9 (2.3)
Stand up for 20 – 30 minutes	182 (46.7)	85 (21.8)	55 (14.1)	45 (11.5)	18 (4.6)	5 (1.3)
Sit in a chair for several hours	105 (26.9)	70 (17.9)	80 (20.5)	82 (21.0)	39 (10.0)	14 (3.6)
Climb one flight of stairs	184 (47.2)	74 (19.0)	63 (16.2)	47 (12.1)	8 (2.1)	14 (3.6)
Walk a few blocks (300 – 400 m)	202 (51.8)	75 (19.2)	52 (13.3)	42 (10.8)	13 (3.3)	6 (1.5)
Walk several kilometres	90 (23.1)	82 (21.0)	74 (19.0)	86 (22.1)	47 (12.1)	11 (2.8)

Table 4.5: Frequency and Percentages of The Quebec Back Pain Disability Scale among the Participants (Cont')

Reach up to high shelves	149 (38.2)	86 (22.1)	68 (17.4)	50 (12.8)	24 (6.2)	13 (3.3)
Throw a ball	246 (63.1)	67 (17.2)	36 (9.2)	29 (7.4)	9 (2.3)	3 (0.8)
Run one block (about 100 m)	197 (50.5)	80 (20.5)	50 (12.8)	41 (10.5)	15 (3.8)	7 (1.8)
Take food out of the refrigerator	302 (77.4)	40 (10.3)	16 (4.1)	19 (4.9)	10 (2.6)	3 (0.8)
Make your bed	244 (62.6)	62 (15.9)	34 (8.7)	31 (7.9)	9 (2.3)	10 (2.6)
Put on socks (pantyhose)	271 (69.5)	52 (13.3)	33 (8.5)	25 (6.4)	5 (1.3)	4 (1.0)
Bend over to clean the bathtub	188 (48.2)	91 (23.3)	49 (12.6)	39 (10.0)	18 (4.6)	5 (1.3)
Move a chair	292 (74.9)	55 (14.1)	17 (4.4)	16 (4.1)	7 (1.8)	3 (0.8)
Pull or push heavy doors	211 (54.1)	105 (26.9)	36 (9.2)	29 (7.4)	8 (2.1)	1 (0.3)
Carry two bags of groceries	191 (49.0)	97 (24.9)	57 (14.6)	31 (7.9)	10 (2.6)	4 (1.0)
Lift and carry a heavy suitcase	144 (36.9)	97 (24.9)	77 (19.7)	43 (11.0)	21 (5.4)	8 (2.1)

The frequency and percentages of the participant's answers to the 20 questions on the Quebec Back Pain Disability Scale are shown in Table 4.5. According to the study's findings, it is demonstrated that most of the participants (32.1%, n = 125) do not have difficulty getting out of bed. However, there are 22 participants (5.6%) unable to get out of bed without assistance.

In the following activity, 2 participant groups with a combined total of more than 200 people have little to no trouble sleeping through the night. Participants reported being able to fall asleep or having minor difficulties falling asleep for 34.6% (n = 135) and 26.9% (n = 105) of the participants, respectively. However, a tiny proportion of participants (2.1%, n = 8) have trouble staying asleep all night.

The next finding was that nearly half of the participants (48.5%, n = 189) had no trouble turning over in bed. But, 6 participants (1.5%) mentioned having trouble turning over in bed.

Moreover, 9 participants (2.3%) said they were unable to ride in a car, compared to half of the participants (50.0%, n = 195) who said they did not have any trouble doing so.

In addition, more than one-third of the participants (46.7%, n = 182) answered with no difficulty to the question, "Stand up for 20 – 30 minutes". Comparatively, there were the fewest respondents (1.3%, n = 5) who were unable to do so.

The participant's capacity to sit in a chair for a prolonged period of time will be tested in the ensuing activity. The majority of the participants (26.9%, n = 105) could spend several hours sitting in a chair. However, 14 participants (3.6%) were unable to spend several hours seated in a chair.

For the subsequent question in the Quebec Back Pain Disability Scale, “Climb one flight of stairs”, most of the participants (47.2%, n = 184) responded that it was not difficult at

all to the statement. However, 2.1% (n = 8) and 3.6% (n = 14) of the participants reported finding it extremely difficult or impossible to climb one flight of steps.

Besides that, more than 200 participants (51.8%, n = 202) indicated that they do not find it difficult to walk a few blocks (300 – 400 m), whereas 6 participants (1.5%) indicated that they are unable to complete the activity.

The majority of participants (23.1%, n = 90) who responded to the following item on the Quebec Back Pain Disability Scale said that it was not at all difficult to walk many kilometres. On the other hand, 2.8% of the participants (n = 11) failed to complete the task.

The Quebec Back Pain Disability Scale's next question, "Reach up to high shelves", was answered by most of the participants (38.2%, n = 149) as not difficult at all. In contrast, 13 participants (3.3%) expressed frustration at their inability to reach the top shelves.

The biggest percentage of participants (63.1%, n = 246) reacted without difficulty to the statement "Throw a ball". In comparison, there were the fewest individuals (0.8%, n = 3) reported having trouble tossing a ball.

"Run one block (about 100 m)" was the next question on the Quebec Back Pain Disability Scale. The majority of participants (50.5%, n = 197) responded that it was not at all difficult, while a tiny minority of the participants (1.8%, n = 7) could not do so.

There were 3 individuals (0.8%) who were unable to remove food from the refrigerator, whereas more than 300 participants (77.4%, n = 302) indicated they did not have any difficulties doing so.

Furthermore, the majority of the participants (62.6%, n = 244) went on to say that making their bed is not an issue for them. Nevertheless, (2.6%, n = 10) and (2.3%, n = 9) of the participants said that making their bed was very difficult or impossible for them.

Other than that, more than two-thirds of the participants (69.5%, n = 271) do not have any trouble putting on their socks or pantyhose. However, a very small percentage of the participants (1.3%, n = 5) and (1.0%, n = 4) struggle with or are unable to put on their socks or pantyhose.

The next activity will assess the participant's capacity to stoop over and clean the bathtub. Most of the participants (48.2%, n = 188) reported being able to bend over to clean the bathtub. However, 5 participants (1.3%) were unable to bend over to clean the bathtub.

Likewise, in the other 2 groups with a similar number of participants, the response to the question "Move a chair" was either highly difficult (1.8%, n = 7) or unable to do so (0.8%, n = 3). By contrast, the total number of participants who did not experience any difficulty shifting a chair was the highest (74.9%, n = 292).

On top of that, more than half of the participants (54.1%, n = 211) were able to pull or push heavy doors independently. Unfortunately, there is 1 participant (0.3%) who was unable to pull or push big doors by himself or herself.

The biggest percentage of the participants (49.0%, n = 191) responded to the directive "Carry two bags of groceries" with no difficulty at all. On the other hand, there were the fewest individuals (1.0%, n = 4) who were unable to handle two bags of goods.

Last but not least, most of the participants (36.9%, n = 144) reacted not difficult at all to the final question, "Lift and carry a heavy suitcase". Comparatively, there were the fewest respondents (2.1%, n = 8) categorically unable to do so.

4.6 Inferential Analysis

This section will discuss the inferential analysis employed in this research project which is Spearman's rho test to test the association between postural awareness and back pain during the hybrid study among undergraduate students and the association between sedentary behaviour and back pain during the hybrid study among undergraduate students. A table of results will be presented at the beginning of the section, followed by a brief summary of the test that was utilized and the test's conclusions.

4.6.1 Spearman's Rho Test (To Test Association between Postural Awareness and Back Pain during the Hybrid Study among Undergraduate Students)

Table 4.6.1: Correlation between Total Postural Awareness Scores and Total Back Pain Scores

			Total Postural Awareness Scores	**Total Back Pain Scores**
Spearman's rho	**Total Postural Awareness Scores**	Correlation Coefficient	1.000	-0.016
		Sig. (2-tailed)		0.747
		N	390	390
	Total Back Pain Scores	Correlation Coefficient	-0.016	1.000
		Sig. (2-tailed)	0.747	
		N	390	390

Table 4.6.2: Tests of Normality of Total Postural Awareness Scores and Total Back Pain Scores

	Kolmogorov Smirnov[a]			Shapiro-Wilk		
	Statistic	**N**	**p-value**	**Statistic**	**N**	**p-value**
Total Postural Awareness Scores	0.061	390	0.002	0.991	390	0.016
Total Back Pain Scores	0.132		<0.0001	0.910		<0.0001

Note: a = Lilliefors Significance Correction

Table 4.6.3: Descriptive Statistic of Total Postural Awareness Scores and Total Back Pain Scores

	Skewness	**Kurtosis**
	Statistics (std error)	**Statistics (std error)**
Total Postural Awareness Scores	0.088 (0.124)	0.100 (0.247)
Total Back Pain Scores	1.089 (0.124)	0.845 (0.247)

Note: std error = Standard Error

Spearman's rho test was performed to find the relation between the total postural awareness scores and total back pain scores to assess the relationship between postural awareness and back pain during the hybrid study among undergraduate students.

r = -0.016. indicates a poor and negative correlation, and r^2 = 0.000256 indicates postural awareness can only account for 0.0256% of the back pain; other factors can likely

explain the other 99.9744%. There is a significant poor and negative correlation between postural awareness and back pain (Table 4.6.1). The p-value of postural awareness ($p = 0.747$) and back pain ($p = 0.747$) is more than the significant level ($p<0.05$). The result suggests that for large samples, a relatively poor correlation can be classified as significant.

Spearman's analysis is utilized because both postural awareness and back pain are continuous data, and they are not normally distributed. There are a few ways to determine the normality of the variables.

First, Kolmogorov Smirnov[a] and Shapiro-Wilk (Table 4.6.2) for postural awareness (0.002, 0.016) and back pain ($p<0.0001$) is lesser than the significant level ($p<0.05$). Since $p<0.05$, the null hypothesis is rejected, and the alternative hypothesis is accepted.

Secondly, skewness and kurtosis are utilized in a z-test to determine the normality of the data. The kurtosis or skew values are divided by their standard errors to produce a z-score (Table 4.6.3). The data is not normally distributed as the z-score for postural awareness and back pain is not within the range of -3 to 3.

Postural Awareness: $Z_{skewness}$ – score = 0.710 $Z_{kurtosis}$ – score = 0.405

Back Pain: $Z_{skewness}$ – score = 8.782 $Z_{kurtosis}$ – score = 3.421

4.6.2 Spearman's Rho Test (To Test Association between Sedentary Behaviour and Back Pain during the Hybrid Study among Undergraduate Students)

Table 4.6.4: Correlation between Total Sedentary Behaviour Scores and Total Back Pain Scores

			Total Postural Awareness Scores	Total Back Pain Scores
Spearman's rho	**Total Sedentary Behaviour Scores**	Correlation Coefficient	1.000	0.049
		Sig. (2-tailed)		0.339
		N	390	390
	Total Back Pain Scores	Correlation Coefficient	0.049	1.000
		Sig. (2-tailed)	0.339	
		N	390	390

Table 4.6.5: Tests of Normality of Total Sedentary Behaviour Scores and Total Back Pain Scores

	Kolmogorov Smirnov[a]			Shapiro-Wilk		
	Statistic	**N**	**p-value**	**Statistic**	**N**	**p-value**
Total Sedentary Behaviour Scores	0.118	390	<0.0001	0.900	390	<0.0001
Total Back Pain Scores	0.132		<0.0001	0.910		<0.0001

Note: a = Lilliefors Significance Correction

Table 4.6.6: Descriptive Statistic of Total Sedentary Behaviour Scores and Total Back Pain Scores

	Skewness Statistics (std error)	Kurtosis Statistics (std error)
Total Sedentary Behaviour Scores	1.370 (0.124)	2.430 (0.247)
Total Back Pain Scores	1.089 (0.124)	0.845 (0.247)

Note: std error = Standard Error

Spearman's rho test was performed between the total sedentary behaviour scores and total back pain scores to assess the relationship between sedentary behaviour and back pain during the hybrid study among undergraduate students.

$r = 0.049$ indicates poor and positive correlation, and $r^2 = 0.0024$ indicates sedentary behaviour can only account for 0.24% of the back pain; other factors can likely explain the other 99.76%. There is a significant poor and positive correlation between sedentary behaviour (Table 4.6.4). The p-value of sedentary behaviour ($p = 0.339$) and back pain ($p = 0.339$) is more than the significant level ($p<0.05$). The result suggests that for large samples, a relatively poor correlation can be classified as significant.

Spearman analysis was utilized because both sedentary behaviour and back pain are continuous data, and they are not normally distributed. There are a few ways to determine the normality of the variables.

First, Kolmogorov Smirnov[a] and Shapiro-Wilk (Table 4.6.5) for sedentary behaviour ($p<0.0001$) and back pain ($p<0.0001$) was lesser than the significant level ($p<0.05$). Since $p<0.05$, the null hypothesis was rejected, and the alternative hypothesis was accepted.

Secondly, skewness and kurtosis are utilized in a z-test to determine the normality of the data. The kurtosis or skew values are divided by their standard errors to produce a z-score (Table 4.6.6). The data is not normally distributed as the z-score for sedentary behaviour and back pain is not within the range of -3 to 3.

Sedentary behaviour: $Z_{skewness}$ – score = 11.048 $Z_{kurtosis}$ – score = 9.838

Back pain: $Z_{skewness}$ – score = 8.782 $Z_{kurtosis}$ – score = 3.421

4.7 Hypothesis Testing

H0i) There is no significant association between postural awareness and back pain during the hybrid study among undergraduate students.

H1i) There is a significant association between postural awareness and back pain during the hybrid study among undergraduate students.

The Spearman rho test conducted reveals no significant difference between the total postural awareness score ($p = 0.747$) and the total back pain score ($p = 0.747$) during the hybrid study among undergraduate students. Therefore, the null hypothesis failed to be rejected as there was no significant association between postural awareness and back pain during the hybrid study among undergraduate students.

H0ii) There is no significant association between sedentary behaviour and back pain during the hybrid study among undergraduate students.

H1ii) There is a significant association between sedentary behaviour and back pain during the hybrid study among undergraduate students.

The Spearman rho test results in a correlation p-value of total sedentary behaviour score and total back pain score of 0.339, respectively which again doesn't point to a statistically significant correlation between the variables. Therefore, the null hypothesis also failed to be

rejected as there was no significant association between sedentary behaviour and back pain during the hybrid study among undergraduate students.

CHAPTER 5

DISCUSSION

In this chapter, the findings of postural awareness, sedentary behaviour, and back pain during the hybrid study among undergraduate students will be discussed. Likewise, the limitations and recommendations for the current study will also be reviewed.

5.1 Postural Awareness during the Hybrid Study Among Undergraduate Students in UTAR

In the current study, most students were more aware of their postures than those who weren't when completing a particular subject. This is corroborated by a study performed by Akulwar-Tajane et al. (2021), who found that young generations frequently utilize digital gadgets while hunched over or in prone lying positions. It has been found that when reading in a chair, bed, or on the floor, students prioritized comfort over ergonomics. However, staying in these positions for a prolonged period of time might contribute negative effects on the musculoskeletal system. Poor posture may result from the improper usage of digital devices. When digital devices are not used ergonomically, poor posture can be the consequence. In addition, a study by Hussain et al. (2015) on physiotherapy students from India discovered that most of the students lacked information about appropriate posture and were not aware of the safety issues associated with poor computer ergonomics for the screen, mouse, keyboard, and general workstation. Therefore, it is crucial to instruct pupils on proper ergonomics while utilising digital gadgets.

5.2 Sedentary Behaviour during the Hybrid Study Among Undergraduate Students in UTAR

Based on the present study, the mean of the participants doing paperwork or computer work such as office work, emails, paying bills, etc., was the highest among the other activities during weekdays and weekends. The mean for the above activity was 2.49 (SD = 2.01) during weekdays and 1.98 (SD = 1.90) during weekends. This is because the students had to sit for a prolonged period of time attending lecture classes and prolonged computer usage to complete their assignments. On the other hand, the mean of the participants playing a musical instrument was the lowest. The mean of the participants playing a musical instrument is 0.79 (SD = 1.33) during weekdays and 0.33 (SD = 0.79) during weekends. This may be because some of the participants do not play a musical instrument. Thus, they did not spend time on this activity.

According to the study by Mahdavi and Kelishadi (2020), increased sedentary time was linked to more frequent stomach aches, irritation, poor blood circulation at the shoulder and neck regions, and weariness. These data suggest that being sedentary can lead to or exacerbate certain types of physical pain at different times of life. Bontrup et al. (2019) study claimed that participants with musculoskeletal disorders or spinal irritation present a stationary sedentary behaviour with fewer postural movements and longer periods of continuous sitting supports this assertion further. By changing position, one may be able to lessen the pressure that has built up beneath the buttocks from extended, continuous sitting. In addition, ongoing compression on an intervertebral disc can lead to kyphosis, lordosis, and diminished disc nutrition.

Rahman et al. (2020) concluded that females had a higher prevalence of sedentary behaviour compared to males. However, in the current study, the association between gender

and sedentary behaviour was not reported. Thus, future studies should investigate variables associated with sedentary behaviour to provide a more valid result.

5.3 Back Pain during the Hybrid Study Among Undergraduate Students in UTAR

In the present study, the Quebec Back Pain Disability Scale was employed to evaluate the level of functional disability in people with back pain. As mentioned in Table 4.2, the mean back pain score obtained was 1.09, while the standard deviation obtained was 0.87. In the other study by Moroder et al. (2011), the participants who experienced low back pain displayed a mean low back pain score of 3.70. These data revealed that the participants in the current study have a lower mean value of low back pain compared to Moroder et al. (2011). This may be explained by the fact that most of the participants in the current study are art students, followed by science students and medical students. However, the target population in research by Moroder et al. (2011) were medical students. It was found that medical students had a more sedentary lifestyle compared to students from other fields. Thus, their prevalence of low back pain will be higher than students from other fields. Besides, changes in the mean value of low back pain may result from population differences, study methodologies, academic curricula, cultural, educational level, environmental, or nutritional factors.

According to the Quebec Back Pain Disability Scale, the questions were divided into 6 domains of activities of daily living which are sleep, sitting or standing, ambulation, general body motions, bending or stooping, and carrying large and heavy objects in order to provide a better comprehension of the questions. Based on the results of the current study, a very small percentage of the participants had trouble getting out of bed (5.6%), sleeping through the night (2.1%), and turning over in bed (1.5%). According to Ilic et al. (2021) study, those who sleep

in the wrong position get low back pain. This outcome can be linked to the compression strain on the spine increasing as a result of uncomfortable sleeping.

5.4 Association between Postural Awareness and Back Pain during the Hybrid Study Among Undergraduate Students in UTAR

In the present study, Spearman's rho test was utilized to examine the relationship between postural awareness and back pain during the hybrid study among undergraduate students in UTAR. As presented in the results section, no significant association was found between postural awareness and back pain during the hybrid study among undergraduate students in UTAR. This is due to the p-value of postural awareness ($p = 0.747$) and back pain ($p = 0.747$) being more than the significant level ($p<0.05$), as shown in Table 4.6.1.

According to Kanaparthy et al. (2015), the authors demonstrated a substantial correlation between postural awareness and the severity of musculoskeletal pain among students in Jizan, Saudi Arabia. The results are revealed to be at odds with those of the current study. This might result from the various questionnaires employed to gauge the participants' level of back pain and postural awareness. The questionnaire used in the study by Kanaparthy et al. (2015) was created specially to track the different working postures performed by dentistry students. In contrast, the Postural Awareness Scale was utilized in the current study and limited research. The fact that the questionnaires' target demographics varied can be used to explain why various results and conclusions were drawn. Hence, it is suggested to administer the Postural Awareness Scale to different groups in order to obtain more data and information.

While this study was going on, Desouzart et al. (2016), Ozdemir et al. (2021), and Zainuddin et al. (2022) discovered a substantial connection between the respondents' body

posture and low back discomfort. According to research by Ozdemir et al. (2021), 4 out of 10 participants indicated that their sitting position in a chair and uncomfortable school tables were to blame for their suffering. The majority of individuals (96.6%) were seen to have bad posture while writing at school desks. Although it has been noted that sex, age, poor posture, ergonomic variables, and physical activity are risk factors for musculoskeletal pain, it is still unclear whether postural awareness is the actual source of musculoskeletal discomfort.

5.5 Association between Sedentary Behaviour and Back Pain during the Hybrid Study Among Undergraduate Students in UTAR

In the current study, Spearman's rho test was utilized to explore the relationship between sedentary behaviour and back pain during the hybrid study among undergraduate students in UTAR. As shown in Table 4.6.4, the p-value of sedentary behaviour ($p = 0.339$) and back pain ($p = 0.339$) is more than the significant level ($p<0.05$). Thus, there is no significant association between sedentary behaviour and back pain during the hybrid study among undergraduate students in UTAR.

The result that concluded sedentary behaviour does not cause back discomfort is consistent with Hartvigsen et al. (2000), Chen et al. (2009) and Moroder et al. (2011) findings. In their study, it was demonstrated that sedentary behaviour and the prevalence of musculoskeletal pain had no significant correlation. This can be explained by low back pain appears to have a multifaceted origin, influenced by genetics, environment, and other potential risk factors. The fact that the study population in this study exhibited no statistically significant difference in the occurrence of back pain may be explained by these unfavourable reports regarding the impact of sedentary behaviour.

In contrast to the findings of the present investigation, Roggio et al. (2021) discovered a substantial link between university students' sedentary behaviour and musculoskeletal pain. According to research, 1 in 2 and 1 in 3 students who engage in sedentary behaviour are more likely to experience neck and low back pain. This study was conducted during the COVID-19 pandemic, whereas the current study was conducted after the COVID-19 pandemic. Thus, this can explain the different results obtained by both studies. Furthermore, prolonged sitting has been linked to musculoskeletal pain, according to studies by Shrier et al. (2001) and Feldman et al. (2002). According to epidemiological research, adopting poor posture for an extended period of time, spending much time sitting down, or simply engaging in sedentary behaviour are all significant risk factors for developing diseases like cancer, diabetes, heart disease, musculoskeletal disorders, and stress. Besides that, another study discovered a link between sedentary behaviour and persistent low back discomfort among sedentary office employees. The varied research populations in the current study could be to blame for this inconsistent finding. Compared to university students, office employees sit for longer periods of time without moving, exhibiting a more static sedentary behaviour. Since university students had to roam across the campus to attend multiple lecture classes in various lecture venues, they had comparatively less sedentary behaviour. Thus, university students moved around more and sat for shorter periods of time compared to office workers.

5.6 Limitations of the Study

It is noted that there are a number of drawbacks present in the present study. First of all, the cross-sectional design used in the current study could not determine the causal link between postural awareness and sedentary behaviour with back pain during the hybrid study among undergraduate students in UTAR. Secondly, the data obtained in the current study were self-reported, despite the fact that the validated questionnaires were utilized as the instruments to

gather the data. Due to the fact that the study is retrospective rather than prospective, there is a chance that memory recall bias will be present, and participants may either undervalue or overvalue their current state of health depending on the questions. In addition, the survey was delivered using online platforms like Microsoft Teams, Instagram, WhatsApp, and Messenger. This could indicate a lack of motivation to complete the entire questionnaire, especially if there are numerous items to answer. Apart from that, a non-probability sampling technique called the convenience sampling method was applied in this study. This prevents undergraduate students in UTAR from having an equal chance of being enrolled in the study, which results in sampling bias. Moreover, since this study was limited to UTAR undergraduate students, it is possible that the results cannot be applied to undergraduate students at other institutions. Besides, the absence of physical evaluative measurements for posture, sedentary behaviour, and back pain can be a drawback. On top of that, this investigation only focused on the association between postural awareness, sedentary behaviour, and back pain. It does not consider the additional risk factors for back pain, which would have provided more crucial details in the previous statement.

5.7 Suggestions and Recommendations

The participants in the current study are not evenly distributed by age group, gender, ethnicity, faculty, or year of study. As a result, the outcomes might be slightly impacted by this. Hence, it is advised to ensure that participants are evenly distributed across each demographic trait so that the results of this study will be better. Other than that, future research can further broaden the study population by incorporating undergraduate students from other Malaysian universities in order to generalize the results to a bigger community. Consequently, there will be a more presentable view of the association between postural awareness, sedentary behaviour, and back pain during the hybrid study among undergraduate students in Malaysia. Furthermore,

the time frame for the whole research project is suggested to be extended. This is due to the fact that if the period for data collection is limited to 3 to 4 weeks, there will be several limitations in terms of the selection of study design and method. It is believed that providing students with more time will improve the quality of their research projects. Besides that, as previously noted, it is recommended to look into characteristics such as smoking, drinking alcohol, physical activity level, wearing high heels, body mass index, etc. that were not examined in this study but should be in further research.

CHAPTER 6

CONCLUSIONS

In a nutshell, there is no significant association between postural awareness, sedentary behaviour, and back pain during the hybrid study among undergraduate students. This may be because back pain can be due to other risk factors such as gender, age, faculty, year of study, smoking, drinking alcohol, physical activity level, etc. According to the findings by Alshagga et al. (2013), musculoskeletal pain was reported to be significantly associated with the year of study, history of low back pain, family history of musculoskeletal pain, body mass index (BMI), electronic device usage, and periods of electronic device usage. Thus, in future study, it is recommended to analyze the various risk factors of back pain to obtain a more reliable outcome.

Other than that, as the proverb says, “prevention is better than cure”, it is important to guarantee the students have a high level of postural awareness and avoid sedentary behaviour to lower the likelihood of back discomfort. Acute low back pain and chronic low back pain can affect the students’ quality of life and activity of daily living. However, the development of acute low back pain into chronic low back pain can be stopped by early identification of the risk factors for musculoskeletal pain. In order to avoid this catastrophe, the government, general public, school administration, parents, and students should put in place some preventative measures.

First, the government and the public can organize a free awareness campaign to encourage everyone to participate, gain knowledge about the benefits of ergonomics for postural habits, and raise their postural awareness level. Besides that, the school authorities

should ensure the classroom and furniture design, such as the chairs and tables, are ergonomically friendly to the students. On top of that, the lecturer should provide 5 to 10 minutes of break time after every hour of class so that students can reduce their static sitting periods, enhance their dynamic posture, and unwind their tense muscles. In addition, parents should also advise children to avoid using electronics for extended periods of time and to read with good posture. Last but not least, the individual ought to encourage an active lifestyle and raise their physical activity level by engaging in exercises like jogging, running, cycling, etc. at least 3 times per week.

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APPENDICES

APPENDIX A

ETHICAL APPROVAL LETTER

No	Research Title	Student's Name	Supervisor's Name	Approval Validity
31.	Association of Postural Awareness with Sedentary Behavior and Back Pain During the Hybrid Study Among Undergraduate Students	Low Xin Yuen	Mr Martin Ebenezer Chellappan	4 November 2022 – 3 November 2023
32.	Impact of Social Media Addiction on Physical Activity Among Undergraduate Students	Mak Kai Nan		
33.	Tibial Torsion and Leg Length Discrepancy in Idiopathic Scoliosis Among UTAR Students	Khoo Wan Qi	Pn Nadia Safirah Binti Rusli	
34.	Prevalence of Patellofemoral Pain Among University Students	Khoo Wen Han		
35.	Prevalence of Varicose Veins Among Fast Food Employees in Cheras, Selangor: A Cross Sectional Study	Ropheca Phuah Su Hui		
36.	The Effect of Unstable Modified Wall Squat on Dynamic Balance Among Recreational Athletes	Chu Sin Jiet	Mr Sathish Kumar Sadagobane	
37.	Knowledge, Perception, and Attitude Towards Breast Cancer and Breast Self-Examination (BSE) Among Non-medical Private University Students	Foo Jes Mynn		
38.	Perception, Knowledge and Attitude Towards the Impact of Daytime Nap on the Risk of Stroke Among Non-Healthcare Undergraduate Students: A Cross-Sectional Study	Chan Chi Kuan	Mr Tarun Amalnerkar Co-Supervisor: Ms Swapneela Jacob	
39.	Awareness, Knowledge and Attitude Toward Orthostatic Hypotension Among Elderlies	Ch'ng Hui Kee		
40.	Effect of TikTok on Student Learning Among Physiotherapy Students	Tan Eng Jing	Mr Avanianban Chakkarapani	
41.	Awareness Towards Tourette Syndrome Among Health Science and Non-health Science Students in A Private University, Malaysia	Tan Kai Xuan		
42.	Effect of Scapular Retraction Exercise on Forward Head Posture Among University Students	Tay Kai Wei	Ms Mahadevi A/P Muthurethina Barathi	
43.	Comparison Between Effect of Lower Limb Cyclic Stretching and Ballistic Stretching on Jumping Distance Among Undergraduate Students: A Comparative Study	Ng Zi Ru		
44.	Relationship of Physical Activity with Anxiety and Depression Among University Students	Ong Aiwei		
45.	Gender Discrepancy and Its Association with Shoulder Pain Among Malaysian Recreational Badminton Players	Khoo Je-Yique	Pn Nur Aqliliriana Binti Zainuddin	
46.	Obesity, Eating Habits and Physical Activity Before and During Covid-19 Pandemic Among University Lecturers	Khoo Tze Sean		

The conduct of this research is subject to the following:

(1) The participants' informed consent be obtained prior to the commencement of the research;

(2) Confidentiality of participants' personal data must be maintained; and

(3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines.

(4) Written consent be obtained from the institution(s)/company(ies) in which the physical or/and online survey will be carried out, prior to the commencement of the research.

APPENDIX B

PERSONAL DATA PROTECTION STATEMENT

PERSONAL DATA PROTECTION NOTICE

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, Universiti Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

1. Personal data refers to any information which may directly or indirectly identify a person which could include sensitive personal data and expression of opinion. Among others it includes:

   a) Name
   b) Identity card
   c) Place of Birth
   d) Address
   e) Education History
   f) Employment History
   g) Medical History
   h) Blood type
   i) Race
   j) Religion
   k) Photo
   l) Personal Information and Associated Research Data

2. The purposes for which your personal data may be used are inclusive but not limited to:

   a) For assessment of any application to UTAR
   b) For processing any benefits and services
   c) For communication purposes
   d) For advertorial and news
   e) For general administration and record purposes
   f) For enhancing the value of education
   g) For educational and related purposes consequential to UTAR
   h) For replying any responds to complaints and enquiries
   i) For the purpose of our corporate governance
   j) For the purposes of conducting research/ collaboration

3. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

4. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:

6. By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.

7. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

8. You may access and update your personal data by writing to us at_____.

Acknowledgment of Notice

[ ] I have been notified and that I hereby understood, consented and agreed per UTAR above notice.

[ ] I disagree, my personal data will not be processed.

.....
Name:
Date:

APPENDIX C

CONSENT FORM

Dear Participants,

You are invited to participate in a research cross-sectional study conducted by Low Xin Yuen, from Bachelor of Physiotherapy (Hons) Universiti Tunku Abdul Rahman (UTAR), Sungai Long Campus, Selangor, Malaysia. The research study aims to investigate the association of postural awareness with sedentary behaviour and back pain during the hybrid study. To participate in this study, you must be a Year 1 to Year 4 UTAR undergraduate student. You are encouraged to read all the descriptions of this study before participating.

Participation

This research study requires you to complete the questionnaire given. This questionnaire comprised four categories, demographic information, Postural Awareness Scale, Sedentary Behaviour Questionnaire and Quebec Back Pain Disability Scale. Section A will be the demographic data of participants. Section B will be the Postural Awareness Scale to assess the participants' self-reported awareness of body posture. Section C will be the Sedentary Behaviour Questionnaire to measure the amount of time spent by the participants doing nine different kinds of activities. Section D will be the Quebec Back Pain Disability Scale to investigate the level of functional disability in participants with back pain.

Confidentiality

Your information and data will be kept confidential. All associated data collected will be

immediately destroyed wherever possible.

Should you have any enquires about this research study, you may contact me, Low Xin Yuen at 012-8779214 or xinyuenlow@1utar.my. If you wish to participate in this study, please fill in the date and answer "Agree" below.

- I have been notified by you and that I hereby understand, consent and agreed per UTAR above notice.
- I disagree, I do not consent to this study.

Signature: .....

Date: .....

Email: .....

APPENDIX D

QUESTIONNAIRES

Part A: Demographic Data

1. Name: _____
2. Age: _____
3. Gender:
    - Male
    - Female
4. Ethnicity:
    - Chinese
    - Malay
    - Indian
    - Others
5. Faculty:
    - M. Kandiah Faculty of Medicine and Health Sciences (MK FMHS)
    - Lee Kong Chian Faculty of Engineering and Science (LKC FES)
    - Faculty of Accountancy and Management (FAM)
    - Faculty of Creative Industries (FCI)
    - Faculty of Engineering and Green Technology (FEGT)
    - Faculty of Information and Communication Technology (FICT)
    - Faculty of Science (FSc)

- Faculty of Business and Finance (FBF)
- Faculty of Arts and Social Science (FAS)
- Institute of Chinese Studies (ICS)

6. Course of Study: _____
7. Year of Study:
    - Year 1
    - Year 2
    - Year 3
    - Year 4

Part B: Postural Awareness Scale

Item	1 Not at all true about me	2 Rarely true	3 Sometimes but infrequently true	4 Neutral	5 Sometimes true	6 Usually true	7 Very true about me
1. Needs to concentrate for being aware of posture							
2. Awareness of bad posture only by pain							
3. Slumps down when sitting							
4. Unaware of posture when focused							
5. Difficulties to consciously adopt a posture							
6. Often checks posture when working							
7. Influences her/his own appeal by posture							
8. Always aware of sitting or standing posture							
9. Often makes her/himself aware of her/his posture							
10. Aware of posture even when focused							
11. Regulates how she/he feels through posture							
12. Needs to concentrate to feel whether a posture benefits her/him or not							

Part C: Sedentary Behaviour Questionnaire

SEDENTARY BEHAVIOR: Weekday									
On a typical WEEKDAY, how much time do you spend (from when you wake up until you go to bed) doing the following?									
	None	**15 min. or less**	**30 min.**	**1 hr**	**2 hrs**	**3 hrs**	**4 hrs**	**5 hrs**	**6 hrs or more**
1. Watching television (including videos on VCR/DVD).	O	O	O	O	O	O	O	O	O
2. Playing computer or video games.	O	O	O	O	O	O	O	O	O
3. Sitting listening to music on the radio, tapes, or CDs.	O	O	O	O	O	O	O	O	O
4. Sitting and talking on the phone.	O	O	O	O	O	O	O	O	O
5. Doing paperwork or computer work (office work, emails, paying bills, etc.)	O	O	O	O	O	O	O	O	O
6. Sitting reading a book or magazine.	O	O	O	O	O	O	O	O	O
7. Playing a musical instrument.	O	O	O	O	O	O	O	O	O
8. Doing artwork or crafts.	O	O	O	O	O	O	O	O	O
9. Sitting and driving in a car, bus, or train.	O	O	O	O	O	O	O	O	O

SEDENTARY BEHAVIOR: Weekend Day

On a typical WEEKEND DAY, how much time do you spend (from when you wake up until you go to bed) doing the following?

	None	15 min. or less	30 min	1 hr	2 hrs	3 hrs	4 hrs	5 hrs	6 hrs or more
1. Watching television (including videos on VCR/DVD).	O	O	O	O	O	O	O	O	O
2. Playing computer or video games.	O	O	O	O	O	O	O	O	O
3. Sitting listening to music on the radio, tapes, or CDs.	O	O	O	O	O	O	O	O	O
4. Sitting and talking on the phone.	O	O	O	O	O	O	O	O	O
5. Doing paperwork or computer work (office work, emails, paying bills, etc.)	O	O	O	O	O	O	O	O	O
6. Sitting reading a book or magazine.	O	O	O	O	O	O	O	O	O
7. Playing a musical instrument.	O	O	O	O	O	O	O	O	O
8. Doing artwork or crafts.	O	O	O	O	O	O	O	O	O
9. Sitting and driving in a car, bus, or train.	O	O	O	O	O	O	O	O	O

Part D: The Quebec Back Pain Disability Scale

The Quebec Back Pain Disability Scale

This questionnaire is about the way your back pain is affecting your daily life. People with back problems may find it difficult to perform some of their daily activities. We would like to know if you find it difficult to perform any of the activities listed below, because of your back. For each activity there is a scale of 0 to 5. Please choose one response option for each activity (do not skip any activities) and circle the corresponding number.

Today, do you find it difficult to perform the following activities because of your back?

		0 Not difficult at all	1 Minimally difficult	2 Somewhat difficult	3 Fairly difficult	4 Very difficult	5 Unable to do
1	Get out of bed	0	1	2	3	4	5
2	Sleep through the night	0	1	2	3	4	5
3	Turn over in bed	0	1	2	3	4	5
4	Ride in a car	0	1	2	3	4	5
5	Stand up for 20-30 minutes	0	1	2	3	4	5
6	Sit in a chair for several hours	0	1	2	3	4	5
7	Climb one flight of stairs	0	1	2	3	4	5
8	Walk a few blocks (300-400 m)	0	1	2	3	4	5
9	Walk several kilometres	0	1	2	3	4	5
10	Reach up to high shelves	0	1	2	3	4	5
11	Throw a ball	0	1	2	3	4	5
12	Run one block (about 100m)	0	1	2	3	4	5
13	Take food out of the refrigerator	0	1	2	3	4	5
14	Make your bed	0	1	2	3	4	5
15	Put on socks (pantyhose)	0	1	2	3	4	5
16	Bend over to clean the bathtub	0	1	2	3	4	5
17	Move a chair	0	1	2	3	4	5
18	Pull or push heavy doors	0	1	2	3	4	5
19	Carry two bags of groceries	0	1	2	3	4	5
20	Lift and carry a heavy suitcase	0	1	2	3	4	5

APPENDIX E

ONLINE QUESTIONNAIRE

Association of Postural Awareness With Sedentary Behaviour and Back Pain During The Hybrid Study Among Undergraduate Students

xy.low01@gmail.com (not shared) Switch account

* Required

Consent form

Dear Participants,

You are invited to participate in a research cross-sectional study conducted by Low Xin Yuen, from Bachelor of Physiotherapy (Hons) Universiti Tunku Abdul Rahman (UTAR), Sungai Long Campus, Selangor, Malaysia. The research study aims to investigate the association of postural awareness with sedentary behaviour and back pain during the hybrid study. To participate in this study, you must be a Year 1 to Year 4 UTAR undergraduate student. You are encouraged to read all the descriptions of this study before participating.

Participation

This research study requires you to complete the questionnaire given. This questionnaire comprised four categories, demographic information, Postural Awareness Scale, Sedentary Behaviour Questionnaire and Quebec Back Pain Disability Scale. Section A will be the demographic data of participants. Section B will be the Postural Awareness Scale to assess the participants' self-reported awareness of body posture. Section C will be the Sedentary Behaviour Questionnaire to measure the amount of time spent by the participants doing nine different kinds of activities. Section D will be the Quebec Back Pain Disability Scale to investigate the level of functional disability in participants with back pain.

Confidentiality

Your information and data will be kept confidential. All associated data collected will be immediately destroyed wherever possible.

Should you have any enquires about this research study, you may contact me, Low Xin Yuen

immediately destroyed wherever possible.

Should you have any enquires about this research study, you may contact me, Low Xin Yuen at 012-8779214 or xinyuenlow@1utar.my. If you wish to participate in this study, please fill in the date and answer "Agree" below.

UTAR Email Address *

Your answer

Today's Date *

Date

dd/mm/yyyy

Consent form *

- ◯ I have been notified by you and that I hereby understand, consent and agreed per UTAR above notice.
- ◯ I disagree, I do not consent to this study.

Back Next Clear for

Association of Postural Awareness With Sedentary Behaviour and Back Pain During The Hybrid Study Among Undergraduate Students

* Required

Personal Data Protection Statement

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, Universiti Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

Notice:

1. Personal data refers to any information which may directly or indirectly identify a person which could include sensitive personal data and expression of opinion. Among others it includes:

- Name
- Identity card
- Place of Birth
- Address
- Education History
- Employment History
- Medical History
- Blood type
- Race
- Religion
- Photo
- Personal Information and Associated Research Data

2. The purposes for which your personal data may be used are inclusive but not limited to:-

- For assessment of any application to UTAR
- For processing any benefits and services
- For communication purposes
- For advertorial and news
- For general administration and record purposes
- For enhancing the value of education
- For educational and related purposes consequential to UTAR
- For replying any responds to complaints and enquiries
- For the purpose of our corporate governance
- For the purposes of conducting research/ collaboration

3. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

4. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:
6. By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.

ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:
6. By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.

7. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

8. You may access and update your personal data by writing to us at xinyuenlow@1utar.my

PDPA Statement *

- ◯ I have been notified by you and that I hereby understand, consent and agreed per UTAR above notice.
- ◯ I disagree, my personal data will not be processed.

Electronic Signature (Eg. Electronically s/d Initials/Nickname) *

For example: Electronically s/d Low

Your answer

Back Next Clear form

Association of Postural Awareness With Sedentary Behaviour and Back Pain During The Hybrid Study Among Undergraduate Students

xy.low01@gmail.com (not shared) Switch account

* Required

Section B Postural Awareness Scale

This part consists of 12 questions that will assess the participants' self awareness of body posture.

Please indicate your level of awareness for all of the questions based on your experience during the hybrid study.

Below is the indicator for each level of awareness:
1 - Not at all true about me
2 - Rarely true
3 - Sometimes but infrequently true
4 - Neutral
5 - Sometimes true
6 - Usually true
7 - Very true about me

1. Needs to concentrate for being aware of posture. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

2. Awareness of bad posture only by pain. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

3. Slump down when sitting. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

4. Unaware of posture when focused. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

5. Difficulties to consciously adopt a posture. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

6. Often checks posture when working. *

6. Often checks posture when working. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

7. Influences her/his own appeal by posture. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

8. Always aware of sitting or standing posture. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

9. Often makes her/himself aware of her/his posture. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

10. Aware of posture even when focused. *

Not at all true about me ○ ○ ○ ○ ○ ○ ○ Very true about me

10. Aware of posture even when focused. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

11. Regulates how she/he feels through posture. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

12. Needs to concentrate to feel whether a posture benefits her/him or not. *

	1	2	3	4	5	6	7	
Not at all true about me	○	○	○	○	○	○	○	Very true about me

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Association of Postural Awareness With Sedentary Behaviour and Back Pain During The Hybrid Study Among Undergraduate Students

xy.low01@gmail.com (not shared) Switch account

* Required

Section C Sedentary Behaviour Questionnaire

On a typical WEEKDAY, how much time do you spend (from when you wake up until you go to bed) doing the following? *

	None	15 minutes or less	30 minutes	1 hour	2 hours	3 hours	4 hours	5 hours	6 hou or mor
Watching television (including videos on VCR/DVD).	○	○	○	○	○	○	○	○	○
Playing computer or video games.	○	○	○	○	○	○	○	○	○
Sitting listening to music on the radio, tapes, or CDs.	○	○	○	○	○	○	○	○	○

Sitting and talking on the phones.	○	○	○	○	○	○	○	○	○
Doing paperwork or computer work (office work, emails, paying bills, etc.).	○	○	○	○	○	○	○	○	○
Sitting reading a book or magazine.	○	○	○	○	○	○	○	○	○
Playing a musical instrument.	○	○	○	○	○	○	○	○	○
Doing artwork or crafts.	○	○	○	○	○	○	○	○	○
Sitting and driving in a car, bus, or train.	○	○	○	○	○	○	○	○	○

On a typical WEEKEND DAY, how much time do you spend (from when you wake up until you go to bed) doing the following? *

	None	15 minutes or less	30 minutes	1 hour	2 hours	3 hours	4 hours	5 hours	6 hou or mor
Watching television (including videos on VCR/DVD).	○	○	○	○	○	○	○	○	○
Playing computer or video games.	○	○	○	○	○	○	○	○	○
Sitting listening to music on the radio, tapes, or CDs.	○	○	○	○	○	○	○	○	○
Sitting and talking on the phones.	○	○	○	○	○	○	○	○	○
Doing paperwork or computer work (office work, emails, paying bills,	○	○	○	○	○	○	○	○	○

Doing paperwork or computer work (office work, emails, paying bills, etc.).	○	○	○	○	○	○	○	○	○
Sitting reading a book or magazine.	○	○	○	○	○	○	○	○	○
Playing a musical instrument.	○	○	○	○	○	○	○	○	○
Doing artwork or crafts.	○	○	○	○	○	○	○	○	○
Sitting and driving in a car, bus, or train.	○	○	○	○	○	○	○	○	○

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Association of Postural Awareness With Sedentary Behaviour and Back Pain During The Hybrid Study Among Undergraduate Students

xy.low01@gmail.com (not shared) Switch account

* Required

Section D Quebec Back Pain Disability Scale

This part consists of 20 questions that will

investigate the level of functional disability in participants with back pain.

Please indicate your level of functional disability for all of the questions based on your experience during the hybrid study.

Below is the indicator for each level of awareness:
0 - Not difficult at all
1 - Minimally difficult
2 - Somewhat difficult
3 - Fairly difficult
4 - Very difficult
5 - Unable to do

1. Get out of bed. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

2. Sleep through the night. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

3. Turn over the bed. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

4. Ride in a car *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

5. Stand up for 20-30 minutes. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

6. Sit in a chair for several hours. *

6. Sit in a chair for several hours. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

7. Climb one flight of stairs *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

8. Walk a few blocks (300-400m). *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

9. Walk several kilometres. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

10. Reach up to high shelves. *

10. Reach up to high shelves. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

11. Throw a ball. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

12. Run one block (about 100m). *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

13. Take food out of the refrigerator. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

14. Make your bed. *

15. Put on socks (pantyhose). *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

16. Bend over to clean the bathtub. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

17. Move a chair. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

18. Pull or push heavy doors. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

19. Carry two bags of groceries. *

0 1 2 3 4 5

Not difficult at all	○	○	○	○	○	○	Unable to do

18. Pull or push heavy doors. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

19. Carry two bags of groceries. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

20. Lift and carry a heavy suitcase. *

	0	1	2	3	4	5	
Not difficult at all	○	○	○	○	○	○	Unable to do

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APPENDIX F

TURNITIN REPORT

Turnitin Originality Report

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Association between postural awareness, sedentry behaviour, and back pain during hybrid study among Undergraduate Students. By Low Yuen Xin

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Eleonora Topino, Alessio Gori, Holger Cramer. "Mind and Body: Italian Validation of the Postural Awareness Scale", Frontiers in Psychology

< 1% match (Internet from 25-May-2021)
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7598079/

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Rodrigo Villaseca-Vicuña, Fernando Manuel Otero-Saborido, Jorge Perez-Contreras, Jose Antonio Gonzalez-Jurado. "Relationship between Physical Fitness and Match Performance Parameters of Chile Women's National Football Team", International Journal of Environmental Research and Public Health

< 1% match ()
Holger Cramer, Wolf E. Mehling, Felix J. Saha, Gustav Dobos, Romy Lauche. "Postural awareness and its relation to pain: validation of an innovative instrument measuring awareness of body posture in patients with chronic pain", BMC Musculoskeletal Disorders

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https://www.researchgate.net/publication/11927508_Reliability_and_Validity_of_the_Active_Straight_Leg_Raise_Test_in_Posterior_Pelvic_Pain_Since_Preg

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https://www.researchgate.net/publication/335933714_Effect_of_Carrying_Style_on_Posture_Score_in_Adolescents_with_Musculoskeletal_Pain

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https://www.researchgate.net/publication/259184323_ANTHROPOMETRIC_DESIGN_OF_FURNITURE_FOR_USE_IN_TERTIARY_INSTITUTIONS_IN_ABEOKUTA_WESTERN_NIGERIA

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http://repub.eur.nl/pub/7165/051215_Groot_M%20de.pdf

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http://eprints.utar.edu.my/1710/1/Research_Project__The_Prevalence_of_LBP_%26_Disability_among_University_Students_.pdf

< 1% match (Internet from 20-Aug-2022)
http://eprints.utar.edu.my/3089/1/fyp_BF_2018_CYX.pdf

< 1% match (Internet from 22-Oct-2017)
https://www.timeshighereducation.com/sites/default/files/institution_downloads/utarprospectus2017-2018_print_view.pdf

< 1% match (Parnia Bagheri, Yahya Salimi, Gholamreza Abdoli, Farid Najafi. "Validity and Reliability of the Persian Version of the Sedentary Behavior Questionnaire Among Office Employees", International Journal of Occupational Safety and Ergonomics, 2022)
Parnia Bagheri, Yahya Salimi, Gholamreza Abdoli, Farid Najafi. "Validity and Reliability of the Persian Version of the Sedentary Behavior Questionnaire Among Office Employees", International Journal of Occupational Safety and Ergonomics, 2022

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https://www.frontiersin.org/articles/10.3389/fpsyt.2022.977238/full

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Submitted to University of Greenwich on 2022-12-11

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CHAPTER 1 INTRODUCTION 1.1 Background of Study The American Academy of Orthopedics (1947) defined body posture as protecting the body structures from harm and gradual distortion by aligning the body parts regularly and in a balanced manner (Zagyapan et al., 2012). Body posture is also the circumscription of the arrangement of skeletal components with respect to one another and their surroundings at a given moment, and how each joint in the body affects this position. As the proverbs said, "every coin has two sides", so as for body posture. The human body posture can be good or bad. A person is said to have a good posture when he or she can maintain the body's stability and balance with the greatest amount of effectiveness and the least amount of effort (Akulwar- Tajane et al., 2021). Besides that, a good posture can ensure the body muscles work together with the musculoskeletal and nervous systems harmoniously without any issues. Furthermore, we can examine a proper posture through the location of the spine. Our spine consists of four natural curves in the vertebral column. They are the cervical, thoracic, lumbar, and sacral curvature (Benjamin, 2021). On the other hand, a bad posture can be characterized by an alteration of muscle tone, impairment of body orientation symmetry, the existence of congenital anomalies, and inappropriate posture while performing functional activities (Glista et al., 2014). For example, lying down while reading, walking with hunched back and etc. As a consequence, odd postures such as cervical hyperlordosis, thoracic hyperkyphosis, and lumbar hyperlordosis will be formed. Other than that, poor posture can lead to instability of the spine and elicit pain in different intensities at different parts of the body while doing activities of daily living. This is because bad posture can place undesirable pressure on other body components. For instance, the nervous system and the respiratory system. Our body organs are strongly correlated with each other such as the brain, spinal cord, and total body function with the spine. Thus, bad posture not only affects the spine but also provokes a wider range of consequences on the whole body due to their close relationship. As an example, poor posture can lead to depression, musculoskeletal disorders, and cardiovascular health issues. Developing posture against gravity and preserving balance are both aspects of postural control. It makes it possible to maintain posture during active motions and to regain equilibrium after a perturbation. Postural control is associated with the perception or sense of joint angles and muscle tensions toward movement and balance. Furthermore, postural awareness is associated with proprioception awareness. Postural awareness is defined as an individual conscious awareness of his or her own body posture when the central nervous system receives proprioceptive signals from the body's periphery (Cramer et al., 2018). Posture is one of the most crucial elements that influence the health of human beings physically and mentally. However, according to the survey done by Akulwar-Tajane et al. (2021), they found that (69%) of the participants acknowledged that they adopted a poor posture, while (31.8%) of the participants engaged in activities of daily living with these odd postures. There are many factors that contributed to the formation of bad posture behavior in the public. The risk factors are surrounding factors, psychological factors, lifestyle, physical activity level, ergonomics, technology and etc. Poor ergonomics such as using a laptop without a laptop stand, and an office chair without lumbar support will lead to awkward posture for laptop users. Hence, Kanaparthy et al. (2015) conducted a study to explore some methods to maintain a good posture. First, ergonomics is essential for us to ensure our body parts are doing their jobs in the correct position with maximum efficiency and safety. In addition, postural awareness techniques should be combined with ergonomics to establish a better outcome. Moreover, people with inappropriate lifestyles should be modified by accommodating various postures and changing their working positions frequently in order to distribute the burden among the muscle groups over the spine, upper limbs, and lower limbs (Finsen et al., 1998). Sedentary behaviour is defined as an activity that requires little effort and is done in a sitting or recumbent position (Mahdavi & Kelishadi, 2020). For instance, watching television, total time spent sitting, total screen time, and office work. These are all linked to individuals engaging in less physical activity. Furthermore, sedentary behaviour is distinguished as energy consumption of less than 1.5 metabolic equivalents (MET) while performing a variety of activities (Katzmarzyk et al., 2009). In 2019, sedentary behaviour became a cause for worry because of the COVID-19 outbreak. Most people are forced to stay at home which leads to the increment of sedentary behaviour globally. Although sedentary lifestyles established a tremendous negative impact on quality of life and health among the public, there are still many people who ignore the detrimental effects and act in their like. According to the study done by Aleixo et al. (2019), a prolonged sitting period can impair the lumbar spine musculoskeletal system and induce muscle atrophy. Moreover, a static sitting posture can decrease blood circulation in the lower part of the body. Thus, oedema can occur at the feet and ankles of the individual. Additionally, this bad attitude can significantly impact our metabolic profiles, endocrine levels, and cardiorespiratory function (Rahman et al., 2020). For instance, a decline in our muscle insulin sensitivity, endurance level, aerobic performance, and alterations in body weight (Gallè et al., 2020). This erroneous behaviour can be due to personal and environmental factors such as being young, a student, coming from a high-level household, and residing in metropolitan areas. However, there are still ways to overcome this problem. Chen et al. (2020) suggested the public carry out some leisure pursuits and indoor physical activity. Exercises that involve balancing, stretching, or strengthening are also acceptable. For example, tandem walking, single-leg stance, cobra pose, child pose, bridging, squatting, and plank are some other exercises to try. Likewise, the benefits of mind-body exercises (MBE), such as Tai chi, yoga, and Qigong, may reduce the risk of cardiovascular disorders (Mahdavi & Kelishadi, 2020). Low back pain is one of the most prevalent health issues that impact individuals of all ages, including children and the elderly (Ilic et al., 2021). There is approximately 85% of people have