FACTORS ASSOCIATED WITH BODY WEIGHT STATUS AND INTERNET ADDICTION AMONG MALAYSIAN UNIVERSITY STUDENTS IN PENANG: MIXED METHOD STUDY BEFORE AND DURING COVID-19 PANDEMIC

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by

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LIST OF SYMBOLS

df	Degrees of freedom
F	Value is used in analysis of variance (ANOVA)
H	Eta
M	Mean
N	Number of valid observations for the variable
T	Computed test statistic
R	Pearson correlation
P	Probability value
rho	Spearman correlation

LIST OF ABBREVIATIONS

ADMR	Acceptable Macronutrient Distribution Range
ADHD	Attention deficit hyperactivity disorder
AARBS	Asian Adolescent Risk Behaviour Survey
BMI	Body Mass Index
CBT	Cognitive Behavioural Therapy
CGPA	Cumulative Grade Point Average
COI	Conflict of interest
CVS	Computer Vision Syndrome
DHHS	Department of Health and Human Services
FGD	Focus Group Discussion
FFQ	Food Frequency Questionnaire
GIA	General Internet Addiction
GPAQ	Global Physical Activity Questionnaire
HEI	Healthy Eating Index
I-PACE	Interaction of Person-Affect-Cognition-Execution
IAD	Internet Addiction Disorder
IAS	Internet Addiction Scale
IAT	Internet Addiction Test
IGD	Internet Gaming Disorder
IPH	Institute for Public Health
IQR	Interquartile range
MANS	Malaysian Adult Nutrition Survey
MCMC	Malaysian Communication and Multimedia Commission
MDG	Malaysian Dietary Guidelines
MET	Metabolic Equivalent
MSU	Management & Science University
MVPA	Moderate to Vigorous Physical Activity
NOMOPHOBIA	NO MObile PHone PhoBIA
NCD	Non-Communicable Diseases
NHANES	National Health and Nutrition Examination Surveys
NHMS	National Health and Morbidity Survey

NPANM	National Plan of Action for Nutrition of Malaysia
OTT	Over-The-Top
PSQI	Pittsburgh Sleep Quality Index
Q-Q	Quantile-Quantile
RDA	Recommended Dietary Allowance
RNI	Recommended Nutrient Intakes
RSI	Repetitive Strain Injury
rTMS	Repetitive Transcranial Magnetic Stimulation
RMS	Resting metabolic rate
RSES	Rosenberg Self-Esteem Scale
SD	Standard deviation
SES	Socio-economic status
SNS	Social networking sites
SPSS	Statistical Package for the Social Sciences
TV	Television
TESOL	Teaching English to Speakers of Other Languages
TEF	Thermic effect of feeding
tDCS	Transcranial Direct Current Stimulation
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USM	Universiti Sains Malaysia
WHO	World Health Organisation

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FAKTOR-FAKTOR YANG BERKAITAN DENGAN STATUS BERAT BADAN DAN KETAGIHAN INTERNETDALAM KALANGAN PELAJAR UNIVERSITI MALAYSIA DI PULAU PINANG: KAJIAN KAEDAH CAMPURAN SEBELUM DAN SEMASA PANDEMIK COVID-19

ABSTRAK

Internet bermula sebagai anugerah kepada manusia untuk mencahayai masyarakat dengan memindahkan pengetahuan dan menyediakan semua maklumat yang diperlukan untuk kesejahteraan, perkembangan dan kemakmuran manusia. Tetapi apabila internet semakin popular, ia menimbulkan satu set masalah yang tersendiri, salah satu masalah utama ialah Ketagihan Internet (IA). Di Malaysia, ketagihan internet muncul sebagai masalah utama dalam kalangan generasi muda. Kajian kaedah campuran ini dilakukan untuk mengkaji faktor-faktor yang berkaitkan dengan status berat badan dan ketagihan internet pelajar universiti Malaysia di Pulau Pinang sebelum dan semasa pandemic COVID-19. Data dikumpulkan daripada 352 pelajar sarjana muda Malaysia yang menuntut di kolej atau universiti awam/swasta. Tahap ketagihan internet ditentukan berdasarkan pelaporan kendiri melalui skala ketagihan internet Young, dan pelajar diklasifikasikan sebagai tiada IA (0.3%), IA ringan (56.8%), IA sederhana (37.5%), dan IA teruk (5.4%). Analisis logistik berganda menunjukkan bahawa jantina pelajar (rujukan, perempuan; lelaki: OR = 7.795, P <0.001), tahun pengajian (rujukan, tahun ketiga pengajian; tahun kedua: OR = 5.924, P <0.001), tertinggi ibu tahap pendidikan (rujukan, tahap pendidikan rendah; tahap pendidikan menengah OR = 0.095, P < 0.001; Tahap pendidikan Kolej/ Universiti OR = 0.021, P <0.001), saiz keluarga (rujukan, saiz keluarga besar; saiz keluarga sederhana OR = 5.515, P <0.001) memberikan sumbangan signifikan secara statistik yang unik kepada model. Ujian chi-square digunakan untuk mengkaji

hubungan antara tahap ketagihan internet pelajar dan corak gaya hidup serta tabiat pemakanan. Waktu tidur yang tidak menentu adalah lebih kerap berlaku pada pelajar ketagihan internet teruk berbanding pelajar ketagihan internet sederhana. Dalam kajian Fasa I, semua pelajar menunjukkan tingkah laku sedentari tetapi dalam kajian Fasa II aktiviti fizikal didapati lebih tinggi dalam kalangan pelajar yang mengalami Ketagihan Internet yang teruk. Kualiti diet dalam kalangan pelajar ketagihan internet yang teruk juga lebih rendah berbanding pelajar ketagihan internet sederhana dan pelajar ketagihan internet ringan. Malah, tabiat pemakanan yang tidak teratur kerana kehilangan selera makan, kerap mengambil snek dan melangkau makan mungkin menyebabkan pemakanan yang tidak seimbang dalam kalangan pelajar ketagihan internet teruk. Kajian ini mendapati bahawa pelajar ketagihan internet teruk mempunyai tabiat pemakanan yang tidak baik dan kualiti pemakanan yang rendah. Analisis regresi logistik multinomial menunjukkan saiz keluarga boleh ubah (rujukan, saiz keluarga besar; saiz keluarga kecil OR = 0.060, P <0.05) didapati signifikan untuk meramalkan kekurangan berat badan. Tahap ketagihan internet (rujukan, tiada ketagihan internet; ketagihan internet ringan OR = 412973.188, P <0.05; ketagihan internet sederhana OR = 143209.451, P <0.001) dan kualiti tidur (OR = 0.206, P <0.001 didapati signifikan) untuk meramal berat normal pelajar. Tiga puluh enam orang pelajar telah dipilih dalam perbincangan kumpulan fokus dan mereka digalakkan untuk berkongsi pengalaman tentang aktiviti internet, kesan penggunaan internet terhadap aspek penting dalam kehidupan dan gejala penarikan diri semasa mereka cuba mengehadkan aktiviti dalam talian. Mereka juga digalakkan untuk berkongsi persepsi tentang hubungan peribadi semasa bersemuka dengan keluarga dan rakan-rakan, semasa bersukan dan aktiviti luar talian lain berbanding dengan aktiviti dalam talian yang serupa. Dapatan kajian ini membuktikan bahawa terdapat

sumbangan faktor demografi dan sosio-ekonomi yang signifikan terhadap ketagihan internet dalam kalangan pelajar universiti/maktab Malaysia di Pulau Pinang. Di samping itu, terdapat sumbangan besar faktor demografi, ketagihan internet, dan kualiti tidur kepada indeks jisim badan pelajar universiti/kolej Malaysia di Pulau Pinang.

FACTORS ASSOCIATED WITH BODY WEIGHT STATUS AND INTERNET ADDICTION AMONG MALAYSIAN UNIVERSITY STUDENTS IN PENANG: MIXED METHOD STUDY BEFORE AND DURING COVID-19 PANDEMIC

ABSTRACT

The Internet began as a divine gift to humans to enlighten society by transferring knowledge and making available all the information required for human well-being, growth, and prosperity. But as the internet grew popular, it created a set of problems on its own, one of the major ones being Internet Addiction (IA). In Malaysia, internet addiction is surfacing as a key problem among the younger generation. This mixed method study was performed to examine the factors associated with body weight status and internet addiction of Malaysian university students in Penang before and during COVID-19 pandemic. Data were collected from 352 Malaysian undergraduate students studying in public/ private colleges or universities. The level of internet addiction was determined based on Young's internet addiction self-reported scale, and students were classified as no IA users (0.3%), mild IA users (56.8%), moderate IA users (37.5%), and severe IA users (5.4%). The multiple logistic analysis showed that the students gender (reference, female; male: OR = 7.795, P < 0.001), year of study (reference, third year of study; second year: OR = 5.924, P < 0.001), mother's highest level of education (reference, primary level of education; secondary level of education OR = 0.095, P < 0.001; College/ University level of education OR = 0.021, P < 0.001), family size (reference, big family size; medium family size OR = 5.515, P < 0.001) made a unique statistically significant contribution to the model. The chi-square test was used to analyse the relationship between the students' levels of internet

addiction and lifestyle patterns and dietary behaviour. Irregular bedtimes were higher among severe internet addiction students than in mild internet addiction students. In Phase I study, all the students showed sedentary behaviour but in Phase II study physical activity was found to be higher among students with severe Internet Addiction. Diet quality among severe internet addiction students was also poorer than in moderate internet addiction students and mild internet addiction students. Moreover, improper dietary behaviour due to the loss of appetite, high frequency of snacking and skipping meals might cause imbalanced nutritional intake among severe internet users. In this study, it has been demonstrated that severely internet addiction students have inappropriate dietary behaviour and poor diet quality. Multinomial logistic regression analysis showed that the variable family size (reference, big family size; small family size OR = 0.060, $P < 0.05$) were found to be significant to predict the underweight. The internet addiction level (reference, no internet addiction; mild internet addiction OR = 412973.188, $P < 0.05$; moderate internet addiction OR = 143209.451, $P < 0.001$) and sleep quality (OR = 0.206, $P < 0.001$) were found to be significant to predict the normal weight of the students. Thirty-six students were subjected to a focus group discussion where they were motivated to share their experience in internet-related activities, the effect of internet usage on their significant aspects of life and the experience of withdrawal symptoms while trying to limit their online activity. They were also encouraged to share their perception of face-to-face personal interaction with family and friends, sports and other offline activities as compared to similar online activities. The findings of this study prove that there is a significant contribution of demographic and socio-economic factors to internet addiction among Malaysian university/college students in Penang. In addition, there is a significant contribution of

demographic factors, internet addiction, and sleep quality to the body mass index of Malaysian university/college students in Penang.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

The Internet is the scope of communication that has broadened through the improvements in Information and Communication Technologies (Asemah et al., 2013). The Internet facility is a widely used platform by individuals to socialize, connect, express, and create. The internet has become the most important and useful technological tool worldwide with positive and negative impacts on our daily life, especially among youth. The use of the internet is expanding constantly. In 2020, there were almost 4.8 billion active internet users worldwide, equivalent to 62% of the global population. The prevalence was 3.7% in India (Patil et al., 2017) and 37% in Iraq and Malaysia (Babakr et al., 2019). Asia is the region with the highest number of online users (Miniwatts Marketing Group, 2020).

Internet addiction is one of the fast-developing addictive behaviours, especially among university students affecting their physical as well as mental health negatively (Akhtar et al., 2022). Students and teachers were accessing online books to complete assignments and online assessments during the COVID-19 pandemic, as universities highly recommended. (Shehata & Abdeldaim, 2021). These significant measures were taken to restrict the spread of the virus by keeping social distancing among people (Fernandes et al., 2020). This led to major changes in youths' lifestyles which in turn affected their psychological well-being (Fegert et al., 2020). During the lockdown, students had a sedentary life involved in excessive and uncontrollable internet usage (Király et al., 2020).

The Internet has become an essential part of online classes that increased the dependency of students on the Internet. Despite the benefits of Internet use, college

students are at higher risk of developing Internet addiction affecting one's health (Tong et al., 2019). Unhealthy dietary behaviour and lifestyle were exhibited by internet addicts among university students (Kamran et al., 2018).

Online activities, such as social networking, gaming, gambling, shopping, virtual sex, and information overload, are related to Internet addiction (ElSalhy et al., 2019). The International Classification of Diseases released by the World Health Organization (WHO) in 2018 reported internet gaming disorder as a new addictive behaviour disorder that is often related to Internet addiction. Therefore, study on Internet addiction especially among adolescents and young adults has gained more attention from researchers (Gao et al., 2022).

Some internet users spend more time online and experience withdrawal symptoms when offline (Van Rooij & Prause, 2014; Lin et al., 2019). Those preoccupied with internet-related activities may neglect healthy food intake, physical activity, and family and social activities (Li et al., 2017). Obsessive thoughts on sex and social interactions are the main factors influencing internet addiction (Ding et al., 2016; Gan et al., 2019).

According to the Internet Users Survey (2018), the wireless internet hotspots kept increasing from 76.9% users in 2016 to 87.4% in 2018. The usage of smartphones as the main device to access the internet is leading with 93.1% of users. In Malaysia where internet use has increased noticeably among those aged 18 to 25, those attending college or university were found to be highly susceptible to Internet addiction (Nik Jaafar et al., 2021).

Internet addiction is defined as the dysfunctional pattern of internet use characterized by psychological dependence, compulsive behaviour, loss of control, impairment of social interactions and withdrawal symptoms especially when offline

for a longer time (Tang et al., 2014). In various countries, Internet addiction has been recognized as an important social issue especially among youths, because of the high prevalence of depression, aggressive behaviour, psychiatric symptoms, and interpersonal problems (Li et al., 2017; Baturay & Toker, 2019).

Addictive internet users reported greater impairment of hobbies, physical activity, sleep and dietary behaviour due to internet use when compared to non-addictive internet users. Lifestyle changes caused by heavy internet use might affect the growth and development of internet addicts (Bhandari et al., 2017).

1.2 Problem Statement

The prevalence of internet addiction has been increasing rapidly due to tremendous growth in the number of internet users worldwide (Usman et al., 2014). The internet has become a vital instrument for entertainment, research, and learning process in academic systems during the study period among students (Varshney et al., 2015). Excessive internet use has been particularly a common problem among students, as demonstrated in several international studies (Chong Guan et al., 2015; Neverkovich et al., 2018; Opeewe, 2019).

A research study among allied health students in Malaysia showed that the prevalence of Internet addiction was more than 80% respectively. Higher scores of anxieties, depression, and stress were associated with higher internet addiction scores (Jaafar et al., 2022). Among students from Southeast Asia, the prevalence of moderate internet addiction ranged from 7.4% to 46.4% while the prevalence of severe internet addiction ranged up to 47.4% (Balhara et al., 2018). In a study conducted by Wu et al. (2015), among 4747 college students, psychological problems, such as depression (16.3%), anxiety (15.9%), and psychopathological symptoms (17.3%) were found.

Also, poor sleep quality among them was 9.8%. High screen time and sedentary activity were significantly positively associated with the risk of psychological problems and poor sleep quality. Suicide risks and psychiatric morbidity rates may be higher among individuals with internet addiction (Bidmon & Terlutter, 2015; Wu et al., 2015; Young & de Abreu, 2017).

Internet usage among youth students in Malaysia was around 6.56 hours daily (Kutty & Sreeramareddy, 2014). Among medical students there had been a daily usage of Facebook ranging from 1 to 8 hours daily (Al-Dubai et al., 2013). Internet addiction has unfavourable outcomes such as gambling, social media misuse, and many other internet-related problems that can subsequently result in depression, suicides, and deaths (Bickham et al., 2015). Internet addiction affects the individual's academic/work performance, relationships, and health (Krishnamurthy & Chetlapalli, 2015; Baturay & Toker, 2019).

There is grave concern over Malaysian internet-addicted youths as it has various consequences. There are high chances for such youths to develop several disorders irrespective of sociodemographic factors (Nik Jaafar et al., 2021). Internet addiction was found to compromise executive functions such as planning and reasoning which increases the impulsive risk (Kurniasanti et al., 2019). Students addicted to the Internet may be destructive to themselves, their families, and their place of education (Park et al., 2017). Internet addiction is similar to substance addiction having repeated failure to reduce or quit causing impairment in daily life (Young, 2017; Kurniasanti et al., 2019). Due to the limitations of an in-depth understanding of the factors contributing to internet addiction and its consequences, to prevent excessive internet use among youths is very difficult to come up with suitable measures (Al-Samarraie et al., 2022).

Among Malaysian youths, several studies examined the prevalence, vulnerability, and risk factors of internet addiction (Alam et al., 2014; Ithnain et al., 2018; Awaluddin et al., 2019; Rosliza et al., 2020) but studies investigating the dietary intake consequences is lacking. Also, there are not enough convincing latest research studies suggesting improving the health of the students who are internet-addicted, especially their diet quality. To prevent students from becoming addicted it is recommended that more studies are done to create an effective awareness programme on responsible use of the internet.

1.3 Objectives

1.3.1 General objective

To determine the factors associated with body weight status and internet addiction among Malaysian university students in Penang.

1.3.2 Specific objectives

1.3.2(a) Quantitative study

1. To assess the demographic and socio-economic factors, internet addiction, sleep quality, physical activity, nutritional status, and diet quality among Malaysian university/college students in Penang.

2. To determine the correlation of internet addiction with demographic and socio-economic factors, sleep quality, physical activity, nutritional status, and diet quality among Malaysian university/college students in Penang.

3. To predict factors associated with internet addiction among Malaysian university/college students in Penang.

4. To predict factors associated with abnormal body weight status among Malaysian university/college students in Penang.

1.3.2(b) Qualitative study

1. To identify factors contributing to internet usage among Malaysian university students in Penang.

2. To explore the perception on potential effects of internet addiction among Malaysian university students in Penang.

1.4 Justification of the Study

Studies among university students have shown associations between internet addiction, socio-demographic factors, sleep quality, academic performance, self-control, parental bonding, relationship problems, changes in attitude, and health problems (Krishnamurthy & Chetlapalli, 2015; Baturay & Toker, 2019). However, information on the effects of internet addiction on diet quality is limited. Also, there is little data on actual addiction rates and the positive or negative impacts of internet use among Malaysian students. Among university students in other countries, there is indeed a considerable amount of empirical evidence for internet addiction (Yang et al., 2014; Krishnamurthy & Chetlapalli, 2015; Wu et al., 2015; Bhandari et al., 2017; Baturay & Toker, 2019) but similar researches (Balakrishnan & Shamim, 2013; Chong Guan et al., 2015) conducted in Malaysia do not provide enough data related to internet addiction due to various reasons such as it doesn't include all the areas of the life of youth students that could be affected by internet addiction; it may study only a particular group of students for example., medical students; it may focus on only one particular social site such as Facebook; and or study one aspect of the effects of internet

addiction like mental health; researches were not conducted throughout Malaysia but in very few states only.

A study showed that more than 80% of Malaysian students may be considered as addicted to the Internet (Jaafar et al., 2022). As Internet addiction increases among university students especially after the emergence of the COVID-19 pandemic, its negative consequences also increase, very badly affecting their well-being (Ting et al., 2021; Mamun et al., 2022; Onukwuli et al., 2023). The consequences not only include psychological problems, unhealthy eating habits, lack of sleep, getting into other forms of addiction such as smoking or alcohol use, and the worst it may even lead to suicidal attempts but, also lead to poor academic achievements and cognitive impairment (Salubi & Muchaonyerwa, 2018). Moreover, Internet addiction can cause physical problems such as musculoskeletal problems, hearing issues, ophthalmic, and even thromboembolism (Lee & Wan Muda, 2019).

Previous studies have shown an increase in physical inactivity throughout the university years (Aira et al., 2021; Corder et al., 2019). Due to internet addiction, university students from various countries have been found to have sedentary behaviour, leading to poor health and well-being due to non-communicable diseases (A. R. Memon et al., 2021). Moreover, the COVID-19 pandemic has caused students to be confined to their homes as a precautionary measure to prevent the spread of the coronavirus. Such changes have altered individuals' lifestyles by reducing physical activity levels owing to increased internet use (López-Valenciano et al., 2021). The physical activity of university students should be further explored consequently.

As there is a need for research studies among students from various demographic backgrounds in Malaysia, the associations between internet addiction levels and socio-demographic factors, lifestyle, nutritional status, and diet quality were

investigated in this study. This study aimed to show whether high-risk internet users have poor diet quality. Also, the risk factors that can contribute to Internet addiction had been explored. These findings will be useful in the future to treat the problem of Internet addiction.

Hence this study was proposed to investigate the factors associated with body weight status and internet addiction among Malaysian university students. This study will contribute to unveiling the opportunities and suitable situations to improve the care offered for those who are internet addicted. There is a potential leading to the development of distinct pathways of evidence-based interventions that could be done either individually or focused on the general population in groups through public health campaigns. University/ college authorities in Malaysia need to be aware of the prevalence of excessive internet use so that interventions can be developed to prevent adverse outcomes by creating awareness of the negative effects of internet addiction and promoting an active lifestyle, healthy dietary behaviour, and restricting students from accessing harmful websites.

1.5 Conceptual Framework

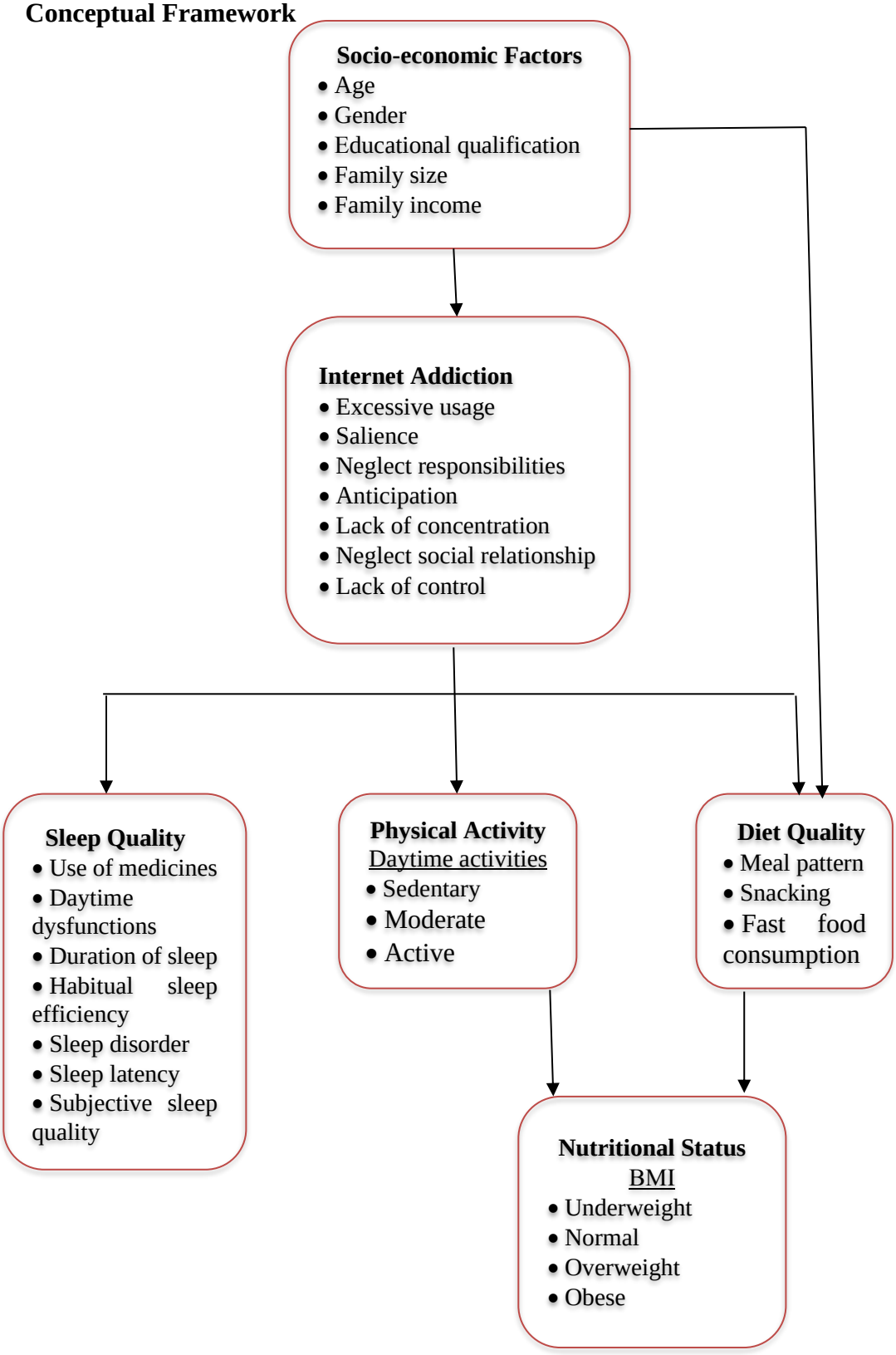

Figure 1.1 Conceptual model of relationship between Internet addiction, sleep quality, physical activity, nutritional status, and diet quality (adapted and modified from Tabatabaee et al., 2018).

Internet addiction has been an ongoing topic of debate for health experts. Researchers have found the contributing factors of Internet addiction among youths, including parental (Awaluddin et al., 2019), sociodemographic (Arya et al., 2018), psychosocial (Fumero et al., 2018), and lifestyle factors (Bener et al., 2016). Also, studies revealed that Internet addiction has adverse effects on dietary behaviour (i.e., frequent meal skipping, increased meal portion size, excessive snacking, carbonated soft drinks, and fast-food consumption) and lifestyle characteristics (i.e., physically inactive, sleep deprivation, and high use of alcohol and tobacco) among university students (Bener et al., 2016; Kamran et al., 2018), which affects the health of the young population.

According to Hassan et al. (2020), internet addiction was significantly higher among respondents whose physical activity was less. While using modern gadgets, inappropriate and irregular dietary behaviour was common due to loss of appetite, frequent meal skipping, and excessive snacking that led to weight-related problems and diseases. Being overweight and obese are more strongly associated with screen time than physical inactivity (Bakour et al., 2022).

All people need to be nourished in an adequate and balanced way to be physically, mentally, and socially healthy and productive. Obesity resulting from unbalanced nutrition is a pathological condition characterized by the storage of the energy received more than required for optimal body functioning causing other health-related problems (Chakraborty et al., 2009; Ying Ying et al., 2020).

In recent years obesity has increased due to the consumption of high-calorie food and the adoption of a sedentary lifestyle. Several studies highlighted the presence of a significant correlation between weight gain and inadequate physical activity (Górnicka et al., 2020; Gómez et al., 2020). Physical inactivity leads to spending less

energy than required and it is considered as a cause of being overweight. Moreover, weight gain also forms a vicious cycle resulting in inadequate physical activity (Ercan et al., 2021).

Sleeping is the best way to give rest to the human body. After waking up from good sleep, individuals feel very active and ready to begin a new day. Sleep quality can be affected by the individual's lifestyle, environment, nature of work, social relationships, economic status, health status, and stress (Karimy et al., 2020). Poor sleep quality can interrupt the continuation of normal life and lead to other problems. Physically active students tend to stay away from gadgets that use the internet and are inclined towards more healthy activities. Also, they tend to sleep early because of physical tiredness, so chances of internet usage till late at night are rare among these students. On the other hand, students who do not participate in physical activities are lazy and tend to remain awake late hours during night-time (Spengler et al., 2015). Studies have shown that internet addiction among young people affects sleep quality negatively (Zachariae et al., 2016; Saquib, 2020). After a long period of sleeplessness, a wide range of cognitive problems and anger temperament may arise. Individuals who suffer from insomnia have difficulty in perception and memory, difficulty in learning, and decreased risk perception. Moreover, insomnia can increase the risk of cardiovascular diseases, diabetes, and cancer, thus contributing to mortality (Peltzer & Pengpid, 2015).

1.6 Research Question

1. What is the prevalence of internet addiction among Malaysian university/ college students in Penang?

2. Do demographic and socio-economic factors, internet addiction, sleep quality, physical activity, and diet quality contribute to the body mass index of Malaysian university/ college students in Penang?

1.7 Research Hypothesis

1. There is a significant contribution of demographic and socio-economic factors toward internet addiction among Malaysian university/ college students in Penang.

2. There is a significant contribution of demographic and socio-economic factors, internet addiction, sleep quality, physical activity, and diet quality toward body mass index of Malaysian university/ college students in Penang.

1.8 Operational and Conceptual Definition

1.8.1 Internet addiction

Internet addiction is the dysfunctional pattern of internet use characterized by psychological dependence, compulsive behaviour, loss of control, impairment of social interactions and withdrawal symptoms, especially when going offline for a longer time. This addictive behaviour influences many aspects of a person's life, including academic/ work performance, family/ social relationships, and physical and mental health (Krishnamurthy & Chetlapalli, 2015; Baturay & Toker, 2019).

In this research, Young's IAT questionnaire was used to assess internet addiction. On the 5-degree Likert-type scale using responses to the degree of involvement in online activities, the addictive behaviour is categorized into lack of addiction (0 to 19 IAT scores), mild signs of addiction (20 to 49 IAT scores), moderate signs of addiction (50 to 79 IAT scores), and severe addictive behaviour (80 to 100 IAT scores).

1.8.2 Lifestyle

Lifestyle is defined as the interests, opinions, habits and behavioural orientations of an individual, group, or culture. The behaviours that are adaptable and the ways of life are the lifestyle factors that influence the health and well-being of an individual. To have a healthy long life, it's very important to have proper lifestyle behaviours such as being physically active, getting enough sleep, eating a healthy diet, maintaining a healthy body weight, avoiding risky habits like smoking or consuming alcohol, and managing good mental health (Chamika & Shavindra, 2018).

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1.8.3 Physical activity

World Health Organization (2020) defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure. Physical activity refers to all kinds of movement such as those during leisure time, for transport to get to and from places, or those involved as part of a person's work.

In daily life, physical activities can be divided into household, occupational, sports, conditioning, and other activities during leisure (Miles, 2007). In this current study, the three modes of physical activity of Malaysian youth students include occupational household activity, traveling activity, and leisure time activity measured by the Global Physical Activity Questionnaire (GPAQ) comprising 16 questions of different behavioural domains. GPAQ had been used to calculate a person's overall energy expenditure by applying MET values according to different domains of physical activity. Based on the GPAQ Analysis Guide subjects are categorized into inactive (600 MET-minutes per week), moderately active (600 to 3000 MET-minutes per week), and highly active (>3000 MET-minutes per week).

1.8.4 Skipping breakfast

Breakfast is any food or beverage eaten in the morning after waking up between 5:00 am and 11:00 am and Breakfast skipping is defined as not eating breakfast one day or more per week (Kahleova et al., 2017).

1.8.5 Nutritional status

The nutritional status of an individual is defined as the balance between the nutritional intake received and the nutritional demands due to the expenditure for the utilization of nutrients to maintain reserves and compensate for losses (Fernández-Lázaro & Seco-Calvo, 2023).

To obtain a good quality life adequate nutrition is necessary. Anthropometric, biochemical, clinical and dietary Assessment are done to accurately determine the nutritional status of an individual. In this study, Anthropometric measurements such as height and weight to determine the body mass index and food frequency questionnaire for dietary assessment has been used. Dietary intake measurement is not a direct measure of the amounts of energy and nutrients available for metabolism. but the 24hours dietary recall and the food frequency provide the best way of describing the actual food intake of an individual

1.8.6 Diet quality

Diet quality refers to both the quantity and quality of a balanced, diversified, and healthy diet, which provides energy and all the essential nutrients required for growth and healthy active life. Diet quality can be attained by the consumption of a variety of foods belonging to different food groups to meet a person's nutrient needs.

The overall diet quality of Malaysian youth students had been measured by ‘The Healthy Eating Index’ which is based on both nutrients and food groups on the degree of compliance to dietary recommendations in the Malaysian Dietary

Guidelines. The HEI scores range from 0 to 100%, in which less than 51% indicates a poor diet, 51 to 80% indicates a diet requiring improvement, and more than 80% indicates a good diet (Lee et al., 2011).

1.8.7 Sleep quality

Sleep quality is the measurement of an individual's satisfaction with sleep experience, sleep quantity, integrating aspects of sleep initiation, sleep maintenance, and refreshment upon awakening. It is basically to find out whether the sleep of Malaysian youth students was restful and restorative.

Sleep Quality was assessed by the Pittsburgh Sleep Quality Index (PSQI) which is an effective instrument used to measure the quality and patterns of sleep among Malaysian youths. It differentiates "poor" from "good" sleep quality by measuring seven areas (components) such as subjective sleep quality, sleep latency, habitual sleep efficiency, sleep duration, sleep disturbances, use of sleeping medications as well as daytime dysfunction over the last month of the assessing period. A total score of "5" or greater indicates poor sleep quality.

CHAPTER 2

REVIEW OF LITERATURE

The internet has become the most important tool for social interaction, information seeking, and enjoying entertainment. As the Internet entered homes, schools, internet cafes, and businesses, Internet addiction has been rapidly increasing (Bharali & Khattar, 2019). During the COVID-19 pandemic, as society embraced the technology and digital transition more readily, the trends of Internet use and change in user behaviours too accelerated. (Fernandes et al., 2020; Internet Users Survey, 2020; Shehata & Abdeldaim, 2021). The Internet has become a vital instrument for entertainment, research, and the learning process in the academic system during the study period among students (Varshney et al., 2015). However, as it developed gradually, like any other tool or technology, its misuse also became inevitable.

2.1 Internet Addiction

Internet addiction is characterized by poor control of internet use which leads to impulse-control disorders (Mengistu et al., 2021). A typical addiction may include loss of control or strong dependence on substances or behaviour, and a desire to continue the activity with a tendency to increase the amount of the activity or the frequency over time despite negative consequences (Kardefelt-Winther et al., 2017; Munno et al., 2017; Xin et al., 2018; Fegert et al., 2020; Nik Jaafar et al., 2021).

Of all the potential behavioural addictions, internet addiction is more prevalent among students (Lemola et al., 2015; Ding et al., 2016; Lim & Nam, 2017; Rosliza et al., 2020). Internet addiction includes a wide range of problematic online behaviour such as social networking, gaming, gambling, and virtual sex and is characterized by extreme preoccupation with connecting to the Internet, with poor control of online

activities affecting personal well-being and quality of life (Carbonell & Panova, 2017; Monacis et al., 2017; Błachnio & Przepiórka, 2018; Fegert et al., 2020).

It remains a controversial matter for the classification of Internet addiction as a behavioural disorder. It has been described as an individual's compulsive and addictive use of the Internet, which reduces academic and job performances, sleep, and personal hygiene, and also strains interpersonal social relationships (Lai et al., 2015; Wu et al., 2015; Lyvers et al., 2016; Sahraian et al., 2016; Young, 2017).

2.1.1 Patterns in Internet Addiction

2.1.1(a) Online time/ Duration of internet use

The number of hours spent on Internet usage significantly influences Internet addiction (Király et al., 2020). Generally, about 37.5% of students are found to spend three or more hours per day doing leisure activities, such as watching TV, playing computer games, or talking over the telephone during a typical day (Kuss et al., 2014). According to a report, internet users aged 16 to 64 years from the Philippines spent an average of over four hours a day on social media, and Malaysia with three hours and 19 minutes a day (Louella Desiderio, 2017).

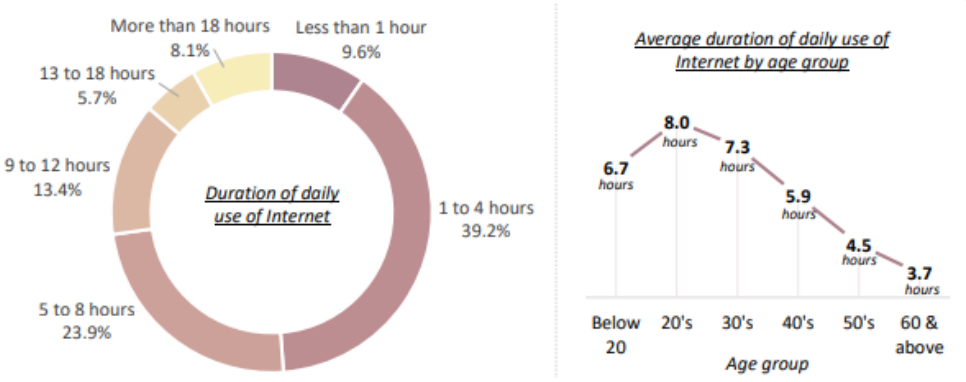

Figure 2.1 Percentage distribution for duration of daily use of Internet and average duration of daily use of Internet by age group (Internet Users Survey, 2018)

Many Internet users spent 5 to 8 hours daily (28.6%), followed by Internet users who spent 1 to 4 hours daily (24.9%). Moreover, 11.5% of internet users daily spent more than three-quarters of their time staying connected to the Internet. Mostly they were using the Internet for social purposes like communicating through texting, voice, or video and visiting social networking sites. In a day, 50% of Internet users spent 5 to 12 hours on the Internet which is an increase of 13% from 37% observed in 2018. The massive increase in the hours spent on the Internet is probably due to the following reasons. Firstly, the MCO has contributed to extended internet use as the users rely on the internet more to acquire information, study/ work from home, communicate with each other, and for entertainment. Secondly, since 2018 as the broadband and data tariff has reduced considerably more users can access the Internet for a longer time (Internet Users Survey, 2020).

Past studies (Krishnamurthy & Chetlapalli, 2015; Bhandari et al., 2017; Baturay & Toker, 2019) have found that university students in Malaysia spent a considerable amount of time online and they also used the Internet frequently. K. S. Young, 1998b found that Internet non-addicts spent an average of five hours per week, whereas addicts spent 39 hours online. Similarly, another report showed that, on average, internet addicts spent 25 hours per week online comparatively more than the non-addicts who spent about nine hours. College students were found to be spending at least two hours a day for education purposes (Ozturk et al., 2019).

2.1.1(b) Place of Internet access

According to the Malaysia Internet Users Survey (2020) for 70.5%, of the users, the most frequent place to go online was their own home. Next is the use of the Internet via on-the-go (64.4%). At another person's home, the usage of the Internet is only 1.3%. Not many Internet users had easy access to the Internet through free Wi-Fi

anywhere in 2020 as compared to the previous years (2020: 6.0%; 2018: 36.3%; 2016: 55.9%). This is partly due to mobile broadband's innovative and competitive packages. Such offers given by service providers made the users prefer their own mobile Internet data plan rather than depending on free Wi-Fi available elsewhere.

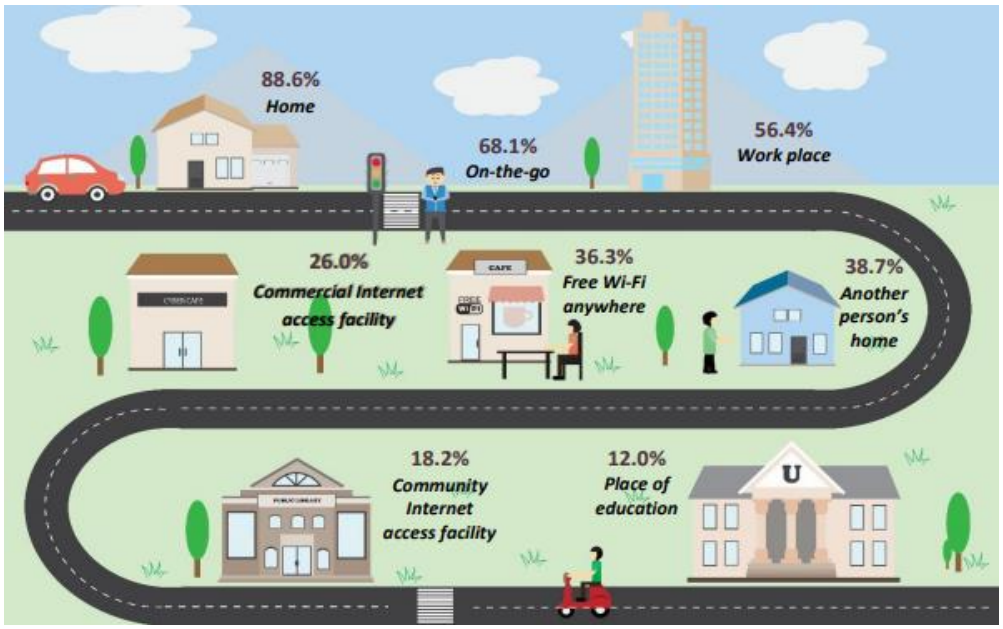

Figure 2.2 Places of internet access (Internet Users Survey, 2018)

The percentage of users visiting community Internet accessing facilities and public libraries dropped to 4.2%, from 19.6% in 2016. Commercial Internet access facilities were used by 2.0% of the users. Compared to 30.0% in 2016 there was a decline in access from such facilities that collect a fee to access the Internet from its patrons, thus attributed to Internet users' preference for mobile Internet devices such as smartphones and laptops.

2.1.1(c) Internet activities

Internet addicts used two-way communication functions such as chat predominately whereas non-addicts preferred search functions (Young, 1998b; Xin et

al., 2018). Social networking especially Facebooking was the most common internet activity among Malaysian graduate students, whereas online shopping was the least preferred activity (Teong & Ang, 2016). Internet Users Survey, (2020) showed that among Internet users, communication by text was popular. It was found that social networking is the second most frequent online activity that increased from 85.6% in 2018 to 93.3% in 2020.

Nowadays, Internet users in Malaysia are streaming video content on Over-The-Top (OTT) platforms such as Netflix. The growth of video streaming consumption is attributed to consumers' preference to be in control of what they want to watch anytime from anywhere. Various online shopping platforms as well as e-wallets have brought convenience to Internet users. Online shoppers have increased from 53.3% in 2018 to 64.2 % in 2020. Similarly, those who conduct online money transactions have increased from 54.2% in 2018 to 63.8%in 2020. The number of Internet users who watch or download videos online is 87.3%, an increment from 77.6% in 2018. Also, 65.0% of Internet users listened to online and/or downloaded music (Internet Users Survey, 2020).

Internet users were found to have an interest in reading online publications (Department of Statistics Malaysia, 2019) namely e-books, online newspapers, online magazines, or journals. The percentage of Internet users reading online publications has risen from 56.3% in 2018 to 68.3% in 2020. Besides information seeking, socializing, and entertaining, the Internet has also facilitated our way of participating in economic activities, especially with the development of services related to online banking and shopping. In Malaysia, this has shown positive trends in the growth of the digital economy. Internet users playing online games also increased from 35.2% in 2018 to 42.8% in 2020 (Internet Users Survey, 2020).

Table 2.1 Percentage of various purposes of internet users (Internet Users Survey, 2020)

PURPOSE	**%**
Communication by text	98.1
Social media/ Online community	93.3
Watch streaming/ online TV	87.3
Communication by voice/ video	81.1
To get information	74.3
Online reading/ Education	68.3
Financial activities	63.8
Online shopping	64.7
Music	65.4
Work related	45.0
Government services	41.4
Online games	42.8
Maintain blogs/ homepages	32.3
Cloud storage	37.1
Online job application	25.7
Education	29.7
Selling goods/ services	12.0

In Malaysia, Soh et al., (2013) found that comparatively males used the internet more than females in duration and frequency, and males are more likely to be internet addicts. Females seem to be more motivated by social–interaction, surveillance/ information use, and shopping while males are more motivated by eroticism having a higher tendency to become internet addicts. These findings are largely consistent with previous studies in Western countries (e.g., Joiner et al., 2012). However, in Malaysia, both males and females are found to be equally motivated to use the Internet for entertainment. The activities of males and females have been found to differ when using the Internet (Kuss et al., 2014). Internet cafes mostly provide rapid Internet connections necessary for a variety of online games. Internet cafes seem to be considered primarily as male gaming places and thus were highly gender-specific (Kapahi et al., 2013).

2.1.2 Types of Internet Addiction

Internet addiction can be a serious disorder, a condition that varies from compulsive internet use, problematic internet use, internet dependency, and virtual addiction, to Internet Addiction Disorder (IAD) (Kuss et al., 2014; Salicetia, 2015). Recently, the American Psychiatric Association has included “Internet Gaming Disorder - IGD” in the appendix of the new DSM-5 for it is a condition that requires further research. In the future, it might be considered a mental disorder (James Sherer, 2023).

According to Young, (1998a) Internet addiction includes these five specific types of namely Cyber sexual addiction, Cyber-relationship addiction, Net compulsions, Information overload, and Computer addiction. Cyber-sexual addiction is the compulsive use of websites with adult content for cybersex and cyberporn, joining chat rooms, or watching fantasy role-play sites that have affected intimate real-life relationships This type of Internet addiction often involves webcams with XXX ratings. It becomes a problem when these kinds of activities interfere with sexual or romantic relationships in the real world. Cyber-relationship addiction is the over-involvement in online relationships through social networking, chat rooms, and messaging to the point where virtual friends are prioritized over real-life relationships such as family and friends. In this type of Internet addiction, the online relationships formed may not have to be sexual but destructive due to the worst consequences in life. Net compulsions are obsessive gambling, shopping or stock trading, and auction sites such as eBay that people mostly find hard to resist. Information overload is the constant web surfing or database searches seeking information frequently causing informational overload. Computer addiction is obsessive computer game playing. Treatment for such compulsive behaviour is needed.

Those using the computer excessively for even offline activities such as games may suffer from obsession-compulsion. This disorder needs to be accurately diagnosed to get resolved. Problematic Internet use was characterized by risky cyber behaviours (Matos et al., 2016; Paiva et al., 2016; Prasad et al., 2017; Neverkovich et al., 2018). However, Griffiths (2012) has argued that many of these addictive behaviours are just excessive Internet use as a medium to trigger other addictions and not Internet addiction.

2.1.3 Pre-disposing Risk Factors of Internet Addiction

Students' overindulgence on the internet can occasionally be problematic when internet addiction symptoms such as excessive online time, heavy preoccupation with the internet, compulsive behaviour, and time management issues are shown (Ying Ying et al., 2021). The adverse consequences of Internet addiction include social behaviour problems and interpersonal distress in relationships during daily-life activities (Wong et al., 2015; Liu et al., 2017; Turnbull et al., 2018). Hence, Internet addiction is a growing public health issue with various multiple predisposing risk factors that need special attention to keep the students' well-being at the desirable level.

Coping is the first mediator dimension which represents substance abuse, denial, and behavioural disengagement, and Internet use expectancies are the second mediator dimension which represents positive expectancies and avoidance expectancies (Brand, Laier, et al., 2014). Based on previous research, it is found that a person's main characteristics associated with Internet addiction include personality aspects, psychopathological aspects, and social cognition. They are described in detail below: -

a. Personal factors

b. Psychopathological symptoms

c. Social cognitions

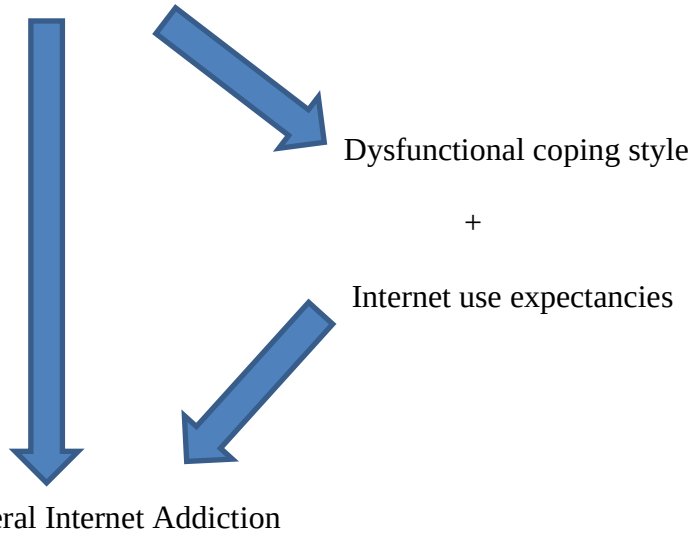

Figure 2.3 Pre-disposing factors/ Risk factors of Internet addiction (Brand, Young, et al., 2014)

Individuals with dysfunctional coping to deal with problems in their lives and those having expectancies that the Internet can be used either to reduce the negative mood or increase the positive mood, most probably develop into General Internet Addiction (GIA). Symptoms of depression and social anxiety may increase the risk of dysfunctional coping strategies and internet expectancies. Treatment of GIA is limited according to many studies but, Winkler et al., (2013) argue that cognitive-behavioural therapy is the best method based on the analysis of treatment effects on time spent online, depression, and anxiety symptoms.

2.1.3(a) Personal factors

2.1.1(a)(i) Gender

Gender is a significant factor influencing internet addiction (Yates et al., 2012; Adiele & Olatokun, 2014). Akhter, (2013) revealed that male students have higher