ERGONOMIC ISSUE ON STUDENT'S HEALTH DURING VIRTUAL LEARNING IN THE POST-PANDEMIC AGE

BY

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DECLARATION

We hereby declare that:

(1) This undergraduate research project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) The word count of this research report is 24,293.

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Abstract

The title of this report is named Ergonomic Issues on Student's Health During Virtual Learning in the Post-Pandemic Age. The COVID-19 pandemic has forced many educational institutions to shift to virtual learning, which has led to an increase in ergonomic issues among students. Prolonged use of digital devices and poor workstation setup can lead to musculoskeletal pain, eye strain, and other health problems. Therefore, the main objective of this study is to identify the factors contributing to ergonomic issues on student's health during virtual learning in the post-pandemic age and investigate their relationship. This study will use a mixed-methods approach, combining existing documents and a questionnaire survey. The existing documents will be collected from online discussions and academic articles or papers, related to ergonomic issues during virtual learning. The questionnaire survey will be distributed to a sample of students to collect data on the prevalence of ergonomic issues, and health impacts. The study will target UTAR-Sungai Long students from various academic programs and levels, who have experienced virtual learning due to the COVID-19 pandemic in the post-pandemic age who have experienced virtual learning. The data collected from the existing documents and questionnaire survey will be analyzed using content analysis, descriptive statistics, and Spearman Correlation analysis. As a result, the findings indicate that only posture show significance in relation to student’s health during virtual learning in the post-pandemic age. In conclusion, this study aims to provide insights into the factors contributing to ergonomic issues on student's health during virtual learning in the post-pandemic age. The findings also can be used to inform policies and interventions to promote healthy virtual learning environments for students.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Research Background

Ergonomic-related issues are really common in the present days, particularly for desk work. Whereby, the consequences include substantial increases in the risk of decreased productivity and decreased morale (Irene, 2018).

A study has been conducted to determine the possible negative impacts of desk work on health. The outcome of this study indicated that musculoskeletal injuries could be related to poor ergonomic practices while conducting desk work (Rademacher, 2017). For example, poor ergonomic practices can be referred to the incorrect posture and prolonged sitting. Furthermore, another study has been done to determine whether poor ergonomic practices could contribute to greater emotional stress. The result of this study demonstrated that sitting at a desk with poorly designed ergonomics could play a critical role in mental health (Rego, 2022). For instance, poorly designed ergonomics could contribute to greater anxiety, depression, and undue stress in the long term. Nevertheless, the causation relationship requires further research as it is not studied thoroughly.

The Covid-19 pandemic has affected our lifestyles and health on a global scale. In the case of educational institutions, they had adopted the virtual mode of teaching which led to studying from home. According to a study, the virtual mode of teaching was still the preferred mode of teaching during the post-pandemic with regard to the health concerns of the students as 73% of the students opted for virtual learning (Kelly, 2021). This change in learning methods eventually led to more hours being spent on smart devices such as computers, laptops, and smart devices. As a result, the prolonged use of these smart gadgets was reported to be probably one of the major reasons that contribute to ergonomic-related injuries (Appalachian State University, 2022).

In this study, the aim is to investigate the relationship between ergonomic issues and the health of students during virtual learning in the post-pandemic age.

1.2 Problem statement

Ergonomic issues might not be familiar to some students. However, it could play a significant role in affecting their general health in both physical and mental aspects. Therefore, the first issue arises which whether poor ergonomic practices are responsible for the increased risk of negative impacts on students' physiological health during virtual learning in the post-pandemic age. According to a study, it shows that 71.2% of students experienced physical discomfort during online learning due to poor ergonomics (Rahmah et al., 2021). With hours being put into virtual learning at home, students should be able to study comfortably without having any issues. However, it seems that physical discomfort is quite common among students as there is an unidentified factor which causes the issue (Anggiat et. al., 2018).

Next, another issue arises which is whether poor ergonomics practices are accountable for the increased risk of negative impact on psychological health. Given that psychological health is not a physical thing, it is somehow affected by the physical environment. This opens up a new discussion of whether there is an unidentified factor which causes a decline in psychological health. According to a study, it indicates that there is approximately 73.6% of participants reported suffering from psychological issues during virtual learning (Xiao et. al., 2020). Apparently, the psychological health of the students when studying from home is negatively impacted and this issue cannot be neglected as it could affect the performance of students (Bui et. al., 2021). Unfortunately, the real reason that contributes to this scenario is yet to be identified.

1.3 Research Questions

The questions of this research are the questions that revolve around this research. To clarify, these questions are meant to be answered by the end of this research. In this scenario, this research addresses two questions.

1. What are the factors contributing to ergonomic issues on student's health during virtual learning in the post-pandemic age?
2. What is the relationship between ergonomic issues and student's health during virtual learning in the post-pandemic age?

1.4 Research Objectives

With reference to the research questions stated above, this research addresses three research objectives.

1. To identify the factors contributing to ergonomic issues on student's health during virtual learning in the post-pandemic age.
2. To investigate the relationship between ergonomic issues and student's health during virtual learning in the post-pandemic age.

1.5 Hypotheses of the Study

1. H_0: There is no significant relationship between posture and students' health during virtual learning in the post-pandemic age.
   H_1: There is a significant relationship between posture and students' health during virtual learning in the post-pandemic age.
2. H_0: There is no significant relationship between workstation and students' health during virtual learning in the post-pandemic age.
   H_1: There is a significant relationship between workstation and students' health during virtual learning in the post-pandemic age.
3. H_0: There is no significant relationship between indoor environmental factors and students' health during virtual learning in the post-pandemic age.
   H_1: There is a significant relationship between indoor environmental factors and students' health during virtual learning in the post-pandemic age.
4. H_0: There is no significant relationship between cognitive factors and students' health during virtual learning in the post-pandemic age.
   H_1: There is a significant relationship between cognitive factors and students' health during virtual learning in the post-pandemic age.
5. H_0: There is no significant relationship between distractions and students' health during virtual learning in the post-pandemic age.
   H_1: There is a significant relationship between distractions and students' health during virtual learning in the post-pandemic age.

6. H_0: There is no significant relationship between organisational factors and students' health during virtual learning in the post-pandemic age.
   H_1: There is a significant relationship between organisational factors and students' health during virtual learning in the post-pandemic age.

1.6 Significance of the Study

Ever since the pandemic hit the world, there has been a transition in lifestyle where people are trying to maximise the use of the internet (Li et al., 2021). One of the most significant changes is the shift towards virtual education, where students can attend virtual meetings without the need for physical presence (Bao, 2020). However, the transition to a digital lifestyle has caused several health issues for students during the post-pandemic age (Sahu et al., 2020). This could be due to a lack of awareness of ergonomic aspects when conducting virtual classes from home. Therefore, this research is significant as it increases awareness about the importance of ergonomics and its impact on the health of students during virtual learning in the post-pandemic age. By highlighting the importance of ergonomics and its impact on students' health during virtual learning in the post-pandemic age, the research can help to promote better practices and improve the overall well-being and performance of students (Gupta et al., 2021).

Besides, this research has the potential to contribute significantly to the existing knowledge on the subject (Pereira et al., 2020). By conducting a thorough analysis and evaluation of the impact of ergonomic practices on the health of students, the research findings could provide valuable insights and recommendations for educators and policymakers (Khan et al., 2021). These recommendations could help improve the design and implementation of virtual learning platforms and promote healthy practices among students, thereby improving their overall well-being and academic performance.

Moreover, the research could also serve as a basis for future studies on the topic, opening up new avenues of research and inquiry in the field of ergonomics and virtual learning. As such, the study is of utmost importance, especially during the current pandemic and in the post-pandemic age.

1.7 Chapter Layout

The report is organized into five major chapters. The first chapter serves as an introduction, providing an overview of the study context and research problem. It sets the stage for the study and highlights its significance.

The second chapter is devoted to the literature review, which explores existing research in the field and identifies gaps in knowledge that the study aims to address. The review is crucial for establishing the study's contribution to the field.

Chapter 3 describes the methodology utilized in the study, including the research design, data collection, and analysis methods. This chapter should provide a clear and comprehensive explanation of how the study was conducted and how the data were analyzed. It is essential to ensure the study's validity and reliability.

Chapter 4 presents the findings of the study, including both descriptive and inferential statistics, and offers an interpretation of the results. This chapter is data-driven and will provide a clear and concise summary of the study's results.

Finally, Chapter 5 concludes the study, summarizing the key findings and conclusions, discussing the implications and limitations of the research, and making recommendations for future research in the field. The conclusion should tie together the key themes and findings of the study and offer insight into the implications and limitations of the research for practice and future research directions.

1.8 Conclusion

In summary, this chapter has highlighted the prevalence of ergonomic-related issues, especially for desk work and virtual learning, which can negatively impact both physical and mental health. The COVID-19 pandemic has led to a shift towards virtual learning, resulting in prolonged use of smart devices, which may contribute to ergonomic-related injuries. Two research questions have been formulated to address these issues: 1) what are the factors contributing to ergonomic issues on student's health during virtual learning in the post-pandemic age? and 2) what is the relationship between ergonomic issues and student's health during virtual learning in the post-pandemic age? To answer these questions, the study aims to identify the factors contributing to ergonomic issues on student's health during virtual learning in the post-pandemic age and to investigate the relationship between ergonomic issues and student's health during virtual learning in the post-pandemic age. Finally, the study proposes 6 hypotheses to be tested regarding the relationship between different factors and students' health during virtual learning.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter provides a comprehensive review of the literature related to the ergonomic issues on students' health during virtual learning in the post-pandemic age. This chapter aims to identify the relevant concepts or ideas and findings that can inform the development of a theoretical framework to guide the research. The review is structured around the dependent variable and independent variables that are relevant to the research topic. In addition, this chapter presents an analysis of the theoretical models that provide the foundation for the proposed conceptual framework. Overall, this chapter provides a rigorous and systematic analysis of the existing literature.

In order to provide a comprehensive understanding of the research topic, it is important to define and clarify key terms that are relevant to the study. Therefore, the following key terms will be defined: ergonomics, Covid-19, pre-pandemic, during pandemic, post-pandemic, endemic, virtual learning, student health, physiological health and psychological health.

2.1 Review of the Literature

2.1.1 Ergonomics

Ergonomics is a field that involves creating tasks that are suited to the individuals, rather than requiring individuals to conform their bodies to responsibilities (Khalaf, 2019). Ergonomists use knowledge about how the body works best to adjust tasks, design equipment, and change workstation to help reduce physical stress on an individual's body. By creating a working environment that allows individuals to perform activities in their natural, non-stressed condition, the risk of potential musculoskeletal injuries is reduced. The goal of ergonomics is to provide individuals with a safe workplace while also increasing their efficiency and satisfaction.

There are three specialized fields within ergonomics: physical ergonomics, cognitive ergonomics, and organizational ergonomics. Physical ergonomics focuses on the effects of

individuals' anatomical, physiological, and biomechanical differences when performing physical activity. Cognitive ergonomics deals with mental processes that affect interactions between inviduals and other aspects of a system, such as cognition, memory, analysis, and motor response. Organizational ergonomics is a field that focuses on improving the efficiency and effectiveness of work systems to enhance productivity and reduce stress.

2.1.2 Covid-19

COVID-19 is a type of virus that causes respiratory illness in humans and is part of the coronavirus family, which includes other viruses that cause illness in humans, such as severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and the common cold (Sahu & Gupta, 2021). The virus is named "corona" because it has crown-like spikes on its surface (Sahu & Gupta, 2021). The first outbreak of COVID-19 was identified in December 2019 in Wuhan, China, and it has since become a global pandemic (Sahu & Gupta, 2021). Coronaviruses are frequently found in animals such as bats, cats, and camels, but they do not cause harm to the animals (Sahu & Gupta, 2021). However, the viruses can mutate when they transfer to new species, and ultimately cause disease in humans (Sahu & Gupta, 2021). It is believed that the first humans infected with COVID-19 caught the virus at a food store in Wuhan that sells meat, fish, and live animals (Sahu & Gupta, 2021).

According to the World Health Organization (WHO), the virus can spread through respiratory droplets of different sizes when an infected person coughs, sneezes, speaks, sings, or breathes (WHO, 2021). Therefore, it is important to practice respiratory etiquette such as coughing into a flexed elbow and staying home when feeling ill to prevent the spread of COVID-19 (WHO, 2021).

2.1.3 Pre-pandemic

The pre-pandemic phase refers to the time period before the outbreak of a pandemic. During this phase, there is typically no significant public health emergency or concern about the spread of an infectious disease (World Health Organization [WHO], 2018). During this phase, the

focus is on regular surveillance of infectious diseases to detect any potential outbreaks early and prevent their spread (WHO, 2018).

In preparation for a possible outbreak, health officials and policymakers in the pre-pandemic phase work on developing and implementing strategies to prevent the spread of infectious diseases. These strategies may include vaccination programs, public health education campaigns, and the implementation of infection control practices in healthcare settings (WHO, 2018).

Although there may not be an immediate threat of a pandemic during the pre-pandemic phase, it is still crucial to be prepared for a potential outbreak. This includes maintaining a stockpile of medical supplies and equipment, developing pandemic response plans, and conducting regular drills and exercises to ensure readiness in the event of an outbreak (WHO, 2018).

2.1.4 During Pandemic

The pandemic phase refers to the period during which a new infectious disease spreads rapidly and widely, affecting many people in multiple regions of the world. A pandemic is a global outbreak of a new infectious disease that spreads rapidly and widely across multiple countries and regions (Centers for Disease Control and Prevention, 2021). Pandemics can arise when a new strain of virus or bacteria emerges that is highly infectious and can spread easily between humans (Centers for Disease Control and Prevention, 2021).

During a pandemic, the virus or bacteria can quickly infect large numbers of people, overwhelming healthcare systems and leading to high levels of illness and death. Governments and health organizations work to implement measures to try to contain the spread of the disease and minimize its impact on society, such as quarantines, travel restrictions, and social distancing measures (World Health Organization, 2021).

The response to a pandemic can vary depending on the severity of the outbreak and the availability of resources to respond to it. In some cases, governments may implement strict lockdowns to try to slow the spread of the disease and protect their populations. In other cases, they may focus on providing medical care and support to those who are infected (Centers for Disease Control and Prevention, 2021).

During a pandemic, there may be multiple waves of infection, with each wave characterized by its own unique challenges and consequences. These waves may be driven by factors such as changes in the virus or bacteria, changes in behavior or social norms, or changes in government policies and responses (World Health Organization, 2021).

2.1.5 Post-pandemic

The post-pandemic phase refers to the period of time after a pandemic has ended and society begins to recover and rebuild (World Health Organization [WHO], 2020). In the context of the current COVID-19 pandemic, the post-pandemic age refers to the period after the virus has been brought under control, and life returns to a certain degree of normalcy.

During the post-pandemic age, there is typically a shift in the way people live and work as they adjust to the aftermath of the pandemic. For example, there may be changes in social norms, economic activity, and government policies, among other things.

One of the main features of the post-pandemic age is that people become more conscious of the risks and potential threats posed by infectious diseases. This can lead to changes in behavior, such as increased use of personal protective equipment, frequent hand washing, and social distancing.

The post-pandemic age may also involve a recovery period where society rebuilds and adapts to the changes that occurred during the pandemic. This may include changes to the healthcare system, the way people work, and the way people interact with one another.

2.1.6 Endemic

Endemic diseases are diseases that are constantly present in a specific population or geographic area (World Health Organization [WHO], 2021). These diseases do not spread rapidly across the globe, unlike pandemics. Endemic diseases are usually caused by pathogens that are adapted to the local environment, and individuals within the population may have developed immunity to the disease through previous exposure. Examples of endemic diseases include

malaria in sub-Saharan Africa, dengue fever in Southeast Asia and Latin America, and tuberculosis in many parts of the world.

In the case of COVID-19, there is a possibility that the virus may become endemic, meaning that it continues to circulate at low levels within the global population (WHO, 2021). This would require ongoing efforts to manage and mitigate the disease, such as vaccination campaigns and public health measures to limit transmission. However, it would also mean that COVID-19 becomes a regular part of life, rather than a crisis to be contained.

2.1.7 Virtual Learning

Virtual learning refers to the teaching and learning styles in which students and teachers do not interact in reality, at least not within the same room (Lewis, 2018). Although some of these modes of learning do include in-person sessions, the teacher and student are typically in separate places and are linked through a computer. Furthermore, not all types of virtual learning use real-time connectivity. Sometimes information is produced ahead of time, and any conversation takes place with time lags, including discussion by email. These many types of virtual learning are becoming incredibly common as substitutes for the traditional classroom's face-to-face learning environment.

Teachers started experimenting with virtual learning shortly just after the Internet's introduction. It wasn't uncommon for some teachers to use multi-object oriented (MOOs) websites to deliver at least some education in the early 1990s (Bajaj & Nagendra, 2021). With the advancement of Internet technology, it became easier to teach whole classes virtually or with no or few in-person class sessions. This concept was adopted to a certain extent in universities and colleges to provide students with more freedom in learning techniques.

The development of virtual learning has led to the emergence of a whole new sector of universities, as well as primary and secondary schools, which operate entirely in a virtual environment. Though the quality varies, they have allowed many people to pursue an education that would not have been possible otherwise.

Virtual learning is delivered in a variety of ways. Some lessons may be held in real time, with lecturers and students connected via videoconferencing, chat sessions, or virtual worlds such as Second Life. Other classes provide students with texts and homework, and any questions

they have are answered by email. Instructors get completed assignments through email. Additional types of learning might include reading materials delivered to students by the teacher or video or audio recordings that are effectively "lectures" (Bajaj & Nagendra, 2021).

2.1.8 Student Health

Student health refers to the overall wellbeing and quality of life of students, which encompasses important aspects such as physiological and psychological health (American College Health Association, 2019). It involves a holistic approach that takes into account various factors such as access to healthcare, healthy lifestyle choices, supportive environments, and academic success. The goal of promoting student health is to empower students to thrive and reach their full potential both inside and outside of the classroom.

2.1.9 Physiological Health

According to the American College Health Association (2021), physiological health refers to the state of the body's physical health and functioning, including the functioning of the organs, systems, and cells, as well as the musculoskeletal system, which includes the bones, muscles, joints, and connective tissue. Physiological health encompasses a wide range of factors, such as nutrition, exercise, sleep, disease prevention, and medical care. It is important for students because poor physiological health can lead to a range of health problems, such as fatigue, illness, chronic diseases, and mental health problems. On the other hand, maintaining good physiological health can improve energy levels, immune function, and overall well-being, allowing students to perform at their best academically and socially (American College Health Association, 2021).

The musculoskeletal system plays an important role in physiological health because it supports the body's movements and posture. Maintaining good musculoskeletal health through exercise and proper body mechanics can help prevent injuries and improve overall physical function. Poor musculoskeletal health can lead to pain, limited mobility, and decreased physical activity, which can negatively impact overall physiological health (American College Health Association, 2021).

2.1.10 Psychological Health

Psychological health refers to the state of a person's emotional and mental well-being, including their ability to cope with stress, manage emotions, and maintain positive relationships (American Psychological Association, 2021). It encompasses a wide range of factors such as self-esteem, resilience, optimism, social support, and coping strategies. Psychological health is important for students because it can affect their academic performance, relationships, and overall quality of life. Poor psychological health can lead to a range of problems, such as anxiety, depression, substance abuse, and academic underachievement. On the other hand, maintaining good psychological health can improve academic success, enhance relationships, and promote overall well-being (American Psychological Association, 2021).

One important aspect of psychological health for students is stress management. Stress is a common experience for many students, and it can have negative effects on both physical and mental health. Good psychological health allows students to manage stress effectively through strategies such as relaxation techniques, time management, and seeking social support (American Psychological Association, 2021).

In addition, building resilience and positive coping strategies can help students navigate challenges and setbacks, and maintain a sense of well-being. This can involve seeking out positive social relationships, engaging in physical activity or hobbies, and developing a positive outlook on life (American Psychological Association, 2021).

2.1.11 Six Main Factors Contributing to the Ergonomic Issues on Student's Health during Virtual Learning in the Post-pandemic Age

Six factors are found to be related to the ergonomic issues on student's health during virtual learning in the post-pandemic age and they include posture, workstation, indoor environmental factors, cognitive factors, distractions, and organisational factors.

Posture factors were categorized into static and awkward posture, as these are the two main types of postures that can cause discomfort and pain when maintained for long periods of time

(Xu et al., 2021). This factor includes the position of the body while sitting or standing during virtual learning. Furthermore, poor posture can lead to musculoskeletal disorders and pain, and can negatively impact physiological health of students.

Workstation factors were categorized based on the different components of the workstation that can contribute to ergonomic issues, such as the desk, chair, monitor, and keyboard and mouse (Barbosa et al., 2020). This factor refers to the design and arrangement of the equipment used for virtual learning and an improperly designed or arranged workstation can lead to discomfort and pain, and can negatively impact physiological health of students.

Indoor environmental factors were categorized based on the types of environmental factors that can have an impact on ergonomics, including lighting, thermal conditions, and noise levels (Buran et al., 2019). This factor includes the conditions of the indoor environment during virtual learning. Moreover, poor indoor environmental conditions can lead to physical discomfort, fatigue, and decreased cognitive function of students.

Cognitive factors were categorized based on the impact that they have on attention levels and engagement in virtual learning, including the interaction with professors, absence of colleagues, and attention level (Zhang et al., 2021). This factor includes the mental processes involved in virtual learning, such as attention, memory, and perception. Poor ergonomic conditions and stress can also negatively affect the cognitive factors of students, which in turn can affect student health.

Distraction factors were categorized based on the types of distractions that can arise during virtual learning, such as text messages and social media (Gao et al., 2020). This factor refers to anything that can divert a student's attention during virtual learning, such as noise, interruptions, or multitasking. Distractions can negatively impact the cognitive function and psychological health of the students.

Organisational factors were categorized based on the impact that they have on the ability of students to dedicate appropriate time to rest and recreational activities, which can impact their overall psychological health, and in turn, their ability to engage effectively in virtual learning (Kim & Hughes, 2021). In the context of this study, this factor refers to the aspects of how students manage their time and balance their academic, rest, and recreational activities. These factors revolve around time management skills, study habits, and the ability to prioritize tasks effectively. Students who struggle with organisational factors may find themselves

overwhelmed by academic demands and struggle to find time for other important aspects of their lives, such as socializing, hobbies, or relaxation. On the other hand, students who can effectively manage their time and balance their activities are more likely to experience better academic performance, reduced stress, and improved overall well-being.

2.1.12 Factors Contributing to the Ergonomic Issues on Student's Health during Virtual Learning in the Post-pandemic Age

2.1.12.1 Static posture

Static posture refers to physical activity in which the exact posture or stance is maintained throughout. These sorts of activities place greater loads or stresses on the tendons and muscles, leading to exhaustion. This happens because not moving hinders the flow of blood, which is required to provide nutrients to the muscles and get rid of waste from muscle metabolism (Chen & Karwowski, 2020). For example, static postures include extending the arms out to perform certain tasks for a prolonged period and standing or sitting in one spot for an extended period of time.

2.1.12.2 Awkward posture

Awkward posture refers to the body posture which deviates from a neutral position. When a section of the body is in an unusual posture, the bones, muscles, and tendons are out of place. Therefore, working in an awkward position raises the likelihood of musculoskeletal problems, since they may stress joint components and restrict or impede blood flow (Huis in 't Veld et al., 2019). For example, awkward postures include carrying out tasks that involve long or uncomfortable reaches and sitting in a hunched or slouched position which might put pressure on the spinal discs and back muscles.

2.1.12.3 Desk

Besides, a desk that does not provide sufficient space for the leg underneath is undesirable as it could cause discomfort to the placement of the leg. That can be explained by the fact that the student might opt to sit for a long period of duration with

an uncomfortable posture and that will impact blood circulation negatively (Lai et al., 2019). After that, a desk that lacks the option to be vertically adjustable will have the result of causing discomfort as that could result in poor posture practised by the student during sitting and contributes to possible ergonomic issues (Jung et al., 2019). In some cases, the desk that is vertically adjustable but does not offer the option for a standing desk is also thought to be unfriendly to the lower back since the student will not able to use the desk while standing whenever he feels discomfort in the lower back.

2.1.12.4 Chair

The chair plays an important role in ensuring the comfort of the working environment as the student will occupy it throughout the day. The plastic chair is commonly sought after by most of the people due to the economic price but however, the inflexibility of the chair to adjust or modify could be a potential issue as it will result in discomfort to the student. The backrest may not sound important but it actually contributes the most to the coziness of the sitting experience as it provides essential support for the back, especially for the lower back which is really vulnerable to external factors and the inability of adjusting the backrest of a chair could probably result in injuries over time (Chung et al., 2020). Moreover, the armrests are optional and it always seems to be not considered when choosing a chair but that could cause fatigue to arms and also the shoulders in some circumstances. Lastly, a chair with a base that is not vertically adjustable could lead to musculoskeletal injuries due to excessively high strain levels where the student has to hump on his back to look at the computer's screen (Kwong et al., 2020).

2.1.12.5 Monitor

The monitor displays all the visual information on its screen and it is what the student will be staring at for hours for studies. The angle, height and distance of the monitor are all crucial aspects to be taken into consideration to set off a good study environment since they could contribute to any injuries and discomfort. It seems like the angle of the monitor screen is one of the possible causes for the unhealthy tension being projected

onto the student's body, whereby headache is also one of the possible consequences as the student will have to bend his neck to have a better look at the monitor screen. Unmatched height could possibly result in musculoskeletal injuries too because the student will have to sit in a poor posture so that his eye level can finally be in the comfortable range for looking at the computer's screen. The distance between the monitor and the student should be within comfortable range because if the monitor is too far away from the student, the student will tend to lean his body forward thus resulting in further musculoskeletal injuries (Fernandes et al., 2019).

2.1.12.6 Keyboard and mouse

Every little detail of the keyboard and mouse matters as any inaccuracy of the decision making will turn into discomfort for the occupier. People tend to ignore the placement of the keyboard and mouse and they just simply put it on the desk without considering the extension of their hands as well as the placement of their wrists. Meanwhile, it finds out that overextension of hands is very unfriendly to the student's body as it is known as an awkward posture and is able to cause injuries to the hands over a certain period (Mayo Clinic Staff, 2021). Next, keyboard kickstands appear to be often mistaken as a tool to improve the typing experience because angled keyboard will place excessive stress on the occupier's wrists too and increase the chance of injury. Then, the size of the mouse is what people is not familiar with and it is noticed that a mouse that is too small will cause the occupier to pinch his fingers while using it whereas pinching will potentially lead to discomfort of fingers along with hands.

2.1.12.7 Lighting

Lighting is an important aspect that influences a student's health during the post-pandemic age (Mayo Clinic Staff, 2021). Students must be able to see well in order to carry out their tasks effectively. Appropriate lighting is necessary as well to ensure that the students are free from any negative health impacts. According to Zhao et al. (2021), appropriate lighting can be referred to as a situation where the reflected light on the item is neither too much nor too little and the contrast between an object and its

surroundings is enough but not excessive. With that, a room with appropriate lighting should be comfortable and allow the student to feel at ease. In contrast, inappropriate lighting causes visual discomfort, resulting in physiological and psychological strain.

2.1.12.8 Thermal

Thermal is another aspect that affects a student's psychological and physiological health if uncontrolled (Zhao et al., 2021). An uncomfortable thermal condition could make the student feel restless or easily distracted, leading to mental stress. In order to avoid that unwanted situation, thermal comfort has to be achieved and it is only achieved when the temperature is neither too cool nor too hot while wearing a regular number of clothing. Besides, the temperature preferences vary for each individual, indicating that there is no certain temperature to achieve thermal comfort. However, it is crucial to maintain a constant thermal condition in an enclosed room as little changes in thermal conditions can be really distressing (Zhao et al., 2021).

2.1.12.9 Noise

According to Julian Treasure (n.d.), the CEO of The Sound Agency, sound has a significant impact on us psychologically, intellectually, and behaviorally, even when we are not aware of it. However, excessive noise can have a detrimental effect on our productivity, well-being, happiness, and, most importantly, our physical health. When we are exposed to loud noises or subjected to specific noises for an extended period, our bodies go into physiological stress mode, which can lead to an increase in blood pressure and heart rate. Additionally, excessive noise levels excite our neurological system, which increases blood pressure and produces stress chemicals. Furthermore, studies have shown that after exposure to the same noises, people are less likely to concentrate on complex tasks. Thus, it is essential to reduce excessive noise levels in our environment to promote better physical and mental health.

2.1.12.10 Interaction with Professors

Virtual learning courses must take into account the importance of interaction mechanisms to provide engaging and successful learning environments. Studies conducted during the pandemic found that students felt less connected to their peers and professors in virtual learning compared to face-to-face schooling (Al-Balas et al., 2020; Puljak et al., 2020; Son et al., 2020). Generally, university students reported lacking in-person interaction with other students and teachers during the lockdown (Puljak et al., 2020), and communication has been more difficult than in face-to-face schooling (Alnusairat et al., 2020; Amir et al., 2020; Radu et al., 2020). This lack of interaction is concerning since social contact and socialization routines are an important aspect of higher education students' everyday lives and might have an impact on their academic growth (UNESCO, 2020).

More community connection has been linked to higher self-efficacy and engagement, as well as decreased academic stress, in the context of virtual classes during the pandemic (Luan et al., 2020; Procentese et al., 2020). Therefore, it is crucial to consider interaction with professors and peers when designing virtual learning courses to ensure a positive learning experience for students.

2.1.12.11 Presence of Colleagues

The presence of colleagues is an important factor to consider when developing virtual learning courses. Studies have shown that students feel less engaged with their peers and teachers during the lockdown than in face-to-face schooling, and they reported lacking in-person interaction with other students and teachers during the lockdown. This lack of interaction is concerning since social contact and socialisation routines are important aspects of higher education students' everyday lives and might have an impact on their academic growth. The pandemic has further increased the importance of this factor, as students reported fewer study partners and felt significantly more socially isolated. Recent studies indicate that students during the pandemic generally feel lonely, and the lack of face-to-face social interactions during the pandemic is not only associated with the sense of loneliness but can also be a significant source of students' stress (Labrague et al., 2021; Dumitrache et al., 2021; Son et al., 2020; Živčić-

Bećirević et al., 2021). Pre-pandemic studies on distance education also emphasize students' needs to connect with other students and imply potential feelings of alienation related to virtual classroom. Therefore, it is essential to include interaction mechanisms in virtual courses to provide interesting and flourishing learning environments and promote community connections, which have been linked to higher self-efficacy and engagement and decreased academic stress in the context of virtual learning during the epidemic.

2.1.12.12 Attention Level

Giusti et al. (2021) reported difficulties regarding learning and concentration during distance education among university students, which highlights the challenge of maintaining attention during virtual learning. Additionally, Elmer et al. (2020) suggested that virtual education can be a rather lonely experience, lacking the usual academic interactions and networking, which can further affect students' motivation and learning. Asynchronous learning, which lacks interactions and dynamics, can negatively affect student motivation and learning. The association of beds with rest can also interfere with students' ability to concentrate and learn (The Observer, 2021). Furthermore, not having breaks can cause frustration and make it harder to maintain focus for the full school day. Philipp Lorenz-Spreen, a member of the Max Planck Institute for Human Development, explained that the increasing volume of content exhausts attention and causes students to switch between topics more frequently (The Observer, 2021). Researchers argue that students taking virtual courses are more vulnerable to distractions since they are freer to multitask (The Observer, 2021). In virtual learning, it takes self-discipline and willpower to stay attentive and focused, and students who struggle with concentration and learning during virtual learning may experience increased levels of stress, anxiety, and frustration, which can negatively impact their mental health.

2.1.12.13 Text Messages

Text messages during virtual learning can have negative effects on students' academic performance and mental well-being. Amir et al. (2020) and Son et al. (2020) found that

texting during virtual classes is associated with difficulties in focusing and concentrating while learning. Khalil et al. (2020) also noted that texting can become a barrier to the acquisition of knowledge through virtual courses. In a classroom setting, texting can act as a distractor to attention and limit learning. According to a study by Wood et al. (2019), college students who used their mobile phones for texting during class had lower academic performance and were more likely to experience distractibility and attention difficulties than those who did not engage in this behavior. Moreover, texting and other distracting activities can lead to mental fatigue, make learning tasks take longer to complete, and require additional time for refamiliarization with the material. Therefore, students should avoid texting and other distractions during virtual learning to optimize their ability to concentrate and learn effectively.

2.1.12.14 Social Media

Social media is a major source of distraction for students and can hinder their ability to successfully complete tasks by tempting them to use social media instead (Ravizza et al., 2018). As a consequence, students can become distracted by social media, which can negatively affect their academic performance and well-being (Hou et al., 2021). Social media distraction refers to the process by which social media cues draw students' attention away from tasks they originally intended to complete, such as studying or completing assignments (Tang et al., 2020). Due to the ease of mobile access to social media, distractions can occur frequently for students (Alzahrani et al., 2020). Previous research has consistently shown that multitasking, including social media use, can negatively impact academic performance among students (Alzahrani & Almohanna, 2021). Distractions take up limited cognitive resources, which can impair students' ability to learn and retain information (Fried & Aricak, 2018). As a result, students may experience lower academic performance and find it challenging to keep up with coursework. Moreover, the constant use of social media can lead to mental exhaustion and stress, as it can be overwhelming and lead to a constant sense of being "plugged in" (Tang et al., 2020). This can lead to increased levels of anxiety and decreased overall well-being (Hou et al., 2021). Therefore, it is crucial for students to avoid being distracted by social media during virtual classes, allowing them to fully engage in their studies and maintain good mental health (Alzahrani et al., 2020).

2.1.12.15 Time Dedicated to Recreational Activities

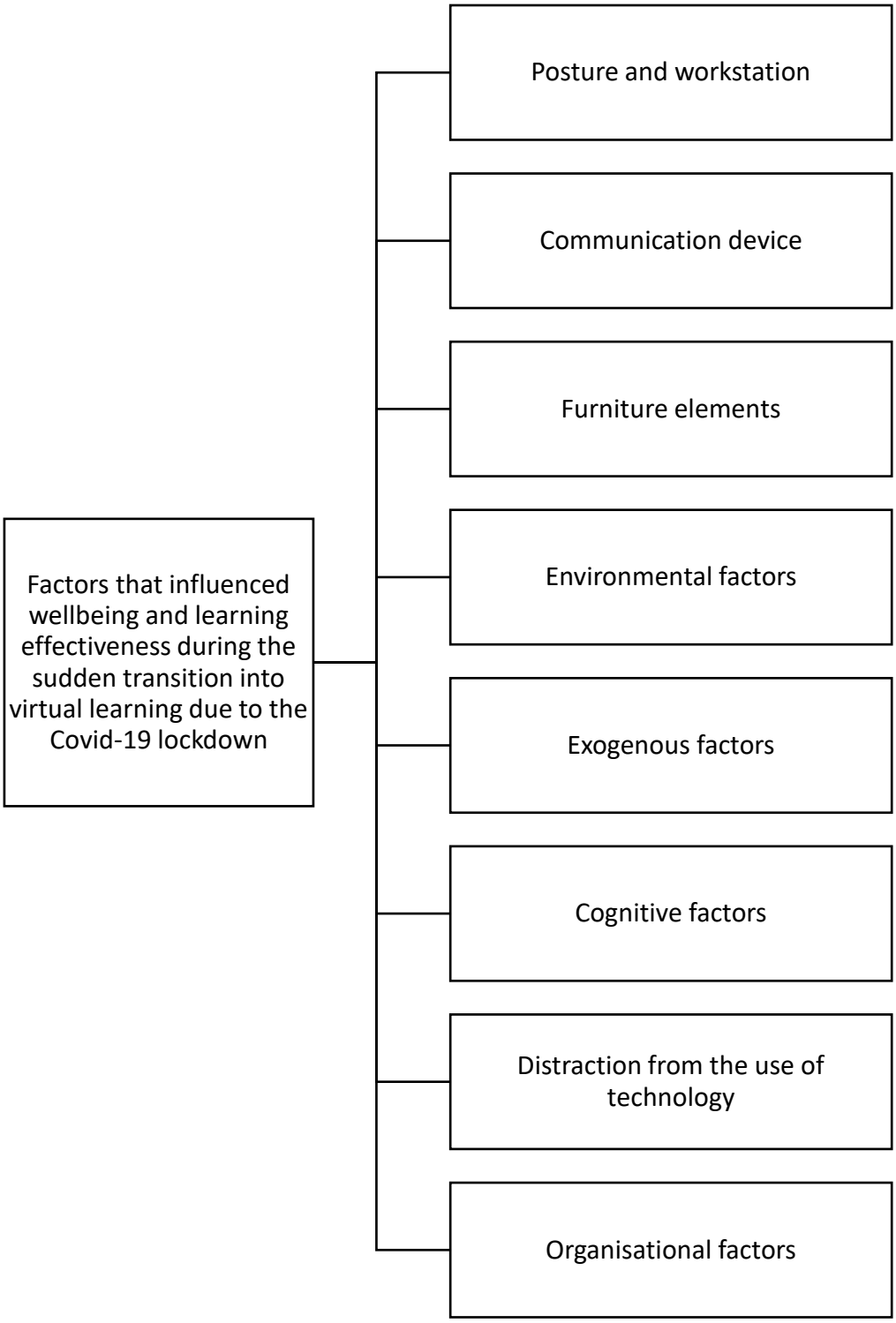
According to Tang et al. (2020), the increased use of social media and technology has resulted in more time being spent on recreational activities, which can negatively impact academic performance and contribute to high levels of stress among college students. Additionally, chronic exposure to stress can have negative effects on mental health, including negative emotions and reduced cognitive functioning. Therefore, it is important for students to manage their time effectively and find healthy ways to cope with stress to maintain their overall well-being.

2.1.12.16 Time Dedicated to Rest

Sleep deprivation due to prolonged screen time negatively affects academic performance by decreasing cognitive function and increasing procedural errors, which can put students at risk. This is particularly concerning as virtual learning has resulted in many students spending prolonged hours staring at computer screens, leading to deficits in the prefrontal cortex of the brain. The transition to virtual learning has also resulted in disrupted sleeping patterns due to technology, which alters the body's circadian rhythm. This disruption can lead to a lack of sleep, negatively affecting academic performance. Effective time management is crucial for students to maintain a healthy balance between their studies and day-to-day lives, as ineffective time management has been linked to poor sleep patterns and increased levels of stress (Kim & Hughes, 2021). Providing uniform breaks between classes can help students stay focused and retain information (Ferguson et al., 2019). Taking breaks can also help students relax and rest their minds, thus increasing productivity levels and maintaining concentration and focus during virtual classes. Therefore, it is essential to incorporate frequent breaks in virtual classes to help students manage their time effectively and maintain their overall well-being.

2.2 Review of Relevant Theoretical Framework

Figure 2.1: Relevant Theoretical Framework



Source: Naddeo, Alessandro, et al. (2021)

The relevant theoretical framework above was obtained from research conducted by Naddeo et al. (2021) where they discussed the possible factors influencing the wellbeing and learning effectiveness during the sudden transition into virtual learning due the to Covid-19 lockdown. By building on this relevant theoretical framework, it can provide a structure and direction for my research by providing a comprehensive framework for understanding the different dimensions of the virtual learning experience.

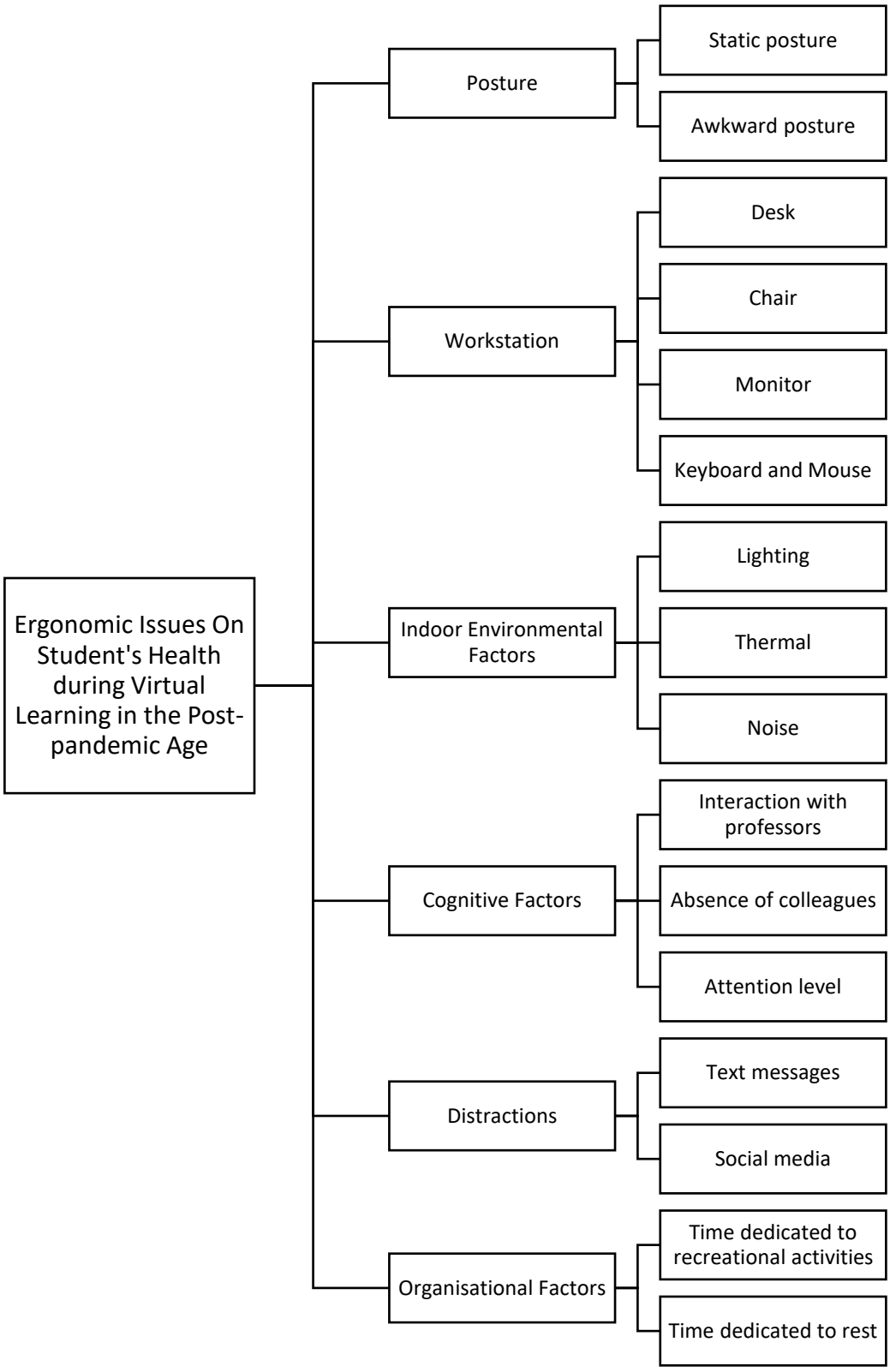
Firstly, the relevant theoretical framework illustrates 8 factors that are found to be influencing the wellbeing and learning effectiveness during the sudden transition into virtual learning due the to Covid-19 lockdown. One of the significant factors is posture and workstation, which includes the characteristics of the seat, layout, and organization of the work area, and the amount of time spent in each position. Communication devices also play a crucial role in virtual learning as the quality of internet connection, technical characteristics of the device, and screen size affect the perceived comfort of students. Furniture elements like room acoustics, auxiliary components, and use of multiple screens also affect the perceived comfort of students.

Environmental factors like the state of maintenance, lighting, air quality, and noises also impact the wellbeing of students. Exogenous factors like sharing the work environment with family or colleagues also affect the perceived wellbeing of students. Cognitive factors, which are the most populated cluster, have a significant impact on the cognitive and emotional aspects of students. The different way of interacting with professors, absence of colleagues, different level of attention, and absence of trips are some of the factors that influence cognitive factors.

Distractions from the use of technology like technological devices, search engines, and the possibility to record lessons can be beneficial for learning effectiveness but also a source of distraction. Organizational factors like the re-organization of time dedicated to study and other activities can impact student wellbeing. The sudden increase in freedom to move during the lesson can be a positive factor for some students, while for others, it can be a negative impact. Whereby, the less time between one lesson and another can also be a stress factor for some students.

2.3 Proposed Theoretical/ Conceptual Framework

Figure 2.2: Proposed Theoretical/ Conceptual Framework



Source: Developed for the research, (2023).

The proposed theoretical/conceptual framework illustrates how 16 factors that contribute to ergonomic issues during virtual learning in the post-pandemic age are categorized into six main factors. The first factor is posture, which includes the static posture and awkward posture adopted by students during virtual learning. Poor posture can lead to various musculoskeletal problems such as neck pain, back pain, and headaches.

The second factor is the workstation, which includes the desk, chair, monitor, keyboard and mouse used by students. A poorly designed workstation can cause discomfort and pain in various parts of the body, such as the back, neck, and hands.

The third factor is indoor environmental factors, such as lighting, thermal comfort and noise levels. Poor indoor environmental conditions can lead to eye strain, headaches, and fatigue, as well as causing distraction and reduced cognitive performance.

The fourth factor is cognitive factors which refer to the mental demands of virtual learning, including the need for concentration and attention. Lack of interaction with professors and colleagues may also lead to feelings of isolation and reduced motivation.

The fifth factor is distractions which refer to potential interruptions such as text messages and social media that can decrease productivity and increase mental fatigue.

The final factor is organizational factors which relate to the importance of balancing virtual learning with recreational activities and rest for overall well-being.

By categorizing the factors that contribute to ergonomic issues into these six main factors, researchers can better understand the complex interplay between various factors and their impact on students' health during virtual learning in the post-pandemic age.

2.4 Conclusion

In summary, chapter 2 provides a comprehensive review of the literature related to the research topic of ergonomic issues on students' health during virtual learning in the post-pandemic age. The chapter begins with a literature review to explore various concepts or ideas and findings relevant to the research objectives. Furthermore, it categorizes the 16 factors into six main factors: posture, workstation, indoor environmental factors, cognitive factors, distractions, and organizational factors. These factors are supported by relevant studies and research in the field.

The review also examines relevant theoretical models that provide a foundation for the proposed theoretical/conceptual framework. The proposed theoretical framework provides a conceptual understanding of several factors or independent variables that contribute to ergonomic issues during virtual learning in the post-pandemic age and how they are categorized into 6 main factors.

Overall, the literature review emphasizes the significance of ergonomic practices during virtual learning and their impact on student's health. It highlights the need for increased awareness and better practices to improve the overall well-being and performance of students during virtual learning in the post-pandemic age.

CHAPTER 3: METHODOLOGY

3.0 Introduction

For this chapter, the research methodology will be performed and it includes the research process as well as the technique applied. The purpose of this chapter is to recognize, choose, evaluate, and analyse the relevant information regarding the relationship between ergonomic issues and students' health during virtual learning in the post-pandemic age. To conduct this chapter, a number of elements are taken into consideration which include research design, data collection methods, sampling design, operational definitions of constructs, measurement scales, and methods of data analysis.

3.1 Research Design

The purpose of the research study in question is to identify the factors contributing to ergonomic issues on student's health during virtual learning in the post-pandemic age and to investigate the relationship between ergonomic issues and students' health during virtual learning in the post-pandemic age. To determine the most appropriate research design, it is necessary to consider the research question and the type of data that will be collected.

In this case, the research question is concerned with the factors contributing to ergonomic issues on student's health during virtual learning in the post-pandemic age and the relationship between ergonomic issues and students' health during virtual learning in the post-pandemic age. To achieve research objective one, a qualitative study is involved. In this case, existing documents are collected to identify the 16 potential factors contributing to the ergonomic issues on student's health during virtual learning in the post-pandemic age, which are also the independent variables of the study and they include static posture, awkward posture, desk, chair, monitor, keyboard and mouse, lighting, thermal, noise, interaction with professors, absence of colleagues, attention level, text messages, social media, time dedicated to recreational activities and time dedicated to rest.

To achieve research objective 2, a quantitative research approach may be appropriate to investigate the effects of ergonomic issues on students' health. Quantitative research is often

used to measure and analyze numerical data and is particularly useful when the research question involves testing hypotheses or making predictions (Creswell & Creswell, 2018). In this case, a survey or questionnaire could be used to gather quantitative data on students' health status and the presence of ergonomic issues in their learning environments. After that, the quantitative data will be analysed using inferential analysis.

Based on the purpose of the research, The research design may be exploratory in nature, allowing for a better understanding of the phenomenon and generating hypotheses for future research (Creswell & Creswell, 2018).

In conclusion, the most appropriate research design for identifying the factors contributing to ergonomic issues on student's health and investigating the relationship between ergonomic issues and students' health during virtual learning in the post-pandemic age may be qualitative and quantitative research, using existing documents and questionnaire to gather data on the prevalence of ergonomic issues among students and the associated health impacts. The research design may be exploratory, allowing for a better understanding of the phenomenon and generating hypotheses for future research.

3.2 Data Collection Methods

This section will describe the methods used to collect primary and secondary data to answer the hypotheses and research questions. In this study, both primary and secondary data collection methods were used to ensure the validity and reliability of the research findings (Hennink, Hutter, & Bailey, 2020).

3.2.1 Primary Data

Primary data collection methods involve the direct collection of data from the target population using various techniques (Saunders, Lewis, & Thornhill, 2019). In this study, the survey is used as the primary data collection method.

A survey was conducted to collect data from students on their experience with ergonomic issues in their learning environments. The survey was designed to gather quantitative data on

the prevalence of ergonomic issues and their impact on student's health. The survey was distributed online using Google Forms to ensure ease of access and to reach a large number of participants.

3.2.2 Secondary Data

Secondary data collection methods involve the use of data that has already been collected by other researchers or organizations (Saunders, Lewis, & Thornhill, 2019). In this study, the literature review is used as the secondary data collection method.

A comprehensive literature review was conducted to gather relevant secondary data on the relationship between ergonomic issues and students' health during virtual learning in the post-pandemic age. The literature review was conducted using an academic database like Google Scholar.

3.3 Sampling Design

Sampling design is a critical aspect of research methodology that involves selecting a subset of individuals or items from a larger population for study (Smith & Jones, 2020). This section will discuss the sampling design for the study, including the target population, sampling frame, sampling elements, sampling technique, and sampling size.

3.3.1 Target Population

The target population for this study is the students of Universiti Tunku Abdul Rahman (UTAR)-Sungai Long Campus in the post-pandemic age which is 9100. The total number of students in the target population was obtained through verbal communication with the administrator of the UTAR-Sungai Long Campus. With that, the sample will be drawn from this population, and the results will be generalized to this group of students.

3.3.2 Sampling Frame and Sampling Location

Sampling frame refers to the list of all the individuals, elements, or units that make up the population of interest. The sampling frame for this study will consist of the list of all students in UTAR-Sungai Long Campus. Sampling location, on the other hand, refers to the physical setting where the sampling will take place. The sampling location will be this specific university campus. This information will be obtained from the university administration and will be used to identify the eligible participants for the study.

3.3.3 Sampling Elements

The sampling elements for this study will be the students of UTAR-Sungai Long Campus. The students will be identified based on their enrolment in the university during the post-pandemic age.

3.3.4 Sampling Technique

For this study, a non-probability sampling technique, specifically convenience sampling, will be used. The target population for the study will be undergraduate students in the Faculty of Business and Finance, and the participants will be selected based on their availability and willingness to participate in the study.

Convenience sampling is chosen for practical reasons, as it is cost-effective and time-efficient (Gorard & Taylor, 2017). However, it is important to acknowledge that this technique may introduce bias and limit the generalizability of the study results. To address this limitation, efforts will be made to ensure that the sample is diverse and representative of the target population as much as possible.

To further enhance the validity and reliability of the study, a sensitivity analysis will be conducted to evaluate the robustness of the findings with respect to different sampling techniques.

3.3.5 Sampling Size

Figure 3.1: Taro Yamane Formula for Calculating Sample Size

$$n = \frac{N}{(1 + Ne)^2}$$

Source: Gupta & Bhatnagar (2019).

Where:

n = sample size

N = population size

e = margin of error (as a decimal, e.g. 0.1 for 10%).

The sample size for this study will be 100 UTAR-Sungai Long Campus students, selected using the stratified random sampling technique. The sample size is determined using the Taro Yamane method and the formula is shown above. With this, the sample size is sufficient to achieve a margin of error of 10% with a 90% confidence level. This sample size is within the time and resource constraints of the study and will provide enough data to answer the research questions and test the hypotheses.

3.4 Research Instrument

In this study, the research instrument that will be used to collect data is a self-administered questionnaire. The questionnaire will be designed to gather information about students' opinions on the factors affecting their physiological and psychological health while conducting the virtual mode of education during the post-pandemic age.

The choice of these instruments was based on their ability to provide reliable and valid data on the research topic. The self-administered questionnaire is a commonly used instrument in ergonomic research as it allows for the collection of large amounts of data in a relatively short time. Additionally, it is a cost-effective method of data collection as it does not require the presence of a researcher during data collection.

A pilot study will be conducted to test the clarity and reliability of the questionnaire. The pilot study will involve a sample of 30 students from the UTAR-Sungai Long Campus who will be asked to complete the questionnaire about their study environment. The data collected from the pilot study will be analysed to determine the clarity and reliability of the questionnaire items.

The data collection activities will involve the distribution of the self-administered questionnaire to a sample of 100 students of UTAR-Sungai Long Campus. The data collection period is estimated to take approximately three weeks. The self-administered questionnaire will be distributed through email, social media, and text messages.

3.4.1 Design of the Questionnaire

To design an effective questionnaire, it is important to consider several factors. Firstly, the objective of the questionnaire should be clearly defined to ensure that the questions are relevant and focused (Albaum & Peterson, 2019). The questionnaire should also be designed in a way that ensures data accuracy and validity. This can be achieved by carefully selecting appropriate questions and response options.

Besides, the questionnaire should be organized into clear sections that are easy to follow and understand. Each section should cover a specific topic or theme, with related questions grouped together. In addition, it is also important to use appropriate language and avoid complex or technical terms that may be difficult for respondents to understand.

For example, only simple, clear and unambiguous English words will be used for the questionnaire. Next, an introduction, objective and description of the survey will be provided on the cover page of the questionnaire. Then, there will be three sections for the questionnaire, Section A will be related to the personal data of the respondents, and this section will be used to obtain information about the respondents such as gender, age, education level, and experience of suffering health issues which is the dependent variable of this study. Section B will be related to the physiological factors contributing to the negative impacts on physiological health while conducting virtual learning during the post-pandemic age such as posture, workstation including desk, chair, monitor, and keyboard and mouse as well as indoor environmental factors. Section C will be related

to the psychological factors contributing to the negative impacts on psychological health while conducting the virtual learning during the post-pandemic age such as cognitive factors, distractions, and organisational factors. For Sections A and B, the respondents will be required to provide their opinions on the statement by indicating their level of agreement or disagreement on a scale ranging from 1: Strongly Disagree, 2: Slightly Disagree, 3: Neutral, 4: Slightly Agree, and 5: Strongly Agree.

3.5 Constructs Measurement

The purpose of the questionnaire is to assess what is the relationship between ergonomic issues and student's health during virtual learning in the post-pandemic age. The constructs being measured, such as posture, workstation, and indoor environmental factors, will be defined based on previous research discussed in Chapter 2. Then, the questionnaire will use a combination of nominal and ordinal as the primary scales of measurement in addition to the scaling technique like the Likert scale to gather data for analysis.

3.5.1 Nominal scale

Nominal scales are a type of measurement used in quantitative research that group data into distinct categories or groups (Noor, 2018). This is the simplest form of measurement, where there is no numerical order or hierarchy among the categories. In nominal scales, each category is assigned a unique name or number, and they are mutually exclusive, meaning that each data point can only belong to one category. These scales are useful for measuring qualitative or categorical data, such as gender, ethnicity, marital status, or occupation. They help to identify patterns or relationships between different groups or categories, but they do not indicate the magnitude or intensity of the differences between the categories. For example:

What is your gender?

- Male
- Female

3.5.2 Ordinal scale

The ordinal scale is a scale of measurement that allows for the ranking of variables according to some order or hierarchy (Noor, 2018). In other words, ordinal scales can be used to categorize or rank data based on some sort of order, but not based on any specific numerical value.

The key feature of ordinal scales is that the variables can be ranked in a particular order, but the intervals between values on the scale may not be equal. This means that the intervals between adjacent categories cannot be assumed to be the same across the scale. For example,

What is your age?

- 19 years old and below
- 20 to 24 years old
- 25 to 29 years old
- 30 years old and above

It is not appropriate to assume the difference in age between "19 years old and below" and "20 to 24 years old" is the same as the difference in age between "25 to 29 years old" and "30 years old and above."

Ordinal scales are often used in research where the variables being studied are qualitative in nature and cannot be measured precisely using numerical values. However, they can also be converted to numerical scores in some cases to facilitate statistical analysis. For example,

Strongly disagree = 1

Slightly disagree = 2

Neutral = 3

Slightly agree = 4

Strongly agree = 5

3.5.3 Likert scale

A Likert scale is a type of rating scale used to measure respondents' attitudes, opinions, or perceptions towards a particular question or topic (Noor, 2018). It involves a series of statements or questions that respondents are asked to rate based on their level of agreement or disagreement. Typically, a Likert scale consists of a range of response options such as "strongly agree," "agree," "neutral," "disagree," and "strongly disagree." Respondents select the option that best represents their opinion or feeling towards the statement. The responses are then assigned numerical values, usually ranging from 1 to 5, with higher values indicating stronger agreement or disagreement. The Likert scale is commonly used to quantify people's attitudes or opinions towards various issues. For example,

The practice of maintaining the same posture or stance for several hours contributes to negative impacts on health. (Example: Sitting at the table for an extended period of time). Please rate your level of agreement with the following statement:

- Strongly disagree
- Slightly disagree
- Neutral
- Slightly agree
- Strongly agree

3.6 Data Processing

Data processing refers to the various steps taken to prepare data for analysis. The process may include checking, editing, coding, transcribing, and any other necessary treatments of the data. Before analyzing the data, it is important to ensure that the data is clean, accurate, and complete. This may involve checking for errors, missing values, or outliers, and making any necessary corrections (Gao & Mi, 2022).

Once the data has been checked and edited, it may need to be coded or transcribed into a format that can be easily analyzed using statistical software. This may involve assigning numerical codes to categorical data or transcribing data from interviews or surveys.

In some cases, special or unusual treatments of the data may be necessary before analysis. For example, if the data is skewed or has a non-normal distribution, it may need to be transformed before analysis to meet the assumptions of the statistical tests being used.

Overall, data processing is an important step in preparing data for analysis, as it ensures that the data is accurate, complete, and in a format that can be easily analyzed using statistical software.

3.6.1 Data Checking

Data checking is the process of reviewing the collected data to ensure that it is complete, accurate, and consistent with the study objectives. This involves verifying that all required data has been collected, checking for errors or inconsistencies in the data, and addressing any issues that arise. Data checking may involve a manual review of the data or the use of software tools to automate the process. The goal of data checking is to ensure that the data is of high quality and can be used for subsequent analysis (Frisch, 2019).

3.6.2 Data Editing

Data editing is the process of reviewing and correcting the collected data to ensure accuracy, completeness, and consistency. It involves identifying and correcting errors, inconsistencies, and missing data to prepare the data for analysis. The purpose of data editing is to produce a clean, high-quality dataset that can be used to draw valid conclusions and make informed decisions. Data editing can be done manually or using automated software tools (Kim et al., 2021).

3.6.3 Data Coding

Data coding refers to the process of assigning numerical codes to the different categories or responses in a variable. This is done to enable statistical analysis of the data.

For example, there is a variable called "Gender" with two categories, "Male" and "Female", a numerical code of 1 to "Male" and 2 to "Female" can be assigned. Similarly, there is a variable called "Current or Highest Education Level" with categories such as "Foundation", "Bachelor Degree", "Master Degree", and "Doctor of Philosophy", the codes of 1, 2, 3, and 4 can be assigned respectively.

Once the coding has been done, statistical analysis can be performed on the data. For example, the mean, standard deviation, or frequency distribution of the different variables can be calculated. Statistical tests such as Spearman Correlation can also be conducted to find out the relationship between ergonomic issues and student's health during virtual learning in the post-pandemic age.

Overall, data coding is an important step in the data analysis process as it enables the quantifying and analyzing of data using statistical methods (Xia & Wang, 2020).

3.6.4 Data Transcribing

Data transcribing is the process of converting spoken or written information into a written or electronic format. This involves listening to an audio recording or reading a handwritten document and typing out the information into a digital file. Data transcription is commonly used in research studies where interviews or focus groups are conducted and the data needs to be analyzed.

3.7 Data Analysis

In this study, the data analysis was conducted using the statistical software program SPSS (Statistical Package for the Social Sciences) (IBM, 2021). The data was analyzed using a combination of techniques, including content analysis, descriptive analysis, scale measurement, and inferential analysis.

3.7.1 Content Analysis

Content analysis is a research method that involves analyzing and interpreting qualitative data to identify patterns, themes, and meanings (Krippendorff, 2018). It is a systematic and objective approach to analyze data to identify and categorize common themes and patterns that emerge from the data. In the context of this study, content analysis will be used to analyze relevant journals or literature to identify the factors that contribute to ergonomic issues during virtual learning in the post-pandemic age by referring to the journals that are available on the internet or books. Then, the factors will be categorized by authors and color-coded for easier reference. The content analysis will provide insights into the key factors that contribute to ergonomic issues during virtual learning and inform the development of interventions to address these issues.

3.7.2 Descriptive Analysis

Descriptive analysis was used to summarize the data collected from the Likert scale questions in the questionnaire. The mean, median, and mode were calculated for each question to determine the participants' average level of agreement or disagreement.

3.7.3 Scale Measurement

Scale measurement is a process of assigning numbers or labels to observations or data points to represent the magnitude or intensity of the variable being measured. It involves the use of a scale to measure a concept or construct, which could be a personality trait, attitude, or behavior. The scale may have several items or questions that aim to capture different aspects of the construct. The responses to these items are then combined or averaged to create a score for the scale. The resulting score can be used to compare different individuals or groups based on their level of the measured construct. Scale measurement is often used in research to study human behavior, attitudes, and opinions.

3.7.3.1 Pilot Test

To test the reliability of the Likert scale questions, a pilot test was conducted with a small sample of participants to assess the consistency of the responses (Azzopardi et al., 2019). The results of the pilot test were used to refine the wording and structure of the Likert scale questions.

3.7.3.2 Reliability Test

A reliability test using Cronbach's alpha was also conducted on the full dataset to assess the internal consistency of the Likert scale items (Taber, 2018).

3.7.4 Inferential Analysis

Finally, inferential analysis was conducted to test the research hypotheses and answer the research questions. The appropriate statistical tests were chosen based on the nature of the research questions and the data collected. For example, a Spearman Correlation was used to compare to investigate the relationship between ergonomic issues and student's health during virtual learning in the post-pandemic age. This is done by

interpreting the correlation coefficient and significance value of each factor with the dependent variable of the research.

3.8 Conclusion

The methodology chapter of this research project has outlined the research design and procedures used to collect and analyze data. The research design involved using existing documents and questionnaire to collect data from UTAR-Sungai Long Campus students to identify the ergonomic issues on student's health and to investigate the relationship between the ergonomic issues and student's health during virtual learning in the post-pandemic age. The data collected was analyzed using descriptive statistics to provide insights into the prevalence and severity of the identified issues.

Content analysis was also conducted on relevant literature to identify the factors that contribute to ergonomic issues during virtual learning. The factors were then categorized and color-coded by author for easier reference.

The research design and procedures were guided by the research objectives and research questions. The sample size was determined using the Taro Yamane method, and the data collection process was conducted using an online survey tool. The data collected was analyzed using SPSS software, and the results were presented using charts, tables, and graphs.

In conclusion, the methodology chapter has provided a detailed explanation of the research design and procedures used in this research project. The use of quantitative research method has allowed for a comprehensive understanding of the research problem. The results obtained from the data analysis will be presented and discussed in the next chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

Chapter 4 aims to provide a descriptive and inferential analysis of the data collected in the study. This chapter will begin by analyzing the demographic profile of the respondents through frequency analysis. Next, it will focus on the central tendencies measurement of constructs using mean values obtained from the frequency analysis. The reliability analysis of the instrument will be presented in the scale measurement section.

The inferential analysis section will examine the individual variables and their relationships with each other to draw conclusions about the population based on the sample data. Finally, the chapter will end with a summary of the major themes addressed in the chapter and a linkage to the next chapter.

4.1 Content Analysis

Table 4.1: Content Analysis

Author's name	**Factors that contribute to ergonomic issues during virtual learning in the post-pandemic age**
Dennis ~~A~~. Attwood, et al. (n.d.)	Posture Workstation Indoor Environmental Factors Cognitive Factors
Bert Maxwell. (2018)	Distractions
Gerding, Thomas, et al. (2021)	Workstation
Naddeo, Alessandro, et al. (2021)	Posture Workstation Indoor Environmental Factors Cognitive Factors Distractions Organisational Factors

Yorulmaz, Denis S, et al. (2022)	Posture Workstation Organisational Factors
Yijing Xiao, et al. (2021)	Workstation Indoor Environmental Factors Cognitive Factors Distractions Organisational Factors
Fahmi Mazalan & Farah Ayuni Shafie. (2021)	Indoor Environmental Factors
Qais B. Yaseen & Heba Salah. (2021)	Posture Organisational Factors

Source: Developed for the research, (2023).

This content analysis aims to identify the factors that contribute to ergonomic issues during virtual learning in the post-pandemic age. The analysis is based on eight studies conducted by various authors, including Attwood et al. (n.d.), Maxwell (2018), Gerding et al. (2021), Naddeo et al. (2021), Yorulmaz et al. (2022), Yijing Xiao et al. (2021), Fahmi Mazalan and Farah Ayuni Shafie (2021), and Qais Yaseen and Heba Salah (2021). The factors identified in these studies have been categorized and color-coded for easier reference. The factors include posture, workstation, indoor environmental factors, cognitive factors, distractions, and organizational factors. The findings of this content analysis can provide insights into the most common factors that contribute to ergonomic issues during virtual learning, which can help educators and students address these issues and create a more comfortable and healthy learning environment.

Attwood et al. (n.d.) discuss how posture can affect our physical health and the importance of adjusting workstations to reduce the risk of injury. They also talk about how indoor environmental factors like temperature can affect our body's response and lead to exhaustion. In addition, the authors mention the impact of cognitive factors like social and leisure time on our overall well-being, including the potential for social isolation if we don't have enough time for these activities.

Then, Bert Maxwell (2018) discusses about the distracting impact of technology on both educators and students. Technology can cause a huge distraction, with teachers and students getting involved in social media, personal messages, and even taking selfies during class or while studying at home. This distraction not only wastes time but also affects mental focus, causing damage over time if it occurs regularly. The author suggests that the only solution to this problem is for everyone to concentrate on learning and studying without letting other things

distract them. While technology has many benefits, including making tasks like checking university rankings and applying for grants easier, its potential for distraction cannot be ignored. Ultimately, the author suggests that it is up to individuals to use technology to their advantage and not let it distract them from their purpose.

Next, Gerding, Thomas, et al. (2021) discussed the importance of designing workstations that can accommodate different working postures to reduce the risk of musculoskeletal disorders (MSDs). They emphasized that prolonged sitting or standing can lead to physical strain, which can cause discomfort, pain, or even injury. They suggested that adjustable workstations that allow workers to switch between sitting and standing positions throughout the day can help prevent MSDs. The authors also discussed the use of ergonomic equipment such as chairs, keyboards, and monitors to promote healthy posture and reduce strain. They highlighted the importance of proper alignment of the body while working to minimize the risk of injury. Additionally, they mentioned the importance of breaks and stretching exercises during the workday to reduce tension and promote blood flow. Overall, Gerding et al. stressed that an ergonomic workstation design is crucial for maintaining a healthy and safe work environment. By addressing the physical demands of their tasks, students can reduce the risk of injuries and improve their overall well-being.

Naddeo et al. (2021) discuss how it can lead to feelings of frustration, boredom, and even anxiety or depression if students feel disengaged or are not learning effectively. In addition, the finding indicates that the success of virtual learning is dependent on several factors, including posture, workstation, indoor environmental factors, cognitive factors, distractions, and organisational factors. The data shows that a comfortable and adjustable workstation is important in maintaining good posture, which in turn positively affects learning effectiveness. Additionally, indoor environmental factors such as air quality, temperature, and illumination also influence well-being and learning effectiveness. The findings suggest that the lack of interaction in virtual education can have a significant negative impact on learning effectiveness and student engagement as well. Minimizing distractions, such as bad connections and noises, and creating a well-organized and structured learning environment are also important factors in virtual learning. In summary, learning effectiveness and student engagement play a significant role in a student's mental and physical health, and it's important for educators to prioritize creating a positive and engaging virtual learning environment to support their students' well-being.

The study conducted by Yorulmaz, Denis ~~S,~~ et al. (2022) emphasizes the importance of preserving the musculoskeletal system (MSS) health and controlling risk factors such as ergonomically incorrect working positions, posture, and workstation setup. They suggest that by maintaining MSS health and controlling these risk factors, the incidence of MSDs will decrease, and productivity and quality of life will increase. The study also found that the increased workload during the distance education period affected MSS pain intensity, and increased weekly working duration increased MSDs among people. Therefore, individuals should be informed about making well-organized plans regarding increased workload management in the distance education period, the formation of a physical activity plan regarding the maintenance of MSS health, and stress management to maintain psychosocial well-being.

Yijing Xiao et al. (2021) discuss the impact of various workstation, environmental, cognitive, distraction and organisational factors on individual health and productivity. Regarding the physical environment, the authors emphasize the importance of designing workstations that promote good posture and reduce physical strain on individuals. The proper ergonomic design of workstations can lead to reduced musculoskeletal disorders and improved productivity. Additionally, the authors discuss how indoor environmental factors, such as air quality and lighting, can impact individual health and productivity. Cognitive factors, such as mental workload and stress, also play a significant role in individual performance. The authors note that high mental workload can lead to reduced cognitive performance, and that stress can negatively impact both physical and mental health. Moreover, the article discusses how distractions, such as noise and interruptions, can impact individual focus and productivity. Finally, the authors discuss the impact of organisational factors on individual health and productivity. Additionally, the authors note that poor time management can also have a negative impact on individual health and productivity. This may include an excessive workload or unrealistic deadlines, which can lead to stress and burnout. Effective time management strategies, such as prioritizing tasks and delegating responsibilities, can help individuals manage their workload and improve overall health and productivity.

Fahmi Mazalan & Farah Ayuni Shafie. (2021) talks about the importance of indoor environmental factors, such as temperature, humidity, and air quality, on human health and well-being. The author highlights how these factors can impact various aspects of our lives, such as our productivity, mood, and physical health. The article also discusses the potential health risks associated with poor indoor air quality, such as respiratory problems and allergies.

Overall, the article emphasizes the importance of creating a healthy and comfortable indoor environment for optimal human health and well-being.

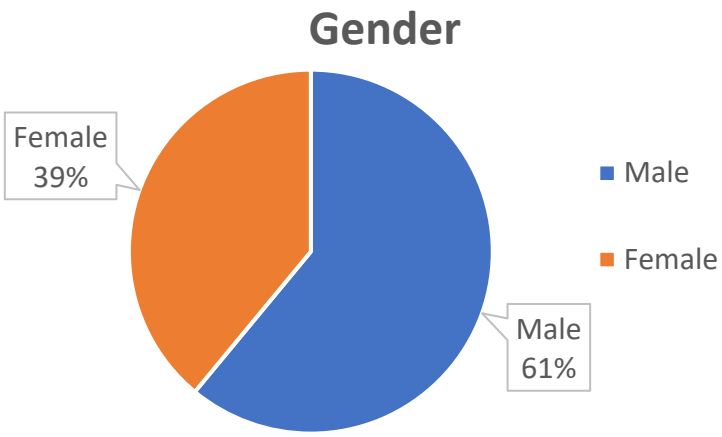
The study conducted by Qais ~~B.~~ Yaseen and Heba Salah (2021) examined the effects of electronic devices on the posture and physical health of students during e-learning. The study found that prolonged use of these devices was associated with poor posture, especially when students were not seated properly or when they used these devices in awkward positions. The poor posture resulted in neck and back pain, and the pain severity increased with longer usage. The pain also affected the normal activities of the students, such as sleeping, bending over, and walking long distances. Females showed a higher prevalence of pain than males, which is consistent with previous studies on neck and back pain. The study suggested that the sedentary lifestyle adopted by students during e-learning may be a contributing factor to the pain. The duration and severity of pain were also found to be correlated with the duration of device usage for e-learning without resting. This suggests that there is a direct relationship between the amount of time spent using electronic devices for e-learning without taking breaks and the risk of developing neck and back pain.

In summary, the content analysis identified six factors that contribute to ergonomic issues during virtual learning in the post-pandemic age: posture, workstation, indoor environmental factors, cognitive factors, distractions, and organisational factors. Posture and workstation were found to be important in reducing the risk of musculoskeletal disorders. Indoor environmental factors, such as temperature and air quality, can affect overall well-being, and cognitive factors, such as mental workload and social/leisure time, can impact individual performance. Distractions, including those caused by technology, were found to be a significant problem affecting mental focus and productivity. Finally, organizational factors, such as a well-structured and engaging learning environment, were found to play an important role in learning effectiveness, student engagement, and overall well-being.

4.2 Descriptive Analysis

4.2.1 Respondent Demographic Profile

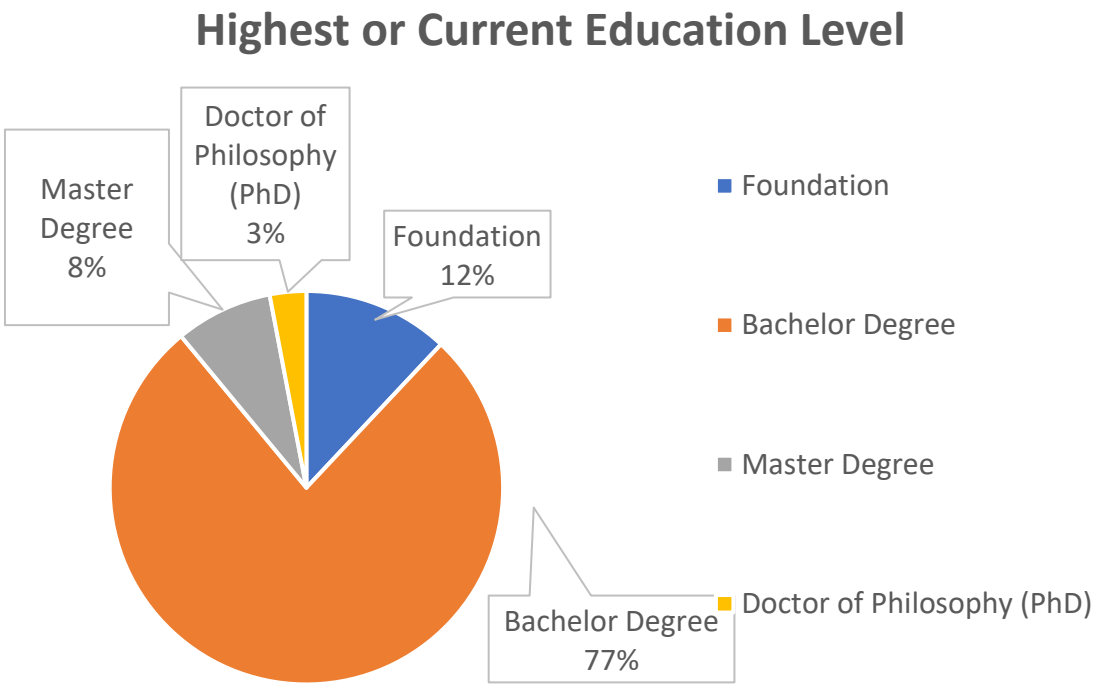
Figure 4.1: Gender



Source: Developed for the research, (2023).

For the respondent demographic profile, 61% of the respondents were male, while 39% were female.

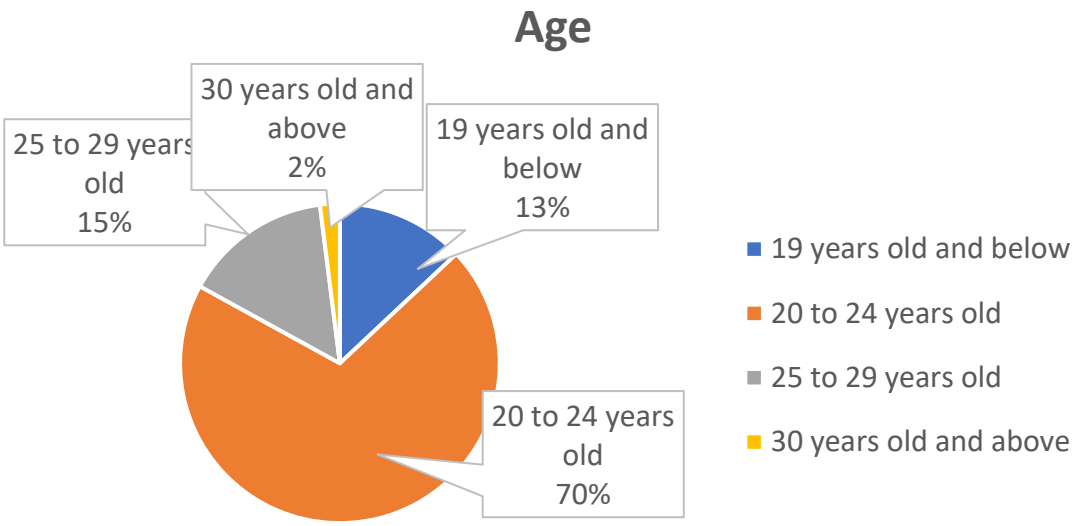
Figure 4.2: Highest or Current Education Level



Source: Developed for the research, (2023).

In terms of education level, 77% of the respondents reported having a Bachelor's degree, 8% reported having a Master's degree, 3% reported having a Doctor of Philosophy (PhD) degree, and 12% reported having a foundation-level education.

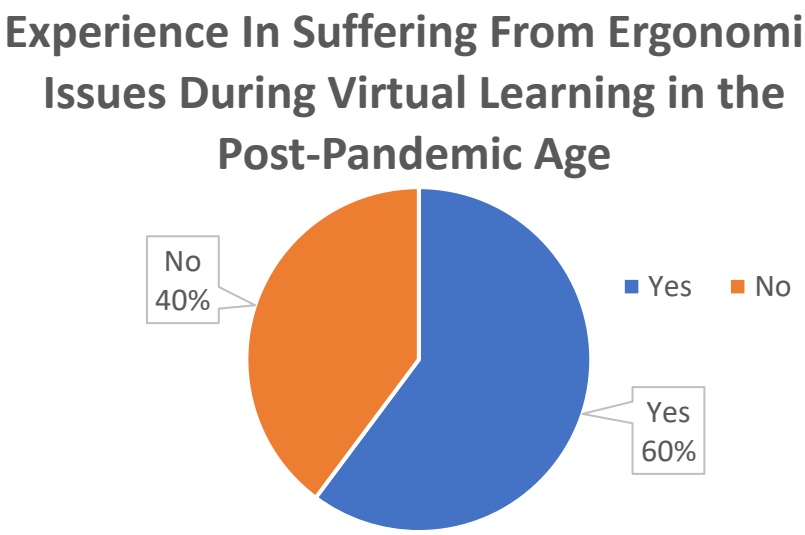
Figure 4.3: Age



Source: Developed for the research, (2023).

The majority of the respondents (70%) were between the ages of 20 and 24, indicating that the sample was largely comprised of young adults. Only a small proportion of the respondents were aged 19 years old and below (13%) or 25 to 29 years old (15%). Additionally, a minority of the respondents were 30 years old and above (2%).

Figure 4.4: Experience in Suffering from Ergonomic Issues during Virtual Learning in the Post-pandemic Age



Source: Developed for the research, (2023).

The results show that 60% of the respondents have reported having experienced suffering from ergonomic issues during virtual learning in the post-pandemic age, while 40% have not.

4.2.2 Central Tendencies Measurement of Constructs

Table 4.2: Mean, Median, and Mode

Independent Variables	Mean	Median	Mode
1. Posture			
(IV1_P1) The practice of maintaining the same posture or stance for several hours contributes to negative impacts on health. (Example: Sitting at the table for an extended period of time).	3.9200	4.0000	4.00
(IV1_P2) The practice of having an awkward or unnatural posture for a significant period contributes to negative impacts on health. (Example: Sitting in a hunched or slouched position).	4.0000	4.0000	4.00
(IV1_P3) Improper posture causes poor blood circulation with tight muscles and joints, hence, resulting in fatigue.	4.0500	4.0000	4.00
1. Workstation			
(IV2_D1) A desk with insufficient leg space is bad for blood circulation.	3.8100	4.0000	4.00
(IV2_D2) A desk that lacks vertical adjustability negatively impacts an individual's physiological health.	3.8600	4.0000	4.00
(IV2_D3) A desk that does not offer the option to be a standing desk negatively impacts an individual's physiological health.	3.7800	4.0000	4.00

(IV2_C1) A chair with a backrest is associated with reduced occurrence of back injuries.	4.0300	4.0000	4.00
(IV2_C2) The absence of an armrest is one of the reasons that contribute to fatigue in arms and shoulders.	3.9600	4.0000	4.00
(IV2_C3) A chair that is not vertically adjustable chair is bad for an individual's physiological health.	4.0500	4.0000	4.00
(IV2_M1) The angle of the monitor screen is one of the possible causes of the unhealthy tension being reflected on an individual body.	3.8400	4.0000	4.00
(IV2_M2) The height of the monitor screen that is too low or high is bad for an individual's physiological health.	3.9300	4.0000	4.00
(IV2_M3) The distance of the monitor screen that is too far or close contributes to causing discomfort to an individual.	3.9200	4.0000	4.00
(IV2_KM1) The unhealthy reach between the keyboard and the mouse with an individual contributes to the overextension of hands.	3.9100	4.0000	4.00
(IV2_KM2) The angle of the keyboard is related to the excessive stress placed on an individual wrist.	3.7600	4.0000	3.00
(IV2_KM3) A mouse that is too small in size is associated with the discomfort of fingers caused by pinching.	3.7800	4.0000	4.00
2. Indoor Environmental Factors			
(IV3_IE1) Poor thermal condition contributes to negative impacts on health. (Example: Room temperature that is too high)	3.7900	4.0000	4.00
(IV3_IE2) Poor lighting condition contributes to negative impacts on health. (Example: Insufficient lighting)	4.1400	4.0000	4.00
(IV3_IE3) Poor noise condition contributes to negative impacts on health. (Example: The room is prone to traffic noise)	3.7800	4.0000	4.00
(IV3_IE4) Poor air ventilation condition contributes to negative impacts on health. (Example: Lack of air circulation).	4.2200	4.0000	4.00
3. Cognitive Factors			
(IV4_C1) The lack of interaction with lecturers during online classes leads to a lack of motivation.	3.6900	4.0000	4.00
(IV4_C2) The absence of other students creates a sense of isolation which results in a greater level of emotional stress.	3.6300	4.0000	4.00
(IV4_C3) A higher level of self-discipline is required during online classes which results in a greater level of emotional stress.	4.0300	4.0000	4.00
4. Distractions			
(IV5_D1) The distraction from text messages during online classes is related to reduced concentration and lower grades, resulting in anxiety or depression.	3.9100	4.0000	4.00
(IV5_D2) The distraction from social media during online classes is associated with reduced concentration and lower grades, resulting in anxiety or depression.	3.8600	4.0000	4.00
(IV5_D3) The distraction from family members during online classes is related to reduced concentration and lower grades, resulting in anxiety or depression.	3.8700	4.0000	4.00

5. Organisational Factors			
(IV6_O1) An unbalanced time dedicated to studying and recreational activities leads to the increased possibility of being stressed and overwhelmed by the heavily accumulated workload.	4.1300	4.0000	4.00
(IV6_O2) Insufficient time dedicated to rest affects an individual's psychological health negatively.	4.0300	4.0000	4.00
(IV6_O3) Multitasking during online classes is one of the reasons that contribute to reduced concentration as well as decreased productivity.	4.1400	4.0000	4.00

Source: Developed for the research, (2023).

Based on the data provided, it can be concluded that maintaining the same posture or stance for several hours (IV1_P1) and having an awkward or unnatural posture for a significant period (IV1_P2) are both perceived as contributors to negative impacts on health, with mean scores of 3.92 and 4.00 respectively. The perception that improper posture causes poor blood circulation with tight muscles and joints resulting in fatigue (IV1_P3) also has a relatively high mean score of 4.05, indicating that it is also seen as a significant factor in the negative impact of posture on health.

For workstation, the data indicates that the central tendencies of the constructs related to workstation factors have been analyzed. The mean scores for desk factors indicate that a desk with insufficient leg space (IV2_D1) and a desk that does not offer the option to be a standing desk (IV2_D3) negatively impact an individual's physiological health, with mean scores of 3.81 and 3.78, respectively. Similarly, a chair that is not vertically adjustable (IV2_C3) has a mean score of 4.05, indicating that it is also bad for an individual's physiological health. On the other hand, a chair with a backrest (IV2_C1) is associated with reduced occurrence of back injuries, as reflected by the high mean score of 4.03. Regarding monitor factors, the height of the monitor screen that is too low or high (IV2_M2) and the distance of the monitor screen that is too far or close (IV2_M3) are bad for an individual's physiological health, with mean scores of 3.93 and 3.92, respectively. Lastly, for keyboard and mouse factors, the angle of the keyboard related to the excessive stress placed on an individual wrist (IV2_KM2) has the lowest mean score of 3.76, while the other two factors, unhealthy reach between the keyboard and the mouse with an individual (IV2_KM1) and a mouse that is too small in size (IV2_KM3), both have mean scores of 3.78.

For indoor environmental factors, the first variable, IV3_IE1, indicated that poor thermal conditions contribute to negative impacts on health. The mean score for this variable was 3.79, indicating that the respondents slightly agreed that poor thermal conditions can negatively

affect one's health. The second variable, IV3_IE2, highlighted that poor lighting conditions can also contribute to negative impacts on health. The mean score for this variable was 4.14, indicating that the respondents agreed that insufficient lighting can negatively affect one's health. The third variable, IV3_IE3, focused on poor noise conditions and how they contribute to negative impacts on health. The mean score for this variable was 3.78, indicating that the respondents slightly agreed that noise pollution can negatively affect one's health. Finally, the fourth variable, IV3_IE4, identified that poor air ventilation conditions can also contribute to negative impacts on health. The mean score for this variable was 4.22, indicating that the respondents agreed that lack of air circulation can negatively affect one's health. Overall, the central tendency measurements for the Indoor Environmental Factors construct revealed that the respondents believed that poor indoor environmental conditions can have negative impacts on an individual's health.

Then, the cognitive factors construct in the study includes three sub-factors related to online classes. The first sub-factor (IV4_C1) states that the lack of interaction with lecturers during online classes leads to a lack of motivation. The participants' responses ranged from 3.69 to 4.0, with a mean of 3.83, indicating that the majority of participants agree that the lack of interaction with lecturers affects their motivation during online classes. The second sub-factor (IV4_C2) indicates that the absence of other students during online classes creates a sense of isolation, resulting in a greater level of emotional stress. The responses ranged from 3.63 to 4.0, with a mean of 3.87, which indicates that most participants agree that the absence of other students in online classes contributes to a sense of isolation and emotional stress. The third sub-factor (IV4_C3) suggests that a higher level of self-discipline is required during online classes, resulting in a greater level of emotional stress. The responses ranged from 4.03 to 4.0, with a mean of 4.01, indicating that most participants agree that online classes require a higher level of self-discipline and that it contributes to greater emotional stress. Overall, these sub-factors highlight the impact of online classes on students' cognitive factors, such as motivation, isolation, and self-discipline, and the resulting emotional stress.

For distractions, it can be concluded that students agree to a moderate extent that distractions during online classes can negatively affect their academic performance and mental health. The mean scores for each statement range from 3.86 to 3.91, indicating that the participants somewhat agree with the statements. The central tendency measures suggest that the majority of participants' responses fall between slightly agree and agree on the scale used, which implies

that distractions during online classes are perceived as significant factors that lead to lower grades and increased anxiety or depression.

Lastly, the organisational factors construct includes three items: (IV6_O1) An unbalanced time dedicated to studying and recreational activities leads to the increased possibility of being stressed and overwhelmed by the heavily accumulated workload; (IV6_O2) Insufficient time dedicated to rest affects an individual's psychological health negatively; and (IV6_O3) Multitasking during online classes is one of the reasons that contribute to reduced concentration as well as decreased productivity. The mean scores for these items ranged from 4.03 to 4.14, indicating that participants tended to slightly agree or agree that these factors are related to negative impacts on their psychological health and academic performance. These findings suggest that it is important for individuals to manage their time effectively and avoid multitasking during online classes to maintain their concentration and productivity.

4.3 Scale Measurement

A reliability test is done to ensure that the measurement instrument, the questionnaire is consistent and stable over time. If the results of the test indicate a high level of reliability, it means that the questionnaire is measuring what it is intended to measure, and that the results obtained are consistent and reliable (Huang & Rust, 2018).

Table 4.3: Cronbach's Alpha Internal Consistency

Cronbach's Alpha	**Internal Consistency**
$\alpha \geq 0.9$	**Excellent**
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

Source: Statisticshowto, (n.d.).

The Cronbach's alpha coefficient measures the reliability of the scale by assessing the extent to which the items in the scale are interrelated. In general, a Cronbach's alpha value of 0.9 or higher is considered excellent, 0.8 to 0.9 is good, 0.7 to 0.8 is acceptable, 0.6 to 0.7 is questionable, 0.5 to 0.6 is poor, and below 0.5 is unacceptable (Statisticshowto, n.d.). These

guidelines are used to assess the degree to which the scale can produce consistent and reliable results.

In terms of the sample size for the reliability test, a sample size of 30 is used, this is a common rule of thumb for conducting reliability tests. While there is no set rule for determining the appropriate sample size, a sample size of 30 is generally considered to be adequate for most purposes (Bujang, Baharum, & Ishak, 2018). This is because a larger sample size increases the reliability of the test, but also increases the cost and time required to collect and analyze the data. Therefore, a sample size of 30 strikes a balance between obtaining reliable results and minimizing time and cost.

Table 4.4: Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.947	28

Source: Developed for the research, (2023).

In this case, the Cronbach's alpha value of 0.946 indicates that the scale is highly reliable and consistent. This means that the items in the scale are strongly interrelated, and the results obtained from the scale can be considered valid and trustworthy.

4.3 Inferential Analyses

4.3.1 Normality Test

Normality tests are used to assess whether a set of data follows a normal distribution, which is a bell-shaped curve with a characteristic mean and standard deviation. The normal distribution is important in statistics because many statistical tests assume that the data is normally distributed. If the data is not normally distributed, the accuracy and validity of these tests may be affected, and alternative tests may need to be used. Therefore, conducting a normality test is a crucial step in data analysis to determine whether parametric tests, which assume normality, or non-parametric tests, which do not assume normality, are appropriate for the data. So, Kolmogorov-Smirnov test is

conducted to determine whether data follows a normal distribution and to help determine the appropriate statistical method for analysis.

Table 4.5: One-Sample Kolmogorov-Smirnov Test

One-Sample Kolmogorov-Smirnov Test		
	N	**Asymp. Sig. (2-tailed)**
1. Posture		
(IV1_P1) The practice of maintaining the same posture or stance for several hours contributes to negative impacts on health. (Example: Sitting at the table for an extended period of time).	30	.004
(IV1_P2) The practice of having an awkward or unnatural posture for a significant period contributes to negative impacts on health. (Example: Sitting in a hunched or slouched position).	30	.000
(IV1_P3) Improper posture causes poor blood circulation with tight muscles and joints, hence, resulting in fatigue.	30	.000
2. Workstation		
(IV2_D1)A desk with insufficient leg space is bad for blood circulation.	30	.000
(IV2_D2)A desk that lacks vertical adjustability negatively impacts an individual's physiological health.	30	.000
(IV2_D3)A desk that does not offer the option to be a standing desk negatively impacts an individual's physiological health.	30	.000
(IV2_C1) A chair with a backrest is associated with reduced occurrence of back injuries.	30	.000
(IV2_C2) The absence of an armrest is one of the reasons that contribute to fatigue in arms and shoulders.	30	.000
(IV2_C3) A chair that is not vertically adjustable chair is bad for an individual's physiological health.	30	.000
(IV2_M1) The angle of the monitor screen is one of the possible causes of the unhealthy tension being reflected on an individual body.	30	.000
(IV2_M2) The height of the monitor screen that is too low or high is bad for an individual's physiological health.	30	.000
(IV2_M3) The distance of the monitor screen that is too far or close contributes to causing discomfort to an individual.	30	.000
(IV2_KM1) The unhealthy reach between the keyboard and the mouse with an individual contributes to the overextension of hands.	30	.002
(IV2_KM2) The angle of the keyboard is related to the excessive stress placed on an individual wrist.	30	.001
(IV2_KM3) A mouse that is too small in size is associated with the discomfort of fingers caused by pinching.	30	.000
3. Indoor Environmental Factors		
(IV3_IE1) Poor thermal condition contributes to negative impacts on health. (Example: Room temperature that is too high)	30	.000
(IV3_IE2) Poor lighting condition contributes to negative impacts on health. (Example: Insufficient lighting)	30	.000

(IV3_IE3) Poor noise condition contributes to negative impacts on health. (Example: The room is prone to traffic noise)	30	.000
(IV3_IE4) Poor air ventilation condition contributes to negative impacts on health. (Example: Lack of air circulation).	30	.000
4. Cognitive Factors		
(IV4_C1) The lack of interaction with lecturers during virtual classes leads to a lack of motivation.	30	.000
(IV4_C2) The absence of other students creates a sense of isolation which results in a greater level of emotional stress.	30	.000
(IV4_C3) A higher level of self-discipline is required during virtual classes which results in a greater level of emotional stress.	30	.000
5. Distractions		
(IV5_D1) The distraction from text messages during virtual classes is related to reduced concentration and lower grades, resulting in anxiety or depression.	30	.000
(IV5_D2) The distraction from social media during virtual classes is associated with reduced concentration and lower grades, resulting in anxiety or depression.	30	.000
(IV5_D3) The distraction from family members during virtual classes is related to reduced concentration and lower grades, resulting in anxiety or depression.	30	.000
6. Organisational Factors		
(IV6_O1) An unbalanced time dedicated to studying and recreational activities leads to the increased possibility of being stressed and overwhelmed by the heavily accumulated workload.	30	.000
(IV6_O2) Insufficient time dedicated to rest affects an individual's psychological health negatively.	30	.000
(IV6_O3) Multitasking during virtual classes is one of the reasons that contribute to reduced concentration as well as decreased productivity.	30	.000

Source: Developed for the research, (2023).

The results of the normality test showed that the distribution of the data was not normal ($p < 0.05$) for all variables. This suggests that the data may not meet the assumptions of some statistical tests that require the data to be normally distributed. Instead, non-parametric tests may be more appropriate for analyzing the data. (Field, 2018)

When the data is not normally distributed, the assumption of normality has been violated, which can affect the accuracy and validity of statistical tests. It is important to use appropriate tests that do not require normality assumptions. One such test is the Spearman correlation, which can be used to assess the relationship between two variables when the data is not normally distributed. Therefore, the Spearman correlation will be used to assess the relationship between the independent variables and the dependent variable (Field, 2018).

4.3.2 Spearman Correlation

Table 4.6: Spearman Correlation

Spearman's rho			
	Experience of Health issues of respondents (Dependent Variable)		
	Correlation Coefficient	**Sig. (2-tailed)**	**N**
1. Posture			
(IV1_P1) The practice of maintaining the same posture or stance for several hours contributes to negative impacts on health. (Example: Sitting at the table for an extended period of time).	-.198*	0.048	100
(IV1_P2) The practice of having an awkward or unnatural posture for a significant period contributes to negative impacts on health. (Example: Sitting in a hunched or slouched position).	-.282**	0.004	100
(IV1_P3) Improper posture causes poor blood circulation with tight muscles and joints, hence, resulting in fatigue.	-.206*	0.040	100
2. Workstation			
(IV2_D1) A desk with insufficient leg space is bad for blood circulation.	-.218*	0.030	100
(IV2_D2) A desk that lacks vertical adjustability negatively impacts an individual's physiological health.	-.267**	0.007	100
(IV2_D3) A desk that does not offer the option to be a standing desk negatively impacts an individual's physiological health.	-.255*	0.010	100
(IV2_C1) A chair with a backrest is associated with reduced occurrence of back injuries.	-.329**	0.001	100
(IV2_C2) The absence of an armrest is one of the reasons that contribute to fatigue in arms and shoulders.	-.290**	0.003	100
(IV2_C3) A chair that is not vertically adjustable chair is bad for an individual's physiological health.	-.437**	0.000	100
(IV2_M1) The angle of the monitor screen is one of the possible causes of the unhealthy tension being reflected on an individual body.	-.257**	0.010	100
(IV2_M2) The height of the monitor screen that is too low or high is bad for an individual's physiological health.	-.222*	0.026	100
(IV2_M3) The distance of the monitor screen that is too far or close contributes to causing discomfort to an individual.	-0.186	0.063	100
(IV2_KM1) The unhealthy reach between the keyboard and the mouse with an individual contributes to the overextension of hands.	-0.086	0.395	100

(IV2_KM2) The angle of the keyboard is related to the excessive stress placed on an individual wrist.	-0.133	0.187	100
(IV2_KM3) A mouse that is too small in size is associated with the discomfort of fingers caused by pinching.	-0.076	0.455	100
3. Indoor Environmental Factors			
(IV3_IE1) Poor thermal condition contributes to negative impacts on health. (Example: Room temperature that is too high)	-0.145	0.150	100
(IV3_IE2) Poor lighting condition contributes to negative impacts on health. (Example: Insufficient lighting)	-.296**	0.003	100
(IV3_IE3) Poor noise condition contributes to negative impacts on health. (Example: The room is prone to traffic noise)	-0.062	0.542	100
(IV3_IE4) Poor air ventilation condition contributes to negative impacts on health. (Example: Lack of air circulation).	-.214*	0.032	100
4. Cognitive Factors			
(IV4_C1) The lack of interaction with lecturers during virtual classes leads to a lack of motivation.	-0.049	0.625	100
(IV4_C2) The absence of other students creates a sense of isolation which results in a greater level of emotional stress.	-0.069	0.492	100
(IV4_C3) A higher level of self-discipline is required during virtual classes which results in a greater level of emotional stress.	-.329**	0.001	100
5. Distractions			
(IV5_D1) The distraction from text messages during virtual classes is related to reduced concentration and lower grades, resulting in anxiety or depression.	-0.102	0.314	100
(IV5_D2) The distraction from social media during virtual classes is associated with reduced concentration and lower grades, resulting in anxiety or depression.	-0.066	0.513	100
(IV5_D3) The distraction from family members during virtual classes is related to reduced concentration and lower grades, resulting in anxiety or depression.	-0.183	0.068	100
6. Organisational Factors			
(IV6_O1) An unbalanced time dedicated to studying and recreational activities leads to the increased possibility of being stressed and overwhelmed by the heavily accumulated workload.	-0.108	0.284	100
(IV6_O2) Insufficient time dedicated to rest affects an individual's psychological health negatively.	-0.125	0.217	100

(IV6_O3) Multitasking during virtual classes is one of the reasons that contribute to reduced concentration as well as decreased productivity.	-0.055	0.589	100

Source: Developed for the research, (2023).

4.3.2.1 Posture

The correlation coefficient between the practice of maintaining the same posture or stance for several hours (IV1_P1) and the experience of health issues of respondents (DV) was found to be -.198 with a significance level of 0.048. This suggests a weak negative correlation between these variables, indicating that a higher frequency of maintaining the same posture or stance for several hours may be associated with a slightly higher likelihood of experiencing health issues. However, it is important to note that the correlation coefficient is relatively small and may not have practical significance.

For IV1_P2, the practice of having an awkward or unnatural posture for a significant period, the correlation coefficient of -.282** with a significance level of 0.004 suggests a moderate negative relationship between this variable and the experience of health issues among the respondents. This means that the more frequently the respondents report having an awkward or unnatural posture, the more likely they are to experience health issues related to ergonomics. This can include problems such as back pain, neck pain, and eye strain, which are commonly associated with prolonged periods of sitting in a hunched or slouched position.

The correlation coefficient of -.206 with a significance level of 0.04 indicates a moderate negative relationship between improper posture causes poor blood circulation with tight muscles and joints (IV1_P3) and the experience of health issues among the respondents due to poor blood circulation. This finding highlights the importance of maintaining proper posture to avoid negative impacts on health.

In conclusion, all three posture-related variables have a negative correlation with students' health during virtual learning and that there is a significant relationship between posture and students' health during virtual learning in the post-pandemic age.

4.3.2.2 Workstation

The correlation coefficient of -.218* suggests a negative correlation between a desk with insufficient leg space (IV2_D1) and the experience with health issues among the respondents. This means that as the leg space of a desk decreases, the negative impact on blood circulation increases. The significance level of 0.03 indicates that this correlation is statistically significant. In short, these findings suggest that it is important to consider the amount of leg space provided by a workstation in order to promote health during virtual learning.

Next, there is a statistically significant negative correlation (significance level = 0.007) between the lack of vertical adjustability of a desk (IV2_D2) and the experience of health issues among the respondents. The correlation coefficient of -.267** suggests a moderate negative relationship between these variables. This means that the more a desk lacks vertical adjustability, the more likely it is for an individual to experience negative effects on their physiological health. This finding underscores the importance of having a desk that is adjustable to promote good health during virtual learning.

The correlation coefficient value of -0.255 indicates a negative correlation between the lack of a standing desk option (IV2_D3) and the experience of health issues among the respondents. The negative sign indicates that as the lack of a standing desk option increases, the individual's physiological health decreases. The significance value of 0.01 (2-tailed) suggests that there is a statistically significant relationship between the lack of a standing desk option and an individual's physiological health. This means that the likelihood of obtaining this result by chance is only 1% or less, indicating that the relationship is not due to random variation and is likely a true effect. Overall, these findings suggest that having the option to use a standing desk may be beneficial for an individual's physiological health.

The study found a significant negative correlation between the presence of a backrest in a chair (IV2_C1) and the experience of health issues among the respondents with a correlation coefficient of -.329 and a significance level of 0.001. This suggests that the absence of a backrest is associated with a higher likelihood of experiencing back injuries. The findings imply that investing in chairs with proper backrests could

potentially reduce the risk of back injuries among individuals who spend extended periods sitting at their workstations.

The absence of an armrest is one of the workstation factors that contribute to fatigue in arms and shoulders (IV2_C2), which in turn negatively impacts an individual's physiological health. The correlation coefficient of -.290** suggests a moderate negative relationship between the absence of an armrest and the experience of health issues among respondents. This finding highlights the importance of having a chair with armrests in promoting good posture and reducing fatigue in the upper body, which can ultimately lead to better overall health outcomes. The significant p-value of 0.003 further supports the strength of this relationship in the population being studied.

Next, the results suggest a strong negative correlation between the absence of vertical adjustability in a chair (IV2_C3) and the experience of health issues among the respondents, as indicated by a correlation coefficient of -.437**. This indicates that individuals who use chairs without the option for vertical adjustability are more likely to experience negative health outcomes. Additionally, the significance level of 0 indicates that this correlation is statistically significant, meaning that it is unlikely to have occurred by chance. Therefore, it is recommended that chairs with the option for vertical adjustability be provided in order to promote better health among individuals.

The data suggests that there is a negative correlation between the angle of the monitor screen (IV2_M1) and the experience of health issues among the respondents. The correlation coefficient value of -.257** indicates a moderate negative correlation, which means that as the angle of the monitor screen increases, the negative impact on an individual's health also increases. The significance value of 0.01 suggests that this correlation is statistically significant and not likely due to chance. These findings imply that the angle of the monitor screen is an important factor to consider in promoting better health among individuals who use computers regularly.

These results suggest that the angle and height of the monitor screen (IV2_M2) are negatively associated with the experience of health issues among the respondents. Specifically, a negative correlation was found between the angle of the monitor screen and unhealthy tension in the body, with a correlation coefficient of -.257** and a significance level of 0.01. Additionally, a negative correlation was found between the height of the monitor screen and physiological health, with a correlation coefficient of

-.222* and a significance level of 0.026. These findings suggest that it is important to consider the placement and angle of the monitor screen in order to promote a healthy work environment.

The correlation analysis indicates that the distance of the monitor screen that is too far or too close (IV2_M3) are negatively associated with the experience of health issues among the respondents, as reflected by a correlation coefficient of -0.186. The significance level of the correlation coefficient is 0.063, which is higher than the commonly used threshold of 0.05, indicating that the relationship between the distance of the monitor screen and health issues may not be statistically significant. However, it is worth noting that the correlation coefficient is negative, which suggests that there is still a potential association between the distance of the monitor screen and health problems. Further research with a larger sample size may be necessary to confirm this relationship.

The correlation coefficient value for IV2_KM1 is -0.086, indicating a weak negative correlation between the unhealthy reach between the keyboard and the mouse with an individual and the experience of health issues among the respondents. However, the significance level of 0.395 suggests that this relationship is not statistically significant.

The correlation analysis indicates that there is a negative correlation of -0.133 between the angle of the keyboard (IV2_KM2) and the experience of health issues among the respondents, particularly in relation to the experience of wrist stress or injury (correlation coefficient = -0.133, p = 0.187). This finding suggests that the angle of the keyboard may have an impact on an individual's physical health. However, the correlation coefficient is not statistically significant with a significant level of 0.187, indicating that this relationship may not be conclusive and may require further investigation.

The correlation analysis suggests that there is a negative correlation between using a mouse that is too small (IV2_KM3) and the experience of health issues among the respondents, particularly the discomfort of fingers caused by pinching (correlation coefficient = -0.076, p = 0.455). This may have implications for an individual's overall experience of health issues, as discomfort and pain can impact daily functioning and productivity. However, the non-significant p-value indicates that further research may

be needed to fully understand the relationship between using a small mouse and its impact on an individual's health.

In conclusion, it appears that some of the variables related to workstation are significant, indicating that there may be a relationship between workstation and students' health during virtual learning in the post-pandemic age. However, not all of the variables related to workstation are significant, so a nuanced interpretation of the results is needed. Further analysis and exploration may be necessary to fully understand the relationship between workstation and students' health in this context.

4.3.2.3 Indoor Environmental Factors

The correlation analysis shows that poor thermal conditions, such as high room temperature (IV3_IE1), are negatively correlated with the experience of health issues among the respondents (correlation coefficient = -0.145, p = 0.15). This suggests that when an individual is exposed to poor thermal conditions, it may lead to negative health outcomes. However, the significance level is not strong enough to conclude that there is a significant relationship between poor thermal conditions and health.

The correlation analysis suggests that poor lighting conditions, such as insufficient lighting (IV3_IE2), have a significant negative correlation with the experience of health issues among the respondents (correlation coefficient = -0.296, p = 0.003). This implies that inadequate lighting may cause health issues among individuals.

The correlation analysis showed a negative correlation between poor noise conditions (IV3_IE3) and the experience of health issues among the respondents (correlation coefficient = -0.062, p = 0.542). However, the correlation coefficient is weak, and the p-value is not statistically significant, suggesting that there is not enough evidence to support a significant association between poor noise conditions and negative health impacts.

The correlation analysis shows that poor air ventilation conditions, such as lack of air circulation (IV3_IE4), are negatively associated with the experience of health issues among the respondents (correlation coefficient = -0.214, p = 0.032). This suggests that

individuals working in environments with poor air circulation may experience negative health outcomes.

In conclusion, it seems that two of the four variables (IV3_IE2 and IV3_IE4) of the indoor environmental factors have a significant negative correlation with students' health during virtual learning in the post-pandemic age, while the other two variables (IV3_IE1 and IV3_IE3) do not show a significant correlation. So, it is neither a clear acceptance nor rejection of the hypotheses, but rather a nuanced interpretation of the results. Further analysis and exploration may be necessary to fully understand the relationship between workstation and students' health in this context.

4.3.2.4 Cognitive Factors

Based on the correlation analysis, there was no significant correlation found between the lack of interaction with lecturers during virtual classes (IV4_C1) and the experience of health issues among respondents (correlation coefficient = -0.049, p = 0.625). Therefore, the lack of interaction with lecturers during virtual classes does not seem to have a significant impact on the respondents' health experiences.

The correlation analysis suggests that the absence of other students during virtual classes (IV4_C2) is negatively correlated with the experience of health issues among respondents, particularly their emotional well-being, indicating that it leads to a greater level of emotional stress (correlation coefficient = -0.069, p = 0.492). However, this correlation is not statistically significant at the conventional significance level of 0.05.

The correlation analysis shows a significant negative correlation between a higher level of self-discipline required during virtual classes (IV4_C3) and the experience of health issues among respondents, particularly emotional stress (correlation coefficient = -0.329, p = 0.001). This suggests that the more self-discipline required during virtual classes, the higher the level of emotional stress experienced by the respondents.

In conclusion, it appears that only one of the cognitive factors (IV4_C3) has a significant relationship with students' health during virtual learning in the post-pandemic age. However, the other two factors (IV4_C1 and IV4_C2) do not show a significant relationship with students' health during this time period. Therefore, further

analysis may be needed to fully understand the relationship between cognitive factors and students' health during virtual learning in the post-pandemic age.

4.3.2.5 Distractions

The correlation analysis indicates that there is a negative correlation between the distraction from text messages (IV5_D1) during virtual classes and the experience of health issues among respondents, specifically anxiety or depression (correlation coefficient = -0.102, p = 0.314). However, the correlation is not statistically significant at the conventional threshold of $p < 0.05$, indicating that the relationship may be weak or non-existent.

These correlation coefficients suggest that there is a negative association between the distraction from social media during virtual classes (IV5_D2) and the experience of health issues among respondents, particularly anxiety or depression. However, the correlation coefficients are relatively small and not statistically significant at the conventional level ($p > 0.05$). This means that the relationship between these variables may be weak or not present in the sample studied.

The correlation analysis indicates that there is a negative correlation between distraction from family members during virtual classes (IV5_D3) and the experience of health issues among respondents, certainly anxiety or depression (correlation coefficient = -0.183, p = 0.068). However, the p-value is greater than 0.05, which means that the relationship is not statistically significant.

In conclusion, none of the distractions factors (IV5_D1, IV5_D2, IV5_D3) showed a significant relationship with students' health during virtual learning in the post-pandemic age, as all of the p-values are greater than 0.05. Therefore, the null hypothesis (H0) for distractions cannot be rejected, and it can be inferred that there is no significant relationship between distractions and students' health during virtual learning in the post-pandemic age.

4.3.2.6 Organisational Factors

This correlation analysis suggests that there is a negative correlation between the balance of time dedicated to studying and recreational activities (IV6_O1) and the experience of health issues among respondents due to being stressed and overwhelmed by the workload (correlation coefficient = -0.108, p = 0.284). In other words, an unbalanced time dedicated to studying and recreational activities may contribute to an increased likelihood of experiencing health issues due to being stressed and feeling overwhelmed by the heavily accumulated workload. However, the result is not statistically significant at the conventional level of significance ($p < 0.05$).

The correlation analysis suggests that there is a negative correlation between insufficient time dedicated to rest (IV6_O2) and the experience of health issues among respondents (correlation coefficient = -0.125, p = 0.217). This indicates that individuals who do not have enough time for rest may experience negative impacts on their psychological well-being. However, the result is not significant at the 0.05 level.

The correlation analysis indicates that there is a weak negative correlation between multitasking during virtual classes (IV6_O3) and the experience of health issues among respondents (correlation coefficient = -0.055, p = 0.589). This suggests that students who engage in multitasking during virtual classes may be less focused and less productive, although the relationship is not significant at a conventional level ($p > 0.05$).

In conclusion, none of the organisational factors (IV6_O1, IV6_O2, IV6_O3) showed a significant relationship with students' health during of virtual learning in the post-pandemic age, as all of the p-values are greater than 0.05. Therefore, the study cannot reject the null hypothesis (H0) for organisational factors, and it can conclude that there is no significant relationship between organisational factors and students' health during virtual learning in the post-pandemic age. However, further investigation may be needed to fully understand the impact of organisational factors on students' academic performance and mental health.

4.4 Conclusion

Lastly, Chapter 4 analyses the impact of virtual learning on students' health during the post-pandemic age. A descriptive analysis of the respondent demographic profile was done and the scale measurement was then conducted with a pilot test of 30 sample sizes. The inferential analyses were performed using normality tests and Spearman correlation to examine the relationship between the six factors, including posture, workstation, indoor environmental factors, cognitive factors, distractions, and organisational factors, and students' health during virtual learning. The findings suggest that not all six factors have a significant relationship with students' health during virtual learning in the post-pandemic age. However, it is important to note that even though some factors did not show a significant relationship, they may still have an impact on students' academic performance and mental health. Chapter 5 will provide a more detailed discussion and conclusion, as well as recommendations for future research and practical limitations.

CHAPTER 5: DISCUSSION, CONCLUSION & IMPLICATION

5.0 Introduction

Chapter 5 aims to discuss the major findings of the study on the impact of virtual learning on students' health during the post-pandemic age, draw conclusions based on the results, and provide practical implications for policymakers and practitioners. This chapter also acknowledges the limitations of the study and provides recommendations for future research.

5.1 Summary of Statistical Analyses

The demographic profile of the respondents shows that 61% of the sample were male and 39% were female. The sample was largely composed of individuals with a higher level of education, with 77% of respondents having a Bachelor's degree. The majority of respondents (70%) were between the ages of 20 and 24, indicating that the sample was largely composed of young adults. Additionally, 60% of the respondents reported experiencing ergonomic issues while engaging in virtual learning in the post-pandemic age, suggesting the importance of addressing these issues to improve the learning experience and overall well-being of students.

Then, frequency analysis is used to examine different constructs related to factors affecting individuals' health and wellbeing, including posture, workstation, indoor environmental factors, cognitive factors, distractions, and organizational factors. The mean scores for each factor were determined based on a scale of 1 to 5, with a higher score indicating a more significant impact on health. The findings revealed that improper posture, insufficient leg space at the workstation, poor thermal condition, poor noise condition, and distractions from text messages, social media, and family members during online classes had a relatively high impact on health. On the other hand, the absence of armrests and an unbalanced time dedicated to studying and recreational activities had a comparatively lower impact on health.

Next, a reliability test is conducted to ensure the questionnaire is consistent and stable over time, and a high level of reliability indicates that the questionnaire measures what it intends to measure and produces consistent and reliable results. The Cronbach's alpha coefficient assesses the interrelatedness of items in the scale, with values of 0.9 or higher considered excellent, and

0.946 in this case indicating high reliability. A sample size of 30 is commonly used for reliability tests as it strikes a balance between obtaining reliable results and minimizing time and cost.

To test for normality, the Kolmogorov-Smirnov test (also known as the KS test) is used. The results of the normality test suggest that the data may not meet the assumptions of some statistical tests that require the data to be normally distributed. Therefore, non-parametric tests such as Spearman correlation were used to assess the relationship between the independent variables and the dependent variable.

The Spearman correlation revealed that all three posture-related variables have a negative correlation with students' health during virtual learning. Furthermore, some of the variables related to workstation and two of the four variables of the indoor environmental factors have a significant negative correlation with students' health during virtual learning in the post-pandemic age, while the other two variables of indoor environmental factors, as well as the distractions and organisational factors, do not show a significant relationship with students' health during virtual learning in the post-pandemic age. Therefore, a nuanced interpretation of the results is needed, and further analysis and exploration may be necessary to fully understand the relationships between the independent variables and students' health during virtual learning in the post-pandemic age.

5.2 Discussions of Major Findings

Table 5.1: Hypotheses Results

Hypotheses	Result
1. H_1: There is a significant relationship between posture and students' health during virtual learning in the post-pandemic age	**Supported**
2. H_1: There is a significant relationship between workstation and students' health during virtual learning in the post-pandemic age	**Partially Supported**
3. H_1: There is a significant relationship between indoor environmental factors and students' health during virtual learning in the post-pandemic age.	**Partially Supported**

4. H_1: There is a significant relationship between cognitive factors and students' health during virtual learning in the post-pandemic age.	**Partially Supported**
5. H_1: There is a significant relationship between distractions and students' health during virtual learning in the post-pandemic age.	**Rejected**
6. H_1: There is a significant relationship between organisational factors and students' health during virtual learning in the post-pandemic age.	**Rejected**

Source: Developed for the research, (2023).

5.2.1 Relationship between Posture and Students' Health during Virtual Learning in the Post-pandemic Age.

Hypothesis 1:

H_0: There is no significant relationship between posture and students' health during virtual learning in the post-pandemic age.

H_1: There is a significant relationship between posture and students' health during virtual learning in the post-pandemic age.

The results of the hypothesis testing suggest that the alternative hypothesis (H1) where there is a significant relationship between posture and students' health during virtual learning in the post-pandemic age (H1) is supported. The correlation analysis reveals a statistically significant positive correlation between poor posture and experiencing health issues among. This indicates that poor posture can lead to discomfort and pain among students during virtual learning, which may negatively impact their overall health and well-being.

The findings are consistent with previous studies conducted by Dennis A. Attwood, et al. (n.d.), Naddeo, Alessandro, et al. (2021), Yorulmaz, Denis S, et al. (2022), and Qais B. Yaseen & Heba Salah. (2021), who have also highlighted the importance of maintaining proper posture during virtual learning. These studies suggest that poor

posture can lead to musculoskeletal disorders, eye strain, and other health issues among students.

Another reason why posture shows significant relationship with student's health is that posture may have a more direct and immediate impact on students' health during virtual learning compared to other factors. For example, the distance of the monitor screen or the angle of the keyboard may not have a significant impact on students' health if they are able to adjust their posture and body position accordingly. In contrast, poor posture can have a more immediate and consistent impact on physical discomfort and fatigue, leading to negative health outcomes for students.

In short, it is recommended that educational institutions should provide guidelines and training to students to maintain proper posture during virtual learning sessions. Additionally, students should be encouraged to take breaks and engage in physical activities to reduce the negative effects of prolonged sitting on their health.

5.2.2 Relationship between Workstation and Students' Health during Virtual Learning in the Post-pandemic Age.

Hypothesis 2:

H_0: There is no significant relationship between workstation and students' health during virtual learning in the post-pandemic age.

H_1: There is a significant relationship between workstation and students' health during virtual learning in the post-pandemic age.

The results of the Spearman correlation analysis revealed that certain workstation variables such as the leg space, vertical adjustability of the desk, armrest, backrest and vertical adjustability of the chair, and the height and angle of the monitor screen exhibited significant correlations with students' health. However, other variables related to workstation such as the distance of the monitor screen, the distance of keyboard and mouse, the angle of the keyboard, and the size of the mouse did not exhibit significant correlations.

These findings indicate that the relationship between workstation factors and students' health during virtual learning is nuanced and not straightforward. The non-significant correlations suggest that additional factors or variables may contribute to the overall relationship. Therefore, further analysis and exploration are necessary to fully understand the complex dynamics between workstation factors and students' health in the context of virtual learning in the post-pandemic age.

Based on the findings, not all of the variables related to workstation showed significant correlations with students' health during virtual learning, this does not necessarily mean that the findings of the correlation analysis are inconsistent with the content analysis because the correlation analysis may have focused on specific variables related to the workstation, while the content analysis may have looked at a broader range of factors affecting student health during virtual learning. In other words, the two analyses may have approached the topic from different angles and with different scopes, which could result in different findings. In short, it is important to note that not all variables related to workstation showed significant correlations, indicating a need for a nuanced interpretation of the results. This means that the relationship between workstation and students' health is not straightforward or nuanced and may depend on specific factors related to workstation design. Overall, the findings from the correlation analysis and content analysis are largely consistent in highlighting the importance of workstation factors for students' health during virtual learning.

In conclusion, it appears that some of the variables related to workstation are significant, indicating that there may be a relationship between workstation and students' health during virtual learning in the post-pandemic age. However, not all of the variables related to workstation are significant, so a nuanced interpretation of the results is needed where the alternative hypothesis is only partially supported. Further analysis and exploration may be necessary to fully understand the relationship between workstation and students' health in this context. These findings contribute to the growing body of knowledge on the impact of workstation factors on students' health during virtual learning and highlight the importance of creating optimal and ergonomic work environments for students in the post-pandemic age.

5.2.3 Relationship between Indoor Environmental Factors and Students' Health during Virtual Learning in the Post-pandemic Age.

Hypothesis 3:

H_0: There is no significant relationship between indoor environmental factors and students' health during virtual learning in the post-pandemic age.

H_1: There is a significant relationship between indoor environmental factors and students' health during virtual learning in the post-pandemic age.

The overall results indicate that two out of the four variables related to indoor environmental factors (IV3_IE2 and IV3_IE4) showed a significant negative correlation with students' health during virtual learning. On the other hand, the remaining two variables (IV3_IE1 and IV3_IE3) did not show a significant correlation with students' health. This suggests that the alternative hypothesis (H1) is only partially supported.

While the significant negative correlations between IV3_IE2 and IV3_IE4 and students' health provide evidence of a potential relationship, it is important to interpret the findings in a nuanced manner. The lack of significant correlations for IV3_IE1 and IV3_IE3 suggests that these variables may not have a substantial impact on students' health during virtual learning in the post-pandemic age. However, it is crucial to consider the limitations of the study and the potential influence of other unmeasured factors that may contribute to the overall relationship.

The findings of the content analysis indicated that indoor environmental factors were important factors in creating a healthy learning environment. The significant negative correlation between IV3_IE2 (air quality) and IV3_IE4 (temperature) and students' health outcomes in the correlation analysis is consistent with these findings. This suggests that these specific variables (air quality and temperature) are associated with adverse health outcomes among students during virtual learning in the post-pandemic age. The young demographic can play a role in the consistency between the findings of

the content analysis and correlation analysis. Younger students may be more susceptible to certain environmental factors, such as indoor air quality and temperature control, due to their developing immune systems and limited ability to regulate their body temperature.

However, it's important to note that the remaining two variables (IV3_IE1 and IV3_IE3) did not show a significant correlation with students' health outcomes in the correlation analysis, this may be inconsistent with the findings of the content analysis, which identified indoor environmental factors as important factors in creating a healthy learning environment. This inconsistency could be due to the limited sample size, measurement error, or other unmeasured variables that could influence the relationship. Other than that, it is also possible that additional factors or variables may also play a role in influencing the relationship between indoor environmental factors and students' health outcomes.

Overall, while there may be some nuances in the results, the findings of the correlation analysis are generally consistent with the findings of the content analysis. Moreover, further analysis and exploration are warranted to gain a comprehensive understanding of the complex dynamics between indoor environmental factors and students' health during virtual learning. Future studies could investigate additional variables or conduct in-depth assessments of specific aspects of the indoor environment to provide a more comprehensive understanding of their influence on students' health.

In conclusion, the findings indicate that two variables related to indoor environmental factors show a significant negative correlation with students' health during virtual learning in the post-pandemic age. However, the lack of significant correlations for the other variables calls for a nuanced interpretation where the alternative hypothesis is only partially supported. These results contribute to the understanding of the impact of indoor environmental factors on students' health and emphasize the need for further research to elucidate the relationship in greater detail.

5.2.4 Relationship between Cognitive Factors and Students' Health during Virtual Learning in the Post-pandemic Age.

Hypothesis 4:

H_0: There is no significant relationship between cognitive factors and students' health during virtual learning in the post-pandemic age.

H_1: There is a significant relationship between cognitive factors and students' health during virtual learning in the post-pandemic age.

The analysis of the relationship between cognitive factors and students' health during virtual learning in the post-pandemic age revealed that only one of the three factors showed a significant relationship with students' health. This finding suggests that the alternative hypothesis (H1) is only partially supported and that cognitive factors may have a limited impact on students' health during virtual learning, and that other factors may play a more prominent role in influencing students' health outcomes.

The lack of significant relationships for IV4_C1 and IV4_C2 suggests that these cognitive factors may not have a substantial influence on students' health during virtual learning in the post-pandemic age. However, it is crucial to consider the limitations of the study and the potential influence of other unmeasured factors that may contribute to the overall relationship.

Based on the findings, the correlation analysis results seem to be inconsistent with the content analysis findings regarding the relationship between cognitive factors and students' health during virtual learning in the post-pandemic age. In this case, the content analysis supported the idea that cognitive factors to be one of the key factors contributing to ergonomic issues during virtual learning. In contrast, the correlation analysis found that only one of the three (IV4_C3) cognitive factors measured, showed a significant relationship with students' health during virtual learning. However, the lack of significant relationships for the other cognitive factors (IV4_C1 and IV4_C2) in the correlation analysis does not necessarily negate the content analysis findings. It is possible that other unmeasured cognitive factors, such as mental fatigue or lack of motivation, could be impacting students' health outcomes during virtual learning.

The inconsistency between the content analysis and correlation analysis in regards to the cognitive factors may be due to several reasons. First, the content analysis and correlation analysis measure different aspects of the relationship between cognitive factors and students' health during virtual learning. The content analysis focuses on identifying themes and patterns in qualitative data such as student responses, while the correlation analysis looks at the statistical relationship between quantitative variables such as cognitive factors and health outcomes. These different approaches may capture different aspects of the relationship between cognitive factors and students' health during virtual learning, leading to different findings. Second, the sample size and characteristics of the participants in the two studies may differ, leading to different results. The content analysis may have been conducted on a smaller sample of students or a different population, while the correlation analysis may have used a larger sample with different demographic characteristics. The differences in sample size and characteristics may lead to different findings in terms of the relationship between cognitive factors and students' health during virtual learning.

Therefore, further analysis and exploration may be necessary to fully understand the relationship between cognitive factors and students' health during virtual learning in the post-pandemic age. These findings contribute to the growing body of knowledge on the impact of cognitive factors on students' health during virtual learning and highlight the importance of considering a variety of factors when developing interventions and strategies to promote student success and well-being in this context.

In conclusion, a nuanced interpretation of the results is needed where the alternative hypothesis is only partially supported as there is a lack of significant correlations for the other two variables.

5.2.5 Relationship between Distractions and Students' Health during Virtual Learning in the Post-pandemic Age.

Hypothesis 5:

H_0: There is no significant relationship between distractions and students' health during virtual learning in the post-pandemic age.

H_1: There is a significant relationship between distractions and students' health during virtual learning in the post-pandemic age.

The results indicate that none of the distractions factors (IV5_D1, IV5_D2, IV5_D3) shows a significant relationship with students' health, as all of the p-values are greater than 0.05.

Based on these findings, it can be concluded that the alternative hypothesis (H1) for distractions is not supported. This means that there is no significant relationship between distractions and students' health during virtual learning in the post-pandemic age. It is important to note that while distractions may be present during virtual learning, they do not appear to have a statistically significant impact on students' health in the context of this study.

However, it is worth considering that the absence of a significant relationship does not necessarily imply that distractions have no effect on student's health. Other factors, such as individual coping mechanisms or the specific nature of distractions, may play a role in influencing students' health outcomes. Further research and exploration are needed to better understand the complexities of the relationship between distractions and students' health during virtual learning in the post-pandemic age.

Then, based on the results of the correlation analysis, it appears that there is no significant relationship between distractions and students' health during virtual learning in the post-pandemic age. This finding seems to be inconsistent with the content analysis, which identified distractions as one of the key factors contributing to ergonomic issues during virtual learning.

One possible explanation for this discrepancy could be related to the methodology used in each analysis. Content analysis is a qualitative research method that involves

identifying and categorizing patterns in textual data, whereas correlation analysis is a quantitative research method that involves analyzing numerical data to identify relationships between variables. It is possible that the content analysis was able to capture a more nuanced view of the role of distractions in virtual learning by drawing on the experiences and opinions of participants, whereas the correlation analysis may have been limited by the specific factors that were measured.

Another possible explanation could be related to the specific measures used to assess distractions in the correlation analysis. The study measured distractions based on three factors (IV5_D1, IV5_D2, and IV5_D3), it is possible that other forms of distractions that were not captured by these measures, such as clutter distractions, could have a more significant impact on students' health.

Overall, while the findings of the correlation analysis may appear to contradict the content analysis, it is important to consider the limitations and nuances of each methodology and the specific measures used. It is possible that distractions do play a role in influencing students' health outcomes during virtual learning, but the nature of this relationship may be more complex than can be captured by the specific factors and measures used in this study. Further research and exploration are needed to better understand the multifaceted nature of distractions and their impact on students' well-being.

In summary, the findings suggest that distractions, as measured by the factors IV5_D1, IV5_D2, and IV5_D3, do not show a significant relationship with students' health during virtual learning. These results contribute to the understanding of the factors influencing students' health in virtual learning environments, highlighting the need for continued investigation into the multifaceted nature of distractions and their impact on students' well-being.

5.2.6 Relationship between Organisational Factors and Students' Health during Virtual Learning in the Post-pandemic Age.

Hypothesis 6:

H_0: There is no significant relationship between organisational factors and students' health during virtual learning in the post-pandemic age.

H_1: There is a significant relationship between organisational factors and students' health during virtual learning in the post-pandemic age.

The results of this study indicate that none of the organisational factors measured (IV6_O1, IV6_O2, IV6_O3) shows a statistically significant relationship with students' health during virtual learning in the post-pandemic age. The p-values for all of these factors were greater than 0.05, indicating that the alternative hypothesis (H1) is not supported for organisational factors. However, it's important to note that while the specific factors measured in this study may not be significant in relation to students' health outcomes, organisational factors may still impact students' academic performance and mental health in other ways.

In the case of hypothesis 6, the results of the correlation analysis do not support the alternative hypothesis (H1) that there is a significant relationship between organisational factors and students' health during virtual learning in the post-pandemic age. These results are inconsistent with the findings from the content analysis, which identified organisational factors as one of the main themes influencing students' well-being. However, it's important to note that the content analysis and correlation analysis used different methods and measures to evaluate the impact of organisational factors on students' health.

One possible explanation for the lack of a significant relationship between organisational factors and students' health in the correlation analysis could be the specific factors that were measured in this study. It's possible that other organisational factors, such as lack of routine, and insufficient time dedicated to self-care activities may have a greater impact on student's health outcomes. Additionally, the demographic characteristics of the participants in this study may also have played a role in the results. It's possible that the impact of organisational factors on students' health may vary based

on age, gender, or other demographic factors, which were not explored in this study. Further investigation and exploration are needed to gain a comprehensive understanding of the impact of organisational factors on students' health during virtual learning in the post-pandemic age.

Overall, while the specific organisational factors measured in this study did not show a significant relationship with students' health during virtual learning, it's important to continue exploring the potential impact of organisational strategies on students' academic performance and mental well-being in virtual learning environments. Further research is needed to gain a more comprehensive understanding of the complex relationship between organisational factors and students' health in the post-pandemic age.

In summary, the findings suggest that the organisational factors measured in this study do not show a significant relationship with students' health during virtual learning. While these results contribute to the current understanding of the factors influencing students' health in virtual learning environments, future research should consider exploring additional organisational factors and examining their potential impact on students' academic performance and mental well-being in virtual learning settings.

5.3 Implications of the Study

5.3.1 Managerial Implications

From a managerial perspective, the implications of this study emphasize the importance of considering ergonomic factors when designing and implementing virtual learning environments in the post-pandemic age. The results indicate that various factors, such as posture, workstation, indoor environmental factors, cognitive factors, distractions, and organisational factors, all contribute to the overall health and well-being of students during virtual learning. Therefore, policymakers and practitioners should prioritize the incorporation of ergonomic design principles into virtual learning program planning and implementation. By doing so, they can enhance the learning experience and promote the overall health and well-being of students.

Specifically, policymakers and practitioners can take measures such as providing guidelines for ergonomic workstation setup, ensuring adequate indoor air quality, minimizing distractions, and promoting healthy study habits. Additionally, they can provide training to students on proper posture and ergonomics during virtual learning sessions.

Overall, the managerial implications of this study highlight the need for policymakers and practitioners to prioritize the incorporation of ergonomic principles when designing and implementing virtual learning environments to promote student health and well-being.

5.4 Limitations of the Study

One significant limitation of this study is the relatively small sample size, which may have impacted the accuracy of the data collected (Kaleem et al., 2021). With a larger sample size, the study could have potentially produced more robust and reliable findings. Additionally, there may be other factors that were not accounted for in this study that could have contributed to the relationship between the variables being studied. For instance, factors such as socioeconomic status, pre-existing health conditions, and access to technological devices and support could have influenced the results.

Despite these limitations, the findings of this study still provide valuable insights into the impact of ergonomics on the health and well-being of students in virtual learning environments, particularly in the post-pandemic age. By acknowledging the limitations of this study, future researchers can build on these findings and address the gaps that were not covered in this study.

5.5 Recommendations for Future Research

To build on the findings of this study, future research could focus on increasing the sample size to help improve the reliability and generalizability of the findings (Kaleem et al., 2021). A larger sample size can reduce the likelihood of sampling errors and improve statistical power, leading to more robust conclusions.

In addition, exploring other potential factors that may influence the relationship between ergonomics and student health can help identify other important variables that may need to be considered in future interventions (Yun et al., 2019). For example, future research could investigate the impact of lighting and noise levels on student health and well-being during virtual learning.

Finally, investigating the effectiveness of interventions designed to promote ergonomics and improve student health outcomes can provide important insights for policy makers and practitioners involved in designing and implementing virtual learning environments (Molino et al., 2020). For instance, future studies could examine the effectiveness of interventions such as ergonomic training for students and teachers, or the provision of ergonomic equipment and furnishings in virtual learning settings.

Overall, future research in this area can contribute to the development of evidence-based practices that promote student health and well-being in virtual learning environments.

5.6 Conclusion

In line with the research objectives set, this study successfully achieved its first objective of identifying the factors that contribute to ergonomic issues during virtual learning in the post-pandemic age. Through the content analysis, the study examined various factors including posture, workstation, indoor environmental factors, cognitive factors, distractions, and organisational factors. By analyzing these variables, the study gained insights into the factors influencing ergonomic issues in virtual learning environments.

Furthermore, the second objective of investigating the effects of ergonomic issues on students' health during virtual learning in the post-pandemic age was accomplished through the use of Spearman correlation analysis. This statistical technique allowed for an examination of the relationship between ergonomic factors and students' health outcomes, providing valuable insights into the impact of ergonomics on student well-being.

Despite the limitations of the study, such as the small sample size and potential unmeasured factors, the analysis conducted in this research project contributed to achieving the intended research objectives. The findings shed light on the importance of considering ergonomics in virtual learning environments and their influence on student health.

To expand upon these achievements, future research endeavors can focus on addressing the limitations by increasing the sample size for improved generalizability, exploring additional factors that may affect ergonomic issues and student health, and investigating the effectiveness of interventions aimed at promoting ergonomics and enhancing student health outcomes in virtual learning settings.

In conclusion, this research project successfully achieved its objectives by identifying the contributing factors to ergonomic issues and examining their effects on students' health during virtual learning in the post-pandemic age. The findings provide valuable insights for policymakers and practitioners involved in the design and implementation of virtual learning programs, emphasizing the significance of considering ergonomics for student well-being.

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APPENDICES

Appendix 1: Questionnaire

Introduction

Dear Respondents,

Wishing you a great day. I am Ma Yong Zhuang, a final year student pursuing Bachelor's Degree of Building and Property Management (Hons) in Universiti Tunku Abdul Rahman (UTAR). I am currently conducting a research project with the topic of "Ergonomic Issues on Students' Health during Virtual Learning in The Post-Pandemic Age ".

You are invited to participate in this research by filling up this questionnaire.

This survey aims to investigate the relationship between ergonomic issues and the general health of students associated with the virtual mode of teaching during the post-pandemic age. To help me have a better understanding about your view and opinion in relation to the factors that contribute to the negative impacts on physiological health and psychological health, please take a few minutes to complete and return this questionnaire.

Your cooperation and honest response is highly appreciated for the success of my research.

Your response will be kept confidential, and we will only share the compiled information from the many questionnaires we collected.

For any suggestions or inquires related to this survey, please contact Ma Yong Zhuang at mayz1130@1utar.my or +60 10-950 8580.

Thank you for your time and input in this research.

I hereby consent on my voluntary participation in this survey which will be conducted anonymously. (As proposed accordingly by Personal Data Protection Statement - UTAR)

☐ Yes, proceed to the questionnaire.
☐ No, thank you for your time.

Topic: The Effects of Ergonomic Issues on Students' Health during Virtual Learning in The Post-Pandemic Age

Section A: Please provide your personal information.

1. **Gender**
   - ☐ Male
   - ☐ Female

2. **Age**
   - ☐ 19 years old and below
   - ☐ 20 to 24 years old
   - ☐ 25 to 29 years old
   - ☐ 30 years old and above

3. **Current education level or the highest education level that you have pursued.**
   - ☐ Foundation
   - ☐ Bachelor's degree
   - ☐ Master's degree
   - ☐ Doctor of Philosophy (PhD)

4. **Have you experienced suffering from health issues such as lower back pain, headache or migraine, stiff neck and so on during virtual classes?**
   - ☐ Yes
   - ☐ No

Section B: Physiological factors

This section provides a list of questions which are related to the factors that contribute to the negative impacts on physiological health while conducting the virtual learning during the post-pandemic age.

1- **Strongly Disagree**
2- **Slightly Disagree**
3- **Neutral**
4- **Slightly Agree**
5- **Strongly Agree**

Criteria	1	2	3	4	5
Factor 1: Posture					
1. The practice of maintaining the same posture or stance for several hours contributes to negative impacts on health. (Example: Sitting at the table for an extended period of time)					
2. The practice of having an awkward or unnatural posture for a significant period contributes to negative impacts on health. (Example: Sitting in a hunched or slouched position)					
3. Improper posture causes poor blood circulation with tight muscles and joints, hence, resulting in fatigue.					
Factor 2: Workstation					
a) Desk					
1. A desk with insufficient leg space is bad for blood circulation.					
2. A desk that lacks vertical adjustability negatively impacts an individual's physiological health.					
3. A desk that does not offer the option to be a standing desk negatively impacts an individual's physiological health.					
b) Chair					
1. A chair with a backrest is associated with reduced occurrence of back injuries.					
2. The absence of an armrest is one of the reasons that contribute to fatigue in arms and shoulders.					
3. A chair that is not vertically adjustable chair is bad for an individual's physiological health.					
c) Monitor					
1. The angle of the monitor screen is one of the possible causes of the unhealthy tension being reflected on an individual body.					
2. The height of the monitor screen that is too low or high is bad for an individual's physiological health.					

3. The distance of the monitor screen that is too far or close contributes to causing discomfort to an individual.					
d) Keyboard and mouse					
1. The unhealthy reach between the keyboard and the mouse with an individual contributes to the overextension of hands.					
2. The angle of the keyboard is related to the excessive stress placed on an individual wrist.					
3. A mouse that is too small in size is associated with the discomfort of fingers caused by pinching.					
Factor 3: Indoor Environmental Factors					
1. Poor thermal condition contributes to negative impacts on health. (Example: Room temperature that is too high)					
2. Poor lighting condition contributes to negative impacts on health. (Example: Insufficient lighting)					
3. Poor noise condition contributes to negative impacts on health. (Example: The room is prone to traffic noise)					
4. Poor air ventilation condition contributes to negative impacts on health. (Example: Lack of air circulation)					

Section C: Psychological factors

This section provides a list of questions which are related to the factors that contribute to the negative impacts on psychological health while conducting the virtual learning during the post-pandemic age.

1- **Strongly Disagree**
2- **Slightly Disagree**
3- **Neutral**
4- **Slightly Agree**
5- **Strongly Agree**

Criteria	1	2	3	4	5
Factor 1: Cognitive Factors					
1. The lack of interaction with lecturers during virtual classes leads to a lack of motivation.					
2. The absence of other students creates a sense of isolation which results in a greater level of emotional stress.					
3. A higher level of self-discipline is required during virtual classes which results in a greater level of emotional stress.					
Factor 2: Distractions					
1. The distraction from text messages during virtual classes is related to reduced concentration and lower grades, resulting in anxiety or depression.					
2. The distraction from social media during virtual classes is associated with reduced concentration and lower grades, resulting in anxiety or depression.					
3. The distraction from family members during virtual classes is related to reduced concentration and lower grades, resulting in anxiety or depression.					
Factor 3: Organisational Factors					
1. An unbalanced time dedicated to studying and recreational activities leads to the increased possibility of being stressed and overwhelmed by the heavily accumulated workload.					
2. Insufficient time dedicated to rest affects an individual's psychological health negatively.					
3. Multitasking during virtual classes is one of the reasons that contribute to reduced concentration as well as decreased productivity.					