UNIVERSITI PUTRA MALAYSIA

PHYSICAL AND PSYCHOSOCIAL DISORDERS RELATED TO SMARTPHONE ADDICTION AMONG YOUTH IN MALAYSIA

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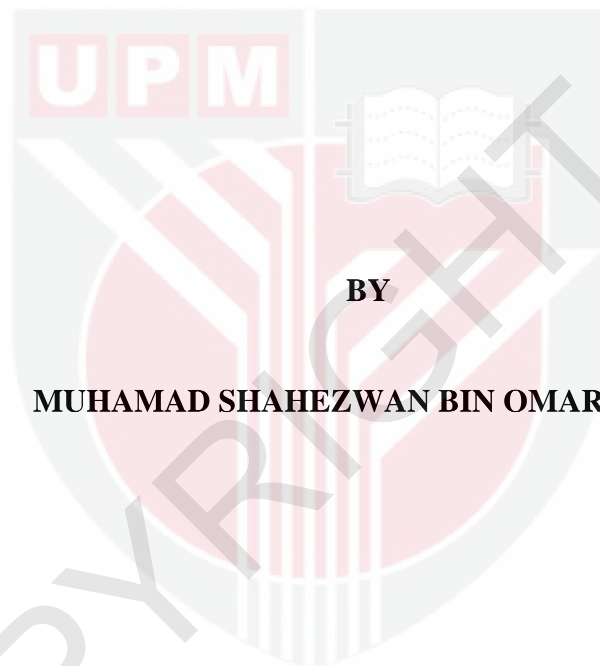

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MUHAMAD SHAHEZWAN BIN OMAR SHAH

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Thesis submitted in fulfilment of the requirement for the degree of Bachelor of Science in Environmental and Occupational Health with Honours from the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia

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ABSTRACT

PHYSICAL AND PSYCHOSOCIAL DISORDERS RELATED TO SMARTPHONE ADDICTION AMONG YOUTH IN MALAYSIA

MUHAMAD SHAHEZWAN BIN OMAR SHAH

Introduction: Smartphone is a Handheld Electronic Device capable of performing a variety of functions. Due to the increased usage particularly by the youth these days, users have been reported in previous studies to exhibit sign and symptoms akin to addiction in circumstances when the device were inaccessible. Being a public health concern, there is a need to establish the severity and risk factors including other associated effects physiologically and psychologically. **Objectives:** This study aims to determine the association between sociodemographic characteristics, smartphone usage and smartphone addiction with musculoskeletal disorders, depression, anxiety, and stress (MSDs and DAS) among youth in Malaysia. **Methodology:** A cross-sectional study was conducted involving youth in Malaysia. Convenience sampling was used to recruit the respondents. A set of self-administered online questionnaire which includes Smartphone Addiction Scale (SAS-sv), Modified Nordic Musculoskeletal Questionnaire (mNMQ) and Depression, Anxiety and Stress Scale (DASS-21) were utilized in this study. **Results and Discussion:** A total of 945 respondents have participated in this study, but only 723 data were eligible for further analysis. The females (77.9%) dominate the category followed by the males (22.1%). The median age of respondents was 22 years old (IQR=5). The average duration of smartphone usage in this study was 7.00 (IQR=5.45) hours per day. The prevalence of smartphone addiction, self-reported MSDs (12-months), depression, anxiety and stress among the respondents were 63.1%, 77.0%, 55.9%, 67.2% and 42.3% respectively. This study found significant associations between smartphone usage on typical day (hours) (χ^2= 7.741, p=0.005; 12 months; χ^2= 3.960, p=0.047; 7 days), smartphone addiction (χ^2= 27.647, p<0.001; 12 months; χ^2= 17.745; p<0.001; 7 days) with MSDs. Moreover, this study also found significant associations between smartphone usage in a typical day (hours) (χ^2= 15.863, p<0.001; depression; χ^2= 11.342, p=0.001; anxiety; χ^2= 6.059; p=0.014; stress), smartphone addiction (χ^2= 29.835, p<0.001; depression; χ^2= 23.417, p<0.001; anxiety; χ^2= 24.917, p<0.001; stress) with DAS. **Conclusion:** There appear to be valid concern of the health disorders (MSDs and DAS) self-reported by the youth participated in this study as they may be influenced by not only sociodemographic characteristics, but also smartphones usage which warrant further research.

Keywords: Smartphone Addiction, Musculoskeletal Disorders (MSDs), Depression, Anxiety and Stress (DAS), Youth

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ABSTRAK

PENYAKIT FIZIKAL DAN PSIKOSOSIAL YANG BERKAITAN DENGAN KETAGIHAN TERHADAP TELEFON PINTAR DALAM KALANGAN GOLONGAN BELIA DI MALAYSIA

MUHAMAD SHAHEZWAN BIN OMAR SHAH

Pengenalan: Telefon pintar adalah Peranti Elektronik Pegang Tangan yang mampu melaksanakan pelbagai fungsi. Oleh kerana peningkatan penggunaan terutamanya oleh golongan belia hari ini, pengguna telah dilaporkan dalam kajian sebelumnya menunjukkan tanda dan gejala yang serupa dengan ketagihan semasa peranti itu tidak dapat diakses. Sebagai kebimbangan kesihatan awam, terdapat keperluan untuk mewujudkan keterukan dan faktor risiko termasuk kesan lain yang berkaitan secara fisiologi dan psikologi. **Objektif:** Kajian ini bertujuan untuk menentukan perkaitan antara ciri sosiodemografi, penggunaan telefon pintar dan ketagihan telefon pintar dengan gangguan muskuloskeletal, kemurungan, kebimbangan, dan tekanan (MSDs dan DAS) dalam kalangan belia di Malaysia. **Metodologi:** Kajian keratan rentas telah dijalankan melibatkan belia di Malaysia. Persampelan mudah digunakan untuk merekrut responden. Satu set soal selidik atas talian yang ditadbir sendiri merangkumi Skala Ketagihan Telefon Pintar (SAS-sv), Soal Selidik *Muskuloskeletal Nordic Modified* (mNMQ) dan Skala Kemurungan, Kebimbangan dan Tekanan (DASS-21) telah digunakan dalam kajian ini. **Keputusan dan Perbincangan:** Seramai 945 responden telah mengambil bahagian dalam kajian ini, tetapi hanya 723 data yang layak untuk dianalisis. Wanita (77.9%) mendominasi kategori diikuti oleh lelaki (22.1%). Umur median responden ialah 22 tahun (IQR=5). Tempoh purata penggunaan telefon pintar dalam kajian ini ialah 7.00 (IQR=5.45) jam sehari. Kelaziman ketagihan telefon pintar, MSDs yang dilaporkan sendiri (12 bulan), kemurungan, kebimbangan dan tekanan dalam kalangan responden masing-masing adalah 63.1%, 77.0%, 55.9%, 67.2% dan 42.3%. Kajian ini mendapati perkaitan signifikan antara penggunaan telefon pintar dalam sehari (jam) (χ^2=7.741, p=0.005; 12 bulan; χ^2=3.960, p=0.047; 7 hari), ketagihan telefon pintar (χ^2=27.647, p<0.001; 12 bulan; χ^2=17.745; p<0.001; 7 hari) dengan MSDs. Selain itu, kajian ini juga mendapati perkaitan signifikan antara penggunaan telefon pintar dalam sehari (jam) (χ^2=15.863, p<0.001; kemurungan; χ^2=11.342, p=0.001; kebimbangan; χ^2=6.059; p=0.014; tekanan), Ketagihan telefon pintar (χ^2=29.835, p<0.001; kemurungan; χ^2=23.417, p<0.001; kebimbangan; χ^2=24.917, p<0.001; tekanan) dengan DAS. **Kesimpulan:** Terdapat kebimbangan mengenai gangguan kesihatan (MSD dan DAS) yang dilaporkan sendiri oleh belia yang mengambil bahagian dalam kajian ini kerana mereka mungkin dipengaruhi oleh bukan sahaja ciri sosiodemografi, tetapi juga penggunaan telefon pintar yang memerlukan penyelidikan lanjut.

Kata kunci: Ketagihan Telefon Pintar, Gangguan Muskuloskeletal (MSDs), Kemurungan, Kebimbangan dan Tekanan (DAS), Belia

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LIST OF ABBREVATIONS

MSDs	Musculoskeletal Disorders
DAS	Depression, Anxiety and Stress
SAS-sv	Smartphone Addiction Scale Short Version
mNMQ	Modified Nordic Musculoskeletal Questionnaire
DOSM	Department of Statistics Malaysia
MCMC	Malaysian Communication and Multimedia Commission
HHD	Handheld Device
DASS-21	Depression, Anxiety and Stress Scale 21
CMD	Congenital Muscular dystrophy
DMD	Duchenne Muscular dystrophy
BMD	Becker Muscular dystrophy
UNICEF	United Nations Children's Emergency Fund Malaysia
COVID-19	Coronavirus Disease 2019

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CHAPTER 1:

INTRODUCTION

1.1 Study Background

Nowadays, many countries including Malaysia have an increasing trend on the use of smartphones as one of the mediums of communication for working and learning during the pandemic. The number of smartphone users in Malaysia by 2020 has significantly increased compared to the previous years.

Based on a smartphone user statistic in Malaysia, it is estimated that there are more than 30 million people using smartphones in Malaysia by 2020. The trend is expected to increase over the years due to the growth of population (*Statista*, 2017). The penetration of smartphone in Malaysia also have been increasing rapidly years by years. Soo (2016) study reported that there is a continuously growing demand and sales of smartphone in Malaysia.

Smartphones are a type of Handheld Devices (HHD) that is used for many purposes because it has many applications and software. Based on *Cambridge Dictionary* (2021), a smartphone is a mobile phone that contains software like that found on a small computer and connects to the internet. A smartphone can be used to perform various types of work.

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For instance, it is used to communicate with other people such as texting messages and connecting people on social media. Moreover, some people use smartphones for entertainment such as watching videos, playing games, and listening to music. Based on a study by Haug et al. (2015), it is stated the smartphones typically include touch screens, mobile Internet access via Wi-Fi or cellular networks, the ability to install smartphone applications, and other features such as media players, digital cameras, and GPS navigation.

In Malaysia, it is reported that the number of smartphone owner among youth aged 15-30 years old are the highest compared to other ages. Based on a hand phone user survey, it shows that up to 87% of the youth (20-34 years old) population in Malaysia owns a smartphone (Malaysian Communication and Multimedia Commission [MCMC], 2018). The use of smartphones in daily life has brought many benefits to human life. Thus, there is a rapid growth in smartphone penetration and usage in Malaysia especially among youth population.

1.2 Problem Statement

Usage of smartphone nowadays are excessive especially among youth. According to Abi-Jaoude et al. (2020), they commented that a large proportion of young people today engage in extensive smartphone use and media multitasking. In 2019, the average adult in the United States spent 3 hours and 43 minutes per day on mobile devices (Lin, 2020). Extensive usage of smartphone may induce negative effects toward human body. The effect of excessive usage may develop health disorders. The health disorders cause by excessive smartphone usage can be divided into two categories which is physical and psychosocial disorders. These disorders may influence long-term performance and life of a person at such a young age. For instance,

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physical disorders such as musculoskeletal disorders (MSDs) whereby it is reported in a study by Clark (2017), he mentioned that smartphone overuse can result in thumb pain, median nerve pain (palm pain), and decreased hand strength and function. On the other hand, the psychosocial disorder which affect individual psychological behavior such as depression, anxiety and stress has also been reported in previous study. It has been determined that excessive smartphone use had a negative psychological impact (Shoukat, 2019).

To a certain extent, excessive smartphone usage can lead to addiction behaviour. Smartphone addiction is a public health problem. Based on Ammati et al. (2018), they indicated that smartphone addiction is a growing public health issue worldwide, particularly in developing countries. Besides, many people are less aware on this issue. Many people are unaware that smartphone addiction is a serious issue (Alhassan et al., 2018). Globally, there have been many recent studies reported on the prevalence of smartphone addiction among university student including some studies in Malaysia. In a study by Mescollotto et al. (2019), they mentioned that Malaysia is one of the countries reported the highest prevalence of smartphone addiction among university students with 46.9 %. Besides that, from a previous study in Malaysia by Abdul Hadi et al. (2020), they reported a high number of smartphone addiction prevalence which is 51% among clinical year medical student in International Islamic University Malaysia (IIUM). However, in Malaysia, sufficient awareness, and available data on the prevalence of smartphone addiction among general population such as youth is still scarce whereby, this population is at high risk of developing smartphone addiction.

Furthermore, addiction and extensive usage of smartphone may lead to development of physical disorder which is MSDs. Globally, MSDs is among the top 3 highest

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disabilities caused by a musculoskeletal condition which can affect muscle, bones, joints and associated tissues (Tan & Balaraman, 2020). There are some risk factors of smartphones usages that may induce the occurrence of musculoskeletal symptoms. For example, long hour duration, awkward posture, awkward hand movement and static posture while using smartphone. Some of the usage of smartphone that can increase ergonomic risk factors on musculoskeletal function are texting and calling. For instance, based on a study, it is reported that 40% of young people and grown-ups use smartphones for calling and sending messages for more than 4 hours per day (Torrecillas, 2007, as cited in Cha & Seo, 2018). This is supported in a study by Zain and Kei (2018), they indicated that prolonged use of smartphone has induced the development of musculoskeletal discomfort (74.1%) which is reported by the respondent itself. The prevalence of MSD due to excessive smartphone usage and addiction have been reported in many recent studies (Eitivipart et al., 2018; Karkusha et al., 2019; Abdul Hadi et al., 2020; Mustafaoglu et al., 2021) mostly conducted among university students worldwide. According to a recent literature review, the prevalence of musculoskeletal symptoms in at least one area among smartphone users are ranged from 47.7 % to 84.0 % (Weerasak & Rungthip, 2019).

Next, the overused and addiction behavior toward smartphone may leads to the development of several psychosocial disorders such as depression, anxiety, and stress (DAS) among the users. According to a study by Alavi et al. (2020), they stated that increase in usage of phone causes mental health problem among university students. To add, a study by Kim et al. (2012 as cited in Gökçearslan et al., 2018) also reported that stated that smartphone addiction has been found to cause anger issues, individual psychology, and daily work disruption. Other than that, depression, anxiety and stress were caused by smartphone addiction due to the idea of being separated from

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smartphone continuously (Kevser & Didem, 2019). The occurrence of this disorders in people may affect their daily life as it will reduce the psychological well-being of the user (Tangmunkongvorakul et al., 2019, as cited in Winkler et al., 2020). Although there are many previous studies conducted on the psychosocial and smartphone usage, this issue cannot be abandoned, and need future research (Shoukat, 2019).

Therefore, the extensive smartphone usage particularly among youth population is crucial to be studied especially in Malaysia whereby the reference on this issue is still scarce among youth population. Besides that, insufficient awareness, and available data on the prevalence of smartphone addiction among general population such as youth is still limited whereby, this population is at high risk of developing smartphone addiction. Moreover, the effect of smartphone usage on health disorders cannot be neglected and more research need be done in the future.

1.3 Study Justification

As the function of smartphone continuously expand to every single aspect of livelihood, the technology applications are no longer a desire but a need. Being small which made it mobile, a smartphone is capable of performing almost every function a computer can do. Furthermore, the smartphone is now widely used by people of all ages throughout society (Qasim et al., 2017). Based on a smartphone user statistic in Malaysia, it is estimated that there are more than 30 million people using smartphones in Malaysia by 2020.

This results in increased reliance on smartphone to perform a broad range of function which includes but not limited to various type of daily work tasks but also for leisure activities such as sending email, connecting with people, watching videos, performing

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bank transaction and many more. According to a survey by Eitivipart et al. (2018), it is stated that smartphone users spend over 20 hours weekly using social networks, text, and emails. They also add that users depend on smartphones to connect and communicate with others.

In connection to the use of smartphone, where previous study has addressed the various potential health effects in connection to excessive usage of smartphone, there is a need to further investigate the characteristics, behaviour, trend and primarily the health effects of smartphone usage especially in Malaysia where Malaysia has been previously reported to have a high level of technological penetration. Based on MCMC (2018), it is discovered that the proportion of smartphone user increasing from 2016 to 2018 with the percentage of 68.7% to 78% respectively. This shows that the number of smartphone user are rising yearly whereby one of the highest adoption rates by population are among the youth.

The results of this study will be able to fill in gaps and act as future reference in understanding specifically on smartphone addiction, sociodemographic characteristics, social lifestyle, and the association with health effects such as musculoskeletal discomfort and psychosocial disorders. The results would be an invaluable input for the stakeholders, particularly the medical and health practitioners in understanding the problem to which intervention plan or strategies can be devised towards prevention of the health effects. In addition, the result from this study is hoped to provide awareness on addiction to smartphone among its users. This is because based on Alhassan et al. (2018), many people are still unaware that smartphone addiction is a serious issue. Therefore, being equipped with these facts and sense of awareness, the user can be aware and identify the risks of health effects due to excessive smartphone usage.

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1.4 Research Question

a) What is the prevalence of smartphone addiction among youth population in Malaysia?

b) What is the prevalence of physical disorders (MSDs) due to smartphone usage among youth population in Malaysia?

c) What is the prevalence of psychosocial disorder (DAS) due to smartphone usage among youth population in Malaysia?

d) Is the sociodemographic characteristics (age, gender, marital status, education level), smartphone usage (duration of smartphone usage and purpose of usage per day) and smartphone addiction among youth associated with health disorders (MSDs and DAS) among youth population in Malaysia?

1.5 Objectives

1.5.1 General Objective

To determine the association between sociodemographic characteristics, smartphone usage and smartphone addiction with health disorders (MSDs and DAS) among youth in Malaysia.

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1.5.2 Specific Objectives

I. To determine the sociodemographic characteristics (age, gender, marital status, educational level, occupational status), smartphone usage (duration of smartphone usage and purpose of usage per day) of the youth population in Malaysia.
II. To determine the prevalence of smartphone addiction among youth population in Malaysia.
III. To determine the prevalence of physical disorders (MSDs) and psychosocial disorder (DAS) due to smartphone usage among youth population in Malaysia.
IV. To determine the association between sociodemographic characteristics, smartphone usage and smartphone addiction with physical disorder (MSDs) among youth population in Malaysia.
V. To determine the association between sociodemographic characteristics, smartphone usage and smartphone addiction with psychosocial disorder (DAS) among youth population in Malaysia.

1.6 Hypotheses

I. There is a significant association between sociodemographic characteristics, smartphone usage and smartphone addiction with physical disorder (MSDs) among youth population in Malaysia.
II. There is a significant association between sociodemographic characteristics, smartphone usage and smartphone addiction with psychosocial disorder (DAS) among youth population in Malaysia.

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1.7 Conceptual Framework

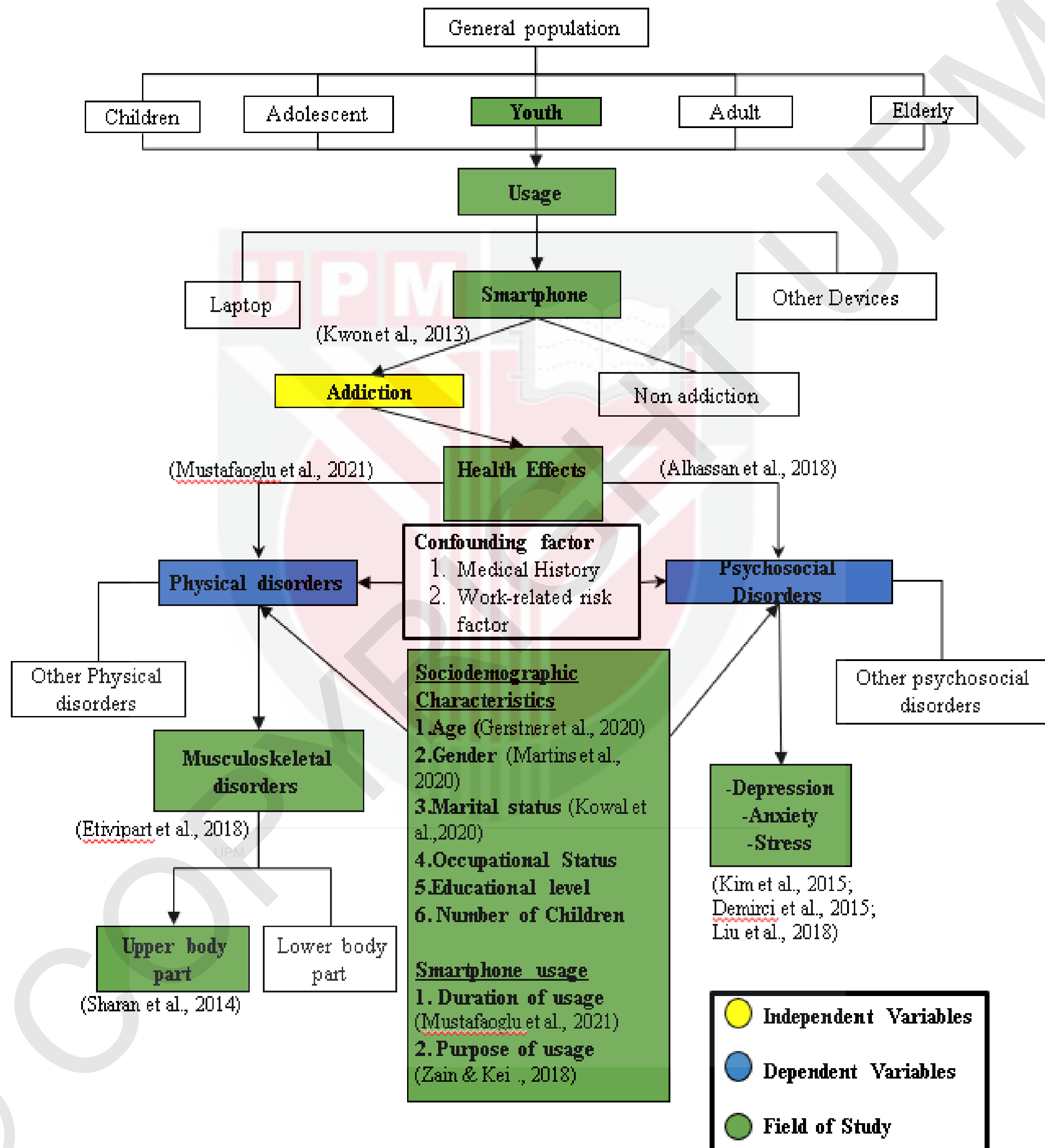

Figure 1.1: Conceptual Framework

1.8 Definition of Terms

1.8.1 Smartphone Addiction

Conceptual:

A behavioural addiction in which patterns of excessive smartphone use lead to tolerance, withdrawal, and dependence on smartphones (Kwon et al., 2013, as cited in Mourra et al., 2020).

Operational:

The smartphone addiction behaviour of the respondents is measured using a self-reported questionnaire (Smartphone Addiction Scale short version) on the usage pattern of smartphone in terms of daily life disruption, positive anticipation, withdrawal, a cyberspace-oriented relationship, overuse, and tolerance (Kwon et al., 2013).

1.8.2 Musculoskeletal Disorders (MSDs)

Conceptual:

Musculoskeletal disorder (MSD) is a type of injury that affects the human body's musculoskeletal system, particularly the bones, spinal discs, tendons, joints, ligaments, cartilage, nerves, and blood vessels, because of repetitive motions, forces, and vibrations on human bodies while performing certain job activities (Putz-Anderson et al., 1997).

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Operational:

MSDs are the self-reported discomfort, pain or ache at the body region and parts indicated by using a body map survey with a modified NMQ for neck, shoulders, upper back, lower back, elbow, and wrists or hands by the respondents in this study.

1.8.3 Depression

Conceptual:

A mood disorder characterized by varying degrees of sadness, despair, and loneliness, and also inactivity, guilt, loss of concentration, social withdrawal, sleep disturbances, and, in some contexts, suicidal thoughts (*Merriam-Webster Dictionary*, 2021).

Operational:

Depression mood of the respondents is measured using a self-reported questionnaire (DASS 21) with 21 questions on the severity of depression level in which it evaluates in terms of the levels of dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest or involvement, anhedonia, and inertia indicated by the respondent in this study.

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1.8.4 Anxiety

Conceptual:

An abnormal and overwhelming sense of dread and fear, often accompanied by physical symptoms (such as tension, sweating, and increased pulse rate), doubt about the reality and nature of the threat, and self-doubt about one's ability to cope with it (*Merriam-Webster Dictionary*, 2021).

Operational:

Anxiety behaviour of the respondents is measured using a self-reported questionnaire (DASS 21) with 21 questions on the severity of anxiety level in terms of autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect indicated by the respondent in this study.

1.8.5 Stress

Conceptual:

A condition or feeling that occurs when a person perceives that demands exceed the individual's physical, mental, or emotional strain or tension (Marksberry, 2017).

Operational:

Stress level of the respondents is measured using a self-reported questionnaire (DASS 21) with 21 questions on the severity of stress level whereby it assesses the difficulty in relaxing, nervous arousal, and being easily upset, agitated, irritable, over-reactive and impatient indicated by the respondent in this study.

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1.8.6 Youth

Conceptual:

Malaysia's National Youth Development Policy (1997) defined youth as being between the ages of 15 and 40, whereas the National Youth Policy (2015), which replaced it, redefined youth as being between the ages of 15 and 30 (United Nations Children’s Emergency Fund Malaysia [UNICEF], 2018).

Operational: -

Youth is identified using a birth date according to the Gregorian calendar whereby it is counted from the day they are born until the day this study is being conducted with aged between 15 to 30 years old as stated in the Identification Card (I/C) of the respondent.

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CHAPTER 2:

LITERATURE REVIEW

2.1 Smartphone usage

A smartphone is a mobile phone that contains software like that found on a small computer and connects to the internet (*Cambridge Dictionary*, 2021). The smartphone has been evolving in functions and technologies from years to years. Globally, the number of smartphone user have been increasing rapidly. Furthermore, the smartphone has been widely used and owned by all people in the society. Smartphones are now widely used by people of all ages throughout society (T. Qasim et al., 2017). This can be seen in several reported studies. For example, in a recent study by Yang et al. (2016), it is reported that in 2012, 78 % of 12- to 17-year-old adolescents in the United States had mobile phones, with 37 % having smartphones. Additionally, they also add that In Japan, 95.6 % of high school students had mobile phones in 2012. More than 60% of adolescents in Shanghai, China, owned a mobile phone, and this proportion has increased as of 2014. In another study by Karkusha et al. (2019), they reported that the proportion of mobile users in Egypt increased from 75% in 2012 to 80% in 2013.

Malaysia similarly have reported that the number of smartphone users in 2020 has significantly increased compared to the previous years. Based on a smartphone user statistic in Malaysia, it is estimated that there are more than 30 million people using smartphones in Malaysia by 2020. The penetration of smartphone in Malaysia are on the rise from years to years. In recent years, there is an increasing number of smartphone user in Malaysia. Based on MCMC (2018), it is discovered that the

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proportion of smartphone user increasing from 2016 to 2018 with the percentage of 68.7% to 78% respectively. This shows that the number of smartphone user are rising yearly. Furthermore, the adoption rate with highest number of smartphone user in Malaysia are among youth (15–30-year-old). This is because based on a user handphone survey by MCMC (2018), it is reported that the top 3 highest number of smartphone owner by age group are among young people. Figure 2.1 below shows the adoption rate of smartphone by age group in Malaysia by 2018. From the figures, it shows that many of the smartphone owners come from younger population whereas, there is a declining rate after the age of 35 years old among the users. The users are mostly among younger people especially youth because smartphone can provide many useful services, applications and very easy to be used in daily basis.

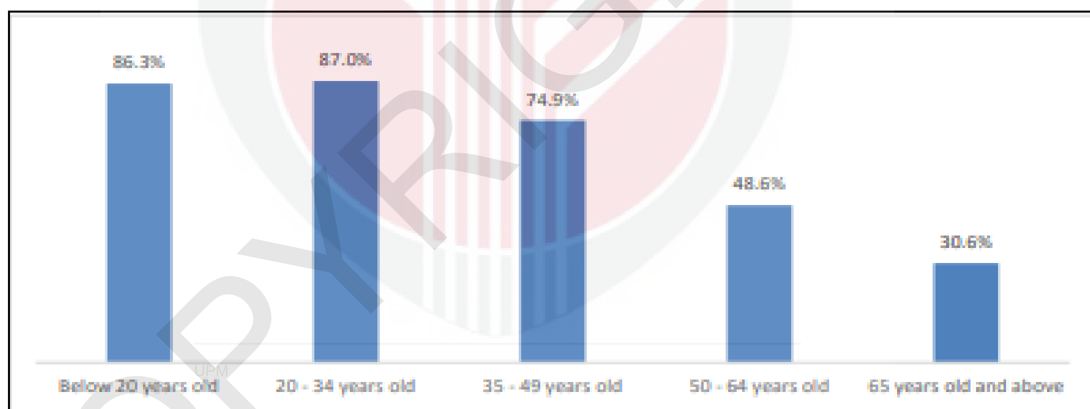

Figure 2.1: Adoption rate of Smartphone owner by age group in Malaysia by 2018 (MCMC,2018)

Smartphone have various type of application and tools that can help human especially those who are working and studying. According to a survey result, it is stated that users spend more than 80 hours a week using the social network, text on smartphones for connection and communication (Eitivipart et al., 2018). Moreover, innovations in smartphone models including portable media players, compact digital cameras, e-mail access, GPS navigation and high-resolution touch screen models help make

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smartphone usage frequent and dependent (Kwon et al., 2013, as cited in AlAbdulwahab et al., 2017). Based on a study by Yang et al. (2016), it is proposed that the application in smartphones allow users to surf the web, watch videos, and play video games. They also add that the adolescents are the highest users spend a significant amount of time using smartphones due to its versatile functionality.

The usage of smartphone is high among the young people. In 2019, the average adult in the United States spent 3 hours and 43 minutes per day on mobile devices. It is also indicated that time spent on mobile devices have exceeded time spent watching television, which came in at 3 hours and 35 minutes (Lin, 2020). The usage pattern of smartphone can be varied. Based on a study, it is reported that 40% of young people and grown-ups use smartphones for calling and sending messages for more than 4 hours per day (Torrecillas, 2007, as cited in Cha & Seo, 2018). According to Eitivipart et al. (2018), it is stated that users spend over 20 hours weekly using social networks, text and emails based on a survey. They also add that users depend on smartphones to connect and communicate with others. Some people used smartphone for communication, text messaging, gaming, entertainment, finance and many more. Based on MCMC (2018), it is proposed that the number of the communication activity among user continue to be the highest activities with 98.1% while using the smartphone. The example of communication activity among users are text messaging and sending voice note. Besides that, other than texting, the communication through voice call is among the activities done by the users also.

The application that is usually used among smartphone user to communicate is WhatsApp, WeChat, Telegram and many more. Based on a handphone survey by MCMC (2018), it is stated that different communication applications like the

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FaceTime, Skype, WhatsApp, and WeChat apps have encouraged more people through this platform to communicate. They also add that 90% of user claimed this activity is performed at least once a day. In Malaysia, the used of smartphone for entertainment is divided into several activities which are watching movies or videos, listening to music, and playing games. Among the entertainment activities, the used of smartphone for watching movies and videos are the most popular usage of smartphone for entertainment with the percentage of 82.7% while listening to music and playing games are 71.9% and 56.4% respectively. The usage for entertainment in smartphone is high among young people. The younger age groups had the most popular listening music and playing games (MCMC, 2018). Below is Figure 2.2 which shows distribution on the usage pattern of smartphone for entertainment by age group.

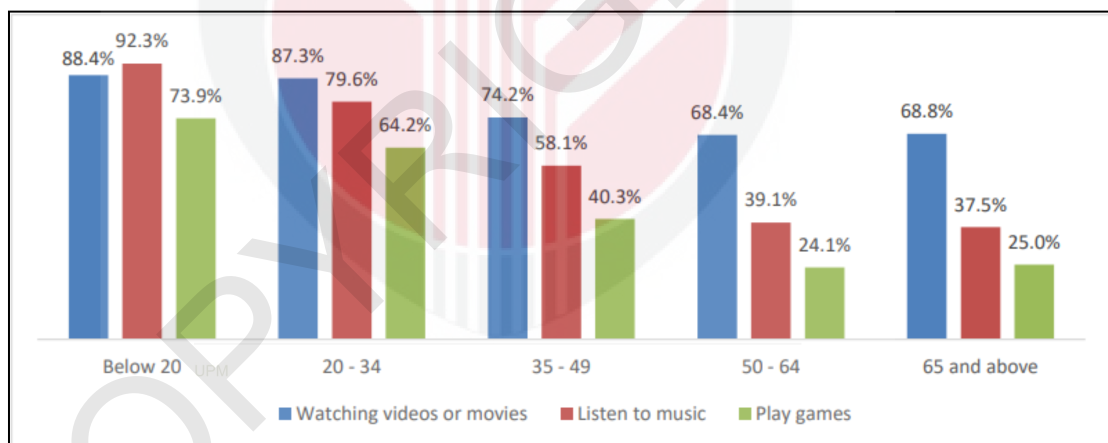

Figure 2.2: Distribution on the usage pattern of smartphone for entertainment by age group in Malaysia in 2018 (MCMC,2018).

Moreover, nowadays, many people use smartphone or any other HHD for e-commerce. E-commerce is an online platform for people to buy or sell products. Based on Bloomenthal (2021), e-commerce is a business model that allows companies and individuals to buy and sell goods over the internet. In recent years, a popular e-commerce platform such as Shopee and Lazada received a huge support from

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Southeast Asian people particularly in Malaysia. Many people usually use these platforms to buy and sell product by using a smartphone because it is easier. According to a 2019 reported e-commerce data in Malaysia by Kemp and Moey (2019), it is stated that 62% of Malaysian people made an online purchased by using a mobile phone. In addition, they also add that currently, 80 % of users between the ages of 16 and 64 do online shopping.

2.2 Smartphones Addiction

Based on Shaffer (2017), many people believe that addiction is a problem of personal weakness, that it begins for self-gratification and continues due to an unwillingness or lack of sufficient willpower to stop. However, within the medical and scientific communities, the notion that addiction is solely driven by pleasure-seeking has fallen out of favor. It also stated that clinicians and scientists now believe that many people engage in potentially addictive activities to alleviate physical and emotional discomfort. People usually engage in psychoactive experiences to feel good and better. There are two type of addiction which is drug addiction and action behaviour addiction. Smartphone addiction is an action of behaviour addiction. The addiction to smartphone is related to the over usage of it. This is because many functions in smartphone such as gaming application and social medias is addictive. In a study by Kwon et al. (2013), it is proposed that advances in models including smartphone media players, compact digital cameras, email access, GPS navigation units and high-resolution touch screens contribute to frequent smartphone use and dependence.

The innovation of smartphone has cause excessive usage of smartphone especially among youth population because smartphones are now being frequently use by people as compared to laptop and computer. This is also because the smartphone provided a

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more user- friendly application and it is easier to use. However, excessive used of smartphone can lead to the development of smartphone addiction among the society who owns a smartphone. Smartphone addiction is defined as a behavioral addiction in which patterns of excessive smartphone use led to tolerance, withdrawal, and dependence on smartphones (Kwon et al., 2013, as cited in Mourra et al., 2020). In another study, the smartphone addiction is defined as technological dependence (Lin et al., 2014, as cited in Haug et al., 2015). In a study by Yang et al. (2016), it is stated that the problems of smartphone addiction or dependencies and their impact on adolescents remain a matter of long-term attention. Interestingly, on another study conducted by Karkusha et al. (2019), they found that addiction to smartphones is twice more common among teenagers than it is among adults.

2.2.1 Prevalence of Smartphone Addiction

The prevalence of smartphone addiction is on the rise due to increase in demand and usage of smartphone nowadays. In a screening study, it is estimated that addictions to smartphones range from just over 0 to 35%. In addition, in a study, a prevalence of 48% of the undergraduate students are addicted to smartphones (AlJomaa et al., 2016, as cited in Panova & Carbonell, 2018). Based on the literature review done on the prevalence of smartphone addiction, many of the study are focuses on the prevalence of smartphone addiction among younger people, adolescent, secondary schoolers and mostly are among the university or undergraduate students. Many previous studies focus smartphone addiction among university student (Eapen et al., 2010a; 2014b; Lui et al., 2011; Berolo et al., 2011; Shan et al., 2013; Ali et al., 2014; Kim et al., 2015; Balakrishnan et al., 2016; Regiani Bueno et al., 2019).

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Based on a study conducted by Chen et al. (2017), it is stated that the prevalence of smartphone addiction among students in one of the colleges in China is up to 30% whereas, the male college student recorded a higher prevalence of smartphone addiction compared to female with 30.3% and 29.3% respectively. On another study done in Saudi Arabia among medical students by Alhazmi et al. (2018), they reported that the overall prevalence of smartphone addiction among the study population is 36.5% which contributed to 66 out of 181 respondents of the study. In another similar study done by Simin Yahyazadeh et al. (2016) among medical sciences students, they indicated that the prevalence of smartphone addiction in the study is 9.3% with the mean of 12.77 ± 32.94. In Philippines, there is also a study conducted by Buctot et al. (2020) among the adolescent which is among 1447 Filipino junior and senior high school students. To add, they indicated that the prevalence of smartphone addiction among the study population is 62.6% whereby, the male (66.2%) has a higher prevalence than female (60.2%). In another study by Mescollotto et al. (2019), they reported that the prevalence rate of smartphone addiction among university student in Brazil was 33.1%. They also indicated that other countries such as Saudi Arabia (71.9 %), Switzerland (16.9 %), and Malaysia (46.9%) are among the countries with the highest prevalence of smartphone addiction among university students.

In Malaysia, there are also some study focuses on the smartphone addiction. However, most of the study found are among university students especially those who are in a medical and health sciences degree. This because students are among those who regularly use smartphones that may lead to dependence if overused (Abdul Hadi et al., 2020). Based on a recent study by Lei et al. (2020), they indicated that prevalence of smartphone addiction among 5714 medical students in University Sains Malaysia (USM) is 40.6%. They also reported that male student's prevalence is found to be

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higher than female which is 49.2% and 36.6% respectively. According to another study among clinical year medical student in International Islamic University Malaysia (IIUM) by Abdul Hadi et al. (2020), they reported a high number of smartphone addiction prevalence which is 51%.

Furthermore, in Malaysia there are also some studies that had been done on other population than university student. In a recent study by Siew et al. (2021), they proposed that about 57.6% of secondary school student are at high risk of getting addiction using smartphone. There also another study done among the patient that has been diagnosed with depression. A recent study by Lim et al. (2020), they reported a prevalence of 58.6% among the patient with depression. Therefore, from the statistic of prevalence, the number of smartphone addiction prevalence increasing rapidly years by years among young population from all around the world especially, in Malaysia with less awareness on this issue.

2.2.2 Risk Factors of Smartphone Addiction

Some of the socio-demographic can be the risk factors that are related to the development of smartphone addiction. Gender is one of the risk factors to develop addiction. This is because in many previous studies it is shows that men are more often using smartphone compared to female. This is supported by one study conducted by Aljomaa et al. (2016), they stated that males are more frequently using smartphones than women and are more interested in smart phones. Therefore, smartphones tend to affect males more negatively.

Moreover, marital status of a person can also lead to addiction. It is found the single people more tend to be developing smartphone addiction compared to married people.

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According to a study by Aljomaa et al. (2016), they indicated that single people are mainly students, which means they are younger and tend to be more enthusiastic about smartphones and the latest applications. They also add that younger generation's obsession with smartphones is caused by various factors including imitation, social pride, the desire to keep fashion, having plenty of free time, the search for emotional connections through various applications and an interest in entertainment applications and games. Thus, these are some of the reason people especially youth use smartphone for long hours. However, married people are less likely to be addicted because they have family and duties resulting of less free time to use smartphone. Married adults have responsibilities and obligations (Aljomaa et al., 2016).

In addition, educational level also may influence the development of smartphone addiction. Based on Al Jomaa et al. (2016), it is reported that the bachelor student scores are higher than Master student (general adult population) in smartphone addiction questionnaire. They also add that students with bachelors (young people generally) tend to be smartphone addicts rather than adults. This is also supported by other several studies that reported high number of smartphone addiction among young adult people compared to other age (International Telecommunication Union [ITU], 2004; Phillip & Bianchi, 2005; Assabawy, 2006; Wajcman et al., 2007; Ishii, 2010; Attamimi, 2011; Hatch, 2011; Divan et al., 2012; Maya & Nazir, 2016, as cited in Al Jomaa et al., 2016).

Besides, the age also one of the factors that can contribute to smartphone addiction. As being discussed before, many literatures review show that people in the range age of a youth or adolescent or young people more tend to be addicted to smartphone. This

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is because many smartphones function itself that can attract user especially youth to use it excessively.

The usage of smartphone can also be addiction risk factors which is the usage of smartphone duration. This because the longer the user using smartphone the higher the chances of developing smartphone addiction. This is supported from a study by Al Jomaa et al. (2016), it is indicated that users who spend more than 4 hour using smartphone have higher chances on getting addicted to smartphone. To add, they also stated that the longer people spend on smartphones, the greater the probability of being addicted to smartphones. In another study conducted by Bhanderi et al. (2016), they reported that respondent with user more than 2 hours have developed highest proportion of smartphone addiction compared to other user who uses smartphone on the range of less than 2 hours. Other than that, they revealed that the longer the daily smartphone usage duration, the higher the likelihood to develop smartphone addiction.

To add, the feature of smartphone can also be a risk factor leads toward addiction. The innovation of smartphone that has been improves it technology from times to times, the ability to surf the internet, gaming application, social medias application and many more. The technology of smartphone has been improved to meet the need of the user. From a study by Mustafaoglu et al. (2021) they indicated that the frequent use and addiction of smartphones have been influenced by innovations in smartphone models, including internet surfing, social media applications, gaming apps, portable media players, compact digital cameras, and high-resolution touchscreens. The innovation of smartphone has cause excessive usage of smartphone especially among youth population because smartphones are now being frequently use as compared to laptop and computer.

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At work, many occupations especially those who work as a white-collar officer (professional, managerial, and administrative work) are the one that commonly uses smartphone. Based on a survey study by Alliance (2013, as cited in Li & Lin, 2019), they reported that about 80% of the Chinese white-collar workers developed a high level of smartphone dependencies which may turn to be addiction. The dependency of smartphone at work may increase the workers performance and workplace social capital. There are some identified risk factors of smartphone usage at work that may lead to smartphone addiction.

Firstly, the use of smartphone for communication at work. Smartphone can facilitate through organizational communication. Based on Li and Lin (2019), they indicated that employees who are most likely to rely on their smartphones to stay connected with their workplace find it difficult to detach themselves psychologically from work and their smartphones.

Next, performing work related action. The more employees rely on their smartphones to meet work objectives, the more important smartphones are to them. According to Li and Lin (2019), they proposed that as smartphones become more important to workers, people begin to check their smartphone status constantly, uncontrollably, become preoccupied with mobile activities, and experience anxiety without it

2.3 Impact and Effects of Smartphone Usage and Addiction

2.3.1 Psychosocial Disorders (Depression, Anxiety, and Stress)

According to Alhassan et al. (2018), the proposed that many people are unaware that smartphone addiction is a serious problem that can have a negative impact on a person's thoughts, behaviour patterns, tendencies, feelings, and sense of well-being.

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There are many impacts and effects of smartphone addiction. Firstly, it gives affect towards psychosocial disorder. It is indicated that the smartphone addiction can cause psychological disturbance in individual. Previous studies have shown that excessive use of smartphone may lead to psychosocial disorders. According to a study by Alavi et al. (2020), they stated that increase in usage of phone causes mental health problem among university students. To add, a study by Kim et al. (2012 as cited in Gökçearslan et al., 2018) also reported that stated that smartphone addiction has been found to cause anger issues, individual psychology, and daily work disruption. Other than that, depression, anxiety and stress were caused by smartphone addiction due to the idea of being separated from smartphone continuously (Kevser & Didem, 2019).

2.3.1.1 Depression

Depression is a general reflection of psychological well-being that is thought to be highly related to smartphone addiction. In a study conducted by Elhai et al. (2017), they indicated that depression is consistently linked to smartphone addiction. From a previous study among Middle Eastern population, it was found that there was a significant positive linear ($P < 0.001$) relationship between smart phone addiction and depression (Alhassan et al., 2018). Furthermore, depression was also found to be significantly associated with smartphone addiction in Lebanese and Austrian university students (Augner & Hacker, 2011; Boumosleh & Jaalouk, 2017, as cited in Alhassan et al., 2018). This result is also supported in another study by Kim et al. (2015), whereby, they reported that there is a positive correlation between smartphone addiction and depression among college students. In Kevser and Didem (2019) study among health professionals, they reported that the smartphone addiction is determined to be positively associated with depression.

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2.3.1.2 Anxiety

Anxiety is an abnormal and overwhelming sense of dread and fear, often accompanied by physical symptoms (i.e., tension, sweating, and increased pulse rate), doubt about the reality and nature of the threat, and self-doubt about one's ability to cope with it (*Merriam-Webster Dictionary*, 2021). Several previous studies have found a correlation between smartphone addiction with anxiety. It has been reported by some researcher (Lee, 2014; Demirci et al., 2015, as cited in Kim & Koh, 2018) that there is a correlation between addiction to smartphone and anxiety. From a study by Demirci et al. (2015), they stated that there was a positive correlation between smartphone addiction score and anxiety level among university students. They also suggested that university students with high levels of depression and anxiety should be closely monitored for smartphone addiction whereby the over usage of smartphone that led to anxiety as well as depression can result in sleep problem. The anxiety level is found to be high in smartphone user group (Demirci et al., 2015).

2.3.1.3 Stress

It is reported in several studies that smartphone usage or addiction has a significant effect on stress. Technostress, or stress produced by information and communication overload, is positively associated with compulsive smartphone use (Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008, as cited in Samaha & Hawi., 2016). From a previous study by Sonali and Nipa (2021), they found that Excessive smartphone usage causes problem with attention and focusing that lead to development of stress. On another study by Liu et al. (2018), they stated that perceived stress is positively associated with mobile phone addiction. In a study by Samaha and Hawi (2016), they studied on the smartphone addiction and perceived stress which influence satisfaction

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and academic performance has been done in previous study. Below is Figure 2.3 which illustrate the relationship between smartphone addiction, perceived stress, academic performance, and satisfaction of life.

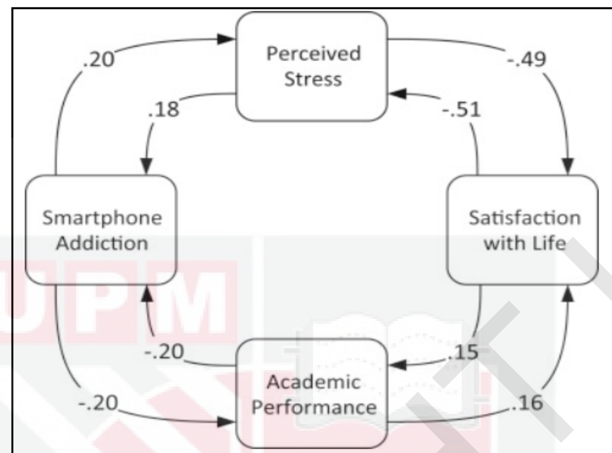

Figure 2.3: Pathway analysis of smartphone addiction, perceived stress, academic performance, and satisfaction of life (Samaha & Hawi, 2016)

2.3.2 Physical Disorder (MSDs)

2.3.2.1 Musculoskeletal Disorders (MSDs)

MSDs is defined as the problem that the musculoskeletal systems (i.e., back, neck, shoulder, joints, muscle) ranging from minor ache to chronic pain that leads to disabilities (European Agency for Safety and Health at Work, 2019). There are many previous studies that have proved the relationship between Smartphone addiction and MSD. The smartphone's ability to facilitate and host a wide range of activities (online surfing, gaming, social networking, etc.) is one of the most important indicators of smartphone addiction.

Addiction led to hours of using smartphone. Prolonged smartphones use causes pain in the cervical muscles, emphasizing the importance of excessive smartphone use as a

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risk factor in the development of ergonomic disorders (Mustafaoglu et al., 2021). In a study on university student by Yang et al. (2016), they revealed that the duration of smartphone ancillary function use is related to the association between smartphone use and musculoskeletal discomfort. To add, they also proposed that hours on the phone spent talking leads to upper back pain. Moreover, in another study by Sharan et al. (2015, as cited in T. Qasim et al., 2017), they concluded that cell phones and gadgets promoted predominant only thumb usage or only one finger usage during texting or control usage were associated with a higher MSDs prevalence. In another study by Eitivipart et al. (2018) it is stated that using a smartphone on a regular basis forces user to adopt an awkward posture, increasing the risk of musculoskeletal disorders and pain.

Other than that, addiction to smartphone also can make users unintentionally adopt poor posture to use it. a study done by Karkusha et al. (2019) has claimed that individual use smartphones for a variety of tasks daily, which can lead to poor posture. They also add that smartphone use has been linked to significant changes in upper cervical posture. Repetition of task can also increase chances of having MSD. Overuse of smartphones increases solicitation and repetitive movement of tendons and joints. Besides, action of typing and calling repeatedly influences muscle activity and effort (Sharan et al., 2015, as cited in Karkusha et al., 2019). Moreover, in a study by Gustafsson et al. (2010a; 2011b, as cited in Gustafsson et al., 2017), they stated that when texting on a mobile phone, the physical exposure consists of a low physical load, repetitive thumb movements, and neck flexion which may lead to musculoskeletal problem.

In a study by Sharan et al. (2014), they stated that a previous study reported that women have higher muscle activity when entering SMS and tended to have higher thumb

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abduction and higher thumb movements and fewer pauses in thumb motions than men at digitorum communis and abductor pollicis longus. The body area that are mostly affected by the smartphone usage is the upper body area such as neck, shoulder, arm, hand, wrist, and upper back. According to a recent literature review, the prevalence of musculoskeletal symptoms in at least one area among users are ranged from 47.7 % to 84.0 % (Weerasak & Rungthip, 2019). They also add that the prevalence of the neck area ranged from 17.3% to 67.8 %, the upper back area from 62.2 %, the thumb area from 9.8 % to 56.9 %, and the shoulder area from 1.2 %to 54.8 % respectively. According to another study by Kim and Kim (2015), the musculoskeletal symptoms reported are on eye pain (42.1%), neck pain (55.8%), shoulder pain (54.8%), arm and hand pain (19.2 %), wrist pain (27.1%), finger pain (19.9%), waist pain (29.8%), and leg and foot pain (9.6%) among university students.

2.4 Summary of Literature Reviews

From this literature review, it can be concluded that the amount of smartphone user around the world especially in Malaysia are on the rise. Other than that, the usage of pattern on smartphone among user are mainly more to e-commerce and entertainment such as gaming application, listening to music, watching movies and online videos as well in a long duration of hours per day. Besides that, in Malaysia, the highest amount of smartphone user is among the youth population. Next, from the literature discussed, the addiction toward smartphone is an action behavioural addiction. This is due to the smartphone annually improvised features and technologies that can attract the users especially young people to use it as it is user-friendly compared to laptop and computer. The prevalence of smartphone addiction around the world are very concerning especially among young people. From the literature searched, globally, the smartphone

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addiction is most common among university students. In Malaysia, the prevalence among general population such as youth is still scarce, however, there some study that has been conducted among the undergraduate students. The risk factors that contribute to smartphone addiction among users is divided in three factors which is sociodemographic (age, gender, marital status, education level), smartphone usage (duration of smartphone usage, and purpose of usage) and work-related factors (communication and performing work-related action). There are some negative impacts and effects on smartphone addiction which is divided into physical disorders (MSDs) and psychosocial disorders (depression, anxiety, and stress). Thus, the increase of smartphone addiction annually shows that the awareness on this issue is still scarce and need to be comprehensively studied.

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CHAPTER 3:

METHODOLOGY

3.1 Study Design

A quantitative method using a cross sectional study design were used to collect data on the prevalence of smartphone addiction, sociodemographic (age, gender, marital status, number of children, education level, occupational status), smartphone usage (duration of smartphone usage, purpose of usage) and its association with health disorders (MSDs and DAS) among youth in Malaysia from October 2021 to December 2021.

3.2 Study Location

Study location of interest in this study is Malaysia. Malaysia is a country in Southeast Asia. It consists of thirteen state and three federal territories. Malaysia is located close to the Equatorial line. The rationale behind this location is because the demand and users of smartphone in Malaysia by 2020 is increasing rapidly by years. According to *Statista* (2019), Approximately 90% of Malaysia's population used a smartphone. Below is Figure 3.1: Maps of Malaysia.

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Figure 3.1: Maps of Malaysia

Source: **www.googlemaps.com**

3.3 Sampling Strategy

3.3.1 Sampling Method

The sampling method used to approach respondents was by using a non-probability sampling method which was a convenience sampling. This method was done by distributing self-administered questionnaires (online survey) to anyone who was easy to access using social media platform (Twitter, Instagram, WhatsApp, Telegram, etc.) or other online platform until the sufficient sample size is achieved for this study. Convenience sampling is chosen because it is convenient and cost effectiveness.

However, this method is vulnerable to selection bias. Although they can be minimized by collecting data in a diversified manner. In this study, different recruitment strategies will be employed to improve representativeness and participation by randomly distributing the questionnaire at different times and dates (within the day as well as within the week) to reach out to more participants who may not be available during time of dissemination such as night or morning due to work.

Besides that, this study is also a homogenous convenience sampling (as described by Jager et al., 2017), where instead of respondents of all socio-demographic background,

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the criteria is limited to youth aged between 18 - 30 years old. Table 3.1 below shows the advantages and disadvantages of convenience sampling method.

Table 3.1. Advantages and Disadvantages of Convenience Sampling

Sampling Method	**Convenience sampling (Jager et al., 2017)**
Advantages	Cheap Efficient Easy to be implemented
Disadvantage	Lack of generalizability

3.3.2 Study Population

The study population in this research are youth who are using smartphone and currently living in Malaysia. Malaysia's National Youth Development Policy (1997) defined youth as being between the age of 15 and 40, however, the National Youth Policy (2015), have redefined youth as being between the age of 15 and 30 (UNICEF, 2018). Based on Department of Statistics Malaysia Official Portal (DOSM, 2021), it is reported that the population amount in Malaysia by 2020 is 32,657,300 peoples. The amount of youth population (15-30) by 2020 in Malaysia are 9,216,000. However, only youth aged 18-30 will be the respondent in this study with the amount of 6,380,300 in Malaysia.

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3.3.3 Sampling Unit

The respondents will be chosen to participate in this study must be subjected to the inclusion and exclusion criteria as follows:

3.3.3.1 Inclusion criteria

I. Malaysian citizen
II. Age between 18-30 years old

3.3.3.2 Exclusion criteria

I. Youth who have any genetically related diseases that affect musculoskeletal system which was diagnosed by a registered medical practitioner (e.g.: Congenital muscular dystrophy (CMD), Duchenne muscular dystrophy (DMD), Becker muscular dystrophy (BMD), Myotonic Muscular Dystrophy, etc.)
II. Youth who is diagnosed with mental illnesses by a registered medical doctor
III. Youth who does not own a smartphone

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3.3.4 Sample Size Calculation

Detailed calculation of sample size of each specific objectives is presented in **Appendix 1**. The sample size for this study was calculated using two proportion formula, with the proportion exposed without come taken as 0.66 (prevalence of smartphone addiction with neck pain) and proportion unexposed with outcome taken as 0.527 (prevalence of non-smartphone addiction with neck pain) was based on a study by Alsalameh et al. (2019). The expected sample size required was 1313 respondents after considering 32.46% of anticipated non-response rate (based on a study by Kohli et al., 2014), 5% significance level, and 95% confidence interval. Using two-proportion formula (Lemeshow et al.,1990) as follow:

$$\frac{n = \{z_{1-\frac{\alpha}{2}}\sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta}\sqrt{P_1(1-p_1)+P_2(1-p_2)}\}^2}{(p_1-p_2)^2}$$

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Calculation of sample size using two-proportion formula:

$$\frac{n = \{z_{1-\frac{\alpha}{2}}\sqrt{2\overline{P}(1-\overline{P})} + z_{1-\beta}\sqrt{P_1(1-p_1)+P_2(1-p_2)}\}^2}{(p_1-p_2)^2}$$

$z_{1-\frac{\alpha}{2}}$= 1.96

$z_{1-\beta}$ = 0.842

$\overline{P}$ = 0.5935

P_1=66% (0.66) proportion exposed with outcome

P_2=52.7% (0.527) proportion unexposed with outcome

d =0.05

CI=95%

Non-Response rate=32.46%

$$\frac{n = \left\{(1.96)\sqrt{2(0.5935)(1-0.5935)} + (0.842)\sqrt{(0.66)(1-0.66)+(0.527)(1-0.527)}\right\}^2}{(0.66-0.527)^2}$$

n=212.853 X 2 ≡ 425.706

n=426

n=426 ÷ (32.46/100)

n=1312.384 ≡ **1313** (Thus, a minimum of **1313 respondents** will be recruited)

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3.4 Instrumentation

3.4.1 Self-administered Online Questionnaire

The self-administered online questionnaire which was used for data collection in this study was adapted from previous studies were prepared in 2 languages: English and Malay. This survey was conducted via online to enable researcher gathering information without risking anyone during the pandemic of Covid 19. The self-administered online questionnaire reliability (Cronbach Alpha > 0.8) and validity (CVI/Ave: 0.96; CVI/UA: 0.91) for this study is reliable and good.

3.4.1.1 Section A- Sociodemographic Characteristics

The sociodemographic questionnaire was an open and close-ended question. The questionnaire consists of the question on the respondent age, gender, number of children, marital status, education level and occupational status. Most of the questions in this section are crucial to be answered. This is because it can influence the data result. Some of the question samples in this section are "Gender?", "Marital Status?", and "Highest Education Level Attained?".

3.4.1.2 Section B- Smartphone Usage

The smartphone usage questionnaire was used to determine the type of operating system of smartphone, access the duration and purposes of using smartphone per day. The question will be an open and close-ended questionnaire. This section is crucial to be answered. The questionnaire was developed based on previous literature review. The questionnaire is adopted and modified from Zain and Kei (2018) study. Some of the question samples in this section are "Type of Smartphone used?", "Estimated

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Duration of Smartphone Usage on a Typical Day?", and "Please State the Duration Based on The Purpose of Smartphone Usage on a Typical Day (Per Hour): Leisure/entertainment usage?".

3.4.1.3 Section C- Modified Nordic Musculoskeletal Questionnaire (mNMQ)

The Nordic Musculoskeletal Questionnaires (NMQ) is a self-reported questionnaire used to assess the incidence of MSD happening in the different body regions of the respondent. The NMQ will also be used to determine the prevalence of the MSD among the respondents. The NMQ is a well-known and established questionnaire. Many of recent studies have adopted the NMQ in previous studies. However, to make sure that the questionnaire meets the criteria of the study which MSD caused by smartphone, the mNMQ is applied in this study. The mNMQ is made up of items from the upper body regions (neck, shoulders (L/R), upper back, upper arm (L/R), forearm (L/R), lower back, and hand wrist (L/R), hip/buttocks) from the original NMQ, and evaluates musculoskeletal function symptoms associated with previous pain or numbness from the lasts 12 months and 7 days. In addition, they also add that the mNMQ investigates the pain and numbness in the most used parts of the body frequently by allowing participants to respond "yes" or "no" with a simple body image.

The reliability and validity of the NMQ is validated as it is a sensitive and reliable tool for screening musculoskeletal symptoms (Tan & Balaraman, 2020). Some of the question samples in this section are "Which of the following body parts did you experience pain / ache / discomfort / numbness / tingling in the past 12 MONTHS?", and "Which of the following body parts did you experience pain / ache / discomfort / numbness / tingling in the past 7 DAYS?".

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3.4.1.4 Section D- Smartphone Addiction Scale Short Version (SAS-SV)

The SAS is used as a screening tool to assess the severity of additive use of smartphone. The SAS question will be a force-choice type questionnaire. It contains 10 items rated on a dimensional scale (1 "strongly disagree" to 6 "strongly agree"). SAS is also used to determine the prevalence of smartphone addiction occurred among the respondent. It is also a well-known and established questionnaire. Many recent studies adopted SAS in their study. For example, in a recent study by Shah et al. (2018), they used the English version of SAS to determine the effect of smartphone addiction and its relation to MSD. Besides, in a previous study by Ching et al. (2015), it is reported that they have develop and modified the SAS into Malay version questionnaires (SAS-M). In addition, they also add that the SAS-M is a valid and reliable to be used.

The SAS-M internal consistency and concurrent validity were verified with Cronbach's alpha = 0.94. The original SAS has been proved its validity and reliability in many previous studies. Based on Kwon et al. (2013, as cited in AlAbdulwahab et al., 2019), it is stated that the SAS is a reliable and valid measurement tool for assessing smartphone addiction. The SAS-SV demonstrated good reliability and validity in assessing smartphone addiction (Kwon et al., 2013). In addition, the SAS-SV can be used to identify a potential high-risk group for smartphone addiction, both in the community and educational fields.

Hence, the English and Malay version of SAS will be adopted in this study. The cut off value for SAS was used and taken from a study by Kwon et al. (2013), whereby, it is stated that for males the cut-off score value was 31 with a sensitivity and specificity value of 0.867 and 0.893 respectively. As for the females, the cut-off score value was 33, with sensitivity and specificity value of 0.875 and 0.886 respectively. Therefore,

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the respondents were considered to have smartphone addiction if the total scored were more than 31 for male and 33 for female. Table 3.2 below show the SAS-SV question number based on each domain.

Table 3.2. SAS-SV Scale and Question Number

Domain	Question numbers
Daily life disturbance	1, 2, 3
Positive anticipation	-
Withdrawal	4, 5, 6, 7
Cyber-oriented relationship	8
Overuse	9
Tolerance	10

3.4.1.5 Section E- Depression, Anxiety and Stress Scale (DASS-21)

DASS-21 is a self-reported questionnaire to measure mental disorders symptoms quantitatively. It is also stated that the DASS were created to assess the constructs of depression and anxiety and to address the failure of previous emotional measures to distinguish between anxiety and depression (Lovibond & Lovibond, 1995, as cited in Oei et al., 2013). According to Oei et al. (2013), it is claimed that the DASS is an instrument with excellent reliability and validity to measure stress, anxiety, and depression. It is also supported in another study by Le et al. (2017), whereby, they indicated that the DASS 21 is a suitable and reliable instrument to measure common mental health symptoms and problems. DASS is consist of 21 items. According to Gomez (2016), each item is scored on a scale of 0 (did not apply to me at all over the last week) to 3 (applied to me very much or most of the time over the past week). In Addition, in scoring DASS-21, The scale to which each item belongs is indicated by the letters D (Depression), A (Anxiety) and S (Stress) whereby, to calculate the final

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score, it is needed to be multiply by 2 as the DASS-21 is a short form version from the original DASS. Table 3.3 and Table 3.4 below show the DASS severity ratings and DASS-21 scale question numbers.

Table 3.3. DASS Severity Ratings

Severity	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

Table 3.4. DASS-21 Scale and Question Numbers

Scale	Question numbers
Depression	3, 5, 10, 13, 16, 17 and 21
Anxiety	2, 4, 7, 9, 15, 19 and 20
Stress	1, 6, 8, 11, 12, 14, and 18

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3.4.2 IBM Statistical Package for Social Sciences (SPSS) Software Version 25

This software was used to analyse the data collected from the respondent to generate several statistical analyses based on the specific objectives.

3.4.3 Research Platform: Moaform

The online questionnaire was designed using the Moaform software. The questionnaire was translated using a back-to-back translation to meet the level of understanding among respondents. The sample of the research questionnaire of the English and Malay version is shown in **Appendix 2**. The present study will be utilizing the online website which is Moaform as the major software for online questionnaire. Scholar found that online surveys have more advantages than face-to-face interview and paper questionnaire.

3.5 Data Collection Procedure

The preparation was conducted orderly before carrying out the data collection. The study population was identified and selected based on the criteria determined by the researcher. The instruments and methods used for the research were constructed and prepared based on previous studies. The approval letters as shown in **Appendix 3** was obtained from the Ethics Committee for Research Involving Human Subjects (JKEUPM) (approved on 11 October 2021) before carrying out the research to obey the rule and regulations stated by government and university.

The content validity test was carried out by two experts (supervisory committee) to ensure the validity of the contents of the research questionnaire. Malay version of the questionnaire was prepared through back-to-back translation. The questionnaire was prepared in Malay and English version.

Reliability of the questionnaire was calculated based on Cronbach-alpha analysis. A face validity test, which involved 45 respondents, also carried out together with a pre-test. The validated questionnaire was later distributed to the respondents through social

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media platform (Twitter, Instagram, WhatsApp, Telegram, Facebook and, etc.) during the data collection period after getting the permission from the supervisor.

The data collection period started from October 2021 to November 2021. A set of questionnaires, together with research instruction were directly stated in the questionnaire for the respondents. The questionnaire was forwarded to each of the targeted population through social media. From the questionnaire, the respondent has been instructed the step of answering the questionnaire. All the respondents have been given the opportunity to choose the language of the questionnaire, either the Malay version or English version. After finished filling, completed questionnaires collected were then undergoing further statistical analysis using SPSS Version 25. The procedure for data collection as shown in Figure 3.2.

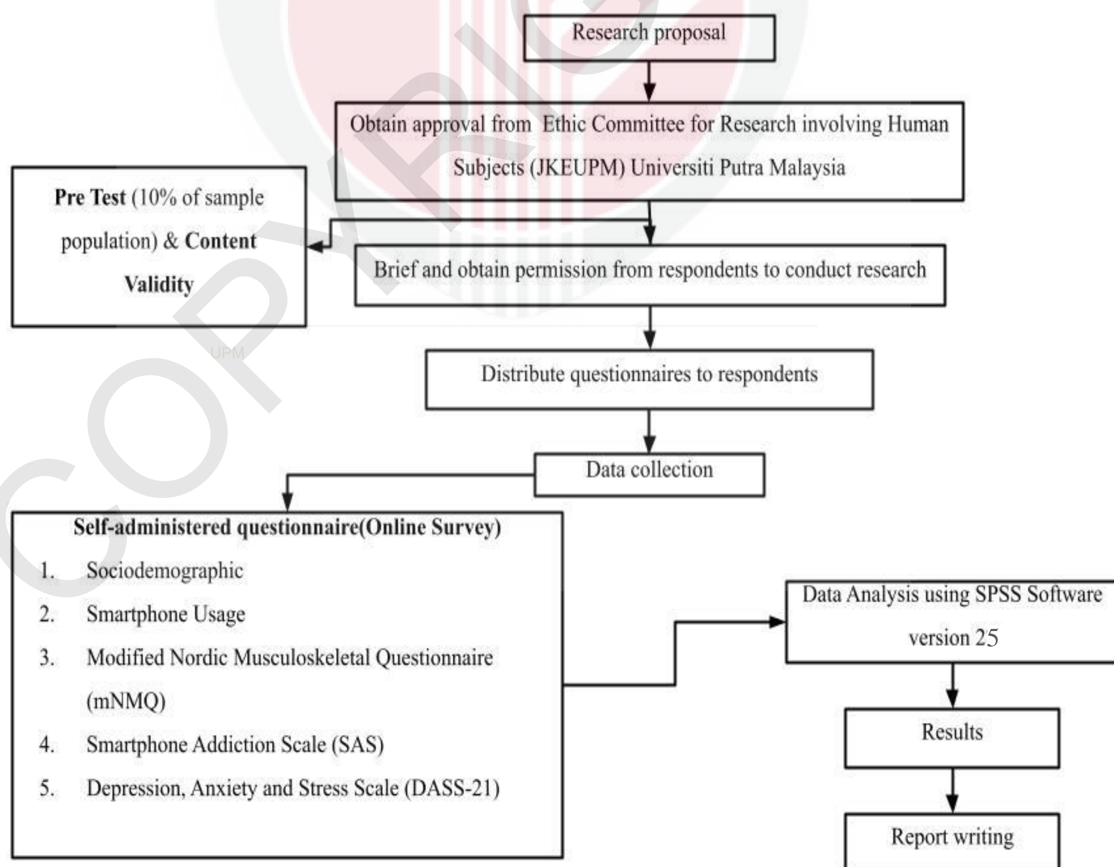

Figure 3.2: Flowchart of Data Collection Procedure

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3.6 Quality Control

Quality control was carried out in this study to ensure the accuracy and validation of the result. Validity test, reliability test, and pre-test were conducted before the data collection to ensure the reliability and validity of the questionnaire. The validity test was needed to measure the capability of a questionnaire prepared to measure the variables of this research to meet the hypothesis. In this research, the content validity test and face validity test were used. The pre-test was carried out between the researcher and the targeted population through a questionnaire survey. Besides, back-to-back translation was carried out to ensure meanings and contents in the translated version remained the same as the original version of the questionnaire.

3.6.1 Content Validity

In this research, the validity of questionnaires was assessed and evaluated by two experts in environmental health for the content validity. This is to make sure that the questionnaires used is reflecting the purpose of the study, the wording of its points is comprehended and represent the content source. On 7th until 14th September 2021, the questionnaire was sent to the two experts in environmental health to check for its content validity. Minor changes and improvement for this study was done after being checked by the experts.

3.6.2 Pre-Test

A pre-test was carried out before actual data collection (online survey), to refine the questionnaire and to estimate the period for the respondents to complete the questionnaire. The purpose of the pre-test was to detect any ambiguity in the terms used to ensure the respondents able to understand the terms in the questionnaire

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without any difficulty. A sample of the questionnaire with English and Malay version was distributed to 45 study sample among 10% of the sample size population. In turn, a total of 45 respondents returned the questionnaire and feedback form, considered as the representative of the respondents to observe their understanding and ability to answer the questionnaire. According to the study of V. Perneger et al. (2014), 30 respondents for a pre-test was considered acceptable. Though questions with poorly worded based on respondents' feedback identified and improved for those questions used in an actual research survey. Besides that, the pre-test served as a useful experimental study to provide the researcher with information on any expected problems that might arise while conducting the actual survey.

3.6.3 Reliability Test

Data obtained from 45 respondents during the pre-test was used to run the reliability test using Statistical Package for the Social Sciences (SPSS) version 25 to ensure the reliability of the questionnaire used during data collection. Cronbach's alpha was known as an internal consistency approach and commonly used for the measurement of reliability. Cronbach's alpha had a coefficient range from 0 to 1. The closing of the value of Cronbach's alpha coefficient to 1, the higher the internal consistency of the research items in the scale, thus high variance of the data. In this research, the acceptable value for Cronbach's alpha coefficient was 0.7. Cronbach's alpha value for each section is shown in Table 3.5.

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Table 3.5. Cronbach's Alpha Value for Pretest

Section	Title	Cronbach's Alpha Value
D	Smartphone Addiction Scale Shot Version (SAS-sv)	0.840*
E	Depression, Anxiety, and Stress Scale (DASS-21)	0.934*

***Considered as reliable > 0.8**

3.6.4 Permission and Consent form

Permission to conduct study was obtained from each respondent that fulfilled the inclusion criteria. Respondents were required to fill up the consent form and briefed on the research needs especially on the benefits of the research and procedure of sampling. All information obtained throughout this research was private and confidential and for public health educational purposes only. The permission and consent form are provided at **Appendix 4**.

3.7 Ethical Consideration

This research was subjected to specific ethical issues. This research was carried out after obtained the permission from the relevant authority department.

3.7.1 Institutional Approval

The approval letter from the university were obtained to conduct this research. Then, the approval letter forwarded to every respondent along with the questionnaire.

3.7.1.1 Universiti Putra Malaysia (UPM)

As request by regulatory for research procedure, a research proposal was sent to Ethics Committee for Research Involving Human Subjects University Putra Malaysia

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(JKEUPM), for review to get approval. After getting permission from JKEUPM, the pre-test study and data collection were carried out. The approval letter of JKEUPM showed in **Appendix 3**.

3.7.2 Individual Consent

The ethical issues of this research included the confidential and privacy of data and information collected from the respondents. These data and information were well documented and kept confidentially as these data included their private personal information. This research was carried out by a voluntary basis, where all the respondents will be informed clearly about the research purpose. A section in the online questionnaire with Respondent's Information Sheet and Individual Consent Form question were prepared for each respondent. The individual consent form of this research was shown in **Appendix 5**.

3.7.3 Instrument Approval

Certain sections of the research questionnaire adapted from the work of other researchers, thus permission from the author obtained before starting the data collection. Approval from the author of the Modified Nordic Musculoskeletal Questionnaire (mNMQ) and Smartphone Addiction Scale Short Version (SAS-sv) were asked, and the approval email showed in **Appendix 6**. since the Depression Anxiety Stress Scale-21 items (DASS 21) was a public domain, there was no requirement for the permission from the author.

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CHAPTER 4:

RESULT

A total of 945 individuals participated in the online questionnaire. However, a total of 222 respondents had to be excluded where 200 of them fit the exclusion criteria while another 20 of them did not provide consent to give information. Therefore, only a total of 723 data were used for analysis in this study.

4.1 Data Analysis

Data analysis was performed using IBM Statistical Package for Social Sciences (SPSS) software Version 25 (SPSS version 25.0) with all carefulness. Before performing any test, normality test (Kolmogorov-Smirnov Test) was being conducted to determine the distribution and normality of each variable data. All variables of independent and dependent was being analyzed independently. Normally distributed data was being test using parametric testing while not normally distributed data was being test using non-parametric testing.

For univariate analyses which is descriptive analyses, it was conducted to obtain the data on frequency, percentage, mean, and standard deviation for normally distributed data. For not normally distributed data, the data was presented in median and interquartile range (IQR). The descriptive analyses data (specific objectives 1, 2, and 3) was used to describe the sociodemographic characteristics, smartphone usages, prevalence of smartphone addiction and prevalence of health disorders (MSDs and DAS) reported by the respondents. The categorical data obtain was presented in

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frequency and percentage while the continuous data was presented in means and standard deviation. Quantitative variable was being categorized for bivariate analysis.

Next, for the bivariate analyses, Chi-Square test was applied for association in data analyses of this study on specific objectives 4 and 5 which is to determine the significant association between sociodemographic characteristics (age, gender, marital status, number of children, education level and occupational status), smartphone usage (duration of smartphone and purpose of usage per day) and smartphone addiction with health disorder (MSDs, depression, anxiety, and stress) among youth population in Malaysia.

4.2 Normality test

The normality test was being conducted statistically using Kolmogorov-Smirnov test. The Kolmogorov-Smirnov test was significant indicating that the data is not normally distributed for some of the variables. Therefore, median, and interquartile range (IQR) were used for non-normally distributed data in descriptive analyses results. Normality result provided in **Appendix 7**.

4.3 Specific objective 1: The Sociodemographic Characteristics and Smartphone Usage Information of The Youth Population in Malaysia.

The first objective was to determine the sociodemographic characteristics (age, gender, marital status, educational level, occupational status) and smartphone usage (duration of smartphone usage and purpose of usage per day) of the youth population in Malaysia.

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As shown in Table 4.1, females (77.9%) dominate the category followed by the males (22.1%). Among the respondents, the median age was 22 years old (IQR=5). Categorized into two categories, 69.3% of the respondents belong to 18- 24 years old age category whereas the rest were 25-30 age category. It was also found that most of the respondents were single (88.8%) and have no children (92.7%). In terms of occupational status, it was found that majority of the respondents are students who hold tertiary level education (77.3%) where 57.8% of them are full-time students during the period the questionnaires were being answered. The rest were blue collar worker (4.7%), white-collar worker (22.8%), and unemployed (14.7%).

Table 4.1. Sociodemographic characteristics of the youth in Malaysia (N=723)

Variables	Frequency (%)	Median (IQR)	Mean ± SD
Age (Years)		22.00 (5)	23.23 ± 3.405
18-24	501 (69.3)		
25-30	222 (30.7)		
Gender			
Male	160 (22.1)		
Female	563 (77.9)		
Marital Status			
Single	642 (88.8)		
Married	78 (10.8)		
Divorced	3 (0.4)		
Number of Children		0.03 (0)	0.16 ± 0.683
No Children	670 (92.7)		
Have Children	53 (7.3)		
Educational Level			
No Formal Education	1 (0.1)		
Primary School	0 (0.0)		
Secondary School	53 (7.3)		
Pre-Universities/ Certificates	110 (15.2)		
Tertiary Education Level	559 (77.3)		
Occupational Status			
Full-time Student	418 (57.8)		
Employed in blue collar work	34 (4.7)		
Employed in white collar work	165 (22.8)		
Unemployed	106 (14.7)		

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In relation to smartphone usage information, the results were summarized in Table 4.2. Overall, most (74.3%) respondents used an Android phone followed by IOS (Apple) (31.3%), Harmony OS (Huawei) (5.5%) and others (0.1%). The median duration of smartphone usage on typical day of the respondents were 7.00 (IQR=5.45) hours per day. Moreover, in this study, the respondents used smartphone for work-related/academic for 2.76 (IQR=4.08) hours in term of median and for leisure/entertainment for 4.00 (IQR= 4.00) hours per day.

Table 4.2. Smartphone usage information of the youth in Malaysia (N=723)

Variables	Frequency (%)	Median (IQR)	Mean ± SD
Type of Operating System of Smartphone Used			
iOS (Apple)	226 (31.3)		
Android	537 (74.3)		
Harmony OS (Huawei)	40 (5.5)		
Others	1 (0.1)		
Duration of Smartphone Usage on Typical Day (Hours)		7.00 (5.45)	7.765 ± 7.187
< 7.00	342 (47.3)		
≥ 7.00	381 (52.7)		
Duration of Smartphone Usage by Purpose on a Typical Day (Hours)			
Work-related / Academic		2.76 (4.08)	3.666 ± 5.106
< 2.76	360 (49.8)		
≥ 2.76	363 (50.2)		
Leisure / Entertainment		4.00 (4.00)	4.699 ± 5.300
< 4.00	346 (47.9)		
≥ 4.00	377 (52.1)		

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4.4 Specific objective 2: The Prevalence of Smartphone Addiction Among Youth Population in Malaysia.

The second objective was to determine the prevalence of smartphone addiction among youth in Malaysia. Table 4.3 and Table 4.3.1 presented the distribution and frequency of smartphone addiction scale questionnaires and the prevalence of smartphone addiction among youth in Malaysia respectively.

Based on the results, 456 (63.1%) of the respondents were identified to be addicted towards smartphone while the remaining 267 (36.9%) respondents were not addicted. Based on the cut-off point provided by SAS questionnaire developer, the categorization of smartphone addiction by gender that 333 females and 123 males were identified to have smartphone addiction.

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Table 4.3. Distribution and frequency of smartphone addiction scale questionnaires among youth in Malaysia (N=723)

Smartphone Addiction Scale Short Version Scores	Strongly Disagree	Disagree	Weakly disagree	Weakly agree	Agree	Strongly agree
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Daily Life Disturbance						
Missing planned work due to smartphone use	55 (7.6)	121 (16.7)	88 (12.2)	213 (29.5)	144 (19.9)	102 (14.1)
Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use	43 (5.9)	93 (12.9)	58 (8.0)	194 (26.8)	194 (26.8)	141 (19.5)
Feeling pain in the wrists or at the back of the neck while using a smartphone	44 (6.1)	74 (10.2)	74 (10.2)	224 (31.8)	205 (28.4)	102 (14.1)
Withdrawal						
Won't be able to stand not having a smartphone	47 (6.5)	93 (12.9)	111 (15.4)	216 (29.9)	152 (21.0)	104 (14.4)
Feeling impatient and fretful when I am not holding my smartphone	86 (11.9)	172 (23.8)	156 (21.6)	157 (21.7)	105 (14.5)	47 (6.5)
Having my smartphone in my mind even when I am not using it	94 (13.0)	189 (26.1)	154 (21.3)	150 (20.7)	89 (12.3)	47 (6.5)
I will never give up using my smartphone even when my daily life is already greatly affected by it.	94 (13.0)	157 (21.7)	146 (20.2)	149 (20.6)	113 (15.6)	64 (8.9)

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Smartphone Addiction Scale Short Version Scores	Strongly Disagree	Disagree	Weakly disagree	Weakly agree	Agree	Strongly agree
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Cyber-Oriented Relationship						
Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook	118 (16.3)	153 (21.2)	106 (14.7)	152 (21.0)	116 (16.0)	78 (10.8)
Overuse						
Using my smartphone longer than I had intended	21 (2.9)	60 (8.3)	87 (12.0)	204 (28.2)	202 (27.9)	149 (20.6)
Tolerance						
The people around me tell me that I use my smartphone too much.	124 (17.2)	205 (28.4)	134 (18.5)	128 (17.7)	82 (11.3)	50 (6.9)

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Table 4.3.1 Prevalence of smartphone addiction among youth in Malaysia (N=723)

	Total SAS Score	
Smartphone addiction	**Frequency (%)**	**Mean ± SD**
Male		
Addiction **(Scored >31)**	123 (76.88)	
No Addiction **(Scored≤31)**	37 (23.12)	
Female		
Addiction **(Scored>33)**	333 (59.15)	
No Addiction (**Scored≤33**)	230 (40.15)	
Total (**Male** + **Female**)		36.19 ± 9.199
Addiction	456 (63.1)	
No Addiction	267 (36.9)	

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4.5 Specific objective 3: The Prevalence of Physical Disorders (MSDs) And Psychosocial Disorders (DAS) Due to Smartphone Usage Among Youth Population in Malaysia.

The third objective was to determine the prevalence of physical disorders (MSDs) and Psychosocial disorders (DAS) due to smartphone usage among youth population in Malaysia.

4.5.1 The Prevalence of Musculoskeletal Disorders (MSDs) and Its Severity Among Youth Population in Malaysia

As shown in Table 4.4, the total prevalence of 12 months and 7 days MSDs among the respondents studied were 577 (77.0%) and 499 (69.0%) respectively.

The prevalence of MSDs in the past 12 months were highest in the neck (48.1%), followed by hand /wrist (right) (30.7%), lower back (23.4%), shoulder (right) (20.7%), shoulder (left) (18.7%), upper back (17.8%), hand/wrist(left) (17.6%), hip/buttocks (14.7%), forearm (right) (10.1%), upper arm (right) (9.4%), forearm (left) (6.2%) and upper arm (left) (5.1%).

Next, as for the past week prevalence (7 days), the highest reported MSDs pain were in neck (34.7%) which were followed by hand/ wrist (right) (23.5%), shoulder (right) (16.0%), lower back (14.5%) upper back (14.2%), shoulder (left) (13.7%), hand/ wrist(left) (13.1%), hip/buttocks (7.5%), upper arm (right)(6.8%), fore arm (right)(5.7%), forearm (left) (3.9%) and upper arm (left) (3.6%).

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Overall, the highest prevalence of MSDs in both past 12 months and 7 days were found in the same body part which was neck with 48.1% and 30.7% respectively. In contrast, the lowest prevalence of the MSDs in the past 12 months and 7 days was at the upper arm (left) with 5.1% and 3.6% respectively.

The severity of each body parts was presented in Table 4.5. Among those who self-reported neck disorders, most of them had experienced discomfort, pain or ached 1-2 times in the past week (60.2%), which were only slightly uncomfortable (57.8%), did not interfere with their normal activities (51.8%) and did not had treatment to relieve their pain (54.6%). For shoulders, most respondents' complaint of disorders for 1-2 times in the past week (62.6% left; 66.4% right), which was mostly only slightly uncomfortable (49.5% left; 54.3% right), interfered slightly in their normal activities (50.5% left; 51.7% right) which resulted in most of them self-medicating (53.5% left; 56.0% right) but did not see a physician.

For the upper back, most respondents' complaint of disorders for 1-2 times in the past week (54.4%) which was only slightly uncomfortable (50.5%), interfered slightly in their normal activities (47.6%) which resulted in only one of them to see a physician (1.0%). As for the upper arms disorders, most of them had experienced discomfort, pain or ached 1-2 times in the past week (65.4% left; 71.4% right), which were only slightly uncomfortable (61.5% left; 61.2% right), while it caused substantially to only a little of them in their normal activities (0.0% left; 2.0% right) which resulted the majority of them did not had treatment to relieve their pain (69.2% left; 55.1% right). For forearms, most respondents' complaint of disorders for 1-2 times in the past week (57.1% left; 63.4% right), which was mostly only slightly uncomfortable (60.7% left;

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73.2% right), did not interfere with their normal activities (50.0% left; 58.5% right) did not had treatment to relieve their pain (78.6% left; 70.7% right).

For those who self-reported hand/wrists disorders, most respondents' complaint of disorders for 1-2 times in the past week (63.2% left; 64.1% right), which was mostly only slightly uncomfortable (61.1% left; 61.2% right), did not interfere with their normal activities (55.8% left; 51.2% right) but did not had treatment to relieve their pain (57.9% left; 66.5% right). In relation to lower back disorders, most of them had experienced discomfort, pain or ached 1-2 times in the past week (44.8%), which were moderately uncomfortable (51.4%), and slightly interfere with their normal activities (59.0%) resulted in most of them self-medicating (50.5%) but did not see a physician. Lastly, for the hip/buttock's disorders, most of them had experienced discomfort, pain or ached 1-2 times in the past week (48.1%), which were only slightly uncomfortable (48.1%), did not interfere with their normal activities (48.1%) and did not had treatment to relieve their pain (57.4%).

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Table 4.4. Prevalence of physical disorders (MSDs) among youth population in Malaysia (N=723)

Body parts	Prevalence	
	12 months	7 days
	Frequency (%)	Frequency (%)
Neck	348 (48.1)	251(34.7)
Shoulder (Left)	135 (18.7)	99 (13.7)
Shoulder (Right)	150 (20.7)	116 (16.0)
Upper Back	129 (17.8)	103 (14.2)
Upper Arm (Left)	37 (5.1)	26 (3.6)
Upper Arm (Right)	68 (9.4)	49 (6.8)
Forearm (Left)	45 (6.2)	28 (3.9)
Forearm (Right)	73 (10.1)	41 (5.7)
Hand /Wrist (Left)	127 (17.6)	95 (13.1)
Hand /Wrist (Right)	222 (30.7)	170 (23.5)
Lower Back	169 (23.4)	105 (14.5)
Hip / Buttocks	106 (14.7)	54 (7.5)
Total MSDs*	557 (77.0)	499 (69.0)

***Reported pain or aches in at least one of the body parts**

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Table 4.5. Distribution of frequency, severity, interference, and treatments for physical disorders (MSDs) complaints in the past week among youth population in Malaysia

Body parts	Total (12 months)	Total (7 days)	Frequency (7 days)			Uncomfortable (7 days)			Interference (7 days)			Treatment to relieve the pain (7 days) (More than one options allowed)		
			1-2 times in the past week	3-4 times in the past week	Every day in the past week	Slightly Uncomfortable	Moderately Uncomfortable	Very Uncomfortable	Not interfere	Slightly interfere	Substantially interfere	Made me self-medicate/treatment	Made me see a physician	Did not apply to me at all
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Neck	348 (48.1)	251 (34.7)	151 (60.2)	68 (27.1)	32 (12.7)	145 (57.8)	98 (39.0)	8 (3.2)	130 (51.8)	111 (44.2)	10 (4.0)	121 (48.2)	3 (1.2)	137 (54.6)
Shoulder (Left)	135 (18.7)	99 (13.7)	62 (62.6)	28 (28.3)	9 (9.1)	49 (49.5)	39 (39.4)	11 (11.1)	43 (43.4)	50 (50.5)	6 (6.1)	53 (53.5)	0 (0.0)	49 (49.5)
Shoulder (Right)	150 (20.7)	116 (16)	77 (66.4)	27 (23.3)	12 (10.3)	63 (54.3)	47 (40.5)	6 (5.2)	54 (46.6)	60 (51.7)	2 (1.7)	65 (56.0)	2 (1.7)	54 (46.6)
Upper Back	129 (17.8)	103 (14.2)	56 (54.4)	33 (32.0)	14 (13.6)	52 (50.5)	41 (39.8)	10 (9.7)	44 (42.7)	49 (47.6)	10 (9.7)	50 (48.5)	1 (1.0)	56 (54.4)

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Body parts	Total (12 months)	Total (7 days)	Frequency (7 days)			Uncomfortable (7 days)			Interference (7 days)			Treatment to relieve the pain (7 days) (More than one options allowed)		
			1-2 times in the past week	3-4 times in the past week	Every day in the past week	Slightly Uncomfortable	Moderately Uncomfortable	Very Uncomfortable	Not interfere	Slightly interfere	Substantially interfere	Made me self-medicate/treatment	Made me see a physician	Did not apply to me at all
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Upper Arm (Left)	37 (5.1)	26 (3.6)	17 (65.4)	6 (23.1)	3 (11.5)	16 (61.5)	9 (34.6)	1 (3.8)	14 (53.8)	12 (46.2)	0 (0.0)	8 (30.8)	0 (0.0)	18 (69.2)
Upper Arm (Right)	68 (9.4)	49 (6.8)	35 (71.4)	8 (16.3)	6 (12.2)	30 (61.2)	18 (36.7)	1 (2.0)	21 (42.9)	27 (55.1)	1 (2.0)	23 (46.9)	0 (0.0)	27 (55.1)
Forearm (Left)	45 (6.2)	28 (3.9)	16 (57.1)	10 (35.7)	2 (7.1)	17 (60.7)	10 (35.7)	1 (3.6)	14 (50.0)	13 (46.4)	1 (3.6)	7 (25.0)	0 (0.0)	22 (78.6)
Forearm (Right)	73 (10.1)	41 (5.7)	26 (63.4)	13 (31.7)	2 (4.9)	30 (73.2)	10 (24.4)	1 (2.4)	24 (58.5)	16 (39.0)	1 (2.4)	12 (29.3)	0 (0.0)	29 (70.7)
Hand/ Wrist (Left)	127 (17.6)	95 (13.1)	60 (63.2)	30 (31.6)	5 (5.3)	58 (61.1)	31 (32.6)	6 (6.3)	53 (55.8)	37 (38.9)	5 (5.3)	42 (44.2)	1 (1.1)	55 (57.9)

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Body parts	Total (12 months)	Total (7 days)	Frequency (7 days)			Uncomfortable (7 days)			Interference (7 days)			Treatment to relieve the pain (7 days) (More than one options allowed)		
			1-2 times in the past week	**3-4 times in the past week**	**Every day in the past week**	**Slightly Uncomfortable**	**Moderately Uncomfortable**	**Very Uncomfortable**	**Not interfere**	**Slightly interfere**	**Substantially interfere**	**Made me self-medicate/treatment**	**Made me see a physician**	**Did not apply to me at all**
	Frequency (%)	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**
Hand/ Wrist (Right)	222 (30.7)	170 (23.5)	109 (64.1)	44 (25.9)	17 (10.0)	104 (61.2)	58 (34.1)	8 (4.7)	87 (51.2)	73 (42.9)	10 (5.9)	60 (35.3)	0 (0.0)	113 (66.5)
Lower Back	169 (23.4)	105 (14.5)	47 (44.8)	37 (35.2)	21 (20.0)	40 (38.1)	54 (51.4)	11 (10.5)	34 (32.4)	62 (59.0)	9 (8.6)	53 (50.5)	2 (1.9)	53 (50.5)
Hip / Buttocks	106 (14.7)	54 (7.5)	26 (48.1)	15 (27.8)	13 (24.1)	26 (48.1)	21 (38.9)	7 (13.0)	26 (48.1)	24 (44.4)	4 (7.4)	23 (42.6)	3 (5.6)	31 (57.4)

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4.5.2 The Prevalence of Psychosocial Disorders (DAS) Due to Smartphone Usage Among Youth Population in Malaysia

The prevalence of depression, anxiety, and stress among the respondents according to different severity level were presented in Table 4.6. Majority of the respondents were normal; not depressed (44.1%), not having anxiety (32.8%), not being stressed (57.7%).

From those who showed depression based on DASS, 15.9%, 20.9%, 7.1% and 12.0% of the respondents had mild, moderate, severe, and extremely severe respectively. In relation to those who showed abnormal anxiety, 10.9% were found to have mild, 25.4% were found to have moderate, and 12.9% were found to have severe, while 18.0% of the respondents were having an extremely severe anxiety. As for the stress, 17.7%, 11.9%, 9.5% and 3.2% of the respondents showed mild, moderate, severe, and extremely severe stress respectively.

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Table 4.6. Prevalence of psychosocial disorders (Depression, Anxiety, Stress) among youth population in Malaysia (N=723)

Psychosocial disorders	Frequency (%)
Depression (D)	
Normal	319 (44.1)
Abnormal	404 (55.9)
Mild	115 (15.9)
Moderate	151 (20.9)
Severe	51 (7.1)
Extremely severe	87 (12.0)
Anxiety (A)	
Normal	237 (32.8)
Abnormal	486 (67.2)
Mild	79 (10.9)
Moderate	184 (25.4)
Severe	93 (12.9)
Extremely severe	130 (18.0)
Stress (S)	
Normal	417 (57.7)
Abnormal	306 (42.3)
Mild	128 (17.7)
Moderate	86 (11.9)
Severe	69 (9.5)
Extremely severe	23 (3.2)

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4.6 Specific objective 4: The Association Between Sociodemographic Characteristics, Smartphone Usage and Smartphone Addiction with Physical Disorder (MSDs) Among Youth Population in Malaysia.

The fourth objective was to determine the association between sociodemographic characteristics, smartphone usage and smartphone addiction with physical disorders (MSDs) among youth population in Malaysia. Table 4.7 and Table 4.8 summarized the association between sociodemographic characteristics, smartphone usage and smartphone addiction with prevalence of MSDs in each of the body parts for 12 months and 7 days respectively.

4.6.1 The Association Between Sociodemographic Characteristics, Smartphone Usage and Smartphone Addiction with Prevalence of MSDs (12 Months) Among Youth Population in Malaysia.

Table 4.7 presented the association between sociodemographic characteristics, smartphone usage and smartphone addiction with prevalence of MSDs (12 months) among the respondents. The findings indicate that there was a significant association between duration of smartphone usage on typical day (χ^2= 7.741; p=0.005), duration of smartphone usage for work-related/academic (χ^2= 7.364; p=0.007), duration of smartphone usage for leisure/entertainment (χ^2= 5.176; p=0.016), total smartphone addiction (χ^2= 27.647; p<0.001), anxiety (χ^2= 19.740; p<0.001) and stress (χ^2= 8.466; p=0.004) with any body parts in the past 12 months. The findings were indicated as significant association when p-value < 0.05 and p-value <0.001. Full result provided at **Appendix 8**.

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Despite the sociodemographic characteristics findings were not significantly associated with any body parts in the past 12 months, the age variable was found to be significantly associated with prevalence of MSDs at hand/wrist (right) (χ^2= 5.032; p=0.025), and lower back (χ^2= 7.004; p=0.008). In addition, the gender variable was found to have a significant association with prevalence of MSDs at shoulder(left) (χ^2=4.164; p=0.041), shoulder (right) (χ^2= 5.074; p=0.024), hand/wrist(left) (χ^2= 6.836; p=0.009), and hand/wrist (right) (χ^2= 9.813; p=0.002). For the marital status and educational level, the Fisher Exact test were used to see the association between both variables and MSDs. Prevalence of MSDs at lower back (χ^2= 6.188; p=0.037) has been found to have significant association with marital status, while prevalence of MSDs at forearm (right) (χ^2= 16.050; p=0.001), hand/wrist (right) (χ^2= 7.501; p=0.041), and hip/buttocks (χ^2= 8.964; p=0.023) were significantly associated with educational level. In contrast, there was no significant association found between number of children with prevalence of MSDs. As for the occupational status, the findings indicate that there was a significant association with prevalence of MSDs at neck (χ^2= 11.220; p=0.011), and lower back (χ^2= 16.374; p=0.001).

For the duration of smartphone usage on a typical day, there was a high association with MSDs on several body regions which were upper arm (left) (χ^2= 14.988; p<0.001), followed by neck (χ^2= 10.891; p=0.001), lower back (χ^2= 7.646; p=0.006), and hand/ wrist (left) (χ^2= 5.427; p=0.020). In relation to the duration of smartphone usage by purpose, the prevalence of MSDs at lower back was found to be significantly associated with work-related/ academic (χ^2=6.184; p=0.013), and leisure/entertainment (χ^2= 8.814; p=0.003) compared to other body parts. Meanwhile, the association findings for smartphone addiction indicated that prevalence of MSDs at neck (χ^2= 31.715; p<0.001), upper back(χ^2= 6.471; p=0.011), upper arm (left) (χ^2=

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5.431; p=0.020),upper arm (right) (χ^2= 5.787; p=0.016), forearm (left) (χ^2= 5.905; p=0.015), forearm (right) (χ^2= 7.856; p=0.005), lowerback (χ^2= 12.492; p=0.001), and hip/buttocks (χ^2= 10.887; p=0.001) were significantly associated.

As for the psychosocial disorders with MSDs (12 months), the result showed that shoulder (Left) (χ^2= 6.797; p=0.009), lower back (χ^2= 10.796; p=0.001) and hip/buttocks (χ^2= 7.311; p=0.007) were significantly associated with depression. Additionally, neck (χ^2= 13.387; p<0.001), hand/wrist (right) (χ^2= 4.088; p=0.043), lower back (χ^2= 16.047; p<0.001), and hip/buttocks (χ^2= 15.081; p<0.001) were significantly associated with anxiety. In relation to stress, it was significantly associated with upper back (χ^2= 4.183; p=0.041), lower back (χ^2= 15.977; p<0.001), and hip/buttocks (χ^2= 6.671; p=0.010).

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Table 4.7. The association between sociodemographic characteristics, smartphone usage and smartphone addiction with physical disorder (MSDs) among youth population in Malaysia (*N=723*)

Variables	Prevalence of MSDs (12 Months); χ^2 (P-value)												
	Neck	**Shoulder (Left)**	**Shoulder (Right)**	**Upper back**	**Upper arm (Left)**	**Upper arm (Right)**	**Forearm (Left)**	**Forearm (Right)**	**Hand/ wrist (Left)**	**Hand/ wrist (Right)**	**Lower back**	**Hip / Buttocks**	**Total MSDs**
Age (Years)	2.529 (0.112)	0.090 (0.764)	0.035 (0.851)	0.302 (0.583)	0.248 (0.619)	0.633 (0.426)	0.074 (0.785)	1.396 (0.237)	1.618 (0.203)	5.032 (0.025) *	7.004 (0.008) *	0.619 (0.431)	1.310 (0.252)
18-24													
25-30													
Gender	0.031 (0.859)	4.164 (0.041) *	5.074 (0.024) *	1.085 (0.298)	0.543 (0.461)	0.104 (0.748)	0.527 (0.468)	0.880 (0.348)	6.836 (0.009) *	9.813 (0.002) *	0.518 (0.472)	2.675 (0.102)	2.394 (0.122)
Male													
Female													
Marital Status	4.973[a] (0.056)	0.443[a] (0.810)	3.153[a] (0.203)	1.059[a] (0.595)	0.897[a] (0.645)	3.646[a] (0.142)	0.914[a] (0.557)	0.172[a] (0.887)	1.088[a] (0.588)	0.779[a] (0.786)	6.188[a] (0.037) *	0.179 [a] (0.917)	1.453[a] (0.440)
Single													
Married													
Divorced													
Number of Children	3.457 (0.063)	0.001 (0.970)	0.497 (0.481)	0.295 (0.587)	0.034 (0.854)	2.172 (0.141)	N/A[a] (0.242)	0.410 (0.522)	0.067 (0.796)	3.767 (0.052)	3.301 (0.069)	0.510 (0.475)	2.687 (0.101)
No Children													
Have Children													
Educational Level	4.761[a] (0.145)	2.705[a] (0.453)	6.157[a] (0.089)	1.433[a] (0.711)	3.257[a] (0.402)	5.530[a] (0.164)	6.536[a] (0.116)	16.050[a] (0.001) *	2.904[a] (0.418)	7.501[a] (0.041) *	1.111[a] (0.778)	8.964[a] (0.023) *	5.550[a] (0.118)
No Formal Education													

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Variables	Prevalence of MSDs (12 Months); χ^2 (P-value)												
	Neck	**Shoulder (Left)**	**Shoulder (Right)**	**Upper back**	**Upper arm (Left)**	**Upper arm (Right)**	**Forearm (Left)**	**Forearm (Right)**	**Hand/ wrist (Left)**	**Hand/ wrist (Right)**	**Lower back**	**Hip / Buttocks**	**Total MSDs**
Primary School													
Secondary School													
Pre-Universities/ Certificates													
Tertiary Education Level													
Occupational Status	11.220 (0.011) *	6.093 (0.107)	1.230 (0.746)	5.472 (0.140)	1.921 (0.589)	2.785 (0.426)	2.089 (0.554)	3.761 (0.288)	4.504 (0.212)	1.169 (0.760)	16.374 (0.001) *	0.754 (0.860)	1.763 (0.623)
Full-time Student													
Employed in blue collar work													
Employed in white collar work													
Unemployed													
Duration of Smartphone Usage on Typical Day (Hours)	10.891 (0.001) *	2.151 (0.142)	0.103 (0.748)	0.888 (0.346)	14.988 (<0.001) ^	1.676 (0.195)	0.988 (0.320)	0.361 (0.548)	5.427 (0.020) *	0.849 (0.357)	7.646 (0.006) *	0.176 (0.674)	7.741 (0.005) *
< 7.00													
≥ 7.00													
Duration of Smartphone Usage by Purpose on Typical Day (Hours)													
Work-related / Academic	5.173 (0.023) *	0.002 (0.967)	0.180 (0.672)	0.676 (0.411)	3.351 (0.067)	0.967 (0.325)	2.771 (0.096)	1.744 (0.187)	1.048 (0.306)	0.062 (0.804)	6.184 (0.013) *	4.230 (0.040) *	7.364 (0.007) *
< 2.76													
≥ 2.76													

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Variables	Prevalence of MSDs (12 Months); χ^2 (P-value)												
	Neck	**Shoulder (Left)**	**Shoulder (Right)**	**Upper back**	**Upper arm (Left)**	**Upper arm (Right)**	**Forearm (Left)**	**Forearm (Right)**	**Hand/ wrist (Left)**	**Hand/ wrist (Right)**	**Lower back**	**Hip / Buttocks**	**Total MSDs**
Leisure / Entertainment	5.361 (0.021) *	0.774 (0.379)	1.128 (0.288)	0.283 (0.595)	1.568 (0.210)	0.019 (0.890)	0.224 (0.636)	1.487 (0.223)	0.546 (0.460)	0.015 (0.902)	8.814 (0.003) *	0.990 (0.320)	5.176 (0.016) *
< 4.00													
≥ 4.00													
Total Smartphone Addiction	31.715 (<0.001) ^	1.340 (0.247)	3.187 (0.074)	6.471 (0.011) *	5.431 (0.020) *	5.787 (0.016) *	5.905 (0.015) *	7.856 (0.005) *	0.050 (0.824)	0.999 (0.318)	12.492 (<0.001) ^	10.887 (0.001) *	27.647 (<0.001) ^
Addiction													
No Addiction													
Psychosocial Disorders													
Depression	2.498 (0.114)	6.797 (0.009) *	1.760 (0.185)	0.166 (0.684)	0.625 (0.429)	0.066 (0.797)	0.070 (0.791)	0.090 (0.764)	1.379 (0.240)	0.000 (0.994)	10.796 (0.001) *	7.311 (0.007) *	1.909 (0.167)
(Normal/ Abnormal)													
Anxiety	13.387 (<0.001) ^	2.175 (0.140)	2.548 (0.110)	2.940 (0.086)	0.165 (0.685)	0.386 (0.534)	0.330 (0.566)	1.068 (0.301)	0.115 (0.734)	4.088 (0.043) *	16.047 (<0.001) ^	15.801 (<0.001) ^	19.740 (<0.001) ^
(Normal/ Abnormal)													
Stress	1.350 (0.245)	3.630 (0.057)	2.498 (0.114)	4.183 (0.041) *	0.639 (0.424)	2.573 (0.109)	0.847 (0.357)	3.150 (0.076)	1.528 (0.216)	2.685 (0.101)	15.977 (<0.001) ^	6.671 (0.010) *	8.466 (0.004) *
(Normal/ Abnormal)													

[a] Fisher's Exact Value
***Significant P-value <0.05**
^Significant P-value <0.001

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4.6.2 The Association Between Sociodemographic Characteristics, Smartphone Usage and Smartphone Addiction with Prevalence of MSDs (7 Days) Among Youth Population in Malaysia.

Table 4.8 summarized the association between sociodemographic characteristics, smartphone usage and smartphone addiction with prevalence of MSDs (7 days) among the respondents. The findings indicate that there was a significant association between gender (χ^2= 5.798; p=0.016), number of children (χ^2= 4.122; p=0.042), duration of smartphone usage on typical day (χ^2= 3.960; p=0.047), duration of smartphone usage for work-related/academic (χ^2= 7.014; p=0.008), total smartphone addiction (χ^2= 17.745; p<0.001), depression(χ^2= 4.549; p=0.033), anxiety (χ^2= 23.965; p<0.001), and stress (χ^2= 10.393; p=0.001) with any body parts in the past 7 days. The findings indicated as a significant association when p-value <0.05 and p-value <0.001. Full result provided at **Appendix 9**.

For the sociodemographic characteristics findings, the age variable was found to be significantly associated with prevalence of MSDs at hand/wrist (right) (χ^2= 5.923; p=0.015). In addition, the gender variable was found to have a significant association with prevalence of MSDs at shoulder(left) (χ^2=8.082; p=0.004), shoulder (right) (χ^2= 6.785; p=0.009), hand/wrist(left) (χ^2= 7.066; p=0.008), and hand/wrist (right) (χ^2= 8.280; p=0.004). For the marital status and educational level, the Fisher's Exact test were used to see the association between both variables and MSDs. However, there was no significant association found in these two variables with the prevalence of MSDs. In contrast, there was an association found between number of children with prevalence of MSDs at lower back (χ^2= 5.323; p=0.021). As for the occupational status, there was also no significant association with prevalence of MSDs in the past 7 days.

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For the duration of smartphone usage on a typical day, there was an association with prevalence of MSDs at neck (χ^2= 9.201; p=0.002) and upper arm (left) (χ^2= 4.434; p=0.035). In relation to the duration of smartphone usage by purpose, the MSDs prevalence at neck was found to be significantly associated with both work-related/ academic (χ^2= 7.891; p=0.005), and leisure/entertainment (χ^2= 4.209; p=0.040). As for the leisure/entertainment smartphone usage duration, the prevalence of MSDs at lower back (χ^2= 5.650; p=0.017), also indicated a significant association. Meanwhile, there were a significant association finding for smartphone addiction at the prevalence of MSDs at neck (χ^2= 21.571; $p<0.001$), upper back (χ^2= 8.262; p=0.004), and hip/buttocks (χ^2= 8.493; p=0.004).

In relation to psychosocial disorders, the result showed that shoulder (Left) (χ^2= 10.231; p=0.001), lower back (χ^2= 8.028; p=0.005) and hip/buttocks (χ^2= 4.971; p=0.026) were significantly associated with depression. Additionally, hand/ wrist (right) (χ^2= 9.764; p=0.002), neck (χ^2= 4.883; p=0.027), and hip/buttocks (χ^2= 8.548; p=0.003) were significantly associated with anxiety. In relation to stress, it was significantly associated with shoulder (left) (χ^2= 7.019; p=0.008), upper back (χ^2= 5.023; p=0.025), hand/wrist (right) (χ^2= 4.574; p=0.032), and hip/buttocks (χ^2= 5.439; p=0.020).

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Table 4.8. The association between sociodemographic characteristics, smartphone usage and smartphone addiction with physical disorder (MSDs) among youth population in Malaysia (*N=723*) (Continue)

Variables	Prevalence of MSDs (7 Days); χ^2 (P-value)												
	Neck	Shoulder (Left)	Shoulder (Right)	Upper back	Upper arm (Left)	Upper arm (Right)	Forearm (Left)	Forearm (Right)	Hand/ wrist (Left)	Hand/ wrist (Right)	Lower back	Hip / Buttocks	Total MSDs
Age (Years)	2.909 (0.088)	0.141 (0.707)	0.126 (0.722)	0.367 (0.545)	0.738 (0.390)	0.954 (0.329)	1.178 (0.278)	2.559 (0.110)	0.835 (0.361)	5.923 (0.015) *	0.942 (0.332)	0.017 (0.898)	0.695 (0.405)
18-24													
25-30													
Gender	0.085 (0.771)	8.082 (0.004) *	6.785 (0.009) *	1.162 (0.281)	0.132 (0.717)	1.027 (0.311)	0.008 (0.927)	0.001 (0.977)	7.066 (0.008) *	8.280 (0.004) *	0.004 (0.952)	0.128 (0.721)	5.798 (0.016) *
Male													
Female													
Marital Status	2.487[a] (0.246)	0.121[a] (1.000)	0.862[a] (0.655)	1.162[a] (0.564)	1.503[a] (0.564)	2.052[a] (0.376)	0.647[a] (1.000)	1.214[a] (0.525)	2.783[a] (0.206)	1.199[a] (0.515)	5.078[a] (0.086)	0.263[a] (1.000)	0.825[a] (0.786)
Single													
Married													
Divorced													
Number of Children	1.739 (0.187)	0.272 (0.602)	0.038 (0.845)	0.051 (0.822)	N/A[a] (0.714)	N/A[a] (0.776)	N/A[a] (1.000)	N/A[a] (0.532)	1.644 (0.200)	0.033 (0.856)	5.323 (0.021) *	0.271 (0.603)	4.122 (0.042) *
No Children													
Have Children													
Educational Level	2.381[a] (0.518)	6.160[a] (0.103)	6.474[a] (0.830)	0.845[a] (0.907)	6.259[a] (0.126)	3.557[a] (0.317)	1.612[a] (1.000)	5.331[a] (0.176)	1.131[a] (0.824)	1.862[a] (0.622)	1.289[a] (0.752)	6.622[a] (0.110)	3.364[a] (0.324)
No Formal Education													
Primary School													
Secondary School													

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Variables	Prevalence of MSDs (7 Days); χ^2 (P-value)												
	Neck	**Shoulder (Left)**	**Shoulder (Right)**	**Upper back**	**Upper arm (Left)**	**Upper arm (Right)**	**Forearm (Left)**	**Forearm (Right)**	**Hand/ wrist (Left)**	**Hand/ wrist (Right)**	**Lower back**	**Hip / Buttocks**	**Total MSDs**
Pre-Universities/ Certificates													
Tertiary Education Level													
Occupational Status	0.893 (0.273)	6.609 (0.085)	1.670 (0.644)	5.113 (0.164)	2.025[a] (0.542)	2.216 (0.529)	3.774[a] (0.246)	1.765 (0.622)	4.131 (0.248)	2.971 (0.396)	4.583 (0.205)	0.487 (0.922)	1.094 (0.778)
Full-time Student													
Employed in blue collar work													
Employed in white collar work													
Unemployed													
Duration of Smartphone Usage on Typical Day (Hours)	9.201 (0.002) *	0.023 (0.881)	0.303 (0.582)	0.302 (0.582)	4.434 (0.035) *	0.733 (0.392)	0.726 (0.394)	0.012 (0.913)	3.771 (0.052)	3.198 (0.074)	1.902 (0.168)	0.018 (0.894)	3.960 (0.047) *
< 7.00													
≥ 7.00													
Duration of Smartphone Usage by Purpose on Typical Day (Hours)													
Work-related / Academic	7.891 (0.005) *	0.078 (0.779)	0.002 (0.961)	0.489 (0.484)	2.485 (0.115)	0.504 (0.478)	1.286 (0.257)	0.603 (0.437)	1.926 (0.165)	0.664 (0.415)	0.817 (0.366)	1.913 (0.167)	7.014 (0.008) *
< 2.76													
≥ 2.76													
Leisure / Entertainment	4.209 (0.040) *	0.535 (0.464)	0.838 (0.360)	0.132 (0.716)	0.031 (0.860)	2.703 (0.100)	1.721 (0.190)	0.040 (0.842)	2.029 (0.154)	1.667 (0.197)	5.650 (0.017) *	0.057 (0.811)	2.008 (0.156)
< 4.00													
≥ 4.00													

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Variables	Prevalence of MSDs (7 Days); χ^2 (P-value)												
	Neck	**Shoulder (Left)**	**Shoulder (Right)**	**Upper back**	**Upper arm (Left)**	**Upper arm (Right)**	**Forearm (Left)**	**Forearm (Right)**	**Hand/ wrist (Left)**	**Hand/ wrist (Right)**	**Lower back**	**Hip / Buttocks**	**Total MSDs**
Total Smartphone Addiction	21.571 (<0.001) ^	1.045 (0.307)	1.503 (0.220)	8.262 (0.004) *	1.159 (0.282)	2.440 (0.118)	0.287 (0.592)	1.095 (0.295)	0.226 (0.635)	2.545 (0.111)	3.684 (0.055)	8.493 (0.004) *	17.745 (<0.001) ^
Addiction													
No Addiction													
Psychosocial Disorders													
Depression	1.485 (0.223)	10.231 (0.001) *	0.728 (0.393)	0.096 (0.757)	0.036 (0.850)	1.163 (0.281)	0.835 (0.361)	0.125 (0.724)	0.468 (0.494)	1.532 (0.216)	8.028 (0.005) *	4.971 (0.026) *	4.549 (0.033) *
(Normal/ Abnormal)													
Anxiety	4.883 (0.027) *	2.211 (0.137)	0.755 (0.385)	2.350 (0.125)	1.152 (0.283)	3.651 (0.056)	0.800 (0.371)	0.699 (0.403)	0.943 (0.331)	9.764 (0.002) *	2.783 (0.095)	8.548 (0.003) *	23.965 (<0.001) ^
(Normal/ Abnormal)													
Stress	0.015 (0.903)	7.019 (0.008) *	1.012 (0.314)	5.023 (0.025) *	1.467 (0.226)	2.483 (0.115)	2.620 (0.105)	2.288 (0.130)	1.666 (0.197)	4.574 (0.032) *	1.411 (0.235)	5.439 (0.020) *	10.393 (0.001) *
(Normal/ Abnormal)													

[a] Fisher's Exact Value
***Significant P-value <0.05**
^Significant P-value< 0.001

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4.7 Specific objectives 5: The Association Between Sociodemographic Characteristics, Smartphone Usage and Smartphone Addiction with Psychosocial Disorder (DAS) Among Youth Population in Malaysia.

The fifth objective was to determine the association between sociodemographic characteristics, smartphone usage and smartphone addiction with psychosocial disorders (DAS) among youth population in Malaysia. The association of depression, anxiety and stress with sociodemographic characteristics, smartphone usage and smartphone addiction were summarized in Table 4.9. Some variables were conducted using Fischer Exact test due to the Pearson Chi-square assumption has been violated. The findings were indicated as significant association when p-value < 0.05 and p-value <0.001. Full results were provided at **Appendix 10**.

The prevalence of depression among the respondents were found to be significantly associated with age (χ^2= 20.745; p<0.001), marital status (χ^2= 18.770; p<0.001), number of children (χ^2= 15.309; p<0.001), educational level (χ^2= 8.211; p=0.027), occupational status (χ^2= 24.514; p<0.001), duration of smartphone usage on typical day (χ^2= 15.863; p<0.001), duration of smartphone usage for leisure/entertainment (χ^2= 10.237; p=0.001), total smartphone addiction (χ^2= 29.835; p<0.001), and MSDs (7 days) (χ^2= 4.549; p=0.033). In contrast, there were three variable which is gender, duration of smartphone usage for work-related/academic and MSDs (12 months) indicated that there is no significant association with the prevalence of depression among the respondents.

Meanwhile, for the association between the prevalence of anxiety with sociodemographic characteristics, smartphone usage and smartphone addiction, it was indicated that there were several significant associations between the variable. The

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findings indicated that the age (χ^2= 4.411; p=0.036), marital status (χ^2= 10.020; p=0.004), number of children (χ^2= 8.563; p=0.003), duration of smartphone usage on typical day (χ^2= 11.342; p=0.001), duration of smartphone usage for leisure/entertainment (χ^2= 4.639; p=0.031), and total smartphone addiction (χ^2= 23.417; p<0.001) and MSDs (12 months and 7 days) (χ^2= 19.740, p<0.001; χ^2= 23.965, p<0.001) were significantly associated the prevalence of anxiety among the respondents. However, it was also found that gender, educational level, occupational status, and duration of smartphone usage for work-related/academic were not significantly associated with prevalence of anxiety.

As for the prevalence of stress, the finding found that there were a significant association between age (χ^2= 9.571; p=0.002), gender (χ^2= 4.515; p=0.034), marital status (χ^2= 16.128; p<0.001), number of children (χ^2= 7.419; p=0.006), occupational status (χ^2= 13.747; p=0.003), duration of smartphone usage on typical day (χ^2= 6.059; p=0.014), total smartphone addiction (χ^2= 24.917; p<0.001), and MSDs (12 months and 7 days) (χ^2= 8.466, p=0.004; χ^2= 10.393, p=0.001) while there is no significant association with duration of smartphone usage for work-related/academic and leisure/entertainment, and educational level among the respondents.

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Table 4.9. The association between sociodemographic characteristics, smartphone usage and smartphone addiction with psychosocial disorders (DAS) among youth population in Malaysia (*N=723*)

Variables	Total DAS; χ^2 (P-value)		
	Depression	Anxiety	Stress
Age (Years)	20.745 (0.000) ^	4.411 (0.036) *	9.571 (0.002) *
18-24			
25-30			
Gender	0.951 (0.329)	1.123 (0.289)	4.515 (0.034) *
Male			
Female			
Marital Status	18.770[a] (0.000) ^	10.020[a] (0.004) *	16.128[a] (0.000) ^
Single			
Married			
Divorced			
Number of Children	15.309 (0.000) ^	8.563 (0.003) *	7.419 (0.006) *
No Children			
Have Children			
Educational Level	8.211[a] (0.027) *	3.307[a] (0.325)	5.250[a] (0.118)
No Formal Education			
Primary School			
Secondary School			
Pre-Universities/ Certificates			
Tertiary Education Level			
Occupational Status	24.514 (0.000) ^	1.127 (0.770)	13.747 (0.003) *
Full-time Student			
Employed in blue collar work			
Employed in white collar work			
Unemployed			
Duration of Smartphone Usage on Typical Day (Hours)	15.863 (0.000) ^	11.342 (0.001) *	6.059 (0.014) *
< 7.00			
≥ 7.00			
Duration of Smartphone Usage by Purpose on Typical Day (Hours)			
Work-related / Academic	0.852 (0.356)	1.604 (0.205)	1.586 (0.208)
< 2.76			
≥ 2.76			
Leisure / Entertainment	10.237 (0.001) *	4.639 (0.031) *	3.514 (0.061)
< 4.00			
≥ 4.00			
Total Smartphone Addiction	29.835 (0.000) ^	23.417 (0.000) ^	24.917 (0.000) ^
Addiction			
No Addiction			

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Variables		Total DAS; χ^2 (P-value)		
		Depression	Anxiety	Stress
Total MSDs (12 months)		1.909 (0.167)	19.740 (0.000) ^	8.466 (0.004) *
Neck	(Yes/No)	2.498 (0.114)	13.387 (0.000) ^	1.350 (0.245)
Shoulder Left	(Yes/No)	6.797 (0.009) *	2.175 (0.140)	3.630 (0.057)
Shoulder Right	(Yes/No)	1.760 (0.185)	2.548 (0.110)	2.498 (0.114)
Upper back	(Yes/No)	0.166 (0.684)	2.940 (0.086)	4.183 (0.041) *
Upper arm Left	(Yes/No)	0.625 (0.429)	0.165 (0.685)	0.639 (0.424)
Upper arm Right	(Yes/No)	0.066 (0.797)	0.386 (0.534)	2.573 (0.109)
Forearm Left	(Yes/No)	0.070 (0.791)	0.330 (0.566)	0.847 (0.357)
Forearm Right	(Yes/No)	0.090 (0.764)	1.068 (0.301)	3.150 (0.076)
Hand/wrist Left	(Yes/No)	1.379 (0.240)	0.115 (0.734)	1.528 (0.216)
Hand/wrist Right	(Yes/No)	0.000 (0.994)	4.088 (0.043) *	2.685 (0.101)
Lower back	(Yes/No)	10.796 (0.001) *	16.047 (0.000) ^	15.977 (0.000) ^
Hip/Buttocks	(Yes/No)	7.311 (0.007) *	15.801 (0.000) ^	6.671 (0.010) *
Total MSDs (7 days)		4.549 (0.033) *	23.965 (0.000) ^	10.393 (0.001) *
Neck	(Yes/No)	1.485 (0.223)	4.883 (0.027) *	0.015 (0.903)
Shoulder Left	(Yes/No)	10.231 (0.001) *	2.211 (0.137)	7.019 (0.008) *
Shoulder Right	(Yes/No)	0.728 (0.393)	0.755 (0.385)	1.012 (0.314)
Upper back	(Yes/No)	0.096 (0.757)	2.350 (0.125)	5.023 (0.025) *
Upper arm Left	(Yes/No)	0.036 (0.850)	1.152 (0.283)	1.467 (0.226)
Upper arm Right	(Yes/No)	1.163 (0.281)	3.651 (0.056)	2.483 (0.115)
Forearm Left	(Yes/No)	0.835 (0.361)	0.800 (0.371)	2.620 (0.105)
Forearm Right	(Yes/No)	0.125 (0.724)	0.699 (0.403)	2.288 (0.130)
Hand/wrist Left	(Yes/No)	0.468 (0.494)	0.943 (0.331)	1.666 (0.197)
Hand/wrist Right	(Yes/No)	1.532 (0.216)	9.764 (0.002) *	4.574 (0.032) *
Lower back	(Yes/No)	8.028 (0.005) *	2.783 (0.095)	1.411 (0.235)
Hip/Buttocks	(Yes/No)	4.971 (0.026) *	8.548 (0.003) *	5.439 (0.020) *

[a] Fisher's Exact Value
***Significant P-value <0.05**
^Significant P-value < 0.001

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Chapter 5

DISCUSSION

In this study, the duration of smartphone usage in a typical day among the youth was collected during the pandemic and considered as high. In another previous study done in India during pandemic, it was reported that the average smartphone usage has grown to 6.9 hours (*Press Trust of India*, 2020). The result from that study were slightly similar to this study. There was an increasing trend on the usage of smartphone before and during the pandemic. This can be compared to a previous study on smartphone usage duration done before Coronavirus Disease 2019 (Covid-19) pandemic where the US adults had an average duration of 3 hours and 43 minutes (Y. Wurmser, 2019). From another global consumer study in several countries before the pandemic, it was found that people are spending 5 hours and above while using their smartphone (Lu, 2017). The high duration of smartphone usage found in this study may be due to the current pandemic Covid-19 situation where most of the respondents using smartphone as a communication platform for work and study. The outbreak seems to have an impact on phone usage, with significant increases in app usage, messaging, and calling (Twigby, 2020).

As for the purpose of smartphone usage, this study found that the respondents spent more hours on smartphone for leisure/entertainment compared to work-related/academic. The usage of smartphone for work-related/academic in this study was found to be higher than a recent article by Slater-Robins (2021), where he

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highlighted that almost 50% of the respondents from UK and US were self-reported to use smartphone less than 1 hour for work. This is probably because, with the advance of technology, people feel more convenient to use smartphone than other devices for work due to its function and mobility. Likewise, the average duration of smartphone per day was found to be higher for leisure/entertainment because most people are using smartphones for leisure and entertainment (Roy et al., 2020). This is also because people are mostly using smartphone to kill times with entertainment such as watching movie, listening to songs, and playing games especially during lockdown where people are mostly at home and isolated.

This study revealed that the prevalence of smartphone addiction among the respondent was lower compared to a previous study conducted by Zain & Kei (2018) among the similar target population group in Malaysian youth. This discrepancy could be due to few reasons. In this study the respondents that answered the questionnaire were from various region in Malaysia whereas the study by Zain and Kei (2018) only focused to those youth who were in Kuala Lumpur, Malaysia. Other than that, this study uses the SAS using 6-point Likert-scale that range from "Strongly Disagree" to 'Strongly Agree" whereby in Zain and Kei (2018) study, they only adapted the questionnaire that have a 3- point Likert-scale range from "Disagree' to "Strongly Agree". Additionally, this study adapted the Likert-scale that was used from the original SAS. Therefore, the range of scores used to categorize the addiction of smartphone was inconsistent with Zain and Kei (2018) study which led to different categorization of smartphone addiction.

The present study found that the prevalence of physical disorders (MSDs) was higher in the last 12 months and 7 days. This study is quite different from other conducted

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previous studies on MSDs whereby this study does not focus on ergonomic risk factors but more on the usage of smartphone in daily life which will eventually affect the user's body parts. On another study in India among similar target population (18-30 years old), approximately 70% of the people suffered MSDs from the usage of smartphone (Malani et al.,2021). To add, the finding from our study were in the range of most previous studies results on smartphone usage where Weerasak and Rungthip (2019) reported that many recent studies showed the prevalence of MSDs due to smartphone at least one area were in ranged of 47.7 % to 84.0 %.

Findings of this study were found to be quite higher compared with a slightly similar study done by Thorburn et al. (2021), where they found that among the smartphone users, more than half of the users were identified to have musculoskeletal symptoms. This may be due to the respondent's time spent on smartphone. This is because, according to Thorburn et al. (2021), symptoms of MSDs frequently start to occur during the first 30 minutes of usage. In this study, it was found that more than half of the respondents used smartphone for more than 7 hours per day whereas in the study by Thorburn et al. (2021) stated that majority of the respondents that self-reported MSD symptoms used smartphone for less than and equal to 2 hours per usage.

The findings according to each body parts in this study showed that the highest physical disorder that the respondents have experienced pain, discomfort, and aches was at the neck. The neck was also found to be the most affected body part due to smartphone on a similar target group study in India by Malani et al. (2021). In this study, the reported of MSDs at neck is possibly caused by poor posture while holding smartphone especially during Covid-19 pandemic where all the work and study are mostly using smartphone, which will result in repetitive and continuous movements of

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the head and neck toward the screen throughout the day. The position of the body while holding smartphone can also affect the muscle activity of its user (Gustafsson et al., 2010). smartphone usage could alter the natural curvature of the neck when users look down and drop their head forward where the misalignment can cause strain, wear, and tear of muscles on the neck structures over time (*Cleveland Clinic*, 2020). These abnormal movements are linked to an increased risk of chronic neck pain (Veiersted & Westgaard, 1993, as cited in AlAbdulwahab et al., 2017).

The psychosocial disorders findings in this study showed a higher prevalence of depression, anxiety and stress compared to other previous study done in Malaysia. According to a recent study in Malaysia by Perveen et al. (2020) among the adult population, the reported prevalence of depression, anxiety and stress was lower compared to this present study findings. However, in this study, the targeted respondents were range from 18-30 years old whereas in that study, the respondent age range from 20-75 years old. Probably, there might be a slight difference in the result due to age range differences. Similarly, that study was also conducted during the pandemic of Covid-19, however, the finding in our study showed a higher prevalence of psychosocial disorders compared to Perveen et al. (2020) study. This discrepancy could be due to several reasons. In this study, it was conducted long after the pandemic of Covid-19 in Malaysia whereas in Perveen et al. (2020), the study was conducted during the early phase (1st and 2nd phase) of pandemic of Covid-19.

Besides, during the phase of Covid-19 up until now, many people especially the working youth had to undergo some issues such as personal, job and financial. To add, the respondents had been in a lockdown situation where they need to isolate themselves and avoid social interaction with other people. This may also affect the

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mental health of the respondent. This is accordance to a recent online article where anxiety and depression can be caused by factors such as isolation, financial burden, and increased drug use because of the pandemic (Columbia University Irving Medical Centre ,2021). Moreover, the high results of the respondent experience these mental health issues could be because of the lack of regular social interaction, decreased physical activity, and increased electronic screen time during pandemic Covid-19 (Canadian Medical Association Journal, 2020). As mentioned by Li et al. (2021), the Covid-19 outbreak also could contribute to this high prevalence of psychosocial disorders. This current situation explained the increasing prevalence of depression, anxiety, and stress among the respondent in our study compared to other studies that has been conducted previously and also the study by Perveen et al. (2020) from the early phase of Covid-19 pandemic in Malaysia.

On the other hand, several research findings in Germany and the United Kingdom have also reported an increased levels of stress and mental distress, fear, anxiety, and depression in the populations due to severe social distancing (Ahaley, 2021). Additionally, overused of smartphone can also increase high risk of getting psychosocial disorders. This is because, in this study, over half of the respondents were reported to use smartphone for more than 7 hours. The behaviour of keep checking on phone may induce development of psychosocial disorder. As evidence, in accordance with annual stress in America survey, it was note-worthy to know that increased levels of stress in people was linked with frequent checked phones (Scott & Gans, 2017).

This study found that there is a significant association between the prevalence of MSDs in the past week with gender and number of children. In this current study, females reported a higher prevalence of MSDs compared to the male. This is because

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the gender disparity can be attributed to different thresholds due to perception of musculoskeletal symptomatology, female have a greater flexibility than male, and the hormonal changes during puberty (Martins et al., 2020). Female face greater compression fractures and vertebral alterations as they age, such as scoliosis, bone mass loss, and osteoarthritis, than males. Any of these circumstances increase the likelihood of bone fracture, which might aggravate the musculoskeletal discomfort (Russa, 2019). As for the number of children, this may be due to the daily responsibilities of the respondents to take care of their children enhance the severity of musculoskeletal pain. As evidence, in a different study by Gokcin Eminel et al. (2020) among caregivers, it is deduced that responsibility to body care, assisted the child with mobility, and performing home exercises which was mostly slightly inclined and upright the upper body parts where it increases the physical workload on the spin

In terms of smartphone usage, this study found that there was a significant association between the smartphone usage duration and its purposes (work/ academic and leisure/entertainment) in a typical day with the prevalence of MSDs in the past year and week. This is probably because this study is conducted during the period of Covid-19 pandemic where all the people are isolating themselves at home due to lockdown order. This situation might have increased the hour of usage of smartphone at home. Thus, long hours of usage led to unnoticed adoption of awkward posture while using the smartphone. As evidence, from a study by Mustafaoglu et al. (2021), they stated that prolonged smartphone use can result in erroneous postures such as a forward head posture whereby they emphasize that long-term smartphone use is a significant risk factor in the development of musculoskeletal disorders.

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In this study, the prevalence of smartphone addiction has been found to be significantly associated with the occurrence of MSDs in the past year and weeks. The findings in this study are aligned with several previous studies (Hegazy et al., 2016; Mustafaoglu et al., 2021). The addiction to smartphones may cause longer duration of smartphone usage more than the users intended. Consequently, users may be potentially adopting awkward posture while using the smartphone as have been described in various past research (Namwongsa et al., 2018; Mustafaoglu et al., 2021; Tapanya et al., 2021). As evidence, a previous study by Namwongsa et al. (2018) in Thailand among smartphone users found that majority of the respondents adopt awkward body position had self-reported MSDs. This is because when using a phone, sitting with the head bent forward without supporting the arms places resulting in increased upper extremity musculoskeletal disorders (Mustafaoglu et al., 2021).

Additionally, this study showed that psychosocial disorders (depression, anxiety, and stress) were significantly associated with prevalence MSDs (12 months and 7 days). This has been indicated in various previous studies where psychosocial disorder are also one of the risk factors of MSDs especially during this pandemic situation where respondents who are working were stress or pressured due to the workload and task. In an online article by Moran (2020), it was stated that a lecturer, Dr. Shiu, revealed that the pandemic has caused work-from-home stress increases. The high work stress accompanied by long hour of focus and doing of work intensively in combination with repetitive movement or adoption of awkward posture. The contribution of psychosocial states towards MSDs has been very prevalent in various past research. In a study among nurses, it was reported that nurses that experienced stress and depression have reported pain at the neck and shoulder (Smedley, 2003, as cited in Ng et al., 2019). In Ng et al. (2019) study, it was found that psychosocial disorders-related

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tension can raise the chance of feeling muscle tension and pain, as well as changes in blood flow and oxygen delivery, resulting in an increase in algesic chemicals in muscles, particularly in respondents who have been suffering from muscle pain for a long time.

Next, this study has found a significant association between some sociodemographic characteristics (age, marital status, number of children, educational level, and occupational status) with depression among youth. The study finding on age (Akhtar-Danesh & Landeen, 2007), marital status (Bulloch et al., 2017), number of children (Council et al., 2016), educational level (Bjelland et al., 2008) and occupational (Park et al., 2014). Ryba and Hopko (2012), stated that: gender had a direct and significant effect on depression severity, with females reporting more depression. However, in this study, it was found that there was no significant association in relation to the gender of the respondents with the prevalence of depression which is similar with the results from previous studies (Islam et al., 2020; Tayefi et al., 2019; Alim et al., 2017; Shamsuddin et al., 2013). Regarding the duration of smartphone usage, this study has found that there was a significant association between prolonged use of smartphones with development of depression among youth. This result is postulated by a previous study conducted among Chinese adolescents. Liu et al. (2019) highlighted that persistent smartphone use is associated with an increased risk of depression. They also add that the association between smartphone use, and depression is observed for usage periods of more than 2 hours on weekdays and more than 5 hours on weekends whereas, in our study, the average duration of smartphone of the respondents was 7 hours per day. It was found smartphone addiction and depression among the youth were significantly associated. Likewise, some previous studies reported a strong association between smartphone addiction and depression (Lei et al., 2020; Ithnain et al., 2018;

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Alhassan et al., 2018). This is because most people enjoy checking their phones obsessively for updates where such behaviour could become stressful, worsening anxiety and depression symptoms (Hunley, 2017).

In this study, the relationship between anxiety with sociodemographic characteristics (age, marital status, and number of children) was found to be significantly associated. It is noteworthy to say that the age (Gerstner et al., 2020) and marital status (P. Ta et al., 2017) were among factors contributed to anxiety based on previous study. However, in this study, there was no association found between gender with anxiety. This may be due different to difference situation experienced by the respondents during pandemic Covid-19 in our study and previously conducted study. As for the duration of smartphone usage, this study findings were consistent with previous research where they reported the association between anxiety with the duration of smartphone usage (Demirci et al., 2015). It was suggested that a longer duration of smartphone usage is attributable to work and study related use, as well as leisure or entertainment, which involve online social interactions linked to social anxiety. Lei et al. (2020) found that the higher the smartphone addiction score, the higher the anxiety scores. The possible explanation from this study findings may be due to the Covid-19 pandemic, where people are being isolated at home and mostly only use smartphones to communicate with friends, relatives, or family to know about their condition almost every day. This behavior of seeking reassurance is the symptoms of anxiety disorders (Billieux et al., 2015).

In this study, it was found that the association between sociodemographic characteristics (age, gender, marital status, number of children and occupational status) with stress among youth were significant. Previous studies have found that the level

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of stress increase with age (Elo et al., 2003, as cited in Wiegner et al., 2015). As for the marital status and number of children, Kowal et al. (2020), indicated that the possible reason married people experienced low level of stress compared to single person was due to physiological where marrieds were found to have low level of cortisol (Chin et al., 2017) is an indirect indicator of low level of stress. They also add that children may elevate the parental stress level as the outbreak of Covid 19 pandemic jeopardized the parenting a childcare method. From few previous studies, women were found to have higher risk of stress compared to men (Hafiza Sana Ashraf et al., 2021; Limcaoco et al. 2020). This may be due to the ways of male and female coping with stress is different (Limcaoco et al. 2020). It is also found that the usage of smartphones among respondents in a typical day has a significant association with stress. This could be because, during the pandemic, most of the time spent in home, and this leads to high frequencies of smartphone usage. In a previous study, it was found that constantly checking on phones may become stressful because people felt it is important to always stay connected on social networks (Thomée et al., 2010, as cited in Vahedi & Saiphoo, 2018). It was found that a significant association between smartphone addiction and stress among the youth. This may be due to government order for isolation at home because of Covid-19 pandemic. This situation eventually led to stress, which impairs self-control of the respondents in this study and may raise their chances of addiction to smartphone. Smartphone addiction influenced stress by lowering self- control (Lei et al., 2020).

Finally, in this study, it was found that MSDs (12 months and 7 days) has a significant association with all the psychosocial disorders (depression, anxiety, and stress) except for MSDs (12 months) with depression. The MSDs might be a mediating factors for psychosocial or the other way around. In Ng et al. (2019) study, it was noteworthy to

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say that the co-occurrence of MSD and depression, in which those who are in pain are at a higher risk of depression, was significant. In another study by Zarean et al. (2021), it mentioned that negative affect, anxiety, and depression are related with reduced pain thresholds in healthy individuals and are increased in chronic pain states such as musculoskeletal illnesses. To add, respondents who had previously been stressed had an increased probability of acquiring musculoskeletal pain (Bonzini et al., 2014).

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CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

In conclusion, more than half of the studied youth population in Malaysia have addiction to smartphone. Besides, the smartphone addiction was found to be one of the factors associated with the development of physical (MSDs) and psychosocial (DAS) disorders. Hence, youth should use smartphone in a proper manner and duration to reduce risk of developing these disorders.

In relation to physical disorder (MSDs), this study found that the prevalence of MSDs during the past year and week are concerning which were considered as high compared to some previous studies. Besides, there is a significant association found between some of the sociodemographic characteristics (gender and number of children), smartphone usage and DAS with the prevalence of MSDs in the past year and week.

For the psychosocial disorders (DAS), it was found that the prevalence of depression, anxiety, and stress among the youth was higher compared to previous studies conducted among the same population in Malaysia. The study was done during the pandemic of Covid-19. Thus, this incident must have affected the findings of the psychosocial disorders. Moreover, there is a significant association found between some of the sociodemographic characteristics, smartphone usage and MSDs (12 months and 7 days) with each occurrence of depression, anxiety, and stress in this study.

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6.2 Strength and Limitation

In this study, there were some limitations that can be reduce for future studies. Firstly, this study was not able to establish a true cause-effect relationship for the physical and psychosocial disorders due to smartphone usage among youth in Malaysia. This is due to the nature of this study which is a cross-sectional study.

Secondly, the study was also too reliance on the self-reported tool such as questionnaires. Thus, this will lead to recall bias on the collected data whereby, there is a possibility that the respondents might not remember or make mistake while answering the questions about the disorders.

Thirdly, this study is done during the pandemic of Covid 19 where it might affect the physical and psychosocial disorders severity of the respondents. To a certain extent, it will influence the study findings by giving a very high or low prevalence of disorders occurred.

The findings from this study cannot be generalized to a larger population. This is because the data collection in this study was not comprehensive where it does not cover all of the youth population in Malaysia. This is also because the sampling method used was a non-probability sampling.

Nevertheless, to enhance the validity of the results and reduce the bias for this study, the research instrument was validated through validity tests, pre-test, and reliability test before actual data collection process. Validity tests were carried out by two experts on environmental health to revise the questionnaire. The pre-test study was carried out on the targeted population, in which the feedback of the questionnaire was obtained

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from these respondents, and the reliability test yielded a Cronbach's alpha value of more than 0.8.

Moreover, the selection bias of this study was further reduced by giving detail instructions and explanations to the targeted population on answering the questionnaire by collecting data in a diversified manner. In this study, different recruitment strategies were employed to improve representativeness and participation by randomly distributing the questionnaire at different times and dates (within the day as well as within the week) to reach out to more participants who may not be available during time of dissemination such as night or morning due to work. Besides that, this study is also a homogenous convenience sampling (as described by Jager et al., 2017), where instead of respondents of all socio-demographic background, the criteria are limited to youth aged between 18 - 30 years old.

6.3 Recommendation

As mentioned before, the cross-sectional study cannot establish a true cause-effect relationship. Thus, a further study conducted using a different study design such as cohort study should be carried out in the future to study the cause-effect relationship on physical and psychosocial disorders due to smartphone usage among youth in Malaysia as the potential risk factors have been identified in this study.

This study is done among the general youth population in Malaysia. In future studies, further research can build upon our findings and investigate screening and interventions for smartphone addiction among youth in Malaysia.

Furthermore, the findings of this study suggested that policymakers of government or stakeholders might have to consider the issue of smartphone addiction of youth during

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the implementation of an intervention program or establish of policy, to promote a healthy lifestyle among the youth in Malaysia. However, this suggestion does not end at policy maker or stakeholder; by now, parents and youth themselves should have understand the risks and take proactive measures such as reduce usage time of smartphone in a day and applied good posture while using a smartphone to reduce the addiction as well as the physical and psychosocial disorders development due to it.

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APPENDICES

Appendix 1 Sample Size Calculation

Specific Objectives	Formula & Calculation	Reference	Sample Size
1. **To identify the sociodemographic characteristics (age, gender, marital status, educational level), smartphone usage (duration of smartphone usage and purpose of usage) of the youth population in Malaysia**.	N/A	N/A	**N/A**
2. **To determine the prevalence of smartphone addiction among youth population in Malaysia**.	**One proportion formula** $n = \frac{z^2_{1-\frac{a}{2}} P(1-p)}{d^2}$ n=? N=6,380,300 (youth aged 18-30) $z^2_{1-\frac{a}{2}} = 1.96$ P= 69.6% (Zain & Kei, 2018) d=0.05 CI=95 % Non-Response rate= 32.46% n= 326 ÷ (32.46/100) n=1004.31≡ 1005 n=1005 **Sample Size for Frequency in a Population** Population size(for finite population correction factor or fpc)(N): 6380300 Hypothesized % frequency of outcome factor in the population (p): 69.6%+/-5 Confidence limits as % of 100(absolute +/- %)(d): 5% Design effect (for cluster surveys-$DEFF$): 1 **Sample Size(n) for Various Confidence Levels** **ConfidenceLevel(%) — Sample Size** 95% — 326 80% — 139 90% — 229 97% — 399 99% — 562 99.9% — 917 99.99% — 1282	-Based Zain and Kei (2018), it is reported that the prevalence of mild smartphone addiction among Youths in kuala lumpur 69.6 % -The confidence level of 95% is adopted non-response rate is considered. -According to Kohli et al., 2014), the non- response rate of online questionnaire among Malaysian population is 32.46%.	**n= 1005**

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<table>
<tr><th>Specific Objectives</th><th>Formula & Calculation</th><th>Reference</th><th>Sample Size</th></tr>
<tr><td rowspan="2">3. To determine the prevalence of physical disorders (MSDs) and psychosocial disorders (depression, anxiety, and stress) due to smartphone usage among youth population in Malaysia.</td><td>One proportion formula (MSDs)
$n = \frac{z^2_{1-\frac{a}{2}} P(1-p)}{d^2}$
n=?
N=6,380,300 (youth aged 18-30)
$z^2_{1-\frac{a}{2}} = 1.96$
P= 74.1% (Zain & Kei, 2018)
d=0.05
CI=95 %
Non-Response rate= 32.46%
n= 295 ÷ (32.46/100)
n=90.8.81≡ 909

Sample Size for Frequency in a Population
Population size(for finite population correction factor or fpc)(N): 6380300
Hypothesized % frequency of outcome factor in the population (p): 74.1%+/-5
Confidence limits as % of 100(absolute +/- %)(d): 5%
Design effect (for cluster surveys-DEFF): 1
Sample Size(n) for Various Confidence Levels
ConfidenceLevel(%) — Sample Size
95% — 295
80% — 127
90% — 208
97% — 362
99% — 510
99.9% — 832
99.99% — 1163</td><td><u>MSDs</u>
-Based Zain and Kei (2018), it is reported that the prevalence of MSD due to prolonged smartphone use among youth is addiction among Youths 74.1%

-The confidence level of 95% is adopted

<u>non-response rate is considered.</u>

-According to Kohli et al., 2014), the non- response rate of online questionnaire among Malaysian population is 32.46%.</td><td>n=909</td></tr>
<tr><td>One proportion formula (Depression)
$n = \frac{z^2_{1-\frac{a}{2}} P(1-p)}{d^2}$
n=?
N=6,380,300 (youth aged 18-30)
$z^2_{1-\frac{a}{2}} = 1.96$
P= 80% (Firat et al., 2018)
d=0.05
CI=95 %
Non-Response rate= 32.46%
n= 246 ÷ (32.46/100)
n=757.85≡ 758

Sample Size for Frequency in a Population
Population size(for finite population correction factor or fpc)(N): 6380300
Hypothesized % frequency of outcome factor in the population (p): 80%+/-5
Confidence limits as % of 100(absolute +/- %)(d): 5%
Design effect (for cluster surveys-DEFF): 1
Sample Size(n) for Various Confidence Levels
ConfidenceLevel(%) — Sample Size
95% — 246
80% — 106
90% — 174
97% — 302
99% — 425
99.9% — 693
99.99% — 969</td><td><u>Depression</u>
-Based on Fırat et al., (2018) the prevalence of depression among adolescent due to problematic smart mobile phone usage was 80%

-The confidence level of 95% is adopted

<u>non-response rate is considered.</u>

-According to Kohli et al., 2014), the non- response rate of online questionnaire among Malaysian population is 32.46%.</td><td>n=758</td></tr>
</table>

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Specific Objectives	Formula & Calculation	Reference	Sample Size
3. **To determine the prevalence of physical disorders (MSDs) and psychosocial disorders (depression, anxiety, and stress) due to smartphone usage among youth population in Malaysia.** **(continue)**	**One proportion formula (Anxiety)** $$n = \frac{z^2_{1-\frac{a}{2}} P(1-p)}{d^2}$$ n=? N=6,380,300 (youth aged 18-30) $z^2_{1-\frac{a}{2}} = 1.96$ P= 84% (Firat et al., 2018) d=0.05 CI=95 % Non-Response rate= 32.46% n= 207 ÷ (32.46/100) n=637.70 ≡638 **Sample Size for Frequency in a Population** Population size(for finite population correction factor or fpc)(N): 6380300 Hypothesized % frequency of outcome factor in the population (p): 84%+/-5 Confidence limits as % of 100(absolute +/- %)(d): 5% Design effect (for cluster surveys-$DEFF$): 1 **Sample Size(n) for Various Confidence Levels** ConfidenceLevel(%) — Sample Size 95% — 207 80% — 89 90% — 146 97% — 254 99% — 357 99.9% — 583 99.99% — 814	Anxiety - Based on Fırat et al., (2018) the prevalence of anxiety disorders among adolescent due to problematic smart mobile phone usage was 84% -The confidence level of 95% is adopted non-response rate is considered. -According to Kohli et al., 2014), the non- response rate of online questionnaire among Malaysian population is 32.46%.	**n=638**
	One proportion formula (Stress) $$n = \frac{z^2_{1-\frac{a}{2}} P(1-p)}{d^2}$$ n=? N=6,380,300 (youth aged 18-30) $z^2_{1-\frac{a}{2}} = 1.96$ P= 73.5% (Sebastian et al., 2020) d=0.05 CI=95 % Non-Response rate= 32.46% n=300 ÷ (32.46/100) n=924.21≡925 **Sample Size for Frequency in a Population** Population size(for finite population correction factor or fpc)(N): 6380300 Hypothesized % frequency of outcome factor in the population (p): 73.5%+/-5 Confidence limits as % of 100(absolute +/- %)(d): 5% Design effect (for cluster surveys-$DEFF$): 1 **Sample Size(n) for Various Confidence Levels** ConfidenceLevel(%) — Sample Size 95% — 300 80% — 128 90% — 211 97% — 367 99% — 517 99.9% — 844 99.99% — 1180	Stress -Based on Sebastian et al., (2020) they stated student with smartphone have a prevalence of 73.5% of perceived stress -The confidence level of 95% is adopted non-response rate is considered. -According to Kohli et al., 2014), the non- response rate of online questionnaire among Malaysian population is 32.46%.	**n=925**

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Specific Objectives	Formula & Calculation	Reference	Sample Size
4. **To determine the association between sociodemographic characteristics and smartphone usage smartphone addiction with health disorder (MSDs) among youth population in Malaysia**	**Two proportion formula** $n = \frac{\{z_{1-\frac{\alpha}{2}}\sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta}\sqrt{P_1(1-p_1)+P_2(}}{(p_1-p_2)^2}$ $z_{1-\frac{\alpha}{2}} = 1.96$ $z_{1-\beta} = 0.842$ $\bar{P} = 0.5935$ P_1=66% (0.66) proportion exposed with outcome P_2=52.7% (0.527) proportion unexposed with outcome d =0.05 CI=95% Non-Response rate=32.46% $n = \frac{\{(1.96)\sqrt{2(0.5935)(1-0.5935)} + (0.842)\sqrt{(0.66)(1-0.66)+(0.527)(1-0.527}}{(0.66-0.527)^2}$ n=212.853 X 2 ≡ 425.706 n=426 n=426 ÷ (32.46/100) n=1312.384 ≡ 1313 n=1313	Based on previous study by Alsalameh et al., (2019) -P1:66% (smartphones addiction with neck pain (MSD)) -P2:52.7% (No Smartphones addiction with neck pain (MSD)) - The confidence level of 95% is adopted non-response rate is considered. -According to Kohli et al., 2014), the non- response rate of online questionnaire among Malaysian population is 32.46%.	**n=1313**
5. **To determine the association between sociodemographic characteristics, smartphone usage and smartphone addiction with health disorder (depression, anxiety, and stress) among youth population in Malaysia**	**Two proportion formula** $n = \frac{\{z_{1-\frac{\alpha}{2}}\sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta}\sqrt{P_1(1-p_1)+P_2(}}{(p_1-p_2)^2}$ $z_{1-\frac{\alpha}{2}} = 1.96$ $z_{1-\beta} = 0.842$ $\bar{P} = 0.2405$ P_1=0.361 (36.1%) proportion exposed with outcome P_2=0.12 (12%) proportion unexposed with outcome d =0.05 CI=95% Non-Response rate=32.46% $n = \frac{\{(1.96)\sqrt{2(0.2405)(1-0.2405)} + (0.842)\sqrt{(0.361)(1-0.361)+(0.12)(1-0.12}}{(0.361-0.12)^2}$ n=48.245X 2 ≡ 96.491 n=97 n=97 ÷ (32.46/100) n=298.829 ≡ 299 n=299	- Based on Kim et al., (2019) P1:36.1% (smartphones addiction with depression) -P2:12% (No Smartphones addiction with Depression) - The confidence level of 95% is adopted non-response rate is considered. -According to Kohli et al., 2014), the non- response rate of online questionnaire among Malaysian population is 32.46%	**n=299**

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Appendix 2 (Questionnaire/Borang Kaji Selidik)

QUESTIONNAIRE

Research Title:

Physical and Psychosocial Disorders Related to Smartphone Usage

Among Youth in Malaysia.

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Introduction

This study intends to determine the prevalence of smartphone addiction, physical disorder (musculoskeletal disorders), psychosocial disorders (depression, anxiety, stress) occurred among youth aged between 18-30 in Malaysia. Specifically, the inputs from respondent on smartphone addiction and health related disorders are the focus of this study. Moreover, this study would also intend to determine the significant association between sociodemographic characteristics (age, gender, marital status, and education level), smartphone usage (duration and purpose of usage per day) and smartphone addiction with health disorders (musculoskeletal disorder, depression, anxiety, and stress) among the youth population in Malaysia. A total of 1313 respondents will be recruited for this online survey study. All information and identity that obtained through this research will remain confidential and used only for this research. The data processing software will not contain your personal identifier or information

What Will You Have to Do?

This study is completely voluntary where respondents can withdraw at any point of time. Respondent is required to fill in 5 sections in the questionnaires which is sociodemographic characteristics in section A, smartphone usage in section B, modified Nordic Musculoskeletal Disorder (mNMQ) in section C, Smartphone Addiction Scale (SAS) in section D, and followed by Depression, Anxiety and Stress Scale (DASS-21) in section E. The questionnaire is estimated to take about 10 to 20 minutes.

What Are the Possible Risks?

There is a minimal risk as this research does not involve biological specimens. Throughout the process of answering the questionnaire, you may experience a minimal psychosocial risk such as confusion when encounter difficulty in understanding the questions in the questionnaire using any electronic devices of your preference (i.e.: desktop, laptop, phone, tablet, etc.). If you experienced any depression, anxiety, and stress symptoms, stop immediately from answering the questionnaire. You are encouraged to seek help from a counsellor or any organization that can provide mental support.

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Who Should Not participate In This Study?

You should **NOT** participate in this study if you:

- **Youth who have any genetically related diseases that affect musculoskeletal system** which was diagnosed by a registered medical practitioner (e.g.: **Congenital muscular dystrophy (CMD), Duchenne muscular dystrophy (DMD), Becker muscular dystrophy (BMD), Myotonic Muscular Dystrophy, and etc**.)
- **Youth who is diagnosed with mental illness(es)** by a registered medical doctor.
- **Youth who does not own a smartphone**

Who Should You Contact If You Have Additional Questions During the Course of the Research?

If you have any questions during the course of the research, you may contact:

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Exclusion Criteria

Do you (respondent):

- **Have any genetically related diseases that affect the musculoskeletal system** which was diagnosed by a registered medical practitioner (e.g.: Congenital muscular dystrophy (CMD), Duchenne muscular dystrophy (DMD), Becker muscular dystrophy (BMD), Myotonic Muscular Dystrophy, etc.)

OR

- **Have been diagnosed with mental illness(es)** by a registered medical doctor

OR

- Does **NOT own a smartphone**

- Yes
- No

Informed Consent Form

Does the respondent voluntarily take part in this research study?

- Yes
- No

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QUESTIONNAIRE ON PHYSICAL AND PSYCHOSOCIAL DISORDERS RELATED TO SMARTPHONE USAGE AMONG YOUTH IN MALAYSIA

Instruction

Please read and answer all the questions provided in this questionnaire.

This questionnaire contains **5 sections**:

1. **Section A: Sociodemographic Characteristics**
2. **Section B: Smartphone Usage**
3. **Section C: Modified Nordic Musculoskeletal Disorder (mNMQ)**
4. **Section D: Smartphone Addiction Scale (SAS)**
5. **Section E: Depression, Anxiety, and Stress Scale (DASS-21)**

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Section A: Sociodemographic Characteristics

INSTRUCTIONS:

- Please tick your answer and fill in the blanks for the questions below.
- This section contains **6 questions**

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1. Age (Years Old)

2. Gender

- Male
- Female

3. Marital Status

- Single
- Married
- Divorced

4. How Many Children Do You Have? **(Only appear if Question No.3 is answered "Married/Divorced")**

*(If have **No Children**, please state "0")*

5. Highest Education Level Attained

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- No Formal Education
- Primary School
- Secondary School (PMR / SPM)
- Pre-Universities / Certificates
- Tertiary Education Level (Diploma / Bachelor’s degree / Master / PhD)

6. Occupational Status

- Full-time Student
- Employed in blue collar work (eg: those who perform any form of manual labour.)
- Employed in white collar work (eg: people perform professional, desk, managerial, or administrative work)
- Unemployed

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Section B: Smartphone Usage

INSTRUCTIONS:

- Please tick your answer and fill in the blanks for the questions below.
- This section contains **4 questions**
- Conversion table of **Minutes** to **Hour** to help respondent on smartphone usage estimation

Conversion table **MINUTES** to **HOUR** (*If have minutes*)
5 minutes = **0.08** hours
10 minutes = **0.17** hours
15 minutes = **0.25** hours
20 minutes = **0.33** hours
25 minutes = **0.42** hours
30 minutes = **0.50** hours
35 minutes = **0.58** hours
40 minutes = **0.67** hours
45 minutes = **0.75** hours
50 minutes = **0.83** hours
55 minutes = **0.92** hours

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7. Type of Smartphone Used /

(If you are using MORE than ONE smartphone, you may choose more than one answer)

- iOS (Apple)
- Android
- Harmony OS (Huawei)
- Others __________

8. Estimated Duration of Smartphone Usage on a **Typical Day (Per Hour)**:

(if you are using iOS, please refer to the daily average " Screen Time" at "Settings", If you are using other phone without such tracker, please estimates the duration of use)

9. Please State the Duration Based on The **Purpose of Smartphone Usage** on a **Typical Day (Per Hour)**

A) Work-related / Academic Usage

(eg: Scheduling an appointment, Check/ Reply Email, Use Social Media for Promotion, Sales, Banking, Phone call, Browsing for information, and etc.)

(If NOT APPLICABLE to the respondent, please enter "0")

10. Please State the Duration Based on The **Purpose of Smartphone Usage** on a **Typical Day (Per Hour):**

B) Leisure / Entertainment Usage

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(eg: Social media, Phone / Video Calls, Texting, Online shopping, Order Take-outs, Watch/ Listen to Music/Video/Movies, Mobile Gaming, and etc.)

(If NOT APPLICABLE to the respondent, please enter "0")

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Section C: Modified Nordic Musculoskeletal Disorder (mNMQ)

INSTRUCTIONS:

- For each statement below, **please tick and choose** answers that **best represent** how **you have been feeling while using a SMARTPHONE**.
- The Body Diagram below is to help respondents to identify body region/ parts.
- This section contains **several questions** with the following body parts (some are divided into **"LEFT" and "RIGHT"**)

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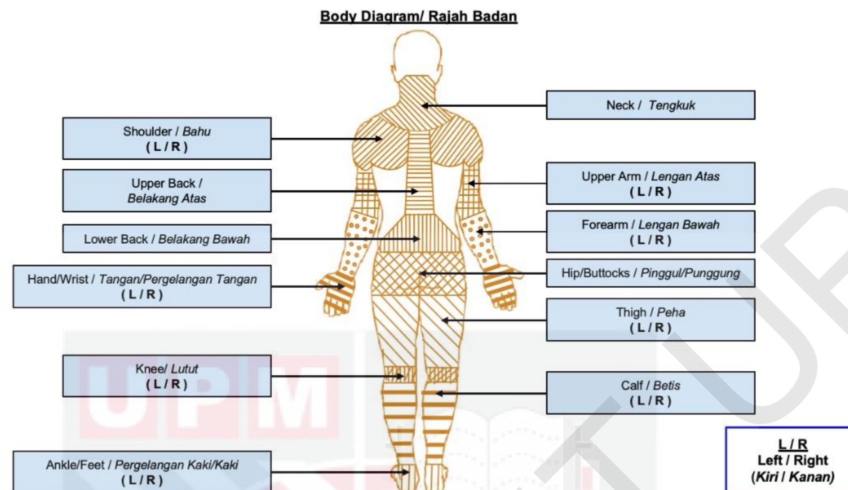
11. Which of the following body parts did you experience pain / ache / discomfort / numbness / tingling in the past 12 MONTHS (while using a smartphone)?



If **NOT APPLICABLE (you have not experience pain / ache / discomfort / numbness / tingling), **you may skip to the next question.***

in the past 12 MONTHS:

Neck	❑
Shoulder (Left)	❑
Shoulder (Right)	❑
Upper Back	❑
Upper Arm (Left)	❑
Upper Arm (Right)	❑
Forearm (Left)	❑
Forearm (Right)	❑
Hand Wrist (Left)	❑
Hand Wrist (Right)	❑
Lower Back	❑
Hip / Buttocks	❑

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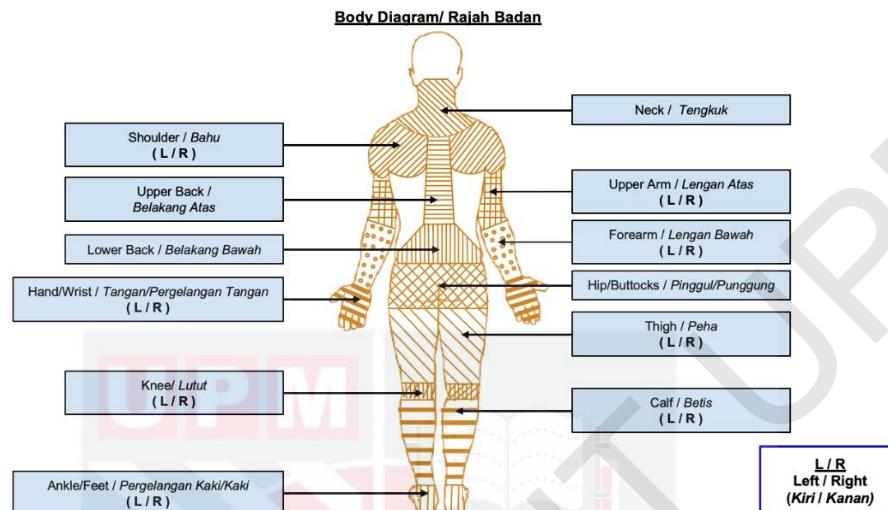
12. Which of the following body parts did you experience pain / ache / discomfort / numbness / tingling in the past 7 DAYS (while using a smartphone)?



If NOT APPLICABLE** *(you have not experience pain / ache / discomfort / numbness / tingling),* ***you may skip to the next question.

in the past 7 DAYS:

Neck	❑
Shoulder (Left)	❑
Shoulder (Right)	❑
Upper Back	❑
Upper Arm (Left)	❑
Upper Arm (Right)	❑
Forearm (Left)	❑
Forearm (Right)	❑
Hand Wrist (Left)	❑
Hand Wrist (Right)	❑
Lower Back	❑
Hip / Buttocks	❑

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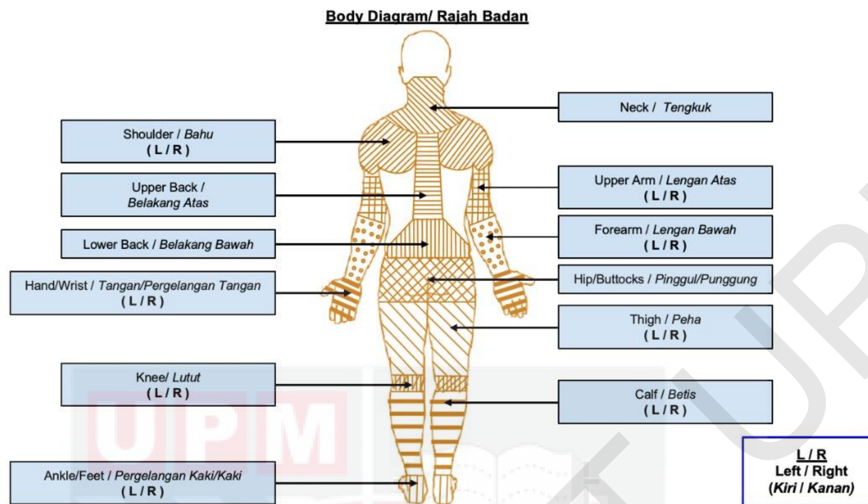
(This section only appears if Question No.12 is answered in its specific body parts)



1. In the past week (**using a smartphone**), how frequent did you experienced the pain / ache / discomfort / numbness / tingling at the **Neck/ Shoulder (L/R)/ Upperarm (L/R)/ Forearm(L/R)/Upperback/Handwrist(L/R)/Lowerback/Hip/Buttocks**?

Every day in the past week	❑
3-4 times in the past week	❑
1-2 times in the past week	❑

2. When experiencing pain / ache / discomfort / numbness / tingling at **Neck/ Shoulder (L/R)/Upperarm(L/R)/Forearm(L/R)/Upperback/Handwrist(L/R)/Lowerback/Hip/Butocks**? how uncomfortable was it?

Is/was Slightly Uncomfortable /	❑
Is/was Moderately Uncomfortable /	❑
Is/was Very Uncomfortable /	❑

3. When experiencing pain / ache / discomfort / numbness / tingling at **Neck/ Shoulder(L/R)/Upperarm(L/R)/Forearm(L/R)/Upperback/Handwrist(L/R)/Low**

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erback/Hip/Buttocks? did it interfere from carrying out normal activities (e.g., job, housework, hobbies)?

Not inteferes	❑
Slightly inteferes	❑
Subtiantially inteferes	❑

4. When experiencing pain / ache / discomfort / numbness / tingling at **Neck/ Shoulder (L/R)/Upperarm(L/R)/Forearm(L/R)/Upperback/Handwrist(L/R)/Lowerback/Hip/Buttocks**? did you see the physician / self-medicate / treatment to relieve the pain? (Tick all that apply)

Made me self-medicate/treatment to relieve the pain (i.e.: painkiller, massage, etc.)	❑
Made me see a physician	❑
Did not apply to me at all	❑

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Section D : Smartphone Addiction Scale (SAS)

INSTRUCTIONS:

- Please tick your answer based on the questions below.
- This section contains **10 questions**

Answer Choice:
(1) Strongly Disagree
(2) Disagree
(3) Somewhat Disagree
(4) Somewhat Agree
(5) Agree
(6) Strongly Agree

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	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Missing planned work due to smartphone use	❑	❑	❑	❑	❑	❑
Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use	❑	❑	❑	❑	❑	❑
Feeling pain in the wrists or at the back of the neck while using a smartphone	❑	❑	❑	❑	❑	❑
Won't be able to stand not having a smartphone	❑	❑	❑	❑	❑	❑
Feeling impatient and fretful when I am not holding my smartphone	❑	❑	❑	❑	❑	❑
Having my smartphone in my mind even when I am not using it	❑	❑	❑	❑	❑	❑
I will never give up using my smartphone even when my daily life is already greatly affected by it.	❑	❑	❑	❑	❑	❑
Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook	❑	❑	❑	❑	❑	❑
Using my smartphone longer than I had intended	❑	❑	❑	❑	❑	❑
The people around me tell me that I use my smartphone too much	❑	❑	❑	❑	❑	❑

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Section E : Depression, Anxiety and Stress Scale (DASS-21)

NSTRUCTIONS:

- For each statement below, please tick the number in the column that **best represents** how you have been **feeling in the last week**.
- There are **no right** or **wrong answers**.
- **Do not spend too much time** on any statement.
- This section contains **21 questions**

Answer Choice:
(0) Did not apply to me at all
(1) Applied to me to some degree or some of the time
(2) Applied to me a considerable degree or a good part of the time
(3) Applied to me very much or most of the time

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	Did not apply to me at all	Applied to me to some degree or some of the time	Applied to me a considerable degree or a good part of the time	Applied to me very much or most of the time
1. I found it hard to wind down (eg: chill, de-stress, relax)	❑	❑	❑	❑
2. I was aware of the dryness of my mouth	❑	❑	❑	❑
3. I couldn't seem to experience any positive feeling at	❑	❑	❑	❑
4. I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	❑	❑	❑	❑
5. I found it difficult to work up the initiative to do things	❑	❑	❑	❑
6. I tended to overreact to situations	❑	❑	❑	❑
7. I experienced trembling (eg, in the hands)	❑	❑	❑	❑
8. I felt that I was using a lot of nervous energy	❑	❑	❑	❑
9. I was worried about situations in which I might panic and make a fool of myself	❑	❑	❑	❑
10. I felt that I had nothing to look forward to	❑	❑	❑	❑
11. I found myself getting agitated	❑	❑	❑	❑
12. I found it difficult to relax	❑	❑	❑	❑
13. I felt downhearted and blue (e.g: Sad, Gloomy)	❑	❑	❑	❑
14. I was intolerant of anything that kept me from getting on with what I was doing	❑	❑	❑	❑
15. I felt I was close to panic	❑	❑	❑	❑
16. I was unable to become enthusiastic about anything.	❑	❑	❑	❑

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17. I felt I wasn't worth much as a person.	❑	❑	❑	❑
18. I felt that I was rather touchy	❑	❑	❑	❑
19. I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	❑	❑	❑	❑
20. I felt scared without any good reason	❑	❑	❑	❑
21. I felt that life was meaningless	❑	❑	❑	❑

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Thank you for your time in answering all of the questions.
Your cooperation is highly appreciated. Your response has been safely recorded.

If you have any questions regarding this research, please contact at:

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BORANG KAJI SELIDIK

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Tajuk Kajian:

Penyakit Fizikal dan Psikososial yang Berkaitan dengan Penggunaan Telefon Pintar dalam Kalangan Golongan Belia di Malaysia.

Pendahuluan

Kajian ini bertujuan untuk menentukan kelaziman ketagihan terhadap telefon pintar, gangguan fizikal (gangguan muskuloskeletal), gangguan psikososial (kemurungan, kebimbangan, tekanan) yang berlaku dalam kalangan belia berusia di antara 18-30 tahun di Malaysia. Secara khususnya, input daripada responden mengenai ketagihan telefon pintar dan gangguan berkaitan kesihatan adalah fokus utama kajian ini. Selain itu, kajian ini juga berhasrat untuk menentukan perkaitan yang signifikan di antara ciri-ciri sosiodemografi (umur, jantina, status perkahwinan, dan tahap pendidikan), penggunaan telefon pintar (durasi penggunaan dan tujuan penggunaan telefon pintar dalam sehari) serta ketagihan terhadap telefon pintar dengan gangguan kesihatan (gangguan muskuloskeletal, kemurungan, kebimbangan, dan tekanan) dalam kalangan penduduk belia di Malaysia. Seramai 1313 responden akan direkrut untuk menyertai kajian secara atas talian ini. Semua maklumat dan identiti yang diperoleh melalui penyelidikan ini akan dirahsiakan dan hanya digunakan untuk penyelidikan ini. Perisian pemprosesan data tidak akan mengandungi pengecam atau maklumat peribadi anda.

Apakah Yang Perlu Anda Lakukan?

Kajian ini sepenuhnya sukarela di mana responden boleh menarik diri pada bila-bila masa. Responden dikehendaki untuk mengisi 5 bahagian dalam soal selidik iaitu ciri-ciri sosiodemografi dalam bahagian A, penggunaan telefon pintar dalam bahagian B, gangguan Nordic Musculoskeletal (mNMQ) yang diubahsuai dalam bahagian C, Skala Ketagihan Telefon Pintar (SAS) dalam bahagian D dan diikuti oleh soalan Skala Kemurungan, Kebimbangan dan Tekanan (DASS-21) dalam bahagian E. Borang kaji selidik ini dianggarkan mengambil masa kira-kira 10 hingga 20 minit untuk disiapkan.

Adakah Ia Berisiko?

Terdapat risiko minimum kerana penyelidikan ini tidak melibatkan spesimen biologi. Sepanjang proses menjawab soal selidik, anda mungkin mengalami risiko psikososial yang minimum seperti kekeliruan ketika menghadapi kesukaran dalam memahami soalan dalam soal selidik menggunakan sebarang alat elektronik pilihan anda (iaitu: komputer, komputer riba, telefon, tablet, dll.). Sekiranya anda mengalami simptom kemurungan, kegelisahan, dan tekanan, segera berhenti menjawab soal selidik. Anda digalakkan untuk mendapatkan pertolongan dari kaunselor atau mana-mana organisasi yang dapat memberikan sokongan mental.

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Siapa Yang Tidak Boleh Menyertai Kajian Ini?

Anda **TIDAK** boleh mengambil bahagian dalam kajian ini sekiranya anda:

- **Mempunyai sebarang penyakit berkaitan genetik yang boleh menjejaskan sistem muskuloskeletal** oleh pengamal perubatan berdaftar (Cth*: **Congenital muscular dystrophy (CMD), Duchenne muscular dystrophy (DMD), Becker muscular dystrophy (BMD), Myotonic Muscular Dystrophy, dan sebagainya**.)*
- **Didiagnosis menghidap penyakit mental** oleh doktor perubatan yang berdaftar
- **Tidak mempunyai telefon pintar**

Siapa Yang Saya Perlu Hubungi Sekiranya Saya Mempunyai Soalan Tambahan Semasa Mengikuti Penyelidikan Ini?

Jika anda mempunyai sebarang persoalan mengenai penyelidikan ini, sila hubungi:

Muhamad Shahezwan Bin Omar Shah (Penyelidik)
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Kriteria Pengecualian

Adakah anda (Responden):

Mempunyai sebarang penyakit berkaitan genetik yang boleh menjejaskan sistem muskuloskeletal yang pernah didiagnosis oleh pengamal perubatan berdaftar (e.g.: Congenital muscular dystrophy (CMD), Duchenne muscular dystrophy (DMD), Becker muscular dystrophy (BMD), Myotonic Muscular Dystrophy, dan dll.)

ATAU

Didiagnosis menghidap penyakit mental oleh doktor perubatan yang berdaftar

ATAU

Tidak mempunyai telefon pintar

- o Ya
- o Tidak

Borang Penerangan dan Persetujuan

Adakah responden secara sukarela mengambil bahagian dalam kaji selidik ini?

- o Ya
- o Tidak

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BORANG KAJI SELIDIK PENYAKIT FIZIKAL DAN PSIKOSOSIAL YANG BERKAITAN DENGAN PENGGUNAAN TELEFON PINTAR DALAM KALANGAN BELIA DI MALAYSIA

Arahan

Sila baca soalan dengan teliti dan jawab semua soalan.

Borang kaji selidik ini mengandungi **5 bahagian**:

1. **Bahagian A: Latar belakang sosiodemografik**.

2. **Bahagian B: Soal Selidik Penggunaan telefon pintar**

3. **Bahagian C: Soal selidik Muskuloskeletal Nordic**

4. **Bahagian D: Soal selidik skala ketagihan terhadap telefon pintar**

5. **Bahagian E: Soal Selidik Skala Kemurungan, Kebimbangan, dan tekanan (DASS-21)**

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Bahagian A: Latar Belakang Sosiodemografik

ARAHAN:

- Sila tanda dan isikan jawapan bagi persoalan dibawah
- Bahagian ini mengandungi **6 soalan**

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1. Umur (Tahun)

2. Jantina

- Lelaki
- Perempuan

3. Status Perkahwinan

- Bujang
- Berkahwin
- Berpisah

4. Berapa Ramai Anak yang anda ada? **(Soalan dipaparkan jika Soalan 3 dijawab "Berkahwin/ Berpisah")**

*(Jika "**TIADA**", Sila isi "0" pada kotak jawapan)*

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5. Taraf Pendidikan Tertinggi yang diperolehi

- Tiada Pendidikan Formal
- Sekolah Rendah
- Sekolah Menengah (PMR / SPM)
- Pra- Universiti / Sijil
- Pendidikan Tinggi (Diploma / Ijazah Sarjana Muda / Ijazah Sarjana / Doktor Falsafah)

6. Status Pekerjaan

- Pelajar Sepenuh Masa
- Bekerja dalam bidang kolar biru (contohnya; mereka yang melakukan kerja seperti buruh secara manual.)
- Bekerja dalam bidang kolar putih (contohnya: orang melakukan kerja profesional, meja, pengurusan, atau pentadbiran)
- Tidak Bekerja

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Bahagian B: Soal Selidik Penggunaan Telefon Pintar

ARAHAN:

- Sila tanda jawapan dan isikan tempat kosong bagi persoalan dibawah.
- Bahagian ini mengandungi **4 soalan**
- Jadual Penukaran **Minit** kepada **Jam** untuk memudahkan responden semasa menjawab anggaran masa penggunaan telefon pintar

Jadual Penukaran **MINIT** kepada **JAM** (*Jika ada minit*):
5 minit = **0.08** Jam
10 minit = **0.17** Jam
15 minit = **0.25** Jam
20 minit = **0.33** Jam
25 minit = **0.42** Jam
30 minit = **0.50** Jam
35 minit = **0.58** Jam
40 minit = **0.67** Jam
45 minit = **0.75** Jam
50 minit = **0.83** Jam
55 minit = **0.92** Jam

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7. Jenis Telefon Pintar Yang Digunakan

(Jika anda memiliki *LEBIH* dari *SATU* telefon pintar, anda boleh memilih lebih daripada satu pilihan jawapan)

- iOS (Apple)
- Android
- Harmony OS (Huawei)
- Lain-lain __________

8. Anggaran Kadar Masa Penggunaan Telefon Pintar dalam Sehari (Per Jam): (jika anda menggunakan iOS, sila rujuk kepada purata harian "Masa Skrin" di "Tetapan", manakala jika anda menggunakan jenis telefon pintar lain tanpa penjejak tersebut, anggarkan tempoh penggunaan)

9. Sila Nyatakan (**Anggaran**) Kadar Penggunaan Telefon Pintar Mengikut **Tujuan** dalam **Sehari (Per Jam)**

A) <u>Penggunaan Kerja / Akademik</u>

(Contohnya: Penjadualan janji temu, Semak/Balas E-mel, Gunakan Media Sosial untuk Promosi, Jualan, Perbankan, Panggilan Telefon, Pencarian maklumat, dan lain-lain)

*(Sekiranya **TIDAK BERLAKU,** Sila **isikan angka '0'**)*

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10. Sila Nyatakan (**Anggaran**) Kadar Penggunaan Mengikut **Tujuan** dalam **Sehari**

(Per Jam):

B) Penggunaan Masa Lapang / Hiburan

(Contohnya: Media Sosial, Panggilan Telefon/Video, Teks, Membeli-belah Dalam Talian, Perintah Bawa Keluar, Tonton/Dengar Muzik/Video/Filem, Permainan Mudah Alih, dan lain-lain)

*(Sekiranya **TIDAK BERLAKU**, Sila **isikan angka '0'**)*

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Bahagian C: Soal Selidik Muskuloskeletal Nordic

ARAHAN:

- Bagi setiap soalan di bawah, **sila pilih dan tandakan** jawapan yang **menggambarkan keadaan anda semasa penggunaan TELEFON PINTAR.**
- Rajah badan dibawah adalah untuk membantu responden menjawab soalan.
- Bahagian ini mengandungi **beberapa soalan** mengikut bahagian anggota badan berikut(sebahagian anggota badan dibahagikan kepada **"KANAN" dan "KIRI").**

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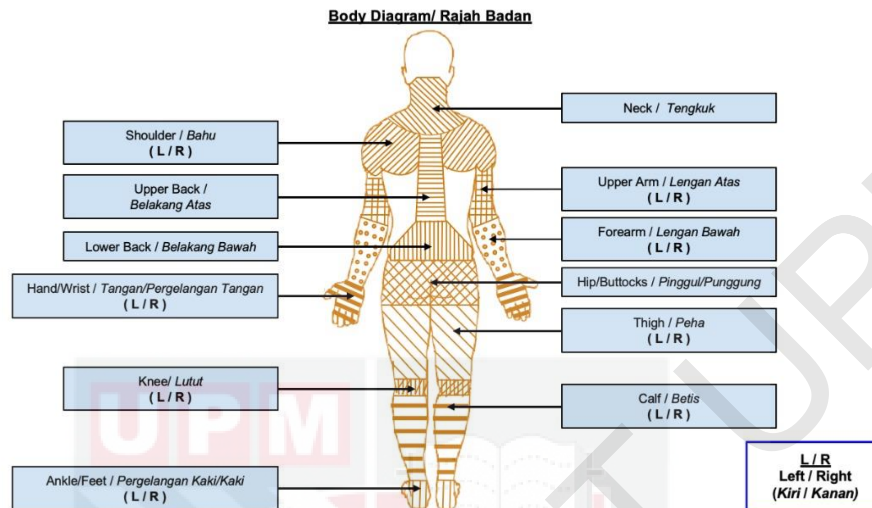
11. Antara bahagian badan berikut, yang manakah anda alami sakit/ ketidakselesaan / kebas / kesemutan dalam 12 BULAN yang lalu (semasa menggunakan telefon pintar)?



Sekiranya **TIDAK BERLAKU (anda tidak pernah alami sakit/ ketidakselesaan / kebas / kesemutan), **anda boleh melangkau ke soalan seterusnya.***

12 BULAN yang lalu:

Tengkuk	❑
Bahu *(Kiri)*	❑
Bahu *(Kanan)*	❑
Belakang Atas	❑
Lengan Atas *(Kiri)*	❑
Lengan Atas *(Kanan)*	❑
Lengan Bawah *(Kiri)*	❑
Lengan Bawah *(Kanan)*	❑
Pergelangan Tangan *(Kiri)*	❑
Pergelangan Tangan *(Kanan)*	❑
Belakang Bawah	❑
Pinggul /Punggung	❑

12. Antara bahagian badan berikut, yang manakah anda alami sakit/ ketidakselesaan / kebas / kesemutan dalam 7 HARI yang lalu (semasa menggunakan telefon pintar)?

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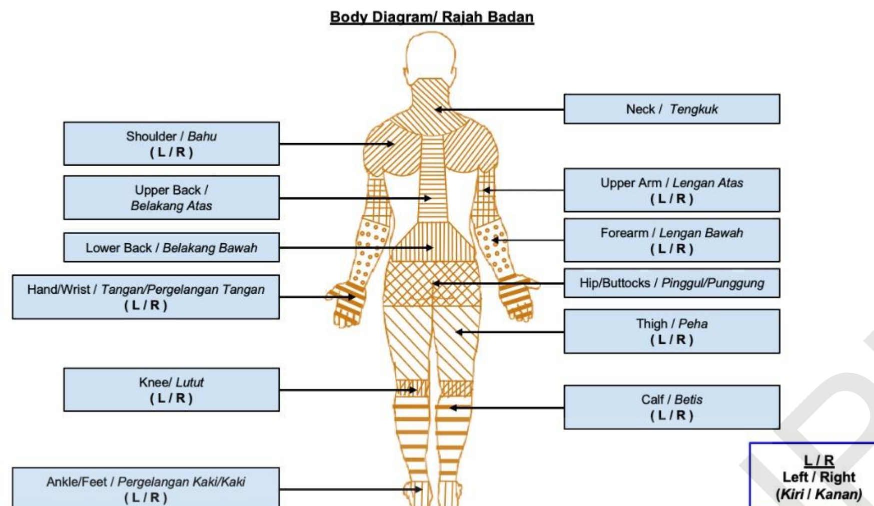

*Sekiranya **TIDAK BERLAKU** (anda tidak pernah alami sakit/ ketidakselesaan / kebas / kesemutan), **anda boleh melangkau ke soalan seterusnya.***

7 HARI yang lalu :

Tengkuk	❑
Bahu *(Kiri)*	❑
Bahu *(Kanan)*	❑
Belakang Atas	❑
Lengan Atas *(Kiri)*	❑
Lengan Atas *(Kanan)*	❑
Lengan Bawah *(Kiri)*	❑
Lengan Bawah *(Kanan)*	❑
Pergelangan Tangan *(Kiri)*	❑
Pergelangan Tangan *(Kanan)*	❑
Belakang Bawah	❑
Pinggul /Punggung	❑

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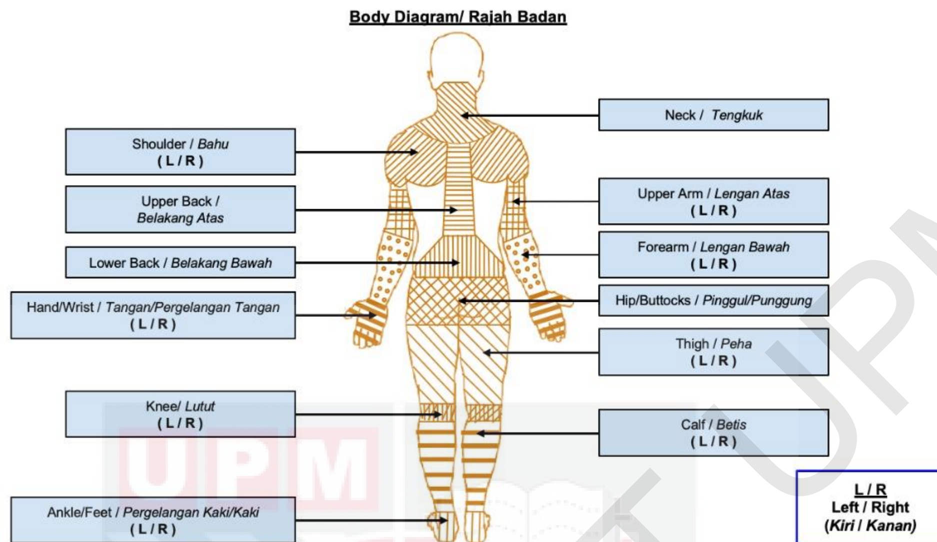
(Bahagian ini akan dipaparkan jika pada soalan No.12 ini telah dijawab pada bahagian badan tertentu)



1. Pada minggu lalu (semasa penggunaan telefon pintar), berapa kerap anda mengalami kesakitan / sakit / ketidakselesaan / kebas / kesemutan di **Tengkuk/ Bahu (L/R)/ Lengan Atas (L/R)/ Lengan Bawah (L/R)/ Belakang Atas/ Belakang Bawah/ Pergelangan Tangan(L/R)/ Pinggul/ Punggung**?

Setiap hari pada minggu lalu	❑
3-4 kali pada minggu lalu	❑
1-2 kali pada minggu lalu	❑

2. Semasa mengalami kesakitan / sakit / tidak selesa / kebas / kesemutan di **Tengkuk/ Bahu (L/R)/ Lengan Atas (L/R)/ Lengan Bawah (L/R)/ Belakang Atas/ Belakang Bawah/ Pergelangan Tangan(L/R)/ Pinggul/ Punggung** bagaimana keadaan ketidakselesaan ini?

Sedikit Tidak Selesa	❑
Sederhana Tidak Selesa	❑
Sangat Tidak Selesa	❑

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3. Semasa mengalami kesakitan / sakit / tidak selesa / kebas / kesemutan di **Tengkuk/ Bahu (L/R)/ Lengan Atas (L/R)/ Lengan Bawah (L/R)/ Belakang Atas/ Belakang Bawah/ Pergelangan Tangan(L/R)/ Pinggul/ Punggung?** adakah ia menganggu daripada menjalankan aktiviti biasa (cth:pekerjaan, kerja rumah, hobi)?

Tidak menganggu	❑
Sedikit menganggu	❑
Sangat menggangu	❑

4. Semasa mengalami kesakitan / sakit / tidak selesa / kebas / kesemutan di **Tengkuk/ Bahu (L/R)/ Lengan Atas (L/R)/ Lengan Bawah (L/R)/ Belakang Atas/ Belakang Bawah/ Pergelangan Tangan(L/R)/ Pinggul/ Punggung?** adakah anda berjumpa doktor / mengubati diri / menerima rawatan untuk menghilangkan rasa sakit? (Tandakan semua yang berkenaan)

*M*engubati diri/menerima rawatan untuk melegakan sakit (cth: ubat penahan sakit, urut, dll.)	❑
Berjumpa doktor	❑
Tidak pernah sama sekali	❑

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Bahagian D: Soal Selidik Skala Ketagihan Terhadap Telefon Pintar

ARAHAN:

- Sila tandakan jawapan anda untuk soalan dibawah.
- Bahagian ini mengandungi **10 soalan**

Pilihan Jawapan:
(1) Sangat Tidak Bersetuju
(2) Tidak Bersetuju
(3) Agak Tidak Bersetuju
(4) Agak Bersetuju
(5) Bersetuju
(6) Sangat Bersetuju

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	Sangat Tidak Bersetuju	Tidak Bersetuju	Agak Tidak Bersetuju	Agak Bersetuju	Bersetuju	Sangat Bersetuju
Kerja yang dirancang tidak dapat dilakukan akibat penggunaan telefon pintar	❑	❑	❑	❑	❑	❑
Sukar memberi tumpuan dalam kelas, semasa membuat tugasan, atau semasa bekerja akibat penggunaan telefon pintar	❑	❑	❑	❑	❑	❑
Rasa sakit di pergelangan tangan atau di tengkuk semasa menggunakan telefon pintar	❑	❑	❑	❑	❑	❑
Tidak mampu bertahan tanpa telefon pintar	❑	❑	❑	❑	❑	❑
Berasa tidak sabar dan gelisah apabila saya tidak memegang telefon pintar	❑	❑	❑	❑	❑	❑
Sentiasa terfikir tentang telefon pintar saya walaupun semasa saya tidak menggunakannya	❑	❑	❑	❑	❑	❑
Saya tidak akan berhenti daripada menggunakan telefon pintar walaupun kehidupan harian saya sangat terganggu olehnya	❑	❑	❑	❑	❑	❑
Sentiasa memeriksa telefon pintar supaya tidak terlepas perbualan di kalangan orang-orang lain di Twitter atau Facebook	❑	❑	❑	❑	❑	❑
Menggunakan telefon pintar lebih lama daripada yang saya jangkakan	❑	❑	❑	❑	❑	❑
Orang di sekeliling mengatakan penggunaan telefon pintar saya adalah terlalu kerap	❑	❑	❑	❑	❑	❑

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Bahagian E: Soal Selidik Skala Kemurungan, Kebimbangan, dan tekanan (DASS-21)

ARAHAN:

- Sila baca kenyataan dan tandakan jawapan yang **menggambarkan keadaan anda SEMINGGU yang lepas**.
- **Tidak ada jawapan yang betul atau salah**.
- **Jangan guna terlalu banyak masa** untuk mana-mana kenyataan.
- Bahagian ini mengandungi **21 soalan**

Skala markah adalah seperti berikut:
(0) Tidak pernah sama sekali
(1) Jarang
(2) Kerap
(3) Sangat Kerap

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	Tidak Pernah Sama Sekali	Jarang	Kerap	Sangat kerap
1. Saya dapati diri saya sukar ditenteramkan	❑	❑	❑	❑
2. Saya sedar mulut saya terasa kering	❑	❑	❑	❑
3. Saya tidak dapat mengalami perasaan positif sama sekali	❑	❑	❑	❑
4. Saya mengalami kesukaran bernafas (contohnya pernafasan yang laju, tercungap-cungap walaupun tidak melakukan senaman fizikal)	❑	❑	❑	❑
5. Saya sukar untuk mendapatkan semangat bagi melakukan sesuatu perkara	❑	❑	❑	❑
6. Saya cenderung untuk bertindak keterlaluan dalam sesuatu keadaan	❑	❑	❑	❑
7. Saya rasa menggeletar (contohnya pada tangan)	❑	❑	❑	❑
8. Saya rasa saya menggunakan banyak tenaga dalam keadaan cemas	❑	❑	❑	❑
9. Saya bimbang keadaan di mana saya mungkin menjadi panik dan melakukan perkara yang membodohkan diri sendiri	❑	❑	❑	❑
10. Saya rasa saya tidak mempunyai apa-apa untuk diharapkan	❑	❑	❑	❑
11. Saya dapati diri saya semakin gelisah	❑	❑	❑	❑
12. Saya rasa sukar untuk relaks	❑	❑	❑	❑
13. Saya rasa sedih dan murung	❑	❑	❑	❑
14. Saya tidak dapat menahan sabar dengan perkara yang menghalang saya meneruskan apa yang saya lakukan	❑	❑	❑	❑
15. Saya rasa hampir-hampir menjadi panik/cemas	❑	❑	❑	❑

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16. Saya tidak bersemangat dengan apa jua yang saya lakukan.	❑	❑	❑	❑
17. Saya tidak begitu berharga sebagai seorang individu	❑	❑	❑	❑
18. Saya rasa yang saya mudah tersentuh	❑	❑	❑	❑
19. Walaupun saya tidak melakukan aktiviti fizikal, saya sedar akan debaran jantung saya (contoh: degupan jantung lebih cepat)	❑	❑	❑	❑
20. Saya berasa takut tanpa sebab yang munasabah	❑	❑	❑	❑
21. Saya rasa hidup ini tidak bermakna	❑	❑	❑	❑

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Terima kasih kerana telah menjawab semua soalan.
kerjasama dan masa anda amatlah saya hargai. Respon anda telah selamat direkodkan.

Jika anda mempunyai sebarang pertanyaan mengenai kajian ini, sila berhubung di:

Muhamad Shahezwan Bin Omar Shah (Penyelidik)
No Telefon: **+60175743373**
E-mel: **oshahezwan99@gmail.com**

Dr. Ng Yee Guan (Penyelia)
No Pejabat: **+60389472396**
No Telefon: **+60192771103**
E-mel: **shah86zam@upm.edu.my**

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ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS (JKEUPM)
UNIVERSITI PUTRA MALAYSIA

Research title	:	**Physical and Psychosocial Disorders Related to Smartphone Usage Among Youth in Malaysia.**
Study Site	:	**Malaysia.**
JKEUPM Ref No.	:	**JKEUPM-2021-372**
Researcher	:	**Muhamad Shahezwan bin Omar Shah**
Supervisor	:	**Assoc. Prof. Dr. Ng Yee Guan**

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 14/06/2021
2. Respondent's Information Sheet / Consent (English), Version 1 dated 02/08/2021
3. Proposal (English), Version 2 dated 11/10/2021
4. Questionnaire / Interviews (English), Version 1 dated 14/06/2021
5. Curriculum Vitae of:
   a. Assoc. Prof. Dr. Ng Yee Guan

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.
Decision by JKEUPM:

[x] Approved

[x] **Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research**

[ ] Disapproved

Please note that the approval is **VALID UNTIL 11 OCTOBER 2022**

Researchers should comply with the following:

I. Complete a Study Final Report upon study completion (Form 3.2).

II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.

III. Applicable for Clinical Trial Studies and Clinical interventional Studies only: Progress Report has to be submitted to JKEUPM at every 6 months from the date of approval (Form 3.1). Report occurrences of all Serious Adverse Events (SAEs), Suspected Unexpected Serious Adverse Reaction (SUSARs) and Protocol Deviation/ Violation at all JKEUPM approved sites to JKEUPM. SAEs are to be reported within 15 calendar days from awareness of event by investigator. Initial report of SUSARs are to be reported as soon as possible but not later than

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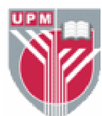
Appendix 4 (Permission and Information Consent Form used in Questionnaire)



JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG, SELANGOR, MALAYSIA

FORM 2.4: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE:

Physical and Psychosocial Disorders Related to Smartphone Usage Among Youth in Malaysia

2. INTRODUCTION:

This study intends to determine the prevalence of smartphone addiction, physical disorder (musculoskeletal disorders), psychosocial disorders (depression, anxiety, stress) occurred among youth aged between 18-30 in Malaysia. Specifically, the inputs from respondent on smartphone addiction and health related disorders are the focus of this study.

Moreover, this study would also intend to determine the significant association between sociodemographic characteristics (age, gender, marital status, and education level), smartphone usage (duration and purpose of usage per day) and smartphone addiction with health disorders (musculoskeletal disorder, depression, anxiety, and stress) among the youth population in Malaysia. A total of 1313 respondents will be recruited for this online survey study.

3. WHAT WILL YOU HAVE TO DO?

This study is completely voluntary where respondents can withdraw at any point of time. Respondent is required to fill in 5 sections in the questionnaires which is sociodemographic characteristics in section A, smartphone usage in section B, modified Nordic Musculoskeletal Disorder (mNMQ) in section C, Smartphone Addiction Scale (SAS) in section D and followed by Depression, Anxiety and Stress Scale (DASS-21) in section E. The questionnaire is estimated to take about 20 to 30 minutes.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

You should NOT participate in this study if you:

a) Have any genetically related disease that affect musculoskeletal or,

b) Have been diagnosed with mental illness by a registered medical doctor or

c) Youth who does not owns a smartphone.
d)

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5. WHAT WILL BE THE BENEFITS OF THE STUDY?

(a) TO YOU AS THE SUBJECT

The input from respondents which is Malaysian youth who uses smartphone on daily basis will be able to help provide an awareness on the excessive usage of smartphone on daily life and its effect towards development of health disorders on human.

There will be no compensation or reward for your participation in this research. However, the collective/summarized results of this research can be obtained after the completion of this research at your request.

(b) TO THE INVESTIGATOR

The investigator will be able to analyze data which can be used to determine the prevalence of smartphone addiction, musculoskeletal disorders, depression, anxiety, and stress, and to determine the association between sociodemographic characteristic, smartphone usage, and smartphone addiction with health disorders among youth in Malaysia. The result from this study can fill in the knowledge gap on smartphone issue especially among youth population. Other than that, the data from this study can be used to establish reference for future researcher who is interested to conduct this study.

6. WHAT ARE THE POSSIBLE RISKS?

There is a minimal risk as this research does not involve biological specimens.

Throughout the process of answering the questionnaire, you may experience a minimal psychosocial risk such as confusion when encounter difficulty in understanding the questions in the questionnaire using any electronic devices of your preference (i.e.: desktop, laptop, phone, tablet, etc.).

If you experienced any depression, anxiety, and stress symptoms, stop immediately from answering the questionnaire. You are encouraged to seek help from a counsellor or any organization that can provide mental support.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

All information and identity that obtained through this research will remain confidential and used only for this research. The data processing software will not contain your personal identifier or information.

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8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

Dr Ng Yee Guan
Associate Professor
Department Of Environmental and Occupational Health,
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia

Office No: +603 9769 2859
Mobile No: +6019 277 1103
Email address: shah86zam@upm.edu.my

Muhamad Shahezwan Bin Omar Shah
Final Year Student
Department of Environmental and Occupational Health,
Faculty of Medicine and Health Sciences,
Universiti Putra Malaysia.

Mobile No.: +6017 574 3373
Email address: oshahezwan99@gmail.com

Please initial here if you have read and understood the contents of this page ____________________

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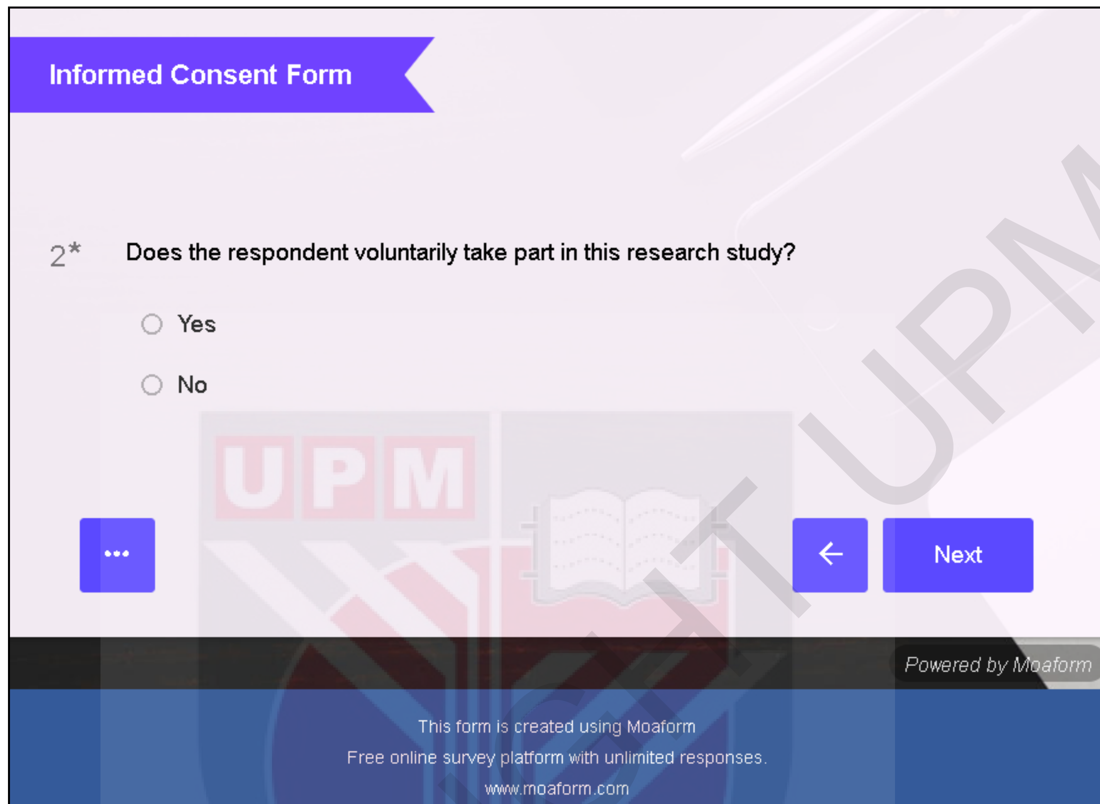
Appendix 5 (Individual consent form)



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Appendix 6 (Approval Letters from previous Researcher for Questionnaires)

Permission to get the Smartphone Addiction Scale Malay version (SAS-M) Inbox

MUHAMAD SHAHEZWAN BIN OMAR SHAH / UPM <198376@student.upm.edu.my> May 27, 2021, 8:00 AM
to sm_ching

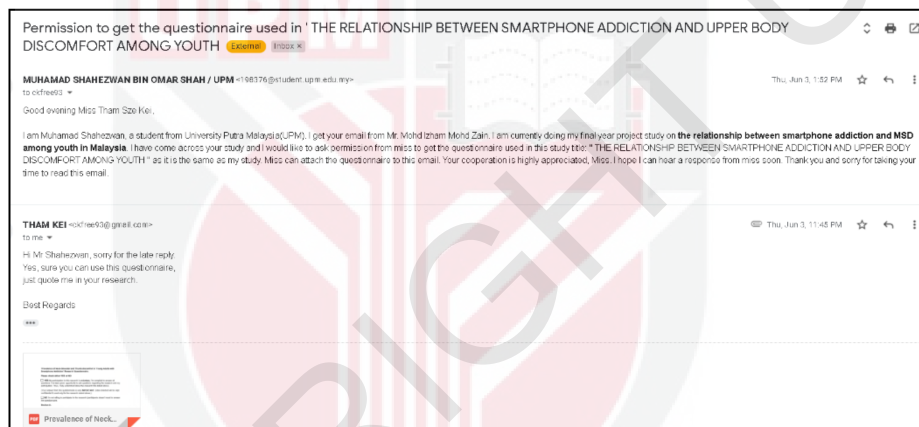
Morning madam,

I am Muhamad Shahezwan, a third-year student from University Putra Malaysia(UPM). I am currently developing a research proposal for my final year project study on **the relationship between smartphone addiction and MSD among youth in Selangor**. I have come across your study and I would like to ask permission from Madam to get the Malay Version Smartphone addiction scale(SAS-M). I would like to get and applied the questionnaire as it is the same as my study. Madam can attach the SAS-M questionnaire to this email. Your cooperation is highly appreciated, madam. I hope I can hear a response from madam soon. Thank you and sorry for taking your time to read this email.

CHING SIEW MOOI / MEDIC <sm_ching@upm.edu.my> May 27, 2021, 8:24 AM
to me

Sure, no problem.

Best regards
Prof. Dr. Ching Siew Mooi
Family Medicine Specialist
Department of Family Medicine
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
Tel: +603-89472538
MMC: 37911 | NSR: 128772
ORCID ID: https://orcid.org/0000-0002-4425-7989
Scopus ID: 55764016000 Google ID: Ching Siew Mooi



Permission to get the questionnaire used in ' THE RELATIONSHIP BETWEEN SMARTPHONE ADDICTION AND UPPER BODY DISCOMFORT AMONG YOUTH External Inbox

MUHAMAD SHAHEZWAN BIN OMAR SHAH / UPM <198376@student.upm.edu.my> Thu, Jun 3, 1:52 PM
to ckfree93

Good evening Miss Tham Sze Kei,

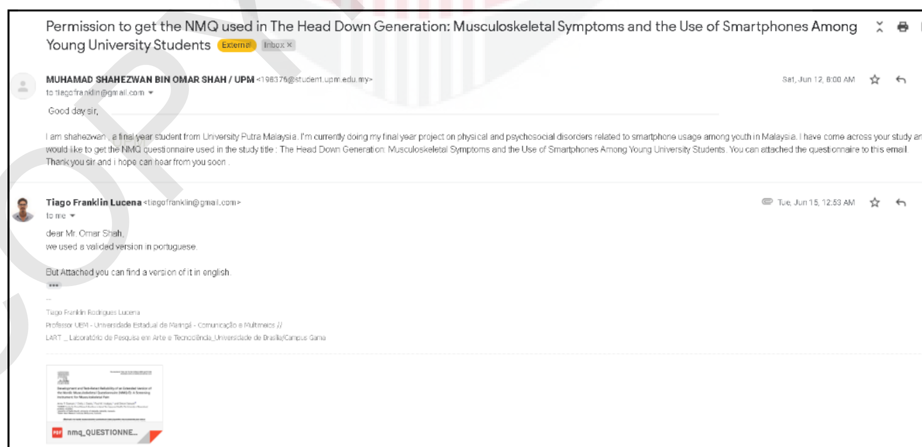
I am Muhamad Shahezwan, a student from University Putra Malaysia(UPM). I get your email from Mr. Mohd Izham Mohd Zain. I am currently doing my final year project study on **the relationship between smartphone addiction and MSD among youth in Malaysia**. I have come across your study and I would like to ask permission from miss to get the questionnaire used in this study title: " THE RELATIONSHIP BETWEEN SMARTPHONE ADDICTION AND UPPER BODY DISCOMFORT AMONG YOUTH " as it is the same as my study. Miss can attach the questionnaire to this email. Your cooperation is highly appreciated, Miss. I hope I can hear a response from miss soon. Thank you and sorry for taking your time to read this email.

THAM KEI <ckfree93@gmail.com> Thu, Jun 3, 11:45 PM
to me

Hi Mr Shahezwan, sorry for the late reply.
Yes, sure you can use this questionnaire,
just quote me in your research.

Best Regards

Prevalence of Neck...



Permission to get the NMQ used in The Head Down Generation: Musculoskeletal Symptoms and the Use of Smartphones Among Young University Students External Inbox

MUHAMAD SHAHEZWAN BIN OMAR SHAH / UPM <198376@student.upm.edu.my> Sat, Jun 12, 8:00 AM
to tiagofranklin@gmail.com

Good day sir,

I am shahezwan , a final year student from University Putra Malaysia. I'm currently doing my final year project on physical and psychosocial disorders related to smartphone usage among youth in Malaysia. I have come across your study and would like to get the NMQ questionnaire used in the study title : The Head Down Generation: Musculoskeletal Symptoms and the Use of Smartphones Among Young University Students. You can attached the questionnaire to this email. Thank you sir and i hope can hear from you soon .

Tiago Franklin Lucena <tiagofranklin@gmail.com> Tue, Jun 15, 12:53 AM
to me

dear Mr. Omar Shah,
we used a valided version in portuguese.

But Attached you can find a version of it in english.

--
Tiago Franklin Rodrigues Lucena
Professor UEM - Universidade Estadual de Maringá - Comunicação e Multimeios //
LART _ Laboratório de Pesquisa em Arte e TecnoCiência_Universidade de Brasília/Campus Gama

nmq_QUESTIONNE...

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Appendix 7 (Normality test)

Variables	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age	.157	723	.000	.937	723	.000
Number of Children	.159	723	.000	.250	723	.000
Duration Of Smartphone sage on a Typical Day	.190	723	.000	.603	723	.000
Purpose Of Smartphones age (work-related/academic)	.236	723	.000	.555	723	.000
Purpose Of Smartphone Usage (entertainment/leisure)	.194	723	.000	.569	723	.000
Total score SAS	.033	723	.056*	.997	723	.148
Depression level score	.127	723	.000	.915	723	.000
Anxiety level score	.115	723	.000	.935	723	.000
Stress level score	.093	723	.000	.963	723	.000

*** Normally distributed = P>0.05**

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Appendix 8 (The association between sociodemographic characteristics, smartphone usage and smartphone addiction with physical disorder (MSDs 12 months) among youth population in Malaysia (*N*=723))

Neck

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				2.529	0.112
	18 - 24	251	250		
	25 - 30	97	125		
Gender				0.031	0.895
	Male	78	82		
	Female	270	293		
Number of Children				3.475	0.063
	With Children	19	34		
	No Children	329	341		
Marital Status				4.973[a]	0.056
	Single	317	325		
	Married	31	47		
	Divorced	0	3		
Occupational Status				11.22	0.011*
	Full-time Student	217	201		
	Blue Collar Worker	9	25		
	White Collar Worker	79	86		
	Unemployed	43	63		
Educational Level				4.761[a]	0.145
	No Formal Education	0	1		
	Secondary School	19	34		
	Pre-Universities/ Certificates	51	59		
	Tertiary Education level	278	281		
Duration of Smartphone Usage (Hour)				10.891	0.001*
	< 7.00	142	199		
	≥ 7.00	206	176		
Work-related / Academic (Hour)				5.173	0.023*
	< 2.76	158	202		
	≥ 2.76	190	173		
Leisure / Entertainment (Hour)				5.361	0.021*
	< 4.00	151	195		
	≥ 4.00	197	180		
Smartphone Addiction				31.715	0.000^
	Yes	256	200		
	No	92	175		
Depression				2.498	0.114
	Normal	205	199		
	Abnormal	143	176		

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Anxiety				13.387	0.000^
	Normal	257	229		
	Abnormal	91	146		
Stress				1.350	0.245
	Normal	155	151		
	Abnormal	193	224		

[a] Fisher's Exact Value
*** Significant P<0.05**
^Significant P<0.001

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Shoulder (Left)

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				0.09	0.764
	18 - 24	95	406		
	25 - 30	40	182		
Gender				4.164	0.041*
	Male	21	139		
	Female	114	449		
Number of Children				0.001	0.970
	With Children	10	43		
	No Children	125	545		
Marital Status				0.433 [a]	0.810
	Single	119	523		
	Married	16	62		
	Divorced	0	3		
Occupational Status				6.093	0.107
	Full-time Student	83	335		
	Blue Collar Worker	3	31		
	White Collar Worker	24	141		
	Unemployed	25	81		
Educational Level				2.705 [a]	0.453
	No Formal Education	0	1		
	Secondary School	6	47		
	Pre-Universities/ Certificates	19	91		
	Tertiary Education level	110	449		
Duration of Smartphone Usage (Hour)				2.151	0.142
	< 7.00	56	285		
	≥ 7.00	79	303		
Work-related / Academic (Hour)				0.002	0.967
	< 2.76	67	293		
	≥ 2.76	68	295		
Leisure / Entertainment (Hour)				0.774	0.379
	< 4.00	60	286		
	≥ 4.00	75	302		
Smartphone Addiction				1.34	0.247
	Yes	91	365		
	No	44	223		
Depression				6.797	0.009*
	Normal	89	315		
	Abnormal	46	273		

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Anxiety				2.175	0.140
	Normal	98	388		
	Abnormal	37	200		
Stress				3.630	0.057
	Normal	67	239		
	Abnormal	68	349		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Shoulder (Right)

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				0.035	0.851
	18 - 24	103	398		
	25 - 30	47	175		
Gender				5.047	0.024*
	Male	23	137		
	Female	127	436		
Number of Children				0.497	0.481
	With Children	13	40		
	No Children	137	533		
Marital Status				3.153 [a]	0.203
	Single	128	514		
	Married	22	56		
	Divorced	0	3		
Occupational Status				1.23	0.746
	Full-time Student	84	334		
	Blue Collar Worker	6	28		
	White Collar Worker	34	131		
	Unemployed	26	80		
Educational Level				6.157 [a]	0.089
	No Formal Education	1	0		
	Secondary School	6	47		
	Pre-Universities/ Certificates	23	87		
	Tertiary Education level	120	439		
Duration of Smartphone Usage (Hour)				0.103	0.748
	< 7.00	69	272		
	≥ 7.00	81	301		
Work-related / Academic (Hour)				0.18	0.672
	< 2.76	77	283		
	≥ 2.76	73	290		
Leisure / Entertainment (Hour)				1.128	0.288
	< 4.00	66	280		
	≥ 4.00	84	293		
Smartphone Addiction				3.187	0.074
	Yes	104	352		
	No	46	221		
Depression				1.760	0.185
	Normal	91	313		
	Abnormal	59	260		

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Variables		**Prevalence 12 Months**		χ^2	**P-value**
		Yes	**No**		
Anxiety				2.548	0.110
	Normal	109	377		
	Abnormal	41	196		
Stress				2.498	0.114
	Normal	72	234		
	Abnormal	78	339		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Upperback

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				0.302	0.583
	18 - 24	92	409		
	25 - 30	37	185		
Gender				1.085	0.298
	Male	33	127		
	Female	96	467		
Number of Children				0.295	0.587
	With Children	8	45		
	No Children	121	549		
Marital Status				1.059 [a]	0.595
	Single	115	527		
	Married	13	65		
	Divorced	1	2		
Occupational Status				5.472	0.140
	Full-time Student	84	334		
	Blue Collar Worker	8	26		
	White Collar Worker	22	143		
	Unemployed	15	91		
Educational Level				1.433 [a]	0.711
	No Formal Education	0	1		
	Secondary School	10	43		
	Pre-Universities/ Certificates	16	94		
	Tertiary Education level	103	456		
Duration of Smartphone Usage (Hour)				0.888	0.346
	< 7.00	56	285		
	≥ 7.00	73	309		
Work-related / Academic (Hour)				0.676	0.411
	< 2.76	60	300		
	≥ 2.76	69	294		
Leisure / Entertainment (Hour)				0.283	0.595
	< 4.00	59	287		
	≥ 4.00	70	307		
Smartphone Addiction				6.471	0.011*
	Yes	94	362		
	No	35	232		
Depression				0.166	0.684
	Normal	70	334		
	Abnormal	59	260		

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Anxiety				2.940	0.086
	Normal	95	391		
	Abnormal	34	203		
Stress				4.183	0.041*
	Normal	65	241		
	Abnormal	64	353		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Upperarm (Left)

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				0.248	0.619
	18 - 24	27	474		
	25 - 30	10	212		
Gender				0.543	0.461
	Male	10	150		
	Female	27	536		
Number of Children				0.034	0.854
	With Children	3	50		
	No Children	34	636		
Marital Status				0.897 [a]	0.645
	Single	32	610		
	Married	5	73		
	Divorced	0	3		
Occupational Status				1.921	0.589
	Full-time Student	24	394		
	Blue Collar Worker	2	32		
	White Collar Worker	5	160		
	Unemployed	6	100		
Educational Level				3.257 [a]	0.402
	No Formal Education	0	1		
	Secondary School	1	52		
	Pre-Universities/ Certificates	8	102		
	Tertiary Education level	28	531		
Duration of Smartphone Usage (Hour)				14.988	0.000^
	< 7.00	6	335		
	≥ 7.00	31	351		
Work-related / Academic (Hour)				3.351	0.067
	< 2.76	13	347		
	≥ 2.76	24	339		
Leisure / Entertainment (Hour)				1.568	0.210
	< 4.00	14	332		
	≥ 4.00	23	354		
Smartphone Addiction				5.431	0.020*
	Yes	30	426		
	No	7	260		
Depression				0.625	0.429
	Normal	23	381		
	Abnormal	14	305		

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Anxiety				0.165	0.685
	Normal	26	460		
	Abnormal	11	226		
Stress				0.639	0.424
	Normal	18	288		
	Abnormal	19	398		

[a] Fisher's Exact Value
*** Significant P<0.05**
^Significant P<0.001

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				0.633	0.426
	18 - 24	50	451		
	25 - 30	18	204		
Gender				0.104	0.748
	Male	14	146		
	Female	54	509		
Number of Children				2.172	0.141
	With Children	8	45		
	No Children	60	610		
Marital Status				3.646 [a]	0.142
	Single	56	586		
	Married	12	66		
	Divorced	0	3		
Occupational Status				2.785	0.426
	Full-time Student	43	375		
	Blue Collar Worker	2	32		
	White Collar Worker	11	154		
	Unemployed	12	94		
Educational Level				5.530 [a]	0.164
	No Formal Education	1	0		
	Secondary School	5	48		
	Pre-Universities/ Certificates	11	99		
	Tertiary Education level	51	508		
Duration of Smartphone Usage (Hour)				1.676	0.195*
	< 7.00	27	314		
	≥ 7.00	41	341		
Work-related / Academic (Hour)				0.967	0.325
	< 2.76	30	330		
	≥ 2.76	38	325		
Leisure / Entertainment (Hour)				0.019	0.890
	< 4.00	32	314		
	≥ 4.00	36	341		
Smartphone Addiction				5.787	0.016*
	Yes	52	404		
	No	16	251		
Depression				0.066	0.797
	Normal	39	365		
	Abnormal	29	290		

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Anxiety				0.386	0.534
	Normal	48	438		
	Abnormal	20	217		
Stress				2.573	0.109
	Normal	35	271		
	Abnormal	33	384		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Forearm (Left)

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				0.074	0.785
	18 - 24	32	469		
	25 - 30	13	209		
Gender				0.527	0.468
	Male	8	152		
	Female	37	526		
Number of Children				N/A [a]	0.242
	With Children	1	52		
	No Children	44	626		
Marital Status				0.914 [a]	0.557
	Single	42	600		
	Married	3	75		
	Divorced	0	3		
Occupational Status				2.089	0.554
	Full-time Student	27	391		
	Blue Collar Worker	2	32		
	White Collar Worker	7	158		
	Unemployed	9	97		
Educational Level				6.536 [a]	0.116
	No Formal Education	0	1		
	Secondary School	2	51		
	Pre-Universities/ Certificates	2	108		
	Tertiary Education level	41	518		
Duration of Smartphone Usage (Hour)				0.988	0.320
	< 7.00	18	323		
	≥ 7.00	27	355		
Work-related / Academic (Hour)				2.771	0.096
	< 2.76	17	343		
	≥ 2.76	28	335		
Leisure / Entertainment (Hour)				0.224	0.636
	< 4.00	20	326		
	≥ 4.00	25	352		
Smartphone Addiction				5.905	0.015*
	Yes	36	420		
	No	9	258		
Depression				0.070	0.791
	Normal	26	378		
	Abnormal	19	300		

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Variables		Prevalence 12 Months		χ²	P-value
		Yes	No		
Anxiety				0.330	0.566
	Normal	32	454		
	Abnormal	13	224		
Stress				0.847	0.357
	Normal	22	284		
	Abnormal	23	394		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Forearm (Right)

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				1.396	0.237
	18 - 24	55	446		
	25 - 30	18	204		
Gender				0.880	0.348
	Male	13	147		
	Female	60	503		
Number of Children				0.410	0.522
	With Children	4	49		
	No Children	69	601		
Marital Status				0.172 [a]	0.887
	Single	66	576		
	Married	7	71		
	Divorced	0	3		
Occupational Status				3.761	0.288
	Full-time Student	49	369		
	Blue Collar Worker	4	30		
	White Collar Worker	11	154		
	Unemployed	9	97		
Educational Level				16.050 [a]	0.001*
	No Formal Education	1	0		
	Secondary School	0	53		
	Pre-Universities/ Certificates	7	103		
	Tertiary Education level	65	494		
Duration of Smartphone Usage (Hour)				0.361	0.548
	< 7.00	32	309		
	≥ 7.00	41	341		
Work-related / Academic (Hour)				1.744	0.187
	< 2.76	31	329		
	≥ 2.76	42	321		
Leisure / Entertainment (Hour)				1.487	0.223
	< 4.00	30	316		
	≥ 4.00	43	334		
Smartphone Addiction				7.856	0.005*
	Yes	57	399		
	No	16	251		
Depression				0.090	0.764
	Normal	42	362		
	Abnormal	31	288		
Anxiety				1.068	0.301
	Normal	53	433		
	Abnormal	20	217		

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Stress				3.150	0.076
	Normal	38	268		
	Abnormal	35	382		

[a] Fisher's Exact Value
*** Significant $P<0.05$**

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Hand/Wrist (Left)

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				1.618	0.203
	18 - 24	82	419		
	25 - 30	45	177		
Gender				6.836	0.009*
	Male	17	143		
	Female	110	453		
Number of children				0.067	0.769
	With Children	10	43		
	No Children	117	553		
Marital Status				1.088 [a]	0.588
	Single	112	530		
	Married	14	64		
	Divorced	1	2		
Occupational Status				4.504	0.212
	Full-time Student	64	354		
	Blue Collar Worker	7	27		
	White Collar Worker	31	134		
	Unemployed	25	81		
Educational Level				2.904 [a]	0.418
	No Formal Education	0	1		
	Secondary School	8	45		
	Pre-Universities/ Certificates	14	96		
	Tertiary Education level	105	454		
Duration of Smartphone Usage (Hour)				5.427	0.020*
	< 7.00	48	293		
	≥ 7.00	79	303		
Work-related / Academic (Hour)				1.048	0.306
	< 2.76	58	302		
	≥ 2.76	69	294		
Leisure / Entertainment (Hour)				0.546	0.460
	< 4.00	57	289		
	≥ 4.00	70	307		
Smartphone Addiction				0.050	0.824
	Yes	79	377		
	No	48	219		
Depression				1.379	0.240
	Normal	65	339		
	Abnormal	62	257		
Anxiety				0.115	0.734
	Normal	87	399		
	Abnormal	40	197		

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Stress				2.685	0.101
	Normal	104	202		
	Abnormal	118	299		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Hand/Wrist (Right)

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				5.032	0.025*
	18 - 24	141	360		
	25 - 30	81	141		
Gender				9.813	0.002*
	Male	33	127		
	Female	189	374		
Number of Children				3.767	0.052
	With Children	10	43		
	No Children	212	458		
Marital Status				0.779 [a]	0.786
	Single	200	442		
	Married	21	57		
	Divorced	1	2		
Occupational Status				1.169	0.760
	Full-time Student	127	291		
	Blue Collar Worker	8	26		
	White Collar Worker	54	111		
	Unemployed	33	73		
Educational Level				7.501 [a]	0.041*
	No Formal Education	0	1		
	Secondary School	8	45		
	Pre-Universities/ Certificates	34	76		
	Tertiary Education level	180	379		
Duration of Smartphone Usage (Hour)				0.849	0.357
	< 7.00	99	242		
	≥ 7.00	123	259		
Work-related / Academic (Hour)				0.062	0.840
	< 2.76	109	251		
	≥ 2.76	113	250		
Leisure / Entertainment (Hour)				0.015	0.902
	< 4.00	107	239		
	≥ 4.00	115	262		
Smartphone Addiction				0.999	0.318
	Yes	146	318		
	No	76	191		
Depression				0.000	0.994
	Normal	124	280		
	Abnormal	98	221		
Anxiety				4.088	0.043*
	Normal	161	325		
	Abnormal	61	176		

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Variables		**Prevalence 12 Months**		χ^2	**P-value**
		Yes	**No**		
Stress				2.685	0.101
	Normal	104	202		
	Abnormal	118	299		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Lowerback

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				7.004	0.008*
	18 - 24	131	370		
	25 - 30	38	184		
Gender				0.518	0.472
	Male	34	126		
	Female	135	428		
Number of Children				3.301	0.069
	With Children	7	46		
	No Children	162	508		
Marital Status				6.188 [a]	0.037*
	Single	159	483		
	Married	10	68		
	Divorced	0	3		
Occupational Status				16.374	0.001*
	Full-time Student	119	299		
	Blue Collar Worker	6	28		
	White Collar Worker	22	143		
	Unemployed	22	84		
Educational Level				1.111 [a]	0.778
	No Formal Education	0	1		
	Secondary School	14	39		
	Pre-Universities/ Certificates	23	87		
	Tertiary Education level	132	427		
Duration of Smartphone Usage (Hour)				4.827	0.006*
	< 7.00	64	277		
	≥ 7.00	105	277		
Work-related / Academic (Hour)				6.184	0.013*
	< 2.76	70	290		
	≥ 2.76	99	264		
Leisure / Entertainment (Hour)				8.814	0.003*
	< 4.00	64	282		
	≥ 4.00	105	272		
Smartphone Addiction				12.492	0.000^
	Yes	126	330		
	No	43	224		
Depression				10.796	0.001*
	Normal	113	291		
	Abnormal	56	263		
Anxiety				16.047	0.000^
	Normal	135	351		
	Abnormal	34	203		

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Stress				15.977	0.000^
	Normal	94	212		
	Abnormal	75	342		

[a] **Fisher's Exact Value**
*** Significant P<0.05**
^Significant P<0.001

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Hip/Buttocks

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				0.619	0.431
	18 - 24	70	431		
	25 - 30	36	186		
Gender				2.675	0.102
	Male	17	143		
	Female	89	474		
Number of Children				0.510	0.475
	With Children	6	47		
	No Children	100	570		
Marital Status				0.179 [a]	0.917
	Single	94	548		
	Married	12	66		
	Divorced	0	3		
Occupational Status				0.754	0.86
	Full-time Student	61	357		
	Blue Collar Worker	4	30		
	White Collar Worker	23	142		
	Unemployed	18	88		
Educational Level				8.946 [a]	0.023*
	No Formal Education	1	0		
	Secondary School	3	50		
	Pre-Universities/ Certificates	13	97		
	Tertiary Education level	89	470		
Duration of Smartphone Usage (Hour)				0.176	0.674
	< 7.00	48	293		
	≥ 7.00	58	324		
Work-related / Academic (Hour)				4.230	0.040*
	< 2.76	43	317		
	≥ 2.76	63	300		
Leisure / Entertainment (Hour)				0.990	0.320
	< 4.00	46	300		
	≥ 4.00	60	317		
Smartphone Addiction				10.887	0.001*
	Yes	82	374		
	No	24	243		
Depression				7.311	0.007*
	Normal	72	332		
	Abnormal	34	285		

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Anxiety				15.801	0.000^
	Normal	89	397		
	Abnormal	17	220		
Stress				6.671	0.010*
	Normal	57	249		
	Abnormal	49	368		

[a] Fisher's Exact Value
*** Significant P<0.05**
^Significant P<0.001

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Total MSDs

Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Age (Years)				1.310	0.252
	18 - 24	380	121		
	25 - 30	177	45		
Gender				2.394	0.122
	Male	116	44		
	Female	441	122		
Number of Children				2.687	0.101
	With Children	36	17		
	No Children	521	149		
Marital Status				1.453 [a]	0.44
	Single	498	144		
	Married	57	21		
	Divorced	2	1		
Occupational Status				1.763	0.623
	Full-time Student	329	89		
	Blue Collar Worker	25	9		
	White Collar Worker	125	40		
	Unemployed	78	28		
Educational Level				5.550 [a]	0.118
	No Formal Education	1	0		
	Secondary School	34	19		
	Pre-Universities/ Certificates	85	25		
	Tertiary Education level	437	122		
Duration of Smartphone Usage (Hour)				7.741	0.005*
	< 7.00	247	94		
	≥ 7.00	310	72		
Work-related / Academic (Hour)				7.364	0.007*
	< 2.76	262	98		
	≥ 2.76	295	68		
Leisure / Entertainment (Hour)				5.761	0.016*
	< 4.00	253	93		
	≥ 4.00	304	73		
Smartphone Addiction				27.647	0.000^
	Yes	380	76		
	No	177	90		
Depression				1.909	0.167
	Normal	85	319		
	Abnormal	81	238		

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Variables		Prevalence 12 Months		χ^2	P-value
		Yes	No		
Anxiety				19.740	0.000^
	Normal	88	398		
	Abnormal	78	159		
Stress				8.466	0.004*
	Normal	54	252		
	Abnormal	112	305		

[a] Fisher's Exact Value
*** Significant P<0.05**
^Significant P<0.001

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Appendix 9 (The association between sociodemographic characteristics, smartphone usage and smartphone addiction with physical disorder (MSDs 7 days) among youth population in Malaysia (*N*=723))

Neck

Variables		**Prevalence 7 Days**		χ^2	**P-value**
		Yes	**No**		
Age (Years)				2.909	0.088
	18 - 24	184	317		
	25 - 30	67	155		
Gender				0.085	0.771
	Male	54	106		
	Female	197	366		
Number of Children				1.739	0.187
	With Children	14	39		
	No Children	237	433		
Marital Status				2.487[a]	0.246
	Single	229	413		
	Married	21	57		
	Divorced	1	2		
Occupational Status				3.893	0.273
	Full-time Student	157	261		
	Blue Collar Worker	9	25		
	White Collar Worker	51	114		
	Unemployed	34	72		
Educational Level				2.381[a]	0.518
	No Formal Education	0	1		
	Secondary School	14	39		
	Pre-Universities/ Certificates	37	73		
	Tertiary Education level	200	359		
Duration of Smartphone Usage (Hour)				9.201	0.002*
	< 7.00	99	242		
	≥ 7.00	521	230		
Work-related / Academic (Hour)				7.891	0.005*
	< 2.76	107	253		
	≥ 2.76	144	219		
Leisure / Entertainment (Hour)				4.209	0.040*
	< 4.00	107	239		
	≥ 4.00	144	233		
Smartphone Addiction				21.571	0.000^
	Yes	187	269		
	No	64	203		
Depression				1.485	0.223
	Normal	148	256		
	Abnormal	103	216		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Anxiety				4.883	0.027*
	Normal	182	304		
	Abnormal	69	168		
Stress				0.015	0.903
	Normal	107	199		
	Abnormal	144	273		

[a] Fisher's Exact Value
*** Significant P<0.05**
^Significant P<0.001

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Shoulder (Left)

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				0.141	0.707
	18 - 24	67	434		
	25 - 30	32	190		
Gender				8.082	0.004*
	Male	11	149		
	Female	88	475		
Number of Children				0.272	0.602
	With Children	6	47		
	No Children	93	577		
Marital Status				0.121 [a]	1.000
	Single	89	553		
	Married	10	68		
	Divorced	0	3		
Occupational Status				6.609	0.085
	Full-time Student	53	365		
	Blue Collar Worker	2	32		
	White Collar Worker	22	143		
	Unemployed	22	84		
Educational Level				6.160 [a]	0.103
	No Formal Education	0	1		
	Secondary School	2	51		
	Pre-Universities/ Certificates	14	96		
	Tertiary Education level	83	476		
Duration of Smartphone Usage (Hour)				0.023	0.881
	< 7.00	46	295		
	≥ 7.00	53	329		
Work-related / Academic (Hour)				0.078	0.779
	< 2.76	48	312		
	≥ 2.76	51	312		
Leisure / Entertainment (Hour)				0.535	0.464
	< 4.00	44	302		
	≥ 4.00	55	322		
Smartphone Addiction				1.045	0.307
	Yes	67	389		
	No	32	235		
Depression				10.231	0.001*
	Normal	70	334		
	Abnormal	29	290		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Anxiety				2.211	0.137
	Normal	73	413		
	Abnormal	26	211		
Stress				7.019	0.008*
	Normal	54	252		
	Abnormal	45	372		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Shoulder (Right)

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				0.126	0.722
	18 - 24	82	419		
	25 - 30	34	188		
Gender				6.785	0.009*
	Male	15	145		
	Female	101	462		
Number of Children				0.038	0.845
	With Children	8	45		
	No Children	108	562		
Marital Status				0.862 [a]	0.655
	Single	101	541		
	Married	15	63		
	Divorced	0	3		
Occupational Status				1.670	0.644
	Full-time Student	63	355		
	Blue Collar Worker	4	30		
	White Collar Worker	29	136		
	Unemployed	20	86		
Educational Level				6.474 [a]	0.083
	No Formal Education	0	1		
	Secondary School	3	50		
	Pre-Universities/ Certificates	22	88		
	Tertiary Education level	91	468		
Duration of Smartphone Usage (Hour)				0.303	0.582
	< 7.00	52	289		
	≥ 7.00	64	318		
Work-related / Academic (Hour)				0.002	0.961
	< 2.76	58	302		
	≥ 2.76	58	305		
Leisure / Entertainment (Hour)				0.838	0.360
	< 4.00	51	295		
	≥ 4.00	65	312		
Smartphone Addiction				1.503	0.220
	Yes	79	377		
	No	37	230		
Depression				0.728	0.393
	Normal	69	335		
	Abnormal	47	272		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Anxiety				0.755	0.385
	Normal	82	404		
	Abnormal	34	203		
Stress				1.012	0.314
	Normal	54	252		
	Abnormal	62	355		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Upperback

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				0.367	0.545
	18 - 24	74	427		
	25 - 30	29	193		
Gender				1.162	0.281
	Male	27	133		
	Female	76	487		
Number of Children				0.051	0.822
	With Children	7	46		
	No Children	96	574		
Marital Status				1.162 [a]	0.564
	Single	89	553		
	Married	14	64		
	Divorced	0	3		
Occupational Status				5.113	0.164
	Full-time Student	70	348		
	Blue Collar Worker	4	30		
	White Collar Worker	18	147		
	Unemployed	11	95		
Educational Level				0.845 [a]	0.907
	No Formal Education	0	1		
	Secondary School	8	45		
	Pre-Universities/ Certificates	14	96		
	Tertiary Education level	81	478		
Duration of Smartphone Usage (Hour)				0.302	0.582
	< 7.00	46	295		
	≥ 7.00	57	325		
Work-related / Academic (Hour)				0.489	0.484
	< 2.76	48	312		
	≥ 2.76	55	308		
Leisure / Entertainment (Hour)				0.132	0.716
	< 4.00	51	295		
	≥ 4.00	52	325		
Smartphone Addiction				8.262	0.004*
	Yes	78	378		
	No	25	242		
Depression				0.096	0.757
	Normal	59	345		
	Abnormal	44	275		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Anxiety				2.350	0.125
	Normal	76	410		
	Abnormal	27	210		
Stress				5.023	0.025*
	Normal	54	252		
	Abnormal	49	368		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Upperarm (Left)

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				0.738	0.390
	18 - 24	20	481		
	25 - 30	6	216		
Gender				0.132	0.717
	Male	5	155		
	Female	21	542		
Number of Children				N/A[a]	0.714
	With Children	1	52		
	No Children	25	645		
Marital Status				1.503 [a]	0.564
	Single	22	620		
	Married	4	74		
	Divorced	0	3		
Occupational Status				1.550	0.671
	Full-time Student	15	403		
	Blue Collar Worker	2	32		
	White Collar Worker	4	161		
	Unemployed	5	101		
Educational Level				6.259 [a]	0.126
	No Formal Education	0	1		
	Secondary School	4	49		
	Pre-Universities/ Certificates	6	104		
	Tertiary Education level	16	543		
Duration of Smartphone Usage (Hour)				4.434	0.035*
	< 7.00	7	334		
	≥ 7.00	19	363		
Work-related / Academic (Hour)				2.485	0.115
	< 2.76	9	351		
	≥ 2.76	17	346		
Leisure / Entertainment (Hour)				0.031	0.860
	< 4.00	12	334		
	≥ 4.00	14	363		
Smartphone Addiction				1.159	0.282
	Yes	19	437		
	No	7	260		
Depression				0.036	0.850
	Normal	15	389		
	Abnormal	11	308		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Anxiety				1.152	0.283
	Normal	20	466		
	Abnormal	6	231		
Stress				1.467	0.226
	Normal	14	292		
	Abnormal	12	405		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Upperarm (Right)

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				0.954	0.329
	18 - 24	37	44		
	25 - 30	12	210		
Gender				1.027	0.311
	Male	8	152		
	Female	41	522		
Number of Children				N/A[a]	0.776
	With Children	4	49		
	No Children	45	625		
Marital Status				2.052 [a]	0.376
	Single	41	601		
	Married	8	70		
	Divorced	0	3		
Occupational Status				2.216	0.529
	Full-time Student	29	389		
	Blue Collar Worker	2	32		
	White Collar Worker	8	157		
	Unemployed	10	96		
Educational Level				3.557 [a]	0.317
	No Formal Education	0	1		
	Secondary School	4	49		
	Pre-Universities/ Certificates	11	99		
	Tertiary Education level	34	525		
Duration of Smartphone Usage (Hour)				0.733	0.392
	< 7.00	26	315		
	≥ 7.00	23	359		
Work-related / Academic (Hour)				0.504	0.478
	< 2.76	22	338		
	≥ 2.76	27	336		
Leisure / Entertainment (Hour)				2.703	0.100
	< 4.00	29	317		
	≥ 4.00	20	357		
Smartphone Addiction				2.440	0.118
	Yes	36	420		
	No	13	254		
Depression				1.163	0.281
	Normal	31	373		
	Abnormal	18	301		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Anxiety				3.651	0.056
	Normal	39	447		
	Abnormal	10	227		
Stress				2.483	0.115
	Normal	26	280		
	Abnormal	23	394		

[a] Fisher's Exact Value

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Forearm (Left)

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				1.178	0.278
	18 - 24	22	479		
	25 - 30	6	216		
Gender				0.008	0.927
	Male	6	154		
	Female	22	541		
Number of Children				N/A[a]	1.000
	With Children	2	51		
	No Children	26	644		
Marital Status				0.647 [a]	1.000
	Single	25	617		
	Married	3	75		
	Divorced	0	3		
Occupational Status				3.513	0.319
	Full-time Student	15	403		
	Blue Collar Worker	2	32		
	White Collar Worker	4	161		
	Unemployed	7	99		
Educational Level				1.612 [a]	1.000
	No Formal Education	0	1		
	Secondary School	2	51		
	Pre-Universities/ Certificates	4	106		
	Tertiary Education level	22	537		
Duration of Smartphone Usage (Hour)				0.726	0.394
	< 7.00	11	330		
	≥ 7.00	17	365		
Work-related / Academic (Hour)				1.286	0.257
	< 2.76	11	349		
	≥ 2.76	17	346		
Leisure / Entertainment (Hour)				1.721	0.190
	< 4.00	10	336		
	≥ 4.00	18	359		
Smartphone Addiction				0.287	0.592
	Yes	19	437		
	No	9	258		
Depression				0.835	0.361
	Normal	18	386		
	Abnormal	10	309		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Anxiety				0.800	0.371
	Normal	21	465		
	Abnormal	7	230		
Stress				2.620	0.105
	Normal	16	290		
	Abnormal	12	405		

[a] Fisher's Exact Value

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Forearm (Right)

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				2.559	0.110
	18 - 24	33	468		
	25 - 30	8	214		
Gender				0.001	0.977
	Male	9	151		
	Female	32	531		
Number of Children				N/A[a]	0.532
	With Children	4	49		
	No Children	37	633		
Marital Status				1.214 [a]	0.525
	Single	35	607		
	Married	6	72		
	Divorced	0	3		
Occupational Status				1.765	0.622
	Full-time Student	27	391		
	Blue Collar Worker	2	32		
	White Collar Worker	6	159		
	Unemployed	6	100		
Educational Level				5.331 [a]	0.176
	No Formal Education	0	1		
	Secondary School	0	53		
	Pre-Universities/ Certificates	5	105		
	Tertiary Education level	36	523		
Duration of Smartphone Usage (Hour)				0.012	0.913
	< 7.00	19	322		
	≥ 7.00	22	360		
Work-related / Academic (Hour)				0.603	0.437
	< 2.76	18	342		
	≥ 2.76	23	340		
Leisure / Entertainment (Hour)				0.040	0.842
	< 4.00	19	327		
	≥ 4.00	22	355		
Smartphone Addiction				1.095	0.295
	Yes	29	427		
	No	12	255		
Depression				0.125	0.724
	Normal	24	380		
	Abnormal	17	302		
Anxiety				0.699	0.403
	Normal	30	456		
	Abnormal	11	226		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Stress				2.288	0.130
	Normal	22	284		
	Abnormal	19	398		

[a] Fisher's Exact Value

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Hand/Wrist (Left)

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				0.835	0.361
	18 - 24	62	439		
	25 - 30	33	189		
Gender				7.066	0.008*
	Male	11	149		
	Female	84	479		
Number of children				1.644	0.200
	With Children	10	43		
	No Children	85	585		
Marital Status				2.783 [a]	0.206
	Single	81	561		
	Married	13	65		
	Divorced	1	2		
Occupational Status				4.131	0.248
	Full-time Student	48	370		
	Blue Collar Worker	5	29		
	White Collar Worker	22	143		
	Unemployed	20	86		
Educational Level				1.131 [a]	0.824
	No Formal Education	0	1		
	Secondary School	7	46		
	Pre-Universities/ Certificates	12	98		
	Tertiary Education level	76	483		
Duration of Smartphone Usage (Hour)				3.771	0.052
	< 7.00	36	305		
	≥ 7.00	59	323		
Work-related / Academic (Hour)				1.926	0.165
	< 2.76	41	319		
	≥ 2.76	54	309		
Leisure / Entertainment (Hour)				2.029	0.154
	< 4.00	39	307		
	≥ 4.00	56	321		
Smartphone Addiction				0.226	0.635
	Yes	62	394		
	No	33	234		
Depression				0.468	0.494
	Normal	50	354		
	Abnormal	45	274		
Anxiety				0.943	0.331
	Normal	68	418		
	Abnormal	27	210		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Stress				1.666	0.197
	Normal	46	260		
	Abnormal	49	368		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Hand/Wrist (Right)

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				5.923	0.015*
	18 - 24	105	396		
	25 - 30	65	157		
Gender				8.280	0.004*
	Male	24	136		
	Female	146	417		
Number of Children				0.033	0.856
	With Children	13	40		
	No Children	157	513		
Marital Status				1.199 [a]	0.515
	Single	148	494		
	Married	21	57		
	Divorced	1	2		
Occupational Status				2.971	0.396
	Full-time Student	90	328		
	Blue Collar Worker	10	24		
	White Collar Worker	40	125		
	Unemployed	30	76		
Educational Level				1.862 [a]	0.622
	No Formal Education	0	1		
	Secondary School	9	44		
	Pre-Universities/ Certificates	28	82		
	Tertiary Education level	133	426		
Duration of Smartphone Usage (Hour)				3.198	0.074
	< 7.00	70	271		
	≥ 7.00	100	282		
Work-related / Academic (Hour)				0.664	0.415
	< 2.76	80	280		
	≥ 2.76	90	273		
Leisure / Entertainment (Hour)				1.667	0.197
	< 4.00	74	272		
	≥ 4.00	96	281		
Smartphone Addiction				2.545	0.111
	Yes	116	340		
	No	54	213		
Depression				1.532	0.216
	Normal	102	302		
	Abnormal	68	251		
Anxiety				9.764	0.002*
	Normal	131	355		
	Abnormal	39	198		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Stress				4.574	0.032*
	Normal	84	222		
	Abnormal	86	331		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Lowerback

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				0.942	0.332
	18 - 24	77	424		
	25 - 30	28	194		
Gender				0.004	0.952
	Male	23	137		
	Female	82	481		
Number of Children				5.323	0.021*
	With Children	2	51		
	No Children	103	567		
Marital Status				5.078 [a]	0.086
	Single	100	542		
	Married	5	73		
	Divorced	0	3		
Occupational Status				4.583	0.205
	Full-time Student	67	351		
	Blue Collar Worker	4	30		
	White Collar Worker	16	149		
	Unemployed	18	88		
Educational Level				1.289 [a]	0.752
	No Formal Education	0	1		
	Secondary School	6	47		
	Pre-Universities/ Certificates	14	96		
	Tertiary Education level	85	474		
Duration of Smartphone Usage (Hour)				3.960	0.047*
	< 7.00	223	118		
	≥ 7.00	62	320		
Work-related / Academic (Hour)				0.817	0.366
	< 2.76	48	312		
	≥ 2.76	57	306		
Leisure / Entertainment (Hour)				5.650	0.017*
	< 4.00	39	307		
	≥ 4.00	66	311		
Smartphone Addiction				3.684	0.055
	Yes	75	381		
	No	30	237		
Depression				8.028	0.005*
	Normal	72	332		
	Abnormal	33	286		
Anxiety				2.783	0.095
	Normal	78	408		
	Abnormal	27	210		

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Variables		**Prevalence 7 Days**		**χ^2**	**P-value**
		Yes	**No**		
Stress				1.411	0.235
	Normal	50	55		
	Abnormal	256	362		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Hip/Buttocks

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				0.017	0.898
	18 - 24	37	464		
	25 - 30	17	205		
Gender				0.128	0.721
	Male	13	147		
	Female	41	522		
Number of Children				0.271	0.603
	With Children	3	50		
	No Children	51	619		
Marital Status				0.263 [a]	1.000
	Single	48	594		
	Married	6	72		
	Divorced	0	3		
Occupational Status				0.487	0.922
	Full-time Student	31	387		
	Blue Collar Worker	2	32		
	White Collar Worker	14	151		
	Unemployed	7	99		
Educational Level				6.622 [a]	0.110
	No Formal Education	1	0		
	Secondary School	5	48		
	Pre-Universities/ Certificates	7	103		
	Tertiary Education level	41	518		
Duration of Smartphone Usage (Hour)				0.018	0.894
	< 7.00	25	316		
	≥ 7.00	29	353		
Work-related / Academic (Hour)				1.913	0.167
	< 2.76	22	338		
	≥ 2.76	32	331		
Leisure / Entertainment (Hour)				0.057	0.811
	< 4.00	25	321		
	≥ 4.00	29	348		
Smartphone Addiction				8.493	0.004*
	Yes	44	412		
	No	10	257		
Depression				4.971	0.026*
	Normal	38	16		
	Abnormal	366	303		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	**No**		
Anxiety				8.548	0.003*
	Normal	46	8		
	Abnormal	440	229		
Stress				5.439	0.020*
	Normal	31	23		
	Abnormal	275	394		

[a] Fisher's Exact Value
*** Significant P<0.05**

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Total MSDs

Variables		Prevalence 7 Days		χ^2	P-value
		Yes	No		
Age (Years)				0.695	0.405
	18 - 24	341	160		
	25 - 30	158	64		
Gender				5.798	0.016*
	Male	98	62		
	Female	401	162		
Number of Children				4.122	0.042*
	With Children	30	23		
	No Children	469	201		
Marital Status				0.825 [a]	0.786
	Single	446	196		
	Married	51	27		
	Divorced	2	1		
Occupational Status				1.094	0.778
	Full-time Student	290	128		
	Blue Collar Worker	23	11		
	White Collar Worker	117	48		
	Unemployed	69	37		
Educational Level				3.364 [a]	0.324
	No Formal Education	1	0		
	Secondary School	31	22		
	Pre-Universities/ Certificates	77	33		
	Tertiary Education level	390	169		
Duration of Smartphone Usage (Hour)				3.960	0.047*
	< 7.00	223	118		
	≥ 7.00	276	106		
Work-related / Academic (Hour)				7.014	0.008*
	< 2.76	232	128		
	≥ 2.76	267	96		
Leisure / Entertainment (Hour)				2.008	0.156
	< 4.00	230	116		
	≥ 4.00	269	108		
Smartphone Addiction				17.745	0.000^
	Yes	340	116		
	No	159	108		
Depression				4.549	0.033*
	Normal	292	112		
	Abnormal	207	112		

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Variables		Prevalence 7 Days		χ^2	P-value
		Yes	**No**		
Anxiety				23.965	0.000^
	Normal	364	122		
	Abnormal	135	102		
Stress				10.393	0.001*
	Normal	231	75		
	Abnormal	268	149		

[a] Fisher's Exact Value
*** Significant P<0.05**
^Significant P<0.001

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Appendix 10 (The association between sociodemographic characteristics, smartphone usage and smartphone addiction with psychosocial disorder (DAS) among youth population in Malaysia (*N*=723))

<u>Depression</u>

Variables		**Prevalence of Depression**		X^2	**P-Value**
		Yes	**No**		
Age (Years)				20.745	0.000^
	18 - 24	308	193		
	25 - 30	96	126		
Gender				0.951	0.329
	Male	84	76		
	Female	320	243		
Marital Status				18.770[a]	0.000^
	Single	377	265		
	Married	26	52		
	Divorced	1	2		
Number of Children				15.309	0.000^
	With Children	16	37		
	No Children	388	282		
Occupational Status				24.514	0.000^
	Full-time Student	255	163		
	Blue Collar Worker	18	16		
	White Collar Worker	65	100		
	Unemployed	66	40		
Educational Level				8.211[a]	0.027*
	No Formal Education	1	0		
	Secondary School	38	15		
	Pre-Universities/ Certificates	66	44		
	Tertiary Education level	299	260		
Duration of Smartphone Usage (Hour)				15.863	0.000^
	< 7.00	164	177		
	≥ 7.00	240	142		
Work-related / Academic (Hour)				0.852	0.356
	< 2.76	195	165		
	≥ 2.76	209	154		
Leisure / Entertainment (Hour)				10.237	0.001*
	< 4.00	172	174		
	≥ 4.00	232	145		
Smartphone Addiction				29.835	0.000^
	Yes	290	166		
	No	114	153		

*** Significant P<0.05**
[a] Fisher's Exact Value
^Significant P<0.001

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Anxiety

Variables		Prevalence of Anxiety		X^2	P-Value
		Yes	No		
Age (Years)				4.411	0.036*
	18 - 24	349	152		
	25 - 30	137	85		
Gender				1.123	0.289
	Male	102	58		
	Female	384	179		
Marital Status				10.020[a]	0.004*
	Single	444	198		
	Married	41	37		
	Divorced	1	2		
Number of Children				8.563	0.003*
	With Children	26	27		
	No Children	460	210		
Occupational Status				1.127	0.77
	Full-time Student	287	131		
	Blue Collar Worker	23	11		
	White Collar Worker	106	59		
	Unemployed	70	36		
Educational Level				3.307[a]	0.325
	No Formal Education	1	0		
	Secondary School	40	13		
	Pre-Universities/ Certificates	78	32		
	Tertiary Education level	367	192		
Duration of Smartphone Usage (Hour)				11.342	0.001*
	< 7.00	208	133		
	≥ 7.00	278	104		
Work-related / Academic (Hour)				1.604	0.205
	< 2.76	234	126		
	≥ 2.76	252	111		
Leisure / Entertainment (Hour)				4.639	0.031*
	< 4.00	219	127		
	≥ 4.00	267	110		
Smartphone Addiction				23.417	0.000^
	Yes	336	120		
	No	150	117		

*** Significant P<0.05**
[a] Fisher's Exact Value
^Significant P<0.001

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Stress

Variables		Prevalence of Stress		X^2	P-Value
		Yes	No		
Age (Years)				9.571	0.002*
	18 - 24	231	270		
	25 - 30	75	147		
Gender				4.515	0.034*
	Male	56	104		
	Female	250	313		
Marital Status				16.128[a]	0.000^
	Single	288	354		
	Married	17	61		
	Divorced	1	2		
Number of Children				7.419	0.006*
	With Children	13	40		
	No Children	293	377		
Occupational Status				13.747	0.003*
	Full-time Student	196	222		
	Blue Collar Worker	13	21		
	White Collar Worker	50	115		
	Unemployed	47	59		
Educational Level				5.250[a]	0.118
	No Formal Education	1	0		
	Secondary School	28	25		
	Pre-Universities/ Certificates	51	59		
	Tertiary Education level	226	333		
Duration of Smartphone Usage (Hour)				6.059	0.014*
	< 7.00	128	213		
	≥ 7.00	178	204		
Work-related / Academic (Hour)				1.586	0.208
	< 2.76	144	216		
	≥ 2.76	162	201		
Leisure / Entertainment (Hour)				3.514	0.061
	< 4.00	134	212		
	≥ 4.00	172	205		
Smartphone Addiction				24.917	0.000^
	Yes	225	231		
	No	81	186		

*** Significant P<0.05**
[a] Fisher's Exact Value
^Significant P<0.001

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