Internet Addiction and Health Problems through Smartphone among International Students in a University in Bangkok Thailand: Online Questionnaire

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A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Public Health Program in Public Health
College of Public Health Sciences
Chulalongkorn University
Academic Year 2017

การติดอินเตอร์เน็ตจากการใช้สมาร์ทโฟนและปัญหาสุขภาพ โดยใช้แบบสอบถามออนไลน์ในนิสิตหลักสูตรนานาชาติในมหาวิทยาลัยแห่งหนึ่งในกรุงเทพมหานคร ประเทศไทย

นางสาวสุพัตรา พรหมศิริ

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต
สาขาวิชาสาธารณสุขศาสตร์
วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2560

Thesis Title	Internet Addiction and Health Problems through Smartphone among International Students in a University in Bangkok Thailand: Online Questionnaire
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Field of Study	Public Health
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สุพัตรา พรหมศิริ : การติดอินเตอร์เน็ตจากการใช้สมาร์ทโฟนและปัญหาสุขภาพ โดยใช้แบบสอบถามออนไลน์ในนิสิตหลักสูตรนานาชาติในมหาวิทยาลัยแห่งหนึ่งในกรุงเทพมหานคร ประเทศไทย (Internet Addiction and Health Problems through Smartphone among International Students in a University in Bangkok Thailand: Online Questionnaire) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ดร.จิตรลดา อารีย์สันติชัย, 151 หน้า.

การใช้อินเตอร์เน็ตผ่านสมาร์ทโฟนมีแนวโน้มเพิ่มสูงขึ้นโดยเฉพาะอย่างยิ่งในกลุ่ม Gen-Y ซึ่งก่อให้เกิดปัญหาสุขภาพในสังคมปัจจุบัน หากแต่ยังขาดการศึกษาเกี่ยวกับการติดอินเตอร์เน็ตจากสมาร์ทโฟนในกรุงเทพ มหานคร การวิจัยครั้งนี้เป็นการศึกษาแบบตัดขวาง มีวัตถุประสงค์เพื่อประเมินระดับการติดอินเตอร์เน็ต ปัญหาสุขภาพที่เกี่ยวข้องกับการใช้อินเตอร์เน็ต และความสัมพันธ์ระหว่างระดับการติดอินเตอร์เน็ตกับปัญหาสุขภาพที่เกิดจากการใช้อินเตอร์เน็ตของนิสิตหลักสูตรนานาชาติในมหาวิทยาลัยแห่งหนึ่งในเขตกรุงเทพมหานคร การศึกษานี้ใช้แบบสอบถามตอบเองโดยผ่านทางออนไลน์เกี่ยวกับรูปแบบการใช้อินเตอร์เน็ต ระดับการติดอินเตอร์เน็ต และปัญหาสุขภาพจากการใช้อินเตอร์เน็ต โดยแบบสอบถามได้ผ่านการตรวจสอบค่าความเที่ยงตรงและค่าความเชื่อมั่นจากผู้เชี่ยวชาญ แบบสอบถามมาตรฐานของ Young ได้ผ่านการทดสอบความเที่ยงตรงของเครื่องมือ (Cronbach's alpha = 0.89) การวิเคราะห์ข้อมูลใช้สถิติเชิงพรรณนา ไคสแควร์ (Chi-square) และ Fisher's exact ผลการศึกษาในภาพรวมพบว่า กลุ่มตัวอย่างทั้งหมดจำนวน 351 คน อายุเฉลี่ย คือ 26.8±7.1 ติดอินเตอร์เน็ตในระดับไม่รุนแรงมากที่สุด ร้อยละ 44 รองลงมาคือระดับปานกลาง ร้อยละ 34 และระดับรุนแรงน้อยที่สุด ร้อยละ 3 ด้านปัญหาสุขภาพพบว่า มีอาการปวดตามากที่สุด ร้อยละ 73 มากกว่า 1ใน 3 ของกลุ่มตัวอย่าง รายงานว่า ปวดศีรษะ (ร้อยละ 41) นอนหลับไม่เพียงพอ (ร้อยละ 55) และมีอาการหดเกร็งที่มือ/ข้อศอก/แขน (ร้อยละ 40) นอกจากนี้ยังพบว่า เกิดอุบัติเหตุขึ้น ร้อยละ 21 ด้านความสัมพันธ์ระหว่างระดับการติดอินเตอร์เน็ตกับปัญหาสุขภาพ พบระดับการติดอินเตอร์เน็ตมีความสัมพันธ์กับอาการปวดตา การนอนหลับไม่เพียงพอ และอาการหดเกร็งที่มือ/ข้อศอก/แขนอย่างมีนัยสำคัญทางสถิติ กล่าวโดยสรุป การติดอินเตอร์เน็ตนั้นมีความสัมพันธ์กับปัญหาสุขภาพ ผลจากการศึกษานี้เป็นหลักฐานเบื้องต้นเกี่ยวกับการติดอินเตอร์เน็ตและปัญหาสุขภาพ ซึ่งสามารถนำไปใช้ในการวางแผนยุทธศาสตร์ด้านการป้องกัน และแก้ไข รวมทั้งการจัดทำนโยบายต่อไป

สาขาวิชา สาธารณสุขศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2560 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

5978815353 : MAJOR PUBLIC HEALTH
KEYWORDS: ADDICTION / HEALTH PROBLEMS / INTERNATIONAL STUDENTS / INTERNET / ONLINE QUESTIONNAIRE / SMARTPHONES

SUPATTRA PHROMSIRI: Internet Addiction and Health Problems through Smartphone among International Students in a University in Bangkok Thailand: Online Questionnaire. ADVISOR: ASSOC. PROF. CHITLADA AREESANTICHAI, Ph.D., 151 pp.

The increase in Internet use through smartphones, particularly among the generation Y group, has brought about several health challenges in today's society. Few studies have investigated the issue of Internet addiction (IA) through the smartphone in Bangkok to date. This cross-sectional study aimed to assess IA level and to determine Internet-related health problems among international program students in a university in Bangkok. Further, this study sought to determine the association between level of smartphone IA and health problems. Data regarding the pattern of Internet use, IA level, and related health problems were collected via a self-administered online questionnaire. Validity and reliability of the instrument were evaluated and deemed acceptable for research prior to use. Young's Internet Addiction Test (IAT), a standardized instrument, was used to measure the IA level (Cronbach's alpha = 0.89). Data were analyzed using descriptive statistics, Chi-square, and Fisher's exact test. Of the 351 participants (mean age 26.8 years, SD ± 7.1), 44% were in the level of mild IA, 34% in the moderate level, and 3% severe level. Overall, eye strain was most reported by the participants (73%). More than one-third of all participants said having had experienced headaches (41%), inadequate sleep (55%), and cramped hand/wrist/arm (40%); accidents were the least reported (21%). IA level was significantly associated with the occurrence of eye strain, inadequate sleep, and hand/wrist/arm cramping. The evidence based of this study regarding Internet addiction and health problems may point to strategic plan of prevention and intervention for implementing policy in the future.

Field of Study: Public Health Student's Signature .....

Academic Year: 2017 Advisor's Signature .....

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to everyone who has supported me throughout my journey. Special thanks goes out to my admirable advisor, Associate Professor Chitlada Areesantichai, Ph.D., for her careful guidance and insightful critiques. I know I have the tendency to lose my way, but thankfully she was always there to put me back on track. I would like to thank Assistant Professor Usaneya Perngparn, Ph.D., for helping me to see the light at the end of the tunnel. If not for her, I would not have made it this far. I would also like to acknowledge Associate Professor Ratana Somrongthong, Ph.D. (chairman), and Assistant Professor Woraphat Ratta-apha, Ph.D. (external examiner) for taking the time out of their busy schedule to evaluate my thesis. My gratitude extends to my family and friends on both sides of the Pacific Ocean. Thank you, mom and dad, for giving me the strength and courage, the continuous love, hope, and reassurance I needed to get to where I am now. The two of you have done so much for me, and I do not know if I will be able to pay back in this lifetime. I would like to thank my wonderful, kind, and compassionate friends for distracting me from loneliness. We have stuck together through the thick and thin, supported each other when times got tough, and somehow managed to pull through. Our time spent together has been quite memorable; it will most certainly carry with me forever and always. Also, I would like to thank all of the academic staffs for their impressive dedication and attention to the students. I am very grateful to be a part of the CPHS community. Finally, my profound appreciation goes out to all of the students who took part in my study. This research would not have been possible without their participation.

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LIST OF ABBREVIATIONS

ASAM	American Society of Addiction Medicine
CBT	Cognitive Behavior Therapy
CT	Cognitive Therapy
DES	Digital Eye Strain
DSM-5	Diagnostic Statistical Manual – Fifth Edition
ETDA	Electronic Transaction Development Agency
IA	Internet Addiction
IAD	Internet Addiction Disorder
IAT	Internet Addiction Test
IOC	Item-objective congruence
IRPS	Internet-Related Problem Scale
PIU	Problematic Internet Use
SAS	Smartphone Addiction Scale
SAS-SV	Smartphone Addiction Scale – Short Version
SD	Standard Deviation
SNS	Social Networking Sites
SPAI	Smartphone Addiction Inventory
SPAI-SF	Smartphone Addiction Inventory – Short Form
WHO	World Health Organization

CHAPTER I
INTRODUCTION

Background and Rationale

There were approximately 3.6 billion Internet users worldwide in 2016. Asia particularly accounted for more than half (50.2%) of the users according to Miniwatts Marketing Group. For Europe and North America, the number falls at around 17% and 9% respectively ("Internet World Stats Usage and Population Statistics," 2017).

Moreover, 60% of the Thai population uses the Internet ("Internet World Stats Usage and Population Statistics," 2017). In terms of Internet usage behavior in Thailand, the average time people spent browsing the web was 6.4 hours a day (Electronic Transactions Development Agency, 2016). To put it in perspective, people are spending a quarter of a day on it. The study by the Electronic Transactions Development Agency (ETDA) found that heaviest user groups were Generation Y (those born in the 1980s and 1990s) and the transgender group (Electronic Transactions Development Agency, 2016).

The incredible acceleration in Internet use has brought about several challenges to health—one of which relating to Internet addiction (IA). IA is an issue worldwide. A meta-analysis, conducted by Cecelia Cheng and Angel Yee-lam Li in 2014, examined data from 31 nations from seven regions of the world (North America, Oceania, Northwest Europe, Southeast Europe, Middle East, Asia, and South America) regarding the prevalence of IA. The estimated global IA prevalence rate in 2014 was found to be 6% (Cheng & Li, 2014). In Asia, the prevalence rate was 7% (Cheng & Li, 2014). In Thailand, the prevalence was 24% (Boonvisudhi & Kuladee, 2017).

Internet addiction disorder (IAD), also known as problematic Internet use (PIU), is considered a type of behavioral addiction—characterized by tolerance, withdrawal, and excessive use regardless of negative consequences. Those with IAD have “excessive or poorly controlled preoccupations, urges, or behaviors regarding Internet use that lead to impairment or distress” (Weinstein, Curtiss Feder, Rosenberg, & Dannon, 2014). There are at least three subtypes of IAD. These subtypes include excessive gaming-gambling, socializing or social networking (this includes messaging and e-mailing), and sexual preoccupations (cybersex) (Weinstein et al., 2014). People who are Internet addicts isolate themselves from those around them and social contact when they use the Internet for extensive periods. The need to escape from reality and oneself are often used to explain the occurrence of IAD. Other factors that contribute to IAD include stress, one’s desire to expand social networks, social anxiety, poor control, and ability to cope with challenging situations.

Smartphones have made accessing the Internet quicker and easier; it can be done by nearly anyone at almost any location. For this reason, smartphones are the most popular device for accessing the Internet. Eighty six percent of Internet users primarily use a smartphone to access the web, while 62% access it through desktop computers. In Thailand, it was found that people are using the Internet through smartphones, on average, 6.2 hours a day (Electronic Transactions Development Agency, 2016).

Research have shown that excessive smartphone use is related to various health hazards, some of which include musculoskeletal disorders of the hand, wrist, and neck (Inal, DemIrc, CetInturk, Akgonul, & Savas, 2015), issues with the eye (J. Kim et al., 2016), and poor physical fitness (S. E. Kim, Kim, & Jee, 2015; Lepp, Barkley, Sanders, Rebold, & Gates, 2013). Additionally, problematic smartphone use has been linked to elevated risk of psychopathologies, for instance, attention deficit (Zheng et al., 2014), aggression, and sleep disturbance (Demirci, Akgonul, & Akpinar, 2015). Smartphone use, moreover, negatively affects academic performance as well (Samaha & Hawi, 2016). People everywhere around the world are too unaware of their surroundings, stuck in this digital realm and small screens. It becomes not only a hazard but also a liability and responsibility for them and the people around them. Problematic use of the Internet and smartphone imposes an issue to ones' health and the health of the public. Research in this area is therefore becoming more and more essential. This study explored the existence of IA, focused specifically through the smartphone, and the potential problems, relating to health that could result from its use.

Few studies on IA have been conducted among international program students in Bangkok, Thailand to date. The first aim of this study was to assess IA level among students. The second aim was to determine health problems related to Internet use through the smartphone via self-administered online questionnaire. This research concentrates on undergraduate and graduate students since they consist of mainly Generation Y individuals. The assumption goes that international program students have international relations, therefore, are engaging in more online activities. For that, they were chosen to be the target population. The third aim was to determine if there is an association between smartphone IA level and health problems. The findings from this study may be applied in future research. Further, this is an evidence-based research; findings can be used in intervention design.

Research Questions

1. What is the prevalence of IA among international students at a university in Bangkok, Thailand?
2. What health problems are related to smartphone Internet use?
3. Is there an association between level of smartphone IA and health problems?
4. What is the difference in Internet usage pattern, IA level, and Internet-related health problems between gender groups?
5. What is the difference in Internet usage pattern, IA level, and Internet-related health problems between age groups?

Research Objectives

1. To assess IA level among international students at a university in Bangkok, Thailand
2. To determine health problems related to Internet use
3. To determine the association between level of smartphone IA and health problems
4. To compare Internet usage pattern, IA level, and Internet-related health problems between gender groups
5. To compare Internet usage pattern, IA level, Internet-related health problems between age groups

Operational Definitions

Accidents – any accidents involving smartphone and Internet use (it could be as minor as tripping and falling or as major as a motor vehicle accident)

Average GPA – accumulated grade point average up to present (GPAX)

Cramped hand/wrist/arm – the presence of tired muscle, cramps, or soreness at the hand, wrist, or arm during Internet use or immediately following use

Eye strain – eyes feel fatigued or tired during or immediately following Internet use

Headache – head hurting while using or after using the Internet

IA level

Mild – those who score 20-39 points on the IAT fall under the category of mild addiction, meaning he/she is an average Internet user

Moderate – scoring 40-69 points on the IAT says that he/she is experiencing occasional problems due to Internet use

Severe – people who score 70-100 points on the IAT are having significant problems because of Internet usage

Inadequate sleep – number of sleep hours less than the standard 7-9 hours due to excessive Internet use

International students – university students studying under an international curriculum

Internet addiction – Internet addiction (IA) is the excessive use or having poor control over preoccupations, impulses, or behaviors concerning the use of the Internet that lead to impairment or distress. Young's Internet Addiction Test (IAT) will be used to measure IA.

Frequency of accessing the Internet – the average number of times he/she accessed the Internet through a smartphone per day in the past 30 days (Rarely means once per day at most. Occasionally equates to 2 – 4 times per day. Often refers to five or more times per day.)

Frequency of health problems

Rarely – once or twice the problem has occurred in the past 30 days of using the Internet through the smartphone

Occasionally – the problem has occurred three to four times

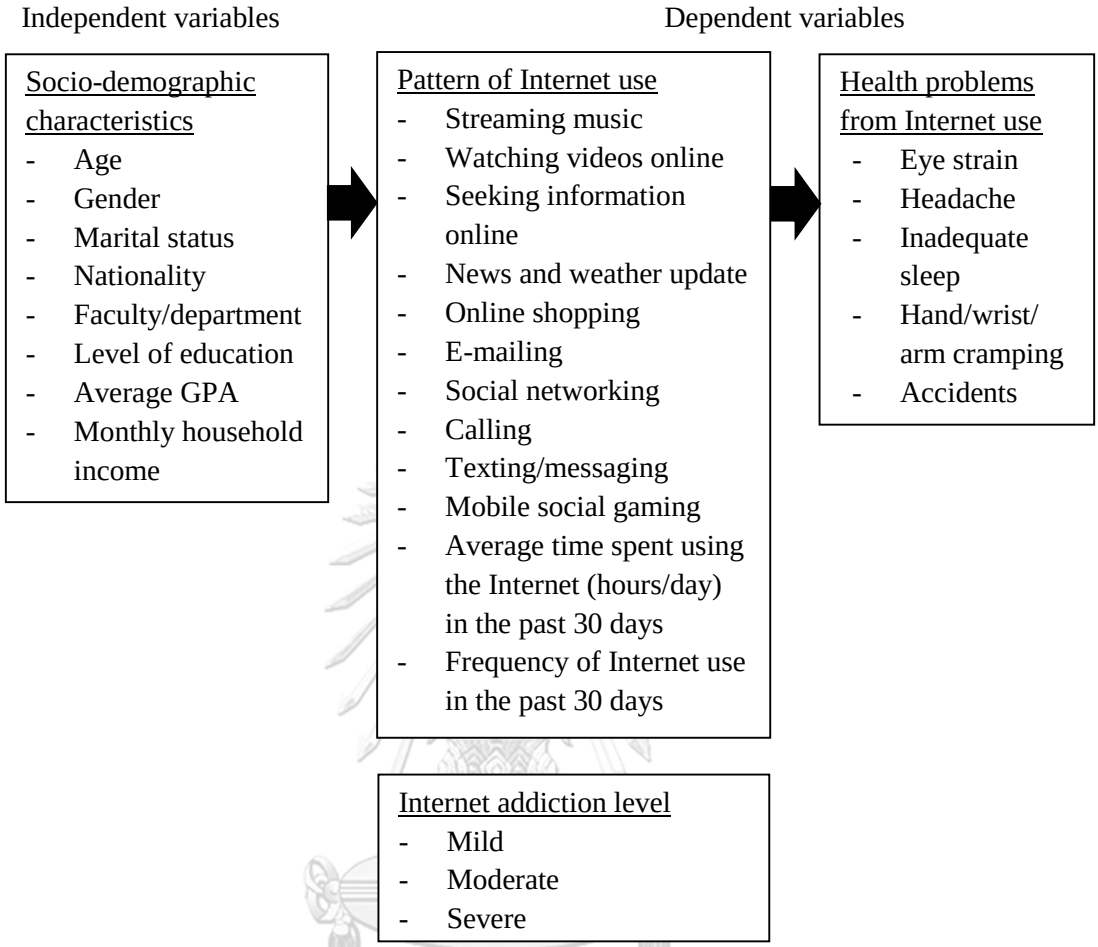
Often – the problem has occurred five or more times

Pattern of Internet use – pattern include Internet-related activities, the situation of use, place of most access, frequency, and amount of time spent on the Internet during the weekends and weekdays

Smartphone – device that performs multiple tasks similar to the computer; they characteristically have a touchscreen interface and have an operating system that can run downloaded applications and can access the Internet. The word "mobiles phones" is used interchangeably with "smartphones." Tablets and other devices are not considered in this study.

Texting/messaging – this means sending/receiving any brief, instant messages through the smartphone. An example would be messaging via LINE application.

Conceptual Framework



CHAPTER II
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Situation

In 2016, there were roughly 3.6 billion Internet users worldwide. Asia accounted for more than half (50.2%) of the world's users ("Internet World Stats Usage and Population Statistics," 2017). As for Europe and North America, the number is at 16.7% and 8.7% respectively.

Based on the World Bank, the number of Internet users in Thailand has increased from 18.2 per 100 people to 39.3 per 100 people from 2008 to 2015 (International Telecommunication Union, 2016). Bangkok, given the fact that it is a more developed area and has a better Internet infrastructure, has greater amounts of Internet users as opposed to other areas in Thailand (Electronic Transactions Development Agency, 2016). When comparing the average time spent per week on the Internet between Bangkok residents and provincial residents, Bangkok residents are using it more—the average hours per week were found to be 48.1 and 44.6, respectively. Most of them use smartphones to access the Internet.

About 2.1 billion people own smartphones in 2016 globally; the numbers are projected to grow to 2.3 billion with the coming year (Statista, 2017). 22 million people in Thailand own smartphones and spends an average of 160 minutes per day on them (Vserv, 2016). It leads to the question of whether smartphones are contributing to problematic Internet use, or more commonly known as Internet addiction (IA).

IA is an issue worldwide. A meta-analysis, conducted by Cecelia Cheng and Angel Yee-lam Li in 2014, looked at data from 31 nations for seven regions of the world (North America, Oceania, Northwest Europe, Southeast Europe, Middle East, Asia, and South America) regarding the prevalence of IA. The estimated global prevalence rate in 2014 was found to be 6.0% (Cheng & Li, 2014). In Asia, the prevalence rate is 7.1% (Cheng & Li, 2014). The study supports the idea that there is an inverse relationship between IA prevalence and quality of life (Cheng & Li, 2014). In Thailand, the prevalence is 24.4% among university students (Boonvisudhi & Kuladee, 2017). Other studies have found the prevalence to range from 2% to 30% (Wanpen, 2016). The wide range can be explained by the lack of coherence and uniformity in study criteria, making it difficult to judge the true prevalence of Internet and smartphone addiction. In a review of cell-phone addiction, De-Sola Gutierrez and colleagues gathered a sizeable prevalence data on addiction, dependence, problematic and excessive use to mobile devices. What was found was that these studies use a broad range of methodologies, measurement tools, and study groups (De-Sola Gutierrez, Rodriguez de Fonseca, & Rubio, 2016).

Summary:

IA is a global issue and smartphones may be contributing to it as they allow people to access the Internet more readily and easily. It is not uncommon to see people glued the device in all types of setting and situation. That is why it would be of interest to study a topic relating to Internet smartphone use and addiction.

Smartphones

Today, smartphones can be used for countless things, attributable to their high functional capabilities. Its compact size and portability allow for one to readily access the Internet at any time and location given that there is Wi-Fi. One could make and receive phone and video calls, send messages via e-mail, share photos, access social networking sites (like Facebook and Instagram), chat, listen to music, watch videos, play games, surf the web, navigate, get updates on news and weather, make appointments, and more (Samaha & Hawi, 2016). Smartphones, when used right, enhances productivity. They allow users to find information, engage in social interactions. Moreover, these devices can be utilized as a diversion, for relaxation, and entertainment (van Deursen, Bolle, Hegner, & Kommers, 2015).

With their vast functionalities, smartphone use has the capability of becoming addictive. In the United States, 46 percent of all smartphone owners indicated that they "couldn't live without their phones" in the Pew Research study (Elhai, Dvorak, Levine, & Hall, 2017). When disconnected from their devices, they have shown to experience anxiety and sometimes physiological withdrawal-like symptoms (Elhai et al., 2017). This construct was given the term "problematic smartphone use." In some literature, this condition is described as "addiction," "excessive use," "compulsive use," as well as "compensatory use" (Elhai et al., 2017). This form of behavioral addiction is mainly characterized by excessive use, poor control urges, or behaviors regarding smartphone use, to the point that one fails to address other important areas of life.

Summary:

There are multitudes of things a smartphone can do. The most distinct features are its' portability and ability to access the Internet at convenience. Several terminologies were coined to describe the construct of addiction to the device.

The Speed of Internet

Before there were 3G services available, there was the 2G mobile network—which had an Internet speed of 70-180 kbps. Under this service, one can only engage in short messaging, conversations, and multimedia messaging. They may also access the Internet, but it was excruciatingly slow. In 2013, 3G became available in Thailand. People were able to connect to the Internet quicker and were able to transfer data faster, thanks to the increased bandwidths and larger capacity for information transmission. The 4G network got introduced in 2016. It was made to handle greater data and work at much higher speeds. Accessing the Internet, downloading, and streaming videos became faster than before. However, many encounter problems with high battery drainage when using 3G/4G. Furthermore, in some areas, there is little to no 4G signal, and service fees are usually high (Electronic Transactions Development Agency, 2016).

Summary:

3G/4G network is widely used. Having 4G is faster and typically better when using large amounts of data.

Target Population

In looking at generation differences, Gen Y individuals use the most time online—53.2 hours per week or 7.6 hours per day. The amount of Internet usage for Gen X, Gen Z, and baby boomer generation are 44.3, 40.2, and 31.8 hours per week, respectively (Electronic Transactions Development Agency, 2016). In addition, residents of Bangkok spend 48.1 hours per week as opposed to provincial residents who spend an average of 44.6 hours per week (Electronic Transactions Development Agency, 2016). This study will concentrate on international university students—which consist mainly of Gen Y individuals, studying in Bangkok. This test group was chosen due to the fact that international students have family and friends far away and therefore, may be engaging in more online activities compared to regular university students.

Summary:

Heaviest users belong to the Gen Y groups (born between the 1980s to early 1990s) living in Bangkok (Electronic Transactions Development Agency, 2016). This study will consider this group.

Pattern of Internet Use

On average, Thai people are on the Internet 45.0 hours per week (6.4 hours per day). In other words, they are using about a quarter of their day online (Electronic Transactions Development Agency, 2016).

In the *Thailand Internet User Profile 2016*, the majority of participants (76.6%) said they surf the net after school or work from 4:00 p.m. to 8:00 p.m., with during school or work hours (8:00 a.m. to 12:00 p.m.) as a close second (76.0%), and the time period between 12:01 p.m. to 4:00 a.m. in third (75.2%). It was found that during different times of the day, different devices are used in accessing the Internet. For instance, during school or working hours (8:00-12:00 a.m. and 12:01-4:00 p.m.), the majority of users will access the Internet using desktop computers. Most used smartphones after school or working hours, up until the early morning (4:00-8:00 p.m. and 8:01-12:00 a.m.). In terms of location, users mostly access the Internet at home (87.6%), then their workplace or school (49.5% and 19.7 %).

In terms of activities, the majority (86.8%) uses social networking sites such as LINE, Facebook, and Instagram for communication. Other popular activities include watching YouTube videos (66.6%), web searching (54.7%), reading e-books (55.7%), and money transfers (45.9%)(Electronic Transactions Development Agency, 2016).

Summary:

The study will look at the pattern of Internet use among students by considering activities like streaming music, watching videos online, seeking information, news and weather update, online shopping, e-mailing, social networking, calling, texting/messaging, and mobile social gaming.

Concept and Definition of Addiction

There are multiple definitions for addiction. The reason for this is that the concept of addiction is multifaceted. It is a "socially defined construct rather than a physical entity with clear, uniquely define boundaries" (West, 2013). Some definitions focus solely on drugs; others incorporate behaviors like gambling and gaming as an addiction.

According to the *American Society of Addiction Medicine* (ASAM), "addiction is a primary, chronic disease of brain reward, motivation, memory, and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social, and spiritual manifestations. This is reflected in the individual pursuing reward or relief by substance use and other behaviors. Addiction is characterized by impairment in behavioral control, craving, a dysfunctional emotional response, and diminished recognition of significant

problems with one's behaviors and interpersonal relationships. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death" (American Society of Addiction Medicine, 2011).

World Health Organization (WHO) defines addiction as the "repeated use of a psychoactive substance or substances, to the extent that the user (referred to as an addict) is periodically or chronically intoxicated, shows a compulsion to take the preferred substance (or substances), has great difficulty in voluntarily ceasing or modifying substance use, and exhibits determination to obtain psychoactive substances by almost any means. Typically, tolerance is prominent, and a withdrawal syndrome frequently occurs when substance use is interrupted. The life of the addict may be dominated by substance use to the virtual exclusion of all other activities and responsibilities." (World Health Organization, 2017)

In the *Collins English Dictionary*, the definition of addiction is "the condition of being abnormally dependent on some habit, especially compulsive dependency on narcotic drugs" (Collins, 2017)

Based on the *EMCDDA INSIGHTS Models of Addiction*, addiction is "a repeated powerful motivation to engage in a purposeful behavior that has no survival value, acquired as a result of engaging in that behavior, with significant potential for unintended harm" (West, 2013).

Summary:

As shown above, there are several definitions for the term "addiction." Some concentrate more on substance (like the *Collins English Dictionary* definition of addiction), while others, less. The definition most appropriate for this study would be that of the *EMCDDA INSIGHTS*, which gives a more general version.

Behavioral Addiction

Addiction can occur in a multitude of ways and take on various forms. Most of the time, it is believed that for someone to be diagnosed with an addiction disorder, the person must have physical dependence characterized by withdrawal symptoms. However, behavioral addiction may happen in pair with negative consequences without the physical issues faced by people diagnosed with drug and alcohol abuse. "It is the compulsive nature of the behavior that is often indicative of a behavioral addiction, or process addiction, in an individual" (American Addiction Centers). What defines behavioral addiction is the feeling of need to continually partake in behavior or activity in spite of the negative consequences on an individual's mental

or physical health as well as hinder their ability to function at home or the community. Individuals may perceive the behavior to be psychologically rewarding, then later experience a feeling of guilt or get overwhelmed by the consequences (American Addiction Centers). It has been recognized that gambling, eating savory foods, using the Internet, shopping, and sexual behaviors can all be addictive.

According to Goodman, producing pleasure is one of the roles of addictive behaviors. The other is to provide an escape from situations that yield emotional or physical discomfort described by "powerlessness" and "unmanageability" (Goodman, 1990). This idea has long been agreed upon in the realm of addiction research (Rosenberg & Feder, 2014).

Griffith's Criteria of Behavioral Addiction:

Using the consensus from various researchers, Mark Griffiths synthesized six fundamental components that constitute behavioral addiction. These six components include "salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse" (Griffiths, 2005). *Salience* refers to the instance in which a behavior or activity comes to be the most important activity in the person's life and dominates the individual's thinking, feelings, and behavior. *Mood modification* occurs when the behavior alters one's emotional state. This oftentimes works as a coping technique; as reported, the behavior provides either a "rush" or an "escape" from reality (Griffiths, 2005). *Tolerance* refers to the process in which more of the particular behavior is needed to acquire the original effects. People frequently spend a greater amount of time engaged in the act or feel the need to increase in intensity. *Withdrawal symptoms* happen when one is unable to participate in the behavior and experiences unpleasant feelings for instance irritability and moodiness. *Conflict* denotes the discordance between the individual and others around the individual, conflicts with other activities, as well as conflict within oneself. *Relapse* is the inclination to revert to previous patterns of excessive behavior (Griffiths, 2005). Griffith believes that all six of these constituents have to be present for a behavior to be considered addictive. Those who partake in addictive behaviors do not necessarily become addicts. He states, "the difference between an excessive healthy enthusiasm and an addiction is that healthy enthusiasms add to life whereas addictions take away from it" (Griffiths, 2005).

Griffith further argues that addiction occurs as a "biopsychosocial process"(Griffiths, 2005). The term biopsychosocial is defined in the Merriam-Webster medical dictionary as the facet "of, relating to or concerned with the biological, psychological, and social aspects in contrast to the strictly biomedical aspects of disease" (Merriam-Webster, 2017).

Griffiths came up with the idea of "technological addiction" in 1996, defining it as a type of behavioral addiction where it involves "human-machine interaction" (Griffiths, 1996).

One form of technological addiction, considered by Lin et al., is smartphone addiction (Lin, Pan, Lin, & Chen, 2016).

Summary:

In this study, smartphone addiction is considered a type of behavioral addiction. Following Griffith's idea, the six component— "salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse"—needs to be present in a smartphone addicted individual.

Treatment for Behavioral Addiction

Treatment may include psychotherapies such as behavioral therapy (BT) and counseling, as well as cognitive behavioral therapy (CBT). BT concentrates on modifying environmental influences while CBT looks to change a person's way of thinking. Merging pharmacological interventions with a psychological intervention is effective for problem behaviors. In a meta-analysis of IA treatment studies, Winkler and colleagues suggested that combining pharmacological and psychological intervention are very effective in lessening Internet usage among addicts. It is also because these treatments are able to target symptoms of anxiety and depression (Winkler, Dörsing, Rief, Shen, & Glombiewski, 2013).

Behavioral Therapy (BT):

BT aims to point out unhealthy, problematic, or self-destructive behaviors and help the person understand that that behavior can be changed. It also aims to show the person that a change in behavior will ultimately change his/her feelings. This therapy focuses on elevating the individual's engagement in activities that serve as positive reinforcement. BT concentrates more on changing one's environmental influences then modifying the person because eventually, the environment will change the person.

Cognitive Behavioral Therapy (CBT):

CBT looks into how a person thinks about themselves, about others, and about the world. This form of therapy is based on the idea that a person's thoughts, feeling, and actions are all interconnected. CBT focuses on finding ways to improve the person's state of mind by putting emphasis on positive psychology. Rather than concentrating on problems of the past as most talking-treatments do, CBT looks at current issues.

In a study, 114 patients with PIU received CBT, most of the patients were found to be able to manage their non-problematic use status by the eighth session and were able to maintain this status when checked in a 6-month follow-up (Young, 2007).

Pharmacological Treatment:

Agents used to treat disorders like ADHD and OCD are used in IAD treatment studies. One study investigated the effects of methylphenidate on Internet video game addiction and ADHD in Korean children. It was found that the amount of Internet use significantly reduced after 8 weeks of treatment. To add, the researchers found a positive correlation with improvement in attention (Han et al., 2009).

Summary:

There are various treatments available for behavioral addictions such as IA. BT and CBT are just some of the many psychotherapy options to choose from. Taking medications may help, but doing a mix treatment (one in which involves pharmacology and psychology) is thought to be more effective.

Theories and Models

Like its definition, there are many existing theories and models used to explain addiction and addictive behavior. To name a few, there is the incentive-sensitization theory, the operant learning theory, the classical (Pavlovian) conditioning theory, social learning theory (or social cognitive theory), automatic imitation, the theory of planned behavior (TPB), the theory of reasoned action (TRA), effortful control, and model of impulsivity.

Incentive-Sensitization Theory:

A more appropriate way in explaining how smartphone use develops into pathological use would be through the positive reinforcement models of addiction, like “the incentive sensitization theory” (Robinson & Berridge, 2001). This theory postulates that addiction first develops as a result of mood enhancement. This is where an individual enjoys, then eventually craves the positive aspects of the compulsory behavior (Robinson & Berridge, 1993); unduly checking notifications in this case for example. In the beginning, the action results in strong associative or Pavlovian learning. This causes the individual to become increasing attuned to small cues that come to signal the reward received from compulsive behavior. Ultimately, the behavior becomes disconnected from “liking” to “wanting” (Robinson & Berridge, 2000). Individuals develop an attention bias to environmental cues that prompt them to engage in the

compulsory behavior. This produces the urge to chase the positive feelings that occurred in the initial stage.

Operant Learning Theory:

According to this theory, behaviors are caused in the presence of certain cues. Positive and negative "reinforcers" are thought to either increase or decrease the likelihood of a behavior. (West, 2013).

The most recognized psychological models of addiction theorize that compulsory use, or "addiction," progresses from the process of positive and negative reinforcement (Robinson & Berridge, 2003). *Negative reinforcement* models propose that addiction develops as a "coping mechanism" (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). Negative reinforcement may result in subconscious associations that prompt automatic motivation to engage in this automatized behavior resulting in heightened levels of negative mood (Baker et al., 2004). Thus, negative reinforcement models offer a possible mechanism for use maintenance, but may not explain how one may progress from use to pathological use.

In this case, problematic smartphone use may start as a process of positive reinforcement. The individual will begin to experience negative moods when not engaging in the behavior as the behavior becomes compulsory (Elhai et al., 2017). Thus, to relieve from withdrawal, one would re-engage in the conduct (Wise and Koob, 2013). What can be found in both positive and negative reinforcement in smartphone addiction is the involvement of a craving for positive emotion in mitigating the negative emotion. It is however, also important not to over-pathologize smartphone use (Billieux et al., 2015). Within literature, there is evidence that some levels of use are not detrimental, but rather adaptive. There is an integrative view that pathological use is the outcomes of a mixture of cultural, personal, environmental, emotional factors, and social factors (Aljomaa et al., 2016).

Classic (Pavlovian) Conditioning Theory:

Classic conditioning theory is similar to operant learning theory as both involve the process of learning. The operant conditioning theory is concerned with associations formed between cues and responses through "voluntary muscles" (West, 2013) whereas, classic conditioning looks into the formation of the association between a stimuli and reflexive response due to the fact that the stimuli involves other motivationally significant stimuli.

Social Learning Theory (Social Cognitive Theory):

Albert Bandura developed the social learning theory, also known as the social cognitive theory. There are three dimensions to this theory; they include behavior, environment, and personal. Bandura believes that these dimensions are "reciprocal determinism," meaning that when one factor is changed, the others will change as well. Based on the social learning theory, the behavior may come from observational learning, self-regulation, and self-efficacy (Bandura & Walters, 1977). Observational learning allows one to create generative and innovative behavior, enhance performance, as well as inhibit or disinhibit behavior. There are two types of models for observation. The first is the live model—models that you contact with. The second is the symbolic model—models passed through various channels like media. The processes of observational learning include attention processes (if you do not pay attention, it will not affect you), retention processes (paying attention and remembering behavior), motor reproduction process (after memorizing behavior, you enact on the behavior), and motivational process (would not behave in a certain way if you do not get something in return). Self-regulation refers to one's ability to control oneself. It is composed of three essential points: self-observation, judgment process, and self-reaction. People oftentimes do not know what they want because they do not know about themselves; therefore, must look into themselves—hence self-observation. For the judgment process, a person must ask whether the behavior meets the desired goal. Self-reaction is the reward you give yourself when the goal is reached. Self-efficacy refers to an individual's self-assessment of ability to successfully take on a behavior required to produce the desired outcome. If you accept that you can do, then you will be able to do it up to your maximum capability. The factors of self-efficacy include: mastery experience, modeling, verbal persuasion, and emotional arousal.

Automatic Imitation:

This theory proposes that people are naturally programmed to mimic behaviors without awareness of doing so. This is also without the need of reward or punishment (Heyes, 2011). Automatic imitation is thought to be a kind of "stimulus-response compatibility". In other words, the features in a stimulus promote responses that are similar.

Theory of Planned Behavior (TPB) and Theory of Reasoned Action (TRA):

The theory of planned behavior (TPB) and theory of reasoned action (TRA) was proposed by Ajzen and Fishbein in 1980 to explain the relationship between behavior and beliefs, attitudes, and intentions. In both of the theories, behavioral intention is assumed to be the most important in determining behavior. The major difference between TPB and TRA is

that TRA includes one additional construct— "perceived behavioral control" which deals with a person's belief in controlling an individual behavior. Four key concepts must be assessed before being able to change a person's behavior: behavioral intention, attitude, subjective norm, and perceived behavioral control.

Effortful Control:

Effortful control is the amount of control an individual has over impulses and emotions. This includes one's ability to focus or shift attention. Those who have low control over impulse are likely engage in addictive behavior.

Model of Impulsivity:

Model of impulsivity says that people with high impulsivity have a greater risk for addictive behaviors. There are two dimensional trait characteristics in this model. The first is the "reward drive" (RD). RD refers to a person's sensitivities to incentive and engagement of addictive behavior in the presence of reward. The second is "rash impulsiveness" (RI). RI refers to a person's ability to modify the addictive behavior because of negative consequences.

Summary:

Many theories and models may be used to describe mobile IA. An appropriate theory to use in explaining how Internet use in smartphones develops into pathological use would be the *incentive sensitization theory*.

Adverse Effects of Smartphone Overuse

Despite the many benefits of smartphones, there are drawbacks to its use.

Accidents:

Smartphones can be the object of distraction, mainly for drivers who talk or text while driving. Such activity may lead to traffic accidents (Cazzulino, Burke, Muller, Arbogast, & Upperman, 2013). It was estimated that 75% of college students in the U.S. use their mobile device while driving (Dr. Kimberly S. Young & De Abreu Cristiano, 2017). Distracted driving is highly prevalent particularly among college students with great self-efficacy for multitasking (Hill et al., 2015). Smartphones may also act as distractors for pedestrians who are walking or crossing the street—increasing chances of injury (Schwebel et al., 2012).

Physical Effects:

Excessive smartphone use is connected with a range of negative physical health effects. One such consequence is having neck and shoulder pain due to poor and/or prolonged posture while using a smartphone (Shan et al., 2013). Users may also experience issues with the eye (J. Kim et al., 2016). Staring at an illuminated screen for an extended period of time is linked to blurred or worsened vision, and strained and tired eyes. Another adverse side effect would be poor physical fitness, as smartphone use is related to sedentary behavior (S. E. Kim et al., 2015; Lepp et al., 2013).

Anxiety, Depression, and Sleep:

Demirci et al. carried out a study in which assesses the relationship between smartphone use, anxiety, depression, and sleep quality among university students. It was found that in the high-smartphone-use group, anxiety, depression, and daytime dysfunction scores were greater in comparison to the low-smartphone-use group. The results show a positive correlation between the Smartphone Addiction Scale (SAS) scores and anxiety, depression, and sleep quality scores. This indicates that there is in fact a relationship between these outcomes and problematic smartphone use (Demirci et al., 2015).

Economic Consequence:

Overuse of smartphones among university students has economic consequences as well. A study by Naz and colleagues found that it is one of the "disastrous threats to economic independence of students and their families" (Naz, Khan, Daraz, & Hussain, 2011). The researchers further reasoned that excess use led the way for crimes and acts that could threaten the stability of a community. These crimes, often times observed in people with gambling issues, include robberies and theft (Naz et al., 2011).

Academic Performance:

Smartphone use affects academic performance as well. Kubey et al. proposed that the overuse of technology specifically for recreational purposes is greatly related to lowered academic performance (Kubey, Lavin, & Barrows, 2001). The reason may be that students, when using their smartphones, "remove" themselves from class activities (Roberts, Yaya, & Manolis, 2014). Cheating and disrupted studies can occur. The same thing can also happen outside the classroom—at one's workplace for instance. Workplace performance may be negatively affected. Excessive smartphone use may hinder relationships between co-workers, friends, family, and so forth.

Summary:

As useful as smartphones may be, there are downsides to its use. The device may contribute to accidents, poor health, bring about economic consequences, and lower academic performance. This study will investigate some potential physical health problems relating to smartphone use.

Factors of Smartphone Use

Age:

Although the use of smartphones continues to increase in all age sectors, according to Head and Ziolkowski, one of the main target groups as well as one of the largest consumer groups of smartphone services are university students (Head & Ziolkowski, 2012). They are typically in the 18-25 age range (S. E. Kim et al., 2015).

Gender:

In a study by Hakoama and Hakoyama, the gender differences in the aspects of smartphone use were examined. The researchers found that females, mainly white, depend more heavily on their devices to sustain social relationships (Hakoama & Hakoyama, 2011). According to Chóliz, females use their phones more compared to males. It was found that females are likelier to engage in phone abuse and face issues with their parents because of overuse (Chóliz, 2012).

Marital Status:

Not much research has looked into the relationship between marital status and smartphone usage. One study, by Kibona and Mgaya, found a positive correlation between marital status and smartphone usage (Kibona & Mgaya, 2015). In other words, those who are married tend to use their smartphones more than those who are not married.

Nationality:

Nationality is a possible factor in smartphone use as different cultural backgrounds may encourage or discourage one to engage in a particular behavior. Approaches have been made in cross-cultural research on smartphone addiction. Lopez-Fernandez adapted the SAS-SV into Spanish and French (Lopez-Fernandez, 2017). Both adapted scales were determined to be valid and reliable (Cronbach's α for Spain and Belgium were .88 and .90, respectively). The researchers found the percentage of excessive smartphone users in Spanish and Belgian people to be 12.5% and 21.5% (Lopez-Fernandez, 2017). Additionally, the order of addictive traits

was determined. The results reveal that in the Spanish, the order goes from tolerance (shown as highest) to loss of control and withdrawal (shown as lowest). In the Belgians, however, the order goes from withdrawal to loss of control and tolerance (Lopez-Fernandez, 2017).

Level of Education:

Kwon et al. obtained SAS scores from those with high school, college, university, masters/doctor level of education. Results show a significant difference in SAS scores between those with high school and master/doctoral education level ($p = 0.013$) (Kwon, Lee, et al., 2013). The mean SAS score for those with high school education level and master/doctoral education level was 120.93 and 90.61, respectively (Kwon, Lee, et al., 2013). To translate, those with a lower education level are more prone to forming an addiction.

Faculty/Department:

There are not many studies that address the association between smartphone addiction level and a student's field of study. One study, by Abu-Jedy, found that students in humanities had significantly higher levels of addiction than students belonging to natural sciences at Amman Al-Ahliyya University and the University of Jordan (Abu-Jedy, 2008). Furthermore, public university students were found to have higher levels of addiction when compared to private university students. A study on Australian university students by Oliver found that students in the business faculty use their mobile phones extensively in their courses (Oliver, 2005).

GPA:

Rosen et al. linked the activity of smartphone multitasking to declined academic performance (Rosen, Mark Carrier, & Cheever, 2013). In a study of 451 US college students, Karpinski et al. established a negative correlation between use of social networking sites (SNS) on mobile phones and GPA (Karpinski, Kirschner, Ozer, Mellott, & Ochwo, 2013). Junco and Cotton found similar results in their study of US university students. The findings linked Facebook and text messaging use while engaging in schoolwork, to lowered GPAs (Junco & Cotten, 2012).

Income:

Income level is one essential predictor of mobile phone use according to Castell et al. (Castells, Fernandez-Ardevol, Qiu, & Sey, 2004). It is, usually, the reason for why people continue or stop use—higher income is correlated with the adoption of these devices. A study

by Zulkefly and Baharudin, investigated personal and family factors associated with mobile phone use (Zulkefly & Baharudin, 2009). The findings show that there is high correlation between family income and amount of mobile phone use. The researchers concluded that university students from a higher income family background spend the greatest time and money on their mobile phones (Zulkefly & Baharudin, 2009).

Summary:

These are some possible factors that influence smartphone use and addiction. In this study, age, gender, marital status, nationality, educational level, average GPA, and income will be the independent variables.

Measurement Tools

The Internet addiction test (IAT) and the Internet Related Problem Scale (IRPS) are two of many instruments constructed to measure problematic Internet use and addiction level, following the DMS-V criteria for addictive behaviors. In addition, several scales have been developed to measure the level of addiction to smartphone use. Some include the smartphone addiction scales (SAS), the smartphone addiction scale short version (SAS-SV), the smartphone addiction inventory (SPAI), and the smartphone addiction inventory short form (SPAI-SF).

Internet Addiction Disorder (IAD):

Smartphones today have made accessing the Internet much more quick and easy; it can be done by nearly anyone at almost any location. More and more people are now using their smartphones to go on the Internet. One reason for why people become so attached to their smartphones may be due to their addiction to the Internet (Weinstein et al., 2014).

Internet addiction disorder (IAD), also known as problematic Internet use (PIU) is considered a type of behavioral addiction and is characterized by tolerance, withdrawal, and excessive use regardless of negative consequences. Those with IAD have “excessive or poorly controlled preoccupations, urges, or behaviors regarding Internet use that lead to impairment or distress” (Weinstein et al., 2014). There are at least three subtypes of IAD. These subtypes include excessive gaming-gambling, socializing or social networking (including messaging and e-mailing), and sexual preoccupations (cybersex) (Weinstein et al., 2014). People who are Internet addicts isolate themselves from those around them and from social contact when they use the Internet for extensive periods. The need to escape from reality and oneself are often used to explain the occurrence of IAD. Other factors that contribute to IAD include stress, one’s

desire to expand social networks, social anxiety, poor control, and ability to cope with challenging situations.

Diagnostic Statistical Manual, fifth edition (DSM-5) and IAD:

There were four vital components of IAD when it was originally proposed to be included in the DSM-5. The first is extensive Internet use, usually associated with "a loss of sense of time or a neglect of basic drives"(Weinstein et al., 2014). The second is withdrawal. This includes feelings of tension, irritation, and/or depression when one is unable to access the Internet. The third is tolerance—needing better equipment, additional software, or more time to use. The fourth and last is adverse consequences. This may include quarrels, lying, lowered academic achievement, isolation, and exhaustion (Weinstein et al., 2014). In 2013, IAD was proposed to be included in the DSM-5 but never added. Only Internet Gaming Disorder was put into the DSM-5 and recognized as a real disorder (Weinstein et al., 2014).

Internet Addiction Test (IAT):

The Internet Addiction Test (IAT) is a valid and reliable instrument (Cronbach's α = 0.889), developed by Dr. Kimberly Young to measure the level of IA (Constantinos C Frangos, Frangos, & Sotiropoulos, 2012). It is a standardized instrument widely used by researchers around the world. The instrument has 20 items, following a 5-point Likert format where 0 = does not apply, 1 = rarely, 2 = occasionally, 3 = frequently, 4 = often, and 5 = always. Eight questions were modified from the DSM-IV criteria for pathological gambling disorder and 12 questions were new. Scores can range from 0 to 100. Levels of addiction are separated into mild, moderate, and severe (Young, 1998). Those who score 20-39 points on the test fall under the category of mild addiction, meaning he/she is an average Internet user. Scoring 40-69 points means that he/she is experiencing occasional problems due to Internet use. People who score 70-100 points are having significant problems because of Internet usage (Widyanto, Griffiths, & Brunsden, 2011).

Although the IAT has been adopted into a Thai version, a standard cutoff point for IA levels has not been established under Thai context. In a pilot study, Supada Plitphonganphim evaluated the psychometric properties of the Thai-IAT (Plitphonganphim, 2016). The original instrument was translated to Thai, and then back translated to English. Psychiatrists and a psychologist evaluated the content validity of the Thai-IAT. Like the original instrument, the Thai-IAT contains 20 items that follow a 5-point Likert scale. Total scores can range from 0 to 100. Increasing scores indicate the severity of IA. The pilot study had 43 university students (age 20.04 ± 0.74 years old) complete the Thai-IAT. The resulting Cronbach's α was 0.93 (95%

CI; 0.90 to 0.96) (Plitphonganphim, 2016). Plitphonganphim investigated the psychometric properties of the Thai-IAT. In using confirmatory factor analysis, the researcher found the six components of addiction to be the same as previous research (Plitphonganphim, 2016). Further study is needed to determine the cutoff point under Thai context. This study will use Young's cutoff points for IA.

Internet Related Problem Scale (IRPS):

Armstrong and colleagues constructed the Internet Related Problem Scale (IRPS) to measure IA level. The scale comprises of 20 items addressing the issue of "tolerance, craving, withdrawal, and negative life consequences in the areas of social, familial, work, and financial-related difficulties" (Armstrong, Phillips, & Saling, 2000). It also includes loss of control over time spent on the Internet and decrease in time spent doing other activities because of excessive Internet use. Like the other tools, the questions follow a Likert scale where 1 = not true at all and 10 = extremely true. The IRPS was found to be reliable with a Cronbach's α of 0.8776 (Armstrong et al., 2000). The validity of the IRPS was determined using the Pearson correlation coefficients. Correlation between IRPS and total hours spent online were found to be highly significant ($p < 0.01$) (Armstrong et al., 2000). It was also found to have high correlation with the MMPI-2 Addiction Potential Scale, a scale used to measure addiction ($p < 0.05$) (Armstrong et al., 2000).

Smartphone Addiction Scale (SAS):

Kwon et al. was the first to develop a self-diagnostic scale to measure problematic smartphone use. It was given the name "Smartphone Addiction Scale" or SAS. There are 33 items in the SAS, consisting of six factors. These include cyberspace-oriented relationship, daily-life disturbance, positive anticipation, overuse, tolerance, and withdrawal (Kwon, Lee, et al., 2013). Items follow a 6-point, Likert-type format where "1 = strongly disagree" and "6 = strongly agree." The greatest total points one could score on the SAS is 198 points. Higher scores indicate greater problematic smartphone uses or higher addiction levels. This scale demonstrated to be both valid and reliable (Cronbach's α = 0.967) (Kwon, Lee, et al., 2013).

Smartphone Addiction Scale Short Version (SAS-SV):

In the same year, Kwon et al. further refined the Smartphone Addiction Scale to produce a shortened version for adolescence. This scale consists of 10 items that follow a 6-point, Likert-type format where "1 = strongly disagree" and "6 = strongly agree." The greatest points one could score on the SAS-SV is 60. The researchers determined the cut-off point to be

33. Likewise, the scale demonstrated to be both valid and reliable (Cronbach's α = 0.911) (Kwon, Kim, Cho, & Yang, 2013).

Smartphone Addiction Inventory (SPAI):

The Smartphone Addiction Inventory (SPAI) is an instrument constructed by Lin et al. to measure smartphone addiction among Taiwanese university students (Lin et al., 2014). There are 26 items in the SPAI consisting of four constructs of behavioral addiction: compulsive behavior, functional impairment, withdrawal, and tolerance. The items follow a 4-point Likert format where "1 = strongly disagree" and "4 = strongly agree." Scores can range from 26 to 104. This instrument was proven to be valid and reliable (Cronbach's α = 0.94) (Lin et al., 2014).

Smartphone Addiction Inventory Short Form (SPAI-SF):

Lin et al. created a shortened form of the Smartphone Addiction Inventory (SPAI-SF) and determined the cut-off point (Lin et al., 2016). There are 10 items in the SPAI-SF consisting of four constructs of behavior addiction: compulsive behavior, functional impairment, withdrawal, and tolerance. The items follow a 4-point Likert format where "1 = strongly disagree" and "4 = strongly agree." 40 is the greatest amount of points one can score on the SPAI-SF. The cut-off point was determined to be 24/25. This instrument was proven to be valid and reliable (Cronbach's α = 0.84) (Lin et al., 2016).

Summary:

For this study, IAT will be used to assess smartphone IA level among international students. Not only is the instrument valid, reliable, and widely used in research, Young created a cut-off point for each level of addiction ranging from mild to severe—which will be useful in analysis.

Related Research

Problematic Online Gaming:

Another type of behavioral addiction related to smartphone addiction is problematic online gaming. Since smartphones today have the capacity to access the Internet, users may enter online games at a greater convenience. In addition, given improved gaming platforms and enhanced graphics, more and more people are becoming involved with online gaming, not only through their computers but smartphones as well due to its portability. The research in problematic online gaming has been gaining a great deal of attention; although, no definite

definitions have been agreed upon. Some see it as a variant of IA, a subset of IAD, while others see it as an "independent" diagnosis (Király, Nagygyörgy, Griffiths, & Demetrovics, 2014). Due to this, estimating the prevalence of the issue is difficult.

According to Griffiths, all behavioral addictions, regardless of characteristics, contain six common components: salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse (as already mentioned under the section Griffith's Criteria of Behavioral Addiction) (Griffiths, 2005). Problematic online gaming consists of all six components. Recently, problematic online gaming has been added to DSM-5, under Section III, titled "substance-related and addictive disorders" (Király et al., 2014).

Problematic Internet Gaming and the Flow Theory:

One concept associated with problematic Internet gaming is the flow theory. The flow theory says that a person is in the state of flow when he/she immerses in a particular activity and acquires optimal experience from the activity. It can be seen as being completely absorbed in the activity; this is often described as being in the zone or "flow state." To experience something at its optimal state, there needs to be a "clear objective and immediate feedback, challenge encounter and adequate skill, combination of action and consciousness, concentration, sense of control, curiosity, loss of self-consciousness, purposeful experience, and inner interests…" (Wan & Chiou, 2006). It can be accomplished through online gaming. However, in a study by Wan and Chiou, it was found that flow state was significantly lower in game addicts than non-addicts. To add, the flow state was negatively correlated with online gaming addiction, revealing that it might not be the main psychological mechanism of gaming addiction (Wan & Chiou, 2006).

Mobile Social Game Addiction:

A study on mobile social game addiction conducted in China on 409 participants looked into the relationship between psychological factors like loneliness, perceived gratifications, self-control, and boredom and mobile gaming (Candy Crush Saga) addiction. Chen and Leung found that 7.3% of the participants were addicted to mobile game and that loneliness and self-control are significant predictors (Chen & Leung, 2016).

"Internet Over-Users' Psychological Profiles: A Behavior Sampling Analysis on Internet Addiction":

In this study, researchers looked into those who excessively use the Internet, their level of use, and their psychological profiles. Young's Internet Addiction Scale was modified and

used for this study. 3.5% of 13,588 users were diagnosed with IA. 18.4% were in the "possible addicts" (PA) group. A strong relationship was found between the Internet Addiction Scale and dysfunctional social behavior. One such behavior is trying to escape from reality through Internet use. Results also showed that users, when stressed or depressed, would access the Internet. Internet addicts were also found to be at greater risks for interpersonal dangers compared to others as they tend to develop an unusually close feeling for strangers (Whang, Lee, & Chang, 2003).

"Social Implications of Smartphone Use: Korean College Students' Smartphone Use and Psychological Well-Being":

Park and Lee investigated the relationship between motives of smartphone use and psychological well-being including perceived social support, loneliness, depressive symptoms, self-esteem, as well as social relations among Korean college students. Correlation analysis revealed that the motives to use are related to bonding relations, but inversely related to bridging relations. Multiple regression analysis was used to find the association between reason for smartphone use, perceived social support, social relations, and the variables of psychological well-being. Depression and loneliness were found to be negatively related to "needs for caring for others". Conversely, self-esteem was positively related to "needs for caring for others". The researchers also found that motivations to communication are not a predictor of depression, loneliness, and self-esteem. Descriptive statistics is used in gathering socio-demographic characteristics of users and smartphone usage. For activities, they looked into voice call, short messaging service, instant messaging, camera, multimedia, game, club/blog, SNS, chatting, applications, and Internet surfing/search. The activity engaged in most among this group was chatting via Kakao Talk (71.3%). Using SNS was the second most (44.8%) and Internet surfing/search (41.6%) third most done activity on a smartphone (Park & Lee, 2012).

"Effects of Smartphone Addiction Level on Social and Educational Life in Health Sciences Students":

Sut and colleagues studied the effect of smartphone addiction on the social and educational life of students in the health science department. The SAS survey was used for this cross-sectional study. They found that there was a high prevalence of smartphone use among this group. The results showed that higher SAS scores were related to lower verbal communication ability, academic achievement, and social life. They also looked into usage and found that the majority (40.1%) of students are on their smartphones 4-6 hours a day. When

examining smartphone usage (SMS, phone, news, games, research, and homework), the use of SMS was found to be the greatest (56.8%) (Sut, Kurt, Uzal, & Ozdilek, 2016).

"Prevalence and risk factors of problematic Internet use and the associated psychological distress among graduate students of Bangladesh":

Islam and Hossin investigated the correlation between socio-demographic and PIU, and psychological distress among adolescents and young adults. A self-administered questionnaire was given to 573 graduate students from Dhaka University of Bangladesh. The questionnaire included sections for socio-demographic and behavioral factor, the Internet addiction test (IAT), the General Health Questionnaire (12 items were selected for use). Results showed that 24% of the participants in the study have PIU. Furthermore, a strong association was found between PIU and psychological distress (Islam & Hossin, 2016).

Drug, Alcohol Use, and Internet Addiction:

Some studies have found drug and alcohol use to be associated with PIU or IA. A study in Finland by Korkeila et al. found that cannabis use was associated to IA (Korkeila, Kaarlas, Jääskeläinen, Vahlberg, & Taiminen, 2010). In another study, IA was associated with problematic alcohol consumption among Taiwanese students (Yen, Ko, Yen, Chang, & Cheng, 2009). A different study found an association between parental problem drinking (PPD) and IA in children (Jang & Ji, 2012).

Habits:

Although there are various studies suggesting that smartphones have the capability to lead to addictive behavior, Oulasvirta et al. reasons that these devices are "habit-forming" rather than addictive (Oulasvirta, Rattenbury, Ma, & Raita, 2012). In a study, they determined a habit related to smartphone use, for which they called "checking habit" (Oulasvirta et al., 2012). Checking habits are defined as brief, repetitive checking of dynamic content on enabled devices. The researchers found that checking habit—which is reinforced by informational rewards—can increase the overall usage of the device. With this, they concluded that while habitual use is frequent, the behavior should be categorized as an annoyance instead of addiction (Oulasvirta et al., 2012).

CHAPTER III
RESEARCH METHODOLOGY

Research Design

This was cross-sectional study for which data was collected from a purposive sample at a specific period. The aims were to assess IA level among international students, to determine the health problems related to smartphone Internet use, and to identify the association between IA level and health problems.

Study Area

A university in Bangkok, Thailand

Study Population

International undergraduate and graduate students, male and female, aged 18 years and older

Sample Size Calculation

Twenty faculties/departments offer international programs. There are approximately 36,000 students, and roughly 4,082 of them are international undergraduate and graduate students, enrolled for a trimester or semester (Chulalongkorn University, 2016). Because the target population is finite, Krejcie and Morgan's formula was used in determining the sample size (Krejcie & Morgan, 1970).

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

n = Sample size

X^2 = Z value for 1 degree of freedom at a confidence level of 0.05 = 3.841

N = Population size (4,082 students)

P = Population proportion (to get maximum sample size P will be assumed as 0.5)

d = Degree of accuracy (0.05)

Calculation for sample size is shown below:

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

$$n = \frac{3.841 \times 4{,}082 \times 0.5 \, (1 - 0.5)}{0.05^2 \, (4{,}082 - 1) + 3.841 \times 0.5 \, (1 - 0.5)}$$

n = 351

Sampling Technique

Purposive sampling was used for this research.

Inclusion Criteria

- Comprehends English
- Owns a smartphone
- Is an undergraduate or a graduate student studying under the international curriculum (included trimester and semester)
- Above 18 years of age

Exclusion Criteria

- Unable to complete the entirety of survey
- Unable to provide informed consent

Procedure

1. Created questionnaire
2. Tested for validity by sending questions to three experts for review
3. Made revision of measurement tool
4. Tested for reliability by piloting the questionnaire on 25 international students
5. Made revision of measurement tool
6. Composed a letter requesting the Ethics Review Board's approval for research
7. Made revision according to the Ethical Review Board's commentary
8. Generated an online questionnaire through Google Forms
9. Generated QR code to link with questionnaire
10. Posted announcements around campus regarding the study
11. Informed faculties about the study
12. Opened questionnaire to allow participants to submit
13. Collected and corrected data
14. Analyzed data
15. Wrote results and discussion
16. Revised manuscript
17. Sent for publication

Data Collection

Data was collected through a self-administered, online questionnaire developed by the researcher.

1. There were two ways of approaching the target group. One method was emailing all faculties/departments that offer international studies, telling them about the research project, and requesting for participants of specific criteria. Purposive sampling was put into practice. The other method of approach was distributing announcement flyers that contains the link and QR code to the questionnaire. Participants were able to complete the questionnaire by scanning QR code or going to it with the link within the allotted period. To access the questionnaire using QR code, he/she must have a QR code scanning application. Line application works as well—scanning can be done by going to "add friends" and then "QR code."
2. When there were enough usable data samples, the system closed (meaning that students will no longer be able to submit). In the questionnaire, respondents were provided with the general information of the study, for example study purpose, instructions, and what to expect from the study. Consent was asked from the participants before the start of this study. As an incentive, participants who completed the survey were eligible to win one of the five prizes in a random draw. Drawing involves assigning each participant's entry with a number and using a random number generator to select five individuals (see point number 6).
3. To ensure that participants do not return multiple submissions, participants were required to provide their phone number and an active e-mail.
4. Data from the questionnaires were directly saved into an excel file. Data will be checked daily for completion.
5. Participants received a reply of their results through the email they provided.
6. Five participants were selected at random to receive a free-size Chulalongkorn University jacket at the end of the study. (Selection process: Each participant had a number attached to their submission entry. A random number generator was used in selecting the participants.) The five chosen individuals were contacted through the e-mail they provided. For those who did not reply within a week, the prize was dropped and the participant was no longer eligible. A date was set as to when and where the participant may claim prize. Those who did not claim the item within the allotted time lost the entitlement.

Outcomes

The study outcomes are as follows:

- Obtained the pattern of Internet use on smartphones among international undergraduate and graduate students in one public university in Bangkok, Thailand
- Established the prevalence of IA at moderate and severe levels (in accords to Young's IA cutoff points)
- Found whether students experienced health related issues such as eye strain, headache, inadequate sleep, hand/wrist/arm cramping, and accidents from smartphone use and how often they did

Measurement Tools

This study used Young's IAT to assess IA level. The IAT is a standardize instrument—both valid and reliable—widely used by researchers (Cronbach's alpha = 0.889) (Constantinos C Frangos et al., 2012). See page 22 for a detailed description of the IAT.

Students who agreed to partake in the study completed a 12-part, self-administered survey. The questions addressed their smartphone ownership status, socio-demographic characteristics, smartphone description, and Internet usage, frequency, self-diagnosis of addiction, IAT, health problems only from Internet use, and substance use. The survey takes approximately 30 minutes to complete (for full questionnaire, see appendix C).

Questionnaire Sections:

1. Smartphone Ownership Status
2. Socio-Demographic Characteristics
3. Smartphone Description
4. Smartphone Usage
5. Frequency
6. Situation
7. Environment
8. Place
9. Self-diagnosis of Internet Addiction
10. Internet Addiction Test (IAT)
11. Health Problems
12. Alcohol and Substance Use

(The author of this study developed items in sections 1-9, 11, and 12)

Part 1: Smartphone Ownership Status

This is a 'screening' section. Here, the question asks the participant if he/she owns a smartphone. Those who answers "no" are not be eligible to participate, and are directed to end page. Those who answer "yes" will be able to go on to the next part—socio-demographic.

Part 2: Socio-Demographic Characteristics

This section consists of eight questions asking for the participant's age, gender, marital status, nationality, faculty/department, level of education at present, average GPA, and monthly household income. A table of the type of data and range/categories of the variables is shown below.

Table 1 Type of data and range/categories for socio-demographic characteristics

Variables	Type of Data	Range/Categories
Age	Continuous	18 years and older
Gender	Categorical – Dichotomous	Male Female
Marital status	Categorical – Nominal	Single Married Widowed Divorced
Nationality	Categorical – Nominal	Thai Other (specify)
Faculty/department	Categorical – Nominal	College of Public Health Sciences Faculty of Allied Health Sciences Faculty of Architecture Faculty of Arts Faculty of Commerce and Accountancy Faculty of Communication Arts Faculty of Dentistry Faculty of Economics Faculty of Education Faculty of Engineering Faculty of Law

		Faculty of Medicine Faculty of Nursing Faculty of Pharmaceutical Science Faculty of Political Science Faculty of Psychology Faculty of Science Graduate School Sasin Graduate Institute of Business Administration The Petroleum and Petrochemical College Other
Level of education	Categorical – Ordinal	First year undergraduate Second year undergraduate Third year undergraduate Fourth year undergraduate Fifth year undergraduate Sixth year undergraduate Master Ph.D. Other
Average GPA	Continuous	0.00 – 4.00
Monthly household Income	Categorical – Ordinal	< 45,000 baht ≥ 45,000 baht Rather not share

Part 3: Smartphone Description

The size of the device may or may not be linked with the self-reported health problems related to Internet use. Therefore, one question about their smartphone screen size was asked.

Table 2 Type of data and range/categories of smartphone description

Variables	Type of Data	Range/Categories
Smartphone size	Categorical – Nominal	3.5 inches 4.0 inches 4.7 inches 5.1 inches 5.5 inches 5.7 inches Other

If the participant owns more than one and they are of different sizes, then he/she were to select the screen size of the smartphone that is use more often. The size does not have to match perfectly to the choices offered. Participants may choose the choice that is closest to their smartphone.

Part 4: Smartphone Usage

This section contains ten questions that ask about smartphone usage—whether he/she did the following Internet-related activities on a smartphone in the past 30 days: (1) streaming music, (2) watching videos online (3) seeking information, (4) new/weather update, (5) online shopping, (6) e-mailing, (7) social networking, (8) calling, (9) texting/messaging, and (10) mobile social gaming. (Note: LINE application is "typically labelled as a messaging app" used for sending/receiving instant messages. It therefore, falls under the "texting" category (Lomas, 2013)). If he/she answers "yes" to doing the activity, an additional question will be asked regarding the average amount of time spent in hours per day (in the past 30 days) doing the activity on a weekend and on a weekday. Answers should be rounded to the nearest hour. In the case that the answer falls at 2 hours and 30 minutes, for instance, participant should round up to 3 hours.

Table 3 Type of data and range/categories for smartphone usage

Variables	Type of Data	Range/Categories
- Streaming music - Watching videos online	Categorical – Dichotomous	No Yes
- Seeking information - News/weather update - Online shopping - E-mailing - Social networking - Calling - Texting/messaging - Mobile social gaming	Categorical – Ordinal	< 1 hour 1 – 2 hours 3 – 4 hours 5 – 6 hours ≥ 7 hours

Part 5: Frequency of Internet Use

One question asked, on average, how often he/she accesses the Internet per day (in the past 30 days). There are three categories for frequency: rarely, occasionally, and often. Rarely means he/she accesses the Internet on average, 0 – 1 time per day, occasionally means 2 – 4 times, and often means five or more times per day. Note that this section does not take into account duration of use.

Table 4 Type of data and range/categories of frequency

Variables	Type of Data	Range/Categories
Frequency	Categorical – Ordinal	Rarely (0 – 1 times per day) Occasionally (2 – 4 times per day) Often (≥ 5 times)

Part 6: Situation

One question asked whether the participant has *ever* used a smartphone in a particular situation. Choices for this include using a smartphone while driving, doing work, doing homework, walking, and eating. Participants can select more than one choice. This question was included in the questionnaire because it relates to the occurrence of accidents. (For instance, a person who drives while using their smartphone are putting themselves in the position of being involved in a motor vehicle accident.)

Table 5 Type of data and range/categories for situation

Variables	Type of Data	Range/Categories
Situation	Categorical – Nominal	Driving Doing work Doing homework Walking Eating

Part 7: Environment

One question asked whether the participant has used his/her smartphone in dark places (e.g. in a room with the lights turned off) in the past seven days. The environment in which a person uses his/her smartphone may have an effect on occurrence of health problems. For instance, using the device in the dark often, may be associated with ocular issues.

Table 6 Type of data and range/categories for environment

Variables	Type of Data	Range/Categories
Environment	Categorical – Dichotomous	No Yes

Part 8: Place

One question inquired where the participant *mostly* uses his/her smartphone. Only one choice may be selected. This question was asked because it is relevant to the pattern of use. It will also reveal whether the person mostly uses their smartphone in a place of work during working hours.

Table 7 Type of data and range/categories for place of access

Variables	Type of Data	Range/Categories
Place	Categorical – Nominal	At home At school At workplace

Part 9: Self-diagnosis of Internet Addiction

A question asked whether the participant considers himself or herself to be addicted to using Internet through the smartphone. Their answer to this question will reveal whether their belief has any relationship to the outcome of their IAT score.

Table 8 Type of data and range/categories of self-diagnosis of IA

Variables	Type of Data	Range/Categories
Self-diagnosis of addiction	Categorical – Dichotomous	No, I am not addicted Yes, I am addicted

Part 10: Internet Addiction Test (IAT)

Young's original IAT (English version) was used for this study. The instructions for this section was slightly modified to fit the context of Internet use through smartphones (see appendix for questionnaire). The IAT consists of 20 items that follow a 5-point, Likert-type format where 0 = does not apply, 1 = rarely, 2 = occasionally, 3 = frequently, 4 = often, and 5 = always. Scores can range from 0 to 100. Levels of addiction are separated into mild, moderate, and severe (Young, 1998). Those who score 20 – 39 points on the test fall under the category of mild addiction, meaning he/she is an average Internet user. Scoring 40 – 69 points means that he/she is experiencing occasional problems due to Internet use. People who score 70 – 100 points are having significant problems because of Internet usage (Widyanto et al., 2011). This instrument is both valid and reliable (Cronbach's $\alpha = 0.889$) (Constantinos C Frangos et al., 2012).

Table 9 Type of data and range/categories for IAT score

Variables	Type of Data	Range/Categories
IA level	Categorical – Ordinal	Mild (20 – 39) Moderate (40 – 69) Severe (70 – 100)

Part 11: Self-Reported Health Problems from Internet Use

In this section, the participants were inquired whether they have ever experienced eye strain, headache, inadequate sleep, and hand/wrist/arm cramping while or after using a smartphone in the past 30 days. In addition, a question asked if he/she experienced any accidents while on a smartphone (it could be as minor as tripping and falling or as major as a motor vehicle accident). The answer for each of the questions is either yes or no. An additional question asked how often he/she experiences these symptoms. Choices included: have not experienced, rarely, occasionally, and often.

Table 10 Type of data and range/categories for health problems from Internet use

Variables	Type of Data	Range/Categories
Eye strain Headache Inadequate sleep Hand/wrist/arm cramping Accidents	Categorical – Dichotomous	- No - Yes
	Categorical – Ordinal	- Have not experienced this in the past 30 days - Rarely - Occasionally - Often

Part 12: Alcohol and Substance Use

In this section, the participant was asked whether he/she ever used alcohol or tobacco in their lifetime as well as in the past 30 days. Some studies have found drug and alcohol use to be associated with IA—for example the study conducted by Yen et al. (2009). The questionnaire incorporated questions regarding substance use, as it is relevant to health outcomes and may be associated to Internet use.

Table 11 Type of data and range/categories for alcohol and substance use

Variables	Type of Data	Range/Categories
Alcohol Tobacco	Categorical – Dichotomous	No Yes

Validity

Content validity:

To determine whether the items in the questionnaire are of good quality—meaning that it measures the concept it is supposed to measure—the set of questions was handed to three specialists for review. Following Rovinelli and Hambleton's method of establishing content validity (Rovinelli & Hambleton, 1976), the specialists scored each of the items with either +1, 0, or -1. Items that comply with the concept (in other words, "clearly measuring") were given a score of +1. Items that the experts feel unsure of ("degree to which it measures the content area is unclear") received a score of 0. Items that are not related to concept whatsoever ("clearly not measuring") were given a score of -1. Item-objective congruence (IOC) was then calculated for each question by totaling the score and dividing it by the total number of experts. The equation for this is shown below. Questions with IOC greater than 0.5 are considered acceptable

(Brown, 1996; Pantahachart, 1998) and were kept. Items with an IOC of 0.5 or less are regarded as unacceptable and thus, rejected or adjusted according to the expert's comments.

IOC = $\sum \frac{R}{N}$

R = Total score (based on opinions of experts)

N = Number of experts

From this study, the average IOC for the IAT is 0.98. The overall content validity of this questionnaire is 0.96.

Reliability

To assess whether the instrument yields consistent results, it was piloted on 25 international students at a university of similar context. Items were modified based on comments. The Cronbach's α for the IAT is .936.

Data Analysis

Descriptive statistics was used to describe the socio-demographic characteristics of the sample, Internet usage pattern, IA level, and health problems. *Chi-square test* was used in determining whether an association between two categorical variables (nominal/ordinal) are of significance. The chi-square test, however, assumes that expected values in each cell is five or higher. Pooling the categories together and preforming chi-square would not work in some instance because cells still had an expected count less than 5. In this case, the *Fisher's exact test* was performed instead.

Ethical Consideration

Prior to conducting the study, the Ethics Review Committee at Chulalongkorn University evaluated and approved the research project, COA No. 126/2017 (for Certificate of Approval, see Appendix D).

Ethical Consideration for Participants:

The respondents were provided general information of the study's purpose, instructions, and what to expect from the study. Those who volunteered to partake in the research had to sign an electronic agreement form. Those who wish not to participate had the right to decline or withdraw from the study at any point. Identity are kept confidential and are not mentioned in

the paper. Results are used only for academic purposes, nothing else otherwise (for the electronic consent form, see Appendix C).

CHAPTER IV
RESULTS

The objective of this research was to assess IA level among international students at a university in Bangkok. The other objective was to determine health problems related to Internet use specifically through the smartphone. Moreover, this study sought to determine the association between IA level and health problems. Data regarding the socio-demographic characteristics of participants, the pattern of their Internet use (including activities, place, situation, frequency of use, and time spent), IA level, and self-reported health problems are presented in this chapter. Of the 650 emails sent, 360 responses were received, yielding a 55% response rate for the self-reported online questionnaire. The four individuals who selected "disagree" to participate were automatically dropped from the study. Two individuals answered "no" when asked whether they own a smartphone and so were removed as part of the exclusion criteria. There were three repeating entries which were removed as well. This left a total of 351 valid responses.

1. Socio-demographic characteristics

Table 1 Socio-demographic characteristics among international students (n = 351)

Characteristics	Males (n = 155) n (%)	Females (n = 196) n (%)
Age (years)		
18 – 26	82 (52.9)	111 (56.6)
27 – 54	73 (47.1)	85 (43.4)
Marital status		
Single	116 (74.8)	154 (78.6)
Married	37 (23.9)	40 (20.4)
Divorced	1 (0.6)	2 (1.0)
Widowed	1 (0.6)	0 (0.0)
Nationality (grouped by region)		
Africa	11 (7.1)	1 (0.5)
Americas	8 (5.2)	7 (3.6)
Asia		
- Eastern Asia	11 (7.1)	5 (2.6)
- Southeastern Asia	100 (64.5)	166 (84.7)

- Southern Asia	23 (14.8)	15 (7.7)
Europe	2 (1.3)	1 (0.5)
Oceania	0 (0.0)	1 (0.5)
Faculty/department		
Applied Sciences	74 (47.7)	75 (38.3)
Humanities	4 (2.6)	15 (7.7)
Social Sciences	44 (28.4)	71 (36.2)
Natural Sciences	9 (5.8)	11 (5.6)
Other	24 (15.5)	24 (12.2)
Level of education		
Undergraduate	61 (39.4)	80 (40.8)
Master	69 (44.5)	91 (46.4)
Ph.D.	20 (12.9)	20 (10.2)
Other (i.e. postdoc.)	5 (3.2)	5 (2.6)
Average GPA		
≤ 2.9	13 (8.4)	18 (9.2)
3.0 – 3.4	50 (32.3)	59 (30.1)
≥ 3.5	92 (59.4)	119 (60.7)
Monthly household income		
< 45,000 baht	60 (54.1)	69 (51.1)
≥ 45,000 baht	51 (45.9)	66 (48.9)
N/A	44	61

Of the 351 participating international students, 155 were male, and 196 were female. The socio-demographic characteristics of the study sample are shown in *Table 1*. The mean age of the international students was 26.8 years (*SD* ± 7.1). More than three-quarter of the participants were single. The vast majority of students were from Southeastern Asia, studying in the field of applied sciences, at the master's level, with an average GPA greater than or equal to 3.5. A little more than half of the participants had a monthly household income less than 45,000 baht.

2. Pattern of smartphone Internet use (separated by gender)

In this section, the pattern of smartphone Internet use is explored among gender groups. The part begins with Internet activities, then goes on to the situation, place, and frequency of use. The amount of time spent is later described in this segment. The section ends with a summary statement.

Table 2.1 Internet activities through the smartphone (n = 351)

Activities	Males (n = 155) n (%)	Females (n = 196) n (%)	*p*-value
Streaming music	130 (83.9)	164 (83.7)	.960
Watching videos online	136 (87.7)	159 (81.1)	.093
Seeking information online	151 (97.4)	189 (96.4)	.597
News and weather update	118 (76.1)	144 (73.5)	.570
Online shopping	52 (33.5)	99 (50.5)	**.001****
E-mailing	137 (88.4)	173 (88.3)	.972
Social networking	154 (99.4)	191 (97.4)	.171
Calling	136 (87.7)	180 (91.8)	.204
Texting/messaging	137 (88.4)	184 (93.9)	.068
Mobile social gaming	74 (47.7)	81 (41.3)	.229

Significant at ** $p < .01$

This study examined ten Internet-related activities a person may do through a smartphone (*Table 2.1*). In the self-reported online questionnaire, participants were asked whether they engaged in any of the ten activities. Social networking was the most popular activity among males (99.4%). The second most common activity was seeking information online (97.4%), while e-mailing and texting/messaging tied for third (88.4%). Online shopping had been the least done activity among males (33.5%). Similarly, for females, the top three activities were social networking (97.4%), seeking information online (96.4%), and texting/messaging (93.9%). The least done activity for them was, however, mobile social gaming (41.3%). In comparing the two groups, it may be observed that a greater percentage of males said to engage in music streaming, watching videos, seeking information, getting updates on new and weather, e-mailing, social networking, and mobile social gaming than females. Online shopping was found to be significantly associated with gender.

Table 2.2 Situation in which the Internet was used through the smartphone (n = 351)

Situation	Males (n = 155) n (%)	Females (n = 196) n (%)	*p*-value
Driving	33 (21.3)	33 (16.8)	.240
Doing work	99 (63.9)	120 (61.2)	
Doing homework	108 (69.7)	132 (67.3)	
Walking	35 (22.6)	37 (18.9)	
Eating	89 (57.4)	133 (67.9)	

All in all, over half of the participants reported to being preoccupied with the Internet through their smartphone while doing the following: work, homework, and eat (*Table 2.2*). The data shows that most of the male participants did their homework while they are on their smartphone (69.7%). Females typically use their smartphones while eating (67.3%). Using a smartphone while driving was the least reported among males and females (21.3% and 16.8% respectively).

Table 2.3 Place where Internet was most used through the smartphone (n = 351)

Place	Males (n = 155) n (%)	Females (n = 196) n (%)	*p*-value
Home	115 (74.2)	157 (80.1)	.419
School	24 (15.5)	23 (11.7)	
Workplace	16 (10.3)	16 (8.2)	

In this study, the participants were asked where, of the three listed places (home, school, and workplace), they mostly accessed the Internet through a smartphone (*Table 2.3*). The data shows that students, males and females alike, commonly accessed the Internet at home (74.2% and 80.1% respectively). Though, it may be observed that a greater percentage of females did so at home. The second most common place to use their smartphone was at school; more males were found to have done this than females (15.5% and 11.7% respectively). Workplace had been the least common place to use the Internet among both gender groups.

Table 2.4 Frequency of accessing the Internet through the smartphone per day (n = 351)

Frequency of accessing the Internet per day	Males (n = 155) n (%)	Females (n = 196) n (%)	*p*-value
At least one time	5 (3.2)	12 (6.1)	.394
2 to 4 times	38 (24.5)	42 (21.4)	
More than five times	112 (72.3)	142 (72.4)	

This study examined the number of times students accessed the Internet through their smartphones (*Table 2.4*). Most of the male participants go on their device five times or more per day (72.3%). The same was examined for the female participants (72.4%).

Table 2.5 Time spent on the Internet through the smartphone (n = 351)

Time spent on the Internet (hours/day)	Males (n = 155) n (%)	Females (n = 196) n (%)	*p*-value
Weekends			
< 1 hour	8 (5.2)	4 (2.0)	.096
1 – 2 hours	24 (15.5)	20 (10.2)	
3 – 4 hours	44 (28.3)	46 (23.5)	
5 – 6 hours	37 (23.9)	61 (31.1)	
≥ 7 hours	42 (27.1)	65 (33.2)	
Weekdays			
< 1 hour	11 (7.1)	11 (5.6)	.249
1 – 2 hours	38 (24.5)	33 (16.8)	
3 – 4 hours	55 (35.5)	69 (35.2)	
5 – 6 hours	23 (14.8)	43 (21.9)	
≥ 7 hours	28 (18.1)	40 (20.4)	

More students spent more hours on the Internet through their smartphones during the weekends than on the weekdays as a whole (*Table 2.5*). During the weekends, the majority of males spent three to four hours on their smartphones (28.3%). A fair number of them reported having spent seven or more hours (27.1%). On weekdays, most of them spent three to four hours (35.5%) or one to two hours (24.5%) on the Internet. Using the Internet for less than an hour was the least reported amount of time amongst them. As for females, most of them were found to have spent seven hours or more on their device during the weekends (33.2%). Many

females also reported to using the Internet via smartphone for five to six hours (31.1%). During the weekdays, they typically spent three to four hours (35.2%) or five to six hours (21.9%). Very few of them had reported using the Internet for less than one hour (5.6%). A Chi-square test of independence was performed to compare the proportion among groups. Between the males and the females of this study sample, there was no significant difference in the amount of time spent on the Internet through their smartphone.

Table 2.6 Smartphone screen size (n = 351)

Screen size (inches)	**Males (n = 155) n (%)**	**Females (n = 196) n (%)**
3.5	7 (4.5)	2 (1.0)
4.0	20 (12.9)	44 (22.4)
4.7	39 (25.2)	62 (31.6)
5.1	24 (15.5)	29 (14.8)
5.5	47 (30.3)	40 (20.4)
5.7	18 (11.6)	17 (8.7)
Other	0 (0.0)	2 (1.0)

Table 2.6 shows the ownership of different smartphone sizes. Nearly one-third (30.3%) of the male participants owned a smartphone with a display of approximately 5.5 inches. As for the majority of female participants, 31.6% of them used a smartphone with a screen size of 4.7 inches.

The patterns for smartphone Internet use among gender groups were addressed in this section. To summarize, the male participants commonly engaged in social networking and seeking information through their smartphone, primarily at home, while doing homework. They tend to access the Internet five times or more and spend up to four hours per day. Female participants mostly engaged in social networking and seeking information on the Internet, while they are at home, and when they are usually eating. Accessing the Internet was frequently done among the female participants—many going on it five times or more in a day. They mostly spend four hours on the smartphone daily and may spend up to seven hours or more during the weekends. As a whole, females spend more time on their smartphones than males.

3. Pattern of smartphone Internet use (separated by age)

In this section, the pattern of smartphone Internet use is explored among age groups. This segment consists descriptions of Internet activities, the situation, place, and frequency of use and the amount of time spent. A summary statement concludes the section.

Table 3.1 Internet activities through the smartphone (n = 351)

Activities	18 – 26 years of age (n = 193) n (%)	27 – 54 years of age (n = 158) n (%)	*p*-value
Streaming music	170 (88.1)	124 (78.5)	.960
Watching videos online	169 (87.6)	126 (79.7)	.093
Seeking information online	188 (97.4)	152 (96.2)	.597
News and weather update	135 (69.9)	127 (80.4)	.570
Online shopping	103 (53.4)	48 (30.4)	**.001****
E-mailing	160 (82.9)	150 (94.9)	.972
Social networking	191 (99.0)	154 (97.5)	.171
Calling	171 (88.6)	145 (91.8)	.204
Texting/messaging	180 (93.3)	141 (89.2)	.068
Mobile social gaming	89 (46.1)	66 (41.8)	.229

Significant at ***p* < .01

In the self-reported online questionnaire, participants were asked whether they engaged in any of the ten identified Internet-related smartphone activities. *Table 3.1* displays the number of students who reported to doing each of these activities. Among the younger age group (18 to 26 years), social networking was the most popular (99.0%). The second and third were seeking information online (97.4%) and texting/messaging (93.3%). Mobile social gaming had been the least reported activity by this group interestingly (46.1%). As for students in the older age group (27 to 54 years), the vast majority reported to taking up on social networking through their smartphones (97.5%). A number of them also reported to seeking information (96.2%) online and e-mailing (94.9%). Online shopping was the least done activity among them (30.4%). When comparing the two age groups and how many reported to doing which activities, it may be observed that a greater percentage of students in the younger age group said to engage in music streaming, video viewing, information seeking, online shopping, social networking, texting/messaging, and mobile social gaming. Online shopping was found to be significantly

Table 3.2 Situation in which the Internet was used through the smartphone (n = 351)

Situation	18 – 26 years of age (n = 193) n (%)	27 – 54 years of age (n = 158) n (%)	*p*-value
Driving	38 (19.7)	29 (18.4)	**.000*** **
Doing work	108 (56.0)	112 (70.9)	
Doing homework	154 (79.8)	88 (55.7)	
Walking	45 (23.3)	28 (17.7)	
Eating	141 (73.1)	83 (52.5)	

Significant at ***$p < .001$

This study looked at five common everyday life situations students may find themselves in when preoccupied with the Internet through their smartphone (*Table 3.2*). The majority of students, 18 to 26 years of age, reported using their smartphones when doing homework (79.8%) and while eating (73.1%). However, most of the students aged 27 to 54 years reported going on their smartphones while doing work (70.9%) and homework (55.7%). Using a smartphone while driving was the least reported situation by both the younger and older age groups (19.7% and 18.4% respectively). A significant association was found between age group and situation of smartphone use.

Table 3.3 Place where Internet was most used through the smartphone (n = 351)

Place	18 – 26 years of age (n = 193) n (%)	27 – 54 years of age (n = 158) n (%)	*p*-value
Home	152 (78.8)	120 (75.9)	**.002** **
School	32 (16.6)	15 (9.5)	
Workplace	9 (4.7)	23 (14.6)	

Significant at **$p < .01$

Table 3.3 presents information on where students mostly used the Internet. According to the data, participants of both the younger and older age groups typically accessed the Internet through their smartphone at home (78.8% and 75.9% respectively). The second most common place for students of the younger age group to use their smartphones was at school. However, for students aged 27 to 54, workplace came second to home.

Table 3.4 Frequency of accessing the Internet through the smartphone per day (n = 351)

Frequency of accessing the Internet per day	18 – 26 years of age (n = 193) n (%)	27 – 54 years of age (n = 158) n (%)	*p*-value
At least one time	10 (5.2)	7 (4.4)	.947
2 to 4 times	44 (22.8)	36 (22.8)	
More than five times	139 (72.0)	115 (72.8)	

Data on the frequency of access among students is presented in *Table 3.4*. Participants in both age groups, young and old alike, mainly accessed the Internet through their smartphone five or more times per day (72.0% and 72.8 % respectively).

Table 3.5 Time spent on the Internet through the smartphone (n = 351)

Time spent on the Internet (hours/day)	18 – 26 years of age (n = 193) n (%)	27 – 54 years of age (n = 158) n (%)	*p*-value
Weekends			
< 1 hour	5 (2.6)	7 (4.4)	.053
1 – 2 hours	18 (9.3)	26 (16.5)	
3 – 4 hours	48 (24.9)	42 (26.6)	
5 – 6 hours	52 (26.9)	46 (29.6)	
≥ 7 hours	70 (36.3)	37 (23.4)	
Weekdays			
< 1 hour	11 (5.7)	11 (7.0)	.266
1 – 2 hours	34 (17.6)	37 (23.4)	
3 – 4 hours	68 (35.2)	56 (35.4)	
5 – 6 hours	35 (18.1)	31 (19.6)	
≥ 7 hours	45 (23.3)	23 (14.6)	

In examining the data, overall, students from both age groups were found to have spent more time on the Internet through their smartphones during the weekends than the weekdays (*Table 3.5*). More than a third of students, 18 to 26 years of age, spent seven or more hours on the Internet through their smartphone during a weekend (36.3%). Roughly a quarter of them were preoccupied on their devices for five to six hours (26.9%). During the weekdays, many students from the younger age group spent three to four hours (35.2%). A number of them reported having spent seven hours or more (23.3%). As for students aged 27 to 54, the majority

said to have spent five to six hours on their smartphones during the weekend (29.6%). Many also reported to spending three to four hours (26.6%). For weekdays, students of the older age group were primarily occupied on the Internet for three to four hours daily (35.4%). Several of them reported to spending only one to two hours (23.4%). There was no significant difference in the amount of time spent on the Internet between the two age groups of this study sample.

This section presented a comparison of Internet usage patterns across two age groups. Patterns consisted of Internet activities students did on their smartphones, situation, and place in which the Internet was most used through the device, frequency, and time spent. In summary, students in the younger age group predominately engaged in social networking and information seeking. They mostly reported having frequently access the Internet five or more times a day, while at home and doing homework. More time was spent on the Internet during a weekend than a weekday. The majority of them spent seven or more hours on a Saturday and Sunday. Students from the older age group were commonly engaged in social networking and information seeking. They frequently accessed the Internet when at home or while doing work. During the weekends, they typically spent five to six hours on their smartphone. Less time was spent during the weekdays. As a whole, students from the younger group spent more time on their devices.

4. IA Level

Table 4 Socio-demographic characteristics and IA level (n = 351)

Characteristics	Males (n = 155) n (%)				Females (n = 196) n (%)			
	Normal (n = 29)	Mild (n = 72)	Moderate (n = 51)	Severe (n = 3)	Normal (n = 41)	Mild (n = 82)	Moderate (n = 67)	Severe (n = 6)
Age (years)								
18 – 26	7 (24.1)	45 (62.5)	28 (54.9)	2 (66.7)	20 (48.8)	46 (56.1)	41 (61.2)	4 (66.7)
27 – 54	22 (75.9)	27 (37.5)	23 (45.1)	1 (33.3)	21 (51.2)	36 (43.9)	26 (38.8)	2 (33.3)
Level of education								
Undergraduate	7 (24.1)	32 (44.4)	21 (41.2)	1 (33.3)	12 (29.3)	35 (42.7)	29 (43.3)	4 (66.7)
Master	15 (51.7)	27 (37.5)	25 (49.0)	2 (66.7)	17 (41.5)	39 (47.6)	33 (49.3)	2 (33.3)
Ph.D.	6 (20.7)	9 (12.5)	5 (9.8)	0 (0.0)	11 (26.8)	6 (7.3)	3 (4.5)	0 (0.0)
Other (i.e. postdoc.)	1 (3.4)	4 (5.6)	0 (0.0)	0 (0.0)	1 (2.4)	2 (2.4)	2 (3.0)	0 (0.0)
Average GPA								
≤ 2.9	2 (6.9)	5 (6.9)	5 (9.8)	1 (33.3)	6 (14.6)	6 (7.3)	4 (6.0)	2 (33.3)
3.0 – 3.4	5 (17.2)	25 (34.7)	19 (37.3)	1 (33.3)	5 (12.2)	25 (30.5)	26 (38.8)	3 (50.0)
≥ 3.5	22 (75.9)	42 (58.3)	27 (52.9)	1 (33.3)	30 (73.2)	51 (62.2)	37 (55.2)	1 (16.7)
Monthly household income								
< 45,000 baht	8 (47.0)	29 (60.4)	21 (48.8)	2 (66.7)	19 (61.3)	20 (40.8)	29 (56.9)	1 (25.0)
≥ 45,000 baht	9 (52.9)	19 (39.6)	22 (51.2)	1 (33.3)	12 (38.7)	29 (59.2)	22 (43.1)	3 (75.0)
N/A	12	24	8	0	10	33	16	2

In this study, young's IAT was used to measure IA level. The test consisted of 20 questions with a score that may range from 0 to 100. Levels of addiction were separated into four categories: normal, mild, moderate and severe. Those who scored below 20 points were categorized as normal with no indication of addiction. Those who scored 20 – 39 points were in the mild group and were considered the average Internet user. Scoring 40 – 69 points meant they were moderately addicted to the Internet and that they may be experiencing problems on occasions. And lastly, those who scored 70 – 100 points fell into the group of severe addiction, which indicates that they may perhaps have significant problems because of Internet use. As a whole, 43.9% of the participants were found to have mild IA, 33.6% moderate, and 2.6% severe. In examining the socio-demographic characteristics among the international students and IA level, it was found that a greater portion of male students, aged 18 to 26, fell in the mild IA group (62.5%) as opposed to the moderate group (54.9%) (*Table 4*). However, there were more male students, aged 27 to 54, in the moderate group (45.1%) than the mild group (37.5%).

In terms of education level, there was a higher proportion of master's student in the moderate (49.0%) and severe IA category (66.7%) than in other study levels for males. Regarding average GPA, the percentage of students with an average of 3.5 and greater were found to decrease in each of the IA categories as IA severity increase. As for the female participants, there were more students, aged 18 to 26, who belonged to the moderate IA group (61.2%) than the mild group (56.1%). Conversely, more female students, aged 27 to 54, were found be in the mild group (43.9%) than in the moderate group (38.8%). In examining education level, the portion of female undergraduate students in each the IA categories increased with IA severity. Regarding average GPA, for students in the range of 3.0 to 3.4, the proportion of students in each IA category were shown to increase as IA level increase. For students with an average GPA of 3.5 and above, it was the opposite. No apparent trend was found between monthly household income and IA level.

5. IA Level (separated by gender)

In this section, IA level is examined across gender groups. The section consists of an account on IA self-diagnosis, the association of IA level with gender, time spent on smartphone Internet-related activities, and frequency of Internet access. IA level and the amount of time spent during the weekend and weekdays are also presented in this section.

Table 5.1 Self-diagnosis of IA (n = 351)

Self-diagnosis of IA	Males (n = 155) n (%)	Females (n = 196) n (%)
No, I am not addicted	69 (44.5)	84 (42.9)
Yes, I am addicted	86 (55.5)	112 (57.1)

In this study, participants were asked if they thought themselves to be addicted to using the Internet through their smartphones (*Table 5.1*). Altogether, more than half of the participants believed they were addicted. Slightly more females (57.1%) thought they were addicted compared to their male counterparts (55.5%).

Table 5.2 IA level by gender (n = 351)

IA level	Males (n = 155) n (%)	Females (n = 196) n (%)
Normal	29 (18.7)	41 (20.9)
Mild	72 (46.5)	82 (41.8)
Moderate	51 (32.9)	67 (34.2)
Severe	3 (1.9)	6 (3.1)

Table 5.2 shows the prevalence of IA across gender groups. There were slightly more female participants in the moderate (34.2%) and severe (3.1%) categories than males (32.9% and 1.9% respectively).

Table 5.3 Time spent on a particular smartphone Internet activity during the weekends and IA level (n = 351)

Time spent on activity (hours/day)	Males (n = 155) n (%)				Females (n = 196) n (%)			
	IA level				IA level			
	Normal (n = 29)	Mild (n = 72)	Moderate (n = 51)	Severe (n = 3)	Normal (n = 41)	Mild (n = 82)	Moderate (n = 67)	Severe (n = 6)
Streaming music								
< 1 hour	16 (55.2)	25 (34.7)	18 (35.3)	1 (33.3)	15 (36.6)	40 (48.8)	19 (28.4)	1 (16.7)
1 – 2 hours	6 (20.7)	25 (34.7)	16 (31.4)	1 (33.3)	15 (36.6)	21 (25.6)	21 (31.3)	1 (16.7)
3 – 4 hours	6 (20.7)	16 (22.2)	8 (15.7)	0 (0.0)	6 (14.6)	15 (18.3)	12 (17.9)	1 (16.7)
5 – 6 hours	1 (3.4)	3 (4.2)	5 (9.8)	0 (0.0)	2 (4.9)	3 (3.7)	10 (14.9)	3 (50.0)
≥ 7 hours	0 (0.0)	3 (4.2)	4 (7.8)	1 (33.3)	3 (7.3)	3 (3.7)	5 (7.5)	0 (0.0)
Watching videos online								
< 1 hour	16 (55.2)	28 (38.9)	10 (19.6)	1 (33.3)	17 (41.5)	36 (43.9)	20 (29.9)	1 (16.7)
1 – 2 hours	7 (24.1)	18 (25.0)	20 (39.2)	1 (33.3)	12 (29.3)	14 (17.1)	18 (26.9)	2 (33.3)
3 – 4 hours	4 (13.8)	20 (27.8)	13 (25.5)	0 (0.0)	9 (22.0)	22 (26.8)	17 (25.4)	1 (16.7)
5 – 6 hours	1 (3.4)	4 (5.6)	4 (7.8)	0 (0.0)	2 (4.9)	8 (9.8)	8 (11.9)	1 (16.7)
≥ 7 hours	1 (3.4)	2 (2.8)	4 (7.8)	1 (33.3)	1 (2.4)	2 (2.4)	4 (6.0)	1 (16.7)
Seeking information online								
< 1 hour	18 (62.1)	34 (47.2)	12 (23.5)	0 (0.0)	16 (39.0)	28 (34.1)	27 (40.3)	1 (16.7)
1 – 2 hours	7 (24.1)	22 (30.6)	24 (47.1)	2 (66.7)	15 (36.6)	32 (39.0)	16 (23.9)	4 (66.7)
3 – 4 hours	4 (13.8)	15 (20.8)	12 (23.5)	0 (0.0)	9 (22.0)	20 (24.4)	17 (25.4)	0 (0.0)
5 – 6 hours	0 (0.0)	1 (1.4)	2 (3.9)	0 (0.0)	1 (2.4)	2 (2.4)	7 (10.4)	1 (16.7)
≥ 7 hours	0 (0.0)	0 (0.0)	1 (2.0)	1 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

News and weather update								
< 1 hour	16 (55.2)	52 (72.2)	37 (72.5)	1 (33.3)	24 (62.5)	59 (67.8)	53 (79.1)	4 (66.7)
1 – 2 hours	6 (20.7)	14 (19.4)	9 (17.6)	1 (33.3)	12 (29.3)	17 (20.7)	11 (16.4)	2 (33.3)
3 – 4 hours	5 (17.2)	3 (4.2)	5 (9.8)	0 (0.0)	4 (9.8)	4 (4.9)	2 (3.0)	0 (0.0)
5 – 6 hours	1 (3.4)	1 (1.4)	0 (0.0)	1 (33.3)	1 (2.4)	2 (2.4)	1 (1.5)	0 (0.0)
≥ 7 hours	1 (3.4)	2 (2.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Online shopping								
< 1 hour	27 (93.1)	63 (87.5)	46 (90.2)	1 (33.3)	35 (85.4)	63 (76.8)	45 (67.2)	3 (50.0)
1 – 2 hours	1 (3.4)	4 (5.6)	3 (5.9)	2 (66.7)	4 (9.8)	15 (18.3)	12 (17.9)	1 (16.7)
3 – 4 hours	1 (3.4)	4 (5.6)	2 (3.9)	0 (0.0)	2 (4.9)	3 (3.7)	6 (9.0)	0 (0.0)
5 – 6 hours	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.2)	4 (6.0)	1 (16.7)
≥ 7 hours	0 (0.0)	1 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (16.7)
E-mailing								
< 1 hour	21 (72.4)	55 (76.4)	32 (62.7)	0 (0.0)	31 (75.6)	44 (53.7)	49 (73.1)	5 (83.3)
1 – 2 hours	4 (13.8)	11 (15.3)	12 (23.5)	2 (66.7)	8 (19.5)	26 (31.7)	15 (22.4)	0 (0.0)
3 – 4 hours	3 (10.3)	3 (4.2)	5 (9.8)	0 (0.0)	2 (4.9)	8 (9.8)	2 (3.0)	0 (0.0)
5 – 6 hours	0 (0.0)	3 (4.2)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.4)	1 (1.5)	1 (16.7)
≥ 7 hours	1 (3.4)	0 (0.0)	2 (3.9)	1 (33.3)	0 (0.0)	2 (2.4)	0 (0.0)	0 (0.0)
Social networking								
< 1 hour	9 (31.0)	10 (13.9)	3 (5.9)	0 (0.0)	8 (19.5)	11 (13.4)	5 (7.5)	0 (0.0)
1 – 2 hours	6 (20.7)	27 (37.5)	14 (27.5)	0 (0.0)	11 (26.8)	20 (24.4)	13 (19.4)	1 (16.7)
3 – 4 hours	9 (31.0)	18 (25.0)	21 (41.2)	2 (66.7)	14 (34.1)	25 (30.5)	17 (25.4)	0 (0.0)
5 – 6 hours	4 (13.8)	13 (18.1)	6 (11.8)	0 (0.0)	5 (12.2)	18 (22.0)	17 (25.4)	0 (0.0)
≥ 7 hours	1 (3.4)	4 (5.6)	7 (13.7)	1 (33.3)	3 (7.3)	8 (9.8)	15 (22.4)	5 (83.3)

Calling								
< 1 hour	18 (62.1)	42 (58.3)	22 (43.1)	0 (0.0)	23 (56.1)	42 (51.2)	29 (43.3)	2 (33.3)
1 – 2 hours	10 (34.5)	18 (25.0)	12 (23.5)	1 (33.3)	12 (29.3)	22 (26.8)	14 (20.9)	0 (0.0)
3 – 4 hours	1 (3.4)	7 (9.7)	15 (29.4)	1 (33.3)	3 (7.3)	10 (12.2)	18 (26.9)	1 (16.7)
5 – 6 hours	0 (0.0)	4 (5.6)	2 (3.9)	1 (33.3)	2 (4.9)	5 (6.1)	3 (4.5)	2 (33.3)
≥ 7 hours	0 (0.0)	1 (1.4)	0 (0.0)	0 (0.0)	1 (2.4)	3 (3.7)	3 (4.5)	1 (16.7)
Texting/messaging								
< 1 hour	16 (55.2)	37 (51.4)	16 (31.4)	1	14 (34.1)	33 (40.2)	23 (34.3)	2 (33.3)
1 – 2 hours	5 (17.2)	19 (26.4)	18 (35.3)	1 (33.3)	16 (39.0)	24 (29.3)	12 (17.9)	0 (0.0)
3 – 4 hours	7 (24.1)	9 (12.5)	13 (25.5)	1 (33.3)	10 (24.4)	15 (18.3)	16 (23.9)	1 (16.7)
5 – 6 hours	0 (0.0)	4 (5.6)	2 (3.9)	0 (0.0)	1 (2.4)	7 (8.5)	8 (11.9)	0 (0.0)
≥ 7 hours	1 (3.4)	3 (4.2)	2 (3.9)	0 (0.0)	0 (0.0)	3 (3.7)	8 (11.9)	3 (50.0)
Mobile social gaming								
< 1 hour	26 (89.7)	47 (65.3)	31 (60.8)	2	34 (82.9)	55 (67.1)	52 (77.6)	5 (83.3)
1 – 2 hours	2 (6.9)	12 (16.7)	6 (11.8)	0 (0.0)	4 (9.8)	15 (18.3)	12 (17.9)	1 (16.7)
3 – 4 hours	0 (0.0)	5 (6.9)	10 (19.6)	0 (0.0)	3 (7.3)	11 (13.4)	3 (4.5)	0 (0.0)
5 – 6 hours	0 (0.0)	3 (4.2)	4 (7.8)	1 (33.3)	0 (0.0)	1 (1.2)	0 (0.0)	0 (0.0)
≥ 7 hours	1 (3.4)	5 (6.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table 5.3 presents the amounts of time spent on a particular smartphone Internet activity during the *weekends* and IA level. The activity that many males spent five or more hour on was social networking. For the female respondents, the activity that most of them spent extended hours on was social networking.

Table 5.4 Time spent on a particular smartphone Internet activity during the weekdays and IA level (n = 351)

Time spent on activity (hours/day)	Males (n = 155) n (%)				Females (n = 196) n (%)			
	IA level				IA level			
	Normal (n = 29)	Mild (n = 72)	Moderate (n = 51)	Severe (n = 3)	Normal (n = 41)	Mild (n = 82)	Moderate (n = 67)	Severe (n = 6)
Streaming music								
< 1 hour	19 (65.5)	34 (47.2)	21 (41.2)	1 (33.3)	16 (39.0)	41 (50.0)	27 (40.3)	0 (0.0)
1 – 2 hours	6 (20.7)	23 (31.9)	16 (31.4)	1 (33.3)	15 (36.6)	31 (37.8)	20 (29.9)	1 (16.7)
3 – 4 hours	4 (13.8)	8 (11.1)	11 (21.6)	0 (0.0)	7 (17.1)	9 (11.0)	12 (17.9)	5 (83.3)
5 – 6 hours	0 (0.0)	4 (5.6)	2 (3.9)	0 (0.0)	1 (2.4)	1 (1.2)	8 (11.9)	0 (0.0)
≥ 7 hours	0 (0.0)	3 (4.2)	1 (2.0)	1 (33.3)	2 (4.9)	0 (0.0)	2 (3.0)	0 (0.0)
Watching videos online								
< 1 hour	19 (65.5)	40 (55.6)	18 (35.3)	0 (0.0)	20 (48.8)	40 (48.8)	24 (35.8)	2 (33.3)
1 – 2 hours	6 (20.7)	19 (26.4)	21 (41.2)	1 (33.3)	16 (39.0)	29 (35.4)	25 (37.3)	2 (33.3)
3 – 4 hours	3 (10.3)	10 (13.9)	10 (19.6)	1 (33.3)	4 (9.8)	12 (14.6)	13 (19.4)	1 (16.7)
5 – 6 hours	0 (0.0)	1 (1.4)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (3.0)	0 (0.0)
≥ 7 hours	1 (3.4)	2 (2.8)	1 (2.0)	1 (33.3)	1 (2.4)	1 (1.2)	3 (4.5)	1 (16.7)
Seeking information online								
< 1 hour	21 (72.4)	43 (59.7)	21 (41.2)	1 (33.3)	17 (41.5)	38 (46.3)	29 (43.3)	1 (16.7)
1 – 2 hours	7 (24.1)	17 (23.6)	20 (39.2)	1 (33.3)	17 (41.5)	36 (43.9)	25 (37.3)	4 (66.7)
3 – 4 hours	1 (3.4)	11 (15.3)	9 (17.6)	0 (0.0)	7 (17.1)	7 (8.5)	12 (17.9)	1 (16.7)
5 – 6 hours	0 (0.0)	1 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.2)	1 (1.5)	0 (0.0)
≥ 7 hours	0 (0.0)	0 (0.0)	1 (2.0)	1 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

News and weather update								
< 1 hour	21 (72.4)	51 (70.8)	36 (70.6)	1 (33.3)	25 (61.0)	66 (80.5)	55 (82.1)	5 (83.3)
1 – 2 hours	5 (17.2)	16 (22.2)	14 (27.5)	1 (33.3)	11 (29.8)	13 (15.9)	9 (13.4)	1 (16.7)
3 – 4 hours	1 (3.4)	3 (4.2)	1 (2.0)	0 (0.0)	4 (9.8)	3 (3.7)	2 (3.0)	0 (0.0)
5 – 6 hours	1 (3.4)	1 (1.4)	0 (0.0)	0 (0.0)	1 (2.4)	0 (0.0)	1 (1.5)	0 (0.0)
≥ 7 hours	1 (3.4)	1 (1.4)	0 (0.0)	1 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Online shopping								
< 1 hour	28 (96.6)	64 (88.9)	48 (94.1)	1 (33.3)	35 (85.4)	70 (85.4)	50 (74.6)	3 (50.0)
1 – 2 hours	1 (3.4)	5 (6.9)	2 (3.9)	2 (66.7)	5 (12.2)	12 (14.6)	12 (17.9)	1 (16.7)
3 – 4 hours	0 (0.0)	2 (2.8)	1 (2.0)	0 (0.0)	1 (2.4)	0 (0.0)	4 (6.0)	1 (16.7)
5 – 6 hours	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0	0 (0.0)	0 (0.0)	1 (1.5)	0 (0.0)
≥ 7 hours	0 (0.0)	1 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (16.7)
E-mailing								
< 1 hour	21 (72.4)	50 (69.4)	31 (60.8)	1 (33.3)	29 (70.7)	45 (54.9)	50 (74.6)	4 (66.7)
1 – 2 hours	5 (17.2)	13 (18.1)	13 (25.5)	1 (33.3)	10 (24.4)	24 (29.3)	13 (19.4)	2 (33.3)
3 – 4 hours	3 (10.3)	5 (6.9)	5 (9.8)	0 (0.0)	1 (2.4)	8 (9.8)	3 (4.5)	0 (0.0)
5 – 6 hours	0 (0.0)	4 (5.6)	0 (0.0)	0 (0.0)	1 (2.4)	1 (1.2)	1 (1.5)	0 (0.0)
≥ 7 hours	0 (0.0)	0 (0.0)	2 (3.9)	1 (33.3)	0 (0.0)	4 (4.9)	0 (0.0)	0 (0.0)
Social networking								
< 1 hour	11 (37.9)	17 (23.6)	2 (3.9)	0 (0.0)	10 (24.4)	16 (19.5)	4 (6.0)	1 (16.7)
1 – 2 hours	10 (34.5)	31 (43.1)	22 (43.1)	0 (0.0)	11 (26.8)	33 (40.2)	20 (29.9)	0 (0.0)
3 – 4 hours	6 (20.7)	15 (20.8)	19 (37.3)	2 (66.7)	14 (34.1)	19 (23.2)	24 (35.8)	2 (33.3)
5 – 6 hours	2 (6.9)	5 (6.9)	3 (5.9)	0 (0.0)	6 (14.6)	11 (13.4)	13 (19.4)	1 (16.7)
≥ 7 hours	0 (0.0)	4 (5.6)	5 (9.8)	1 (33.3)	0 (0.0)	3 (3.7)	6 (9.0)	2 (33.3)

Calling								
< 1 hour	22 (75.9)	40 (55.6)	25 (49.0)	0 (0.0)	26 (63.4)	52 (63.4)	31 (4.6)	1 (16.7)
1 – 2 hours	6 (20.7)	25 (34.7)	16 (31.4)	2 (66.7)	10 (24.4)	16 (19.5)	20 (29.9)	1 (16.7)
3 – 4 hours	1 (3.4)	4 (5.6)	9 (17.6)	0 (0.0)	4 (9.8)	11 (13.4)	13 (19.4)	2 (33.3)
5 – 6 hours	0 (0.0)	3 (4.2)	1 (2.0)	1 (33.3)	1 (2.4)	1 (1.2)	1 (1.5)	1 (16.7)
≥ 7 hours	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.4)	2 (3.0)	1 (16.7)
Texting/messaging								
< 1 hour	17 (58.6)	38 (52.8)	17 (33.3)	1 (33.3)	18 (43.9)	37 (45.1)	23 (34.3)	2 (33.3)
1 – 2 hours	5 (17.2)	21 (29.2)	24 (47.1)	1 (33.3)	12 (29.3)	29 (35.4)	20 (29.9)	0 (0.0)
3 – 4 hours	6 (20.7)	9 (12.5)	7 (13.7)	1 (33.3)	9 (22.0)	13 (15.9)	12 (17.9)	1 (16.4)
5 – 6 hours	0 (0.0)	1 (1.4)	2 (3.9)	0 (0.0)	1 (2.4)	3 (15.9)	9 (13.4)	3 (50.0)
≥ 7 hours	1 (3.4)	3 (4.2)	1 (2.0)	0 (0.0)	1 (2.4)	0 (3.7)	3 (4.5)	0 (0.0)
Mobile social gaming								
< 1 hour	27 (93.1)	54 (75.0)	32 (62.7)	2 (66.7)	34 (82.9)	62 (75.6)	55 (82.1)	6 (100.0)
1 – 2 hours	1 (3.4)	7 (9.7)	9 (17.6)	0 (0.0)	7 (17.1)	16 (19.5)	9 (13.4)	0 (0.0)
3 – 4 hours	0 (0.0)	5 (6.9)	9 (17.6)	0 (0.0)	0 (0.0)	4 (4.9)	3 (4.5)	0 (0.0)
5 – 6 hours	1 (3.4)	0 (0.0)	0 (0.0)	1 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
≥ 7 hours	0 (0.0)	6 (8.3)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table 5.4 shows the association between times spent on a particular smartphone Internet activity during the *weekdays* and IA level. Males who spent more time on activities like social networking, calling, and mobile social gaming seemed to have higher IA level. For the female participants, those who spent more time on activities like streaming music, social networking, and texting/messaging tended to have higher level of IA.

Table 5.5 Frequency of Internet access through a smartphone and IA level (n = 351)

Frequency of accessing the Internet per day	Males (n = 155) n (%)				Females (n = 196) n (%)			
	IA level				IA level			
	Normal (n = 29)	Mild (n = 72)	Moderate (n = 51)	Severe (n = 3)	Normal (n = 41)	Mild (n = 82)	Moderate (n = 67)	Severe (n = 6)
At least one time	1 (3.4)	2 (2.8)	1 (2.0)	1 (33.3)	3 (7.3)	6 (7.3)	2 (3.0)	1 (16.7)
2 to 4 times	7 (24.1)	20 (27.8)	11 (21.6)	0 (0.0)	15 (36.6)	20 (24.4)	7 (10.4)	0 (0.0)
More than five times	21 (72.4)	50 (69.4)	39 (76.5)	2 (66.7)	23 (56.1)	56 (68.3)	58 (86.6)	5 (83.3)

This study investigated the relationship between the frequency of Internet access and IA level (*Table 5.5*). The majority of male participants accessed the Internet five or more times per day and had mild IA (32.3%). For the female student, the majority of them also accessed the Internet five or more times per day but had moderate IA (29.6%).

Table 5.6 Time spent on the Internet through the smartphone and IA level (n = 351)

Time spent on the Internet (hours/day)	Males (n = 155) n (%)				Females (n = 196) n (%)			
	IA level				IA level			
	Normal (n = 29)	Mild (n = 72)	Moderate (n = 51)	Severe (n = 3)	Normal (n = 41)	Mild (n = 82)	Moderate (n = 67)	Severe (n = 6)
Weekends								
< 1 hour	6 (20.7)	1 (1.4)	1 (2.0)	0 (0.0)	1 (2.4)	3 (3.7)	0 (0.0)	0 (0.0)
1 – 2 hours	7 (24.1)	14 (19.4)	3 (5.9)	0 (0.0)	7 (17.1)	9 (11.0)	4 (6.0)	0 (0.0)
3 – 4 hours	9 (31.0)	22 (30.6)	13 (25.5)	0 (0.0)	10 (24.4)	23 (28.0)	13 (19.4)	0 (0.0)
5 – 6 hours	4 (13.8)	16 (22.2)	16 (31.4)	1 (33.3)	11 (26.8)	25 (30.5)	24 (35.8)	1 (16.7)
≥ 7 hours	3 (10.3)	19 (26.4)	18 (35.3)	2 (66.7)	12 (29.3)	22 (26.8)	26 (38.8)	5 (83.3)
Weekdays								
< 1 hour	5 (17.2)	4 (5.6)	2 (3.9)	0 (0.0)	3 (7.3)	8 (9.8)	0 (0.0)	0 (0.0)
1 – 2 hours	9 (31.0)	20 (27.8)	9 (17.6)	0 (0.0)	9 (22.0)	15 (18.3)	9 (13.4)	0 (0.0)
3 – 4 hours	11 (37.9)	24 (33.3)	20 (39.2)	0 (0.0)	11 (26.8)	30 (36.6)	26 (38.8)	2 (33.3)
5 – 6 hours	2 (6.9)	11 (15.3)	9 (17.6)	1 (33.3)	10 (24.4)	15 (18.3)	18 (26.9)	0 (0.0)
≥ 7 hours	2 (6.9)	13 (18.1)	11 (21.6)	2 (66.7)	8 (19.5)	14 (17.1)	14 (20.9)	4 (66.7)

The majority of students who fell in the normal and mild IA category generally spent approximately three to four hours per day on the Internet through their smartphones (Table 5.6). In contrast, the majority of students with severe IA tended to take up seven hours or more.

Data on IA level across gender groups were presented in this section. This study found that more female participants initially thought they were addicted to the Internet compared to their male counterparts. The result was a reflection of that; a higher proportion of females were moderately and severely addicted than males. The majority of males access their smartphones five or more times in a day. A large proportion of females accessed the Internet five times or more a day. Females, all in all, spent more time on the Internet through their smartphones than males, both during the weekend and weekday.

6. IA level (separated by age)

IA level is examined across age groups in this section. Information on IA self-diagnosis, the association between IA level and age group, time spent on smartphone Internet activities, and frequency of Internet access are presented here. The relationship between IA level and the amount of time spent during the weekend and weekdays among age groups are also shown.

Table 6.1 IA level by age group (n = 351)

IA level	18 – 26 years of age (n = 193) n (%)	27 – 54 years of age (n = 158) n (%)
Normal	27 (14.0)	43 (27.2)
Mild	91 (47.2)	63 (39.9)
Moderate	69 (35.8)	49 (31.0)
Severe	6 (3.1)	3 (1.9)

In comparing the groups by age, there were more students, 18 to 26 years of age, who had moderate (35.8%) and severe (3.1%) addiction than students who were aged 27 to 54 (31.0% and 1.9% respectively) (*Table 6.1*).

Table 6.2 Time spent on a particular smartphone Internet activity during the weekends and IA level (n = 351)

Time spent on activity (hours/day)	18 – 26 years of age (n = 193) n (%)				27 – 54 years of age (n = 158) n (%)			
	IA level				IA level			
	Normal (n = 27)	Mild (n = 91)	Moderate (n = 69)	Severe (n = 6)	Normal (n = 43)	Mild (n = 63)	Moderate (n = 49)	Severe (n = 3)
Streaming music								
< 1 hour	7 (25.9)	28 (30.8)	20 (29.0)	1 (1.7)	24 (55.8)	37 (58.7)	17 (34.7)	1 (33.3)
1 – 2 hours	12 (44.4)	30 (33.0)	20 (29.0)	1 (16.7)	9 (20.9)	16 (25.4)	17 (34.7)	1 (33.3)
3 – 4 hours	4 (14.8)	23 (25.3)	14 (20.3)	0 (0.0)	8 (18.6)	8 (12.7)	6 (12.2)	1 (33.3)
5 – 6 hours	2 (7.4)	4 (4.4)	8 (11.6)	3 (50.0)	1 (2.3)	2 (3.2)	7 (14.3)	0 (0.0)
≥ 7 hours	2 (7.4)	6 (6.6)	7 (10.1)	1 (16.7)	1 (2.3)	0 (0.0)	2 (4.1)	0 (0.0)
Watching videos online								
< 1 hour	11 (40.7)	33 (36.3)	17 (24.6)	1 (16.7)	22 (51.2)	31 (49.2)	13 (26.5)	1 (33.3)
1 – 2 hours	8 (29.6)	19 (20.9)	18 (26.1)	2 (33.3)	11 (25.6)	13 (20.6)	20 (40.8)	1 (33.3)
3 – 4 hours	4 (14.8)	26 (28.6)	21 (30.4)	0 (0.0)	9 (20.9)	16 (25.4)	9 (18.4)	1 (33.3)
5 – 6 hours	3 (11.1)	9 (9.9)	9 (13.0)	1 (16.7)	0 (0.0)	3 (4.8)	3 (6.1)	0 (0.0)
≥ 7 hours	1 (3.7)	4 (4.4)	4 (5.8)	2 (33.3)	1 (2.3)	0 (0.0)	4 (8.2)	0 (0.0)
Seeking information online								
< 1 hour	13 (48.1)	34 (37.4)	21 (30.4)	1 (16.7)	21 (48.8)	28 (44.4)	18 (36.7)	0 (0.0)
1 – 2 hours	8 (29.6)	29 (31.9)	21 (30.4)	3 (50.0)	14 (32.6)	25 (39.7)	19 (38.8)	3 (100.0)
3 – 4 hours	6 (22.2)	27 (29.7)	19 (27.5)	0 (0.0)	7 (16.3)	8 (12.7)	10 (20.4)	0 (0.0)
5 – 6 hours	0 (0.0)	1 (1.1)	8 (11.6)	1 (16.7)	1 (2.3)	2 (3.2)	1 (2.0)	0 (0.0)
≥ 7 hours	0 (0.0)	0 (0.0)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	1 (2.0)	0 (0.0)

News and weather update								
< 1 hour	20 (74.1)	71 (78.0)	58 (84.1)	3 (50.0)	20 (46.5)	40 (63.5)	32 (65.3)	2 (33.3)
1 – 2 hours	5 (18.5)	13 (14.3)	8 (11.6)	2 (33.3)	13 (30.2)	18 (28.6)	12 (24.5)	1 (33.3)
3 – 4 hours	2 (7.4)	4 (4.4)	3 (4.3)	0 (0.0)	7 (16.3)	3 (4.8)	4 (8.2)	0 (0.0)
5 – 6 hours	0 (0.0)	2 (2.2)	0 (0.0)	1 (16.7)	2 (4.7)	1 (1.6)	1 (2.0)	0 (0.0)
≥ 7 hours	0 (0.0)	1 (1.1)	0 (0.0)	0 (0.0)	1 (2.3)	1 (1.6)	0 (0.0)	0 (0.0)
Online shopping								
< 1 hour	22 (81.5)	72 (79.1)	49 (71.0)	2 (33.3)	40 (93.0)	54 (85.7)	42 (85.7)	2 (66.7)
1 – 2 hours	3 (11.1)	13 (14.3)	10 (14.5)	2 (33.3)	2 (4.7)	6 (9.5)	5 (10.2)	1 (33.3)
3 – 4 hours	2 (7.4)	5 (5.5)	7 (10.1)	0 (0.0)	1 (2.3)	2 (3.2)	1 (2.0)	0 (0.0)
5 – 6 hours	0 (0.0)	0 (0.0)	3 (4.3)	1 (16.7)	0 (0.0)	1 (1.6)	1 (2.0)	0 (0.0)
≥ 7 hours	0 (0.0)	1 (1.1)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
E-mailing								
< 1 hour	22 (81.5)	64 (70.3)	52 (75.4)	4 (66.7)	30 (69.8)	35 (55.6)	29 (59.2)	1 (33.3)
1 – 2 hours	5 (18.5)	18 (19.8)	12 (17.4)	1 (16.7)	7 (16.3)	19 (30.2)	15 (10.2)	1 (33.3)
3 – 4 hours	0 (0.0)	5 (5.5)	4 (5.8)	0 (0.0)	5 (11.6)	6 (9.5)	3 (6.1)	0 (0.0)
5 – 6 hours	0 (0.0)	2 (2.2)	0 (0.0)	0 (0.0)	0 (0.0)	3 (4.8)	1 (2.0)	1 (33.3)
≥ 7 hours	0 (0.0)	2 (2.2)	1 (1.4)	1 (16.7)	1 (2.3)	0 (0.0)	1 (2.0)	0 (0.0)
Social networking								
< 1 hour	6 (22.2)	12 (13.2)	2 (2.9)	0 (0.0)	11 (25.6)	9 (14.3)	6 (12.2)	0 (0.0)
1 – 2 hours	6 (22.2)	24 (26.4)	13 (18.8)	0 (0.0)	11 (25.6)	23 (36.5)	14 (28.6)	1 (33.3)
3 – 4 hours	10 (37.0)	25 (27.5)	22 (31.9)	1 (16.7)	13 (30.2)	18 (28.6)	16 (32.7)	1 (33.3)
5 – 6 hours	3 (11.1)	20 (22.0)	17 (24.6)	0 (0.0)	6 (14.0)	11 (17.5)	6 (12.2)	0 (0.0)
≥ 7 hours	2 (7.4)	10 (11.0)	15 (21.7)	5 (83.3)	2 (4.7)	2 (3.2)	7 (14.3)	1 (33.3)

Calling								
< 1 hour	14 (51.9)	47 (51.6)	29 (42.0)	2 (33.3)	27 (62.8)	37 (58.7)	22 (44.9)	0 (0.0)
1 – 2 hours	10 (37.0)	23 (25.3)	17 (24.6)	1 (16.7)	12 (27.9)	17 (27.0)	9 (18.4)	0 (0.0)
3 – 4 hours	2 (7.4)	11 (12.1)	18 (26.1)	0 (0.0)	2 (4.7)	6 (9.5)	15 (30.6)	2 (66.7)
5 – 6 hours	1 (3.7)	8 (8.8)	4 (5.8)	2 (33.3)	1 (2.3)	1 (1.6)	1 (2.0)	1 (33.3)
≥ 7 hours	0 (0.0)	2 (2.2)	1 (1.4)	1 (16.7)	1 (2.3)	2 (3.2)	2 (4.1)	0 (0.0)
Texting/messaging								
< 1 hour	7 (25.9)	31 (34.1)	18 (26.1)	(0.0)	23 (53.5)	39 (61.9)	21 (67.3)	3 (100.0)
1 – 2 hours	11 (40.7)	29 (31.9)	15 (21.7)	1 (16.7)	10 (23.3)	14 (22.2)	15 (30.6)	0 (0.0)
3 – 4 hours	7 (25.9)	19 (20.9)	18 (26.1)	2 (33.3)	10 (23.3)	5 (7.9)	11 (22.4)	0 (0.0)
5 – 6 hours	1 (3.7)	9 (9.9)	9 (13.0)	0 (0.0)	0 (0.0)	2 (3.2)	1 (2.0)	0 (0.0)
≥ 7 hours	1 (3.7)	3 (3.3)	9 (13.0)	3 (50.0)	0 (0.0)	3 (4.8)	1 (2.0)	0 (0.0)
Mobile social gaming								
< 1 hour	21 (77.8)	58 (63.7)	50 (72.5)	5 (83.3)	39 (90.7)	44 (69.8)	33 (67.3)	2 (66.7)
1 – 2 hours	3 (11.1)	18 (19.8)	12 (17.4)	0 (0.0)	3 (7.0)	9 (14.3)	6 (12.2)	1 (33.3)
3 – 4 hours	2 (7.4)	7 (7.7)	6 (8.7)	0 (0.0)	1 (2.3)	9 (14.3)	7 (14.3)	0 (0.0)
5 – 6 hours	0 (0.0)	4 (4.4)	1 (1.4)	1 (16.7)	0 (0.0)	0 (0.0)	3 (6.1)	0 (0.0)
≥ 7 hours	1 (3.7)	4 (4.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.6)	0 (0.0)	0 (0.0)

Table 6.2 shows a cross tabulation of times spent on an Internet activity during the *weekends* and IA level by age group. For student 18 to 26 years of age, activities like seeking information, social networking and texting/messaging tend to be done by those with higher IA level. As for students aged 27 to 54, it was calling.

Table 6.3 Time spent on a particular smartphone Internet activity during the weekdays and IA level (n = 351)

Time spent on activity (hours/day)	18 – 26 years of age (n = 193) n (%)				27 – 54 years of age (n = 158) n (%)			
	IA level				IA level			
	Normal (n = 27)	Mild (n = 91)	Moderate (n = 69)	Severe (n = 6)	Normal (n = 43)	Mild (n = 63)	Moderate (n = 49)	Severe (n = 3)
Streaming music								
< 1 hour	9 (33.3)	35 (38.5)	23 (33.3)	0 (0.0)	26 (60.5)	40 (63.5)	23 (46.9)	1 (33.3)
1 – 2 hours	10 (37.0)	38 (41.8)	21 (30.4)	1 (16.7)	11 (25.6)	16 (25.4)	15 (30.6)	1 (33.3)
3 – 4 hours	5 (18.5)	10 (11.0)	15 (21.7)	4 (66.7)	6 (14.0)	7 (11.1)	8 (16.3)	1 (33.3)
5 – 6 hours	1 (3.7)	5 (5.5)	7 (10.1)	0 (0.0)	0 (0.0)	0 (0.0)	3 (6.1)	0 (0.0
≥ 7 hours	2 (7.4)	3 (3.3)	3 (4.3)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Watching videos online								
< 1 hour	12 (44.4)	39 (42.9)	25 (36.2)	1 (16.7)	27 (62.8)	41 (65.1)	17 (34.7)	1 (33.3)
1 – 2 hours	11 (40.7)	32 (35.2)	25 (36.2)	2 (33.3)	11 (25.6)	16 (25.4)	21 (42.9)	1 (33.3)
3 – 4 hours	2 (7.4)	16 (17.6)	15 (21.7)	1 (16.7)	5 (11.6)	6 (9.5)	8 (16.3)	1 (33.3)
5 – 6 hours	0 (0.0)	1 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (6.1)	0 (0.0)
≥ 7 hours	2 (7.4)	3 (3.3)	4 (5.8)	2 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Seeking information online								
< 1 hour	13 (48.1)	43 (47.3)	29 (42.0)	0 (0.0)	25 (58.1)	38 (60.3)	21 (42.9)	2 (66.7)
1 – 2 hours	10 (37.0)	35 (38.5)	25 (36.2)	4 (66.7)	14 (32.6)	18 (28.6)	20 (40.8)	1 (33.3)
3 – 4 hours	4 (14.8)	12 (13.2)	14 (20.3)	1 (16.7)	4 (9.3)	6 (9.5)	7 (14.3)	0 (0.0)
5 – 6 hours	0 (0.0)	1 (1.1)	1 (1.4)	0 (0.0)	0 (0.0)	1 (1.6)	0 (0.0)	0 (0.0)
≥ 7 hours	0 (0.0)	0 (0.0)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	1 (2.0)	0 (0.0)

News and weather update								
< 1 hour	22 (81.5)	75 (82.4)	58 (84.1)	3 (50.0)	24 (55.8)	42 (66.7)	33 (67.3)	3 (100.0)
1 – 2 hours	4 (14.8)	10 (11.0)	9 (13.0)	2 (33.3)	12 (27.9)	19 (30.2)	14 (28.6)	0 (0.0)
3 – 4 hours	1 (3.7)	4 (4.4)	2 (2.9)	0 (0.0)	4 (9.3)	2 (3.2)	1 (2.0)	0 (0.0)
5 – 6 hours	0 (0.0)	1 (1.1)	0 (0.0)	0 (0.0)	2 (4.7)	0 (0.0)	1 (2.0)	0 (0.0)
≥ 7 hours	0 (0.0)	1 (1.1)	0 (0.0)	1 (16.7)	1 (2.3)	0 (0.0)	0 (0.0)	0 (0.0)
Online shopping								
< 1 hour	21 (77.8)	80 (87.9)	54 (78.3)	2 (33.3)	42 (97.7)	54 (85.7)	44 (89.8)	2 (66.7)
1 – 2 hours	5 (18.5)	8 (8.8)	10 (14.5)	2 (33.3)	1 (2.3)	9 (14.3)	4 (8.2)	1 (33.3)
3 – 4 hours	1 (3.7)	2 (2.2)	5 (7.2)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
5 – 6 hours	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.0)	0 (0.0
≥ 7 hours	0 (0.0)	1 (1.1)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
E-mailing								
< 1 hour	21 (77.8)	62 (68.1)	54 (78.3)	4 (66.7)	29 (67.4)	33 (52.4)	27 (55.1)	1 (33.3)
1 – 2 hours	5 (18.5)	20 (22.0)	8 (11.6)	1 (16.7)	10 (23.3)	17 (27.0)	18 (36.7)	2 (66.7)
3 – 4 hours	1 (3.7)	4 (4.4)	6 (8.7)	0 (0.0)	3 (7.0)	9 (14.3)	2 (4.1)	0 (0.0)
5 – 6 hours	0 (0.0)	2 (2.2)	0 (0.0)	0 (0.0)	1 (2.3)	3 (4.8)	1 (2.0)	0 (0.0)
≥ 7 hours	0 (0.0)	3 (3.3)	1 (1.4)	1 (16.7)	0 (0.0)	1 (1.6)	1 (2.0)	0 (0.0)
Social networking								
< 1 hour	7 (25.9)	21 (23.1)	2 (2.9)	0 (0.0)	14 (32.6)	12 (19.0)	4 (8.2)	1 (33.3)
1 – 2 hours	8 (29.6)	31 (34.1)	21 (30.4)	0 (0.0)	13 (30.2)	33 (52.4)	21 (42.9)	0 (0.0)
3 – 4 hours	11 (40.7)	23 (25.3)	27 (39.1)	2 (33.3)	9 (20.9)	11 (17.5)	16 (32.7)	2 (66.7)
5 – 6 hours	1 (3.7)	10 (11.0)	13 (18.8)	1 (16.7)	7 (16.3)	6 (9.5)	3 (6.1)	0 (0.0)
≥ 7 hours	0 (0.0)	6 (6.6)	6 (8.7)	3 (50.0)	0 (0.0)	1 (1.6)	5 (10.2)	0 (0.0)

Calling								
< 1 hour	16 (59.3)	50 (54.9)	32 (46.4)	1 (16.7)	32 (74.4)	42 (66.7)	24 (49.0)	0 (0.0)
1 – 2 hours	8 (29.6)	28 (30.8)	21 (30.4)	1 (16.7)	8 (18.6)	13 (20.6)	15 (30.6)	2 (66.7)
3 – 4 hours	3 (11.1)	9 (9.9)	14 (20.3)	2 (33.3)	2 (4.7)	6 (9.5)	8 (16.3)	0 (0.0)
5 – 6 hours	0 (0.0)	3 (3.3)	1 (1.4)	1 (16.7)	1 (2.3)	1 (1.6)	1 (2.0)	1 (33.3)
≥ 7 hours	0 (0.0)	1 (1.1)	1 (1.4)	1 (16.7)	0 (0.0)	1 (1.6)	1 (2.0)	0 (0.0)
Texting/messaging								
< 1 hour	10 (37.0)	33 (36.3)	19 (27.5)	0 (0.0)	25 (58.1)	42 (66.7)	21 (42.9)	3 (100.0)
1 – 2 hours	8 (29.6)	35 (38.5)	22 (31.9)	1 (16.7)	9 (20.9)	15 (23.8)	22 (44.9)	0 (0.0)
3 – 4 hours	7 (25.9)	19 (20.9)	15 (21.7)	2 (33.3)	8 (18.6)	3 (4.8)	4 (8.2)	0 (0.0)
5 – 6 hours	1 (3.7)	2 (2.2)	10 (14.5)	3 (50.0)	0 (0.0)	2 (3.2)	1 (2.0)	0 (0.0)
≥ 7 hours	1 (3.7)	2 (2.2)	3 (4.3)	0 (0.0)	1 (2.3)	1 (1.6)	1 (2.0)	0 (0.0)
Mobile social gaming								
< 1 hour	21 (77.8)	66 (72.5)	54 (78.3)	5 (83.3)	40 (93.0)	50 (79.4)	33 (67.3)	3 (100.0)
1 – 2 hours	5 (18.5)	14 (15.4)	9 (13.0)	0 (0.0)	3 (7.0)	9 (14.3)	9 (18.4)	0 (0.0)
3 – 4 hours	0 (0.0)	6 (6.6)	6 (8.7)	0 (0.0)	0 (0.0)	3 (4.8)	6 (12.2)	0 (0.0)
5 – 6 hours	1 (3.7)	0 (0.0)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
≥ 7 hours	0 (0.0)	5 (5.5)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.6)	1 (2.0)	0 (0.0)

Table 6.3 shows a cross tabulation between times spent on an Internet activity during the *weekdays* and IA level. For students between the age of 18 and 26, it may be observed that activities like social networking, texting/messaging, and mobile social gaming were particularly greater among those with higher IA levels. For students aged 27 to 54, watching videos online and social networking were considerably more prevalent among those with higher IA levels.

Table 6.4 Frequency of Internet access through a smartphone per day and IA level (n = 351)

Frequency of accessing the Internet per day	18 – 26 years of age (n = 193) n (%)				27 – 54 years of age (n = 158) n (%)			
	IA level				IA level			
	Normal (n = 27)	Mild (n = 91)	Moderate (n = 69)	Severe (n = 6)	Normal (n = 43)	Mild (n = 63)	Moderate (n = 49)	Severe (n = 3)
At least one time	2 (7.4)	5 (5.5)	2 (2.9)	1 (16.7)	2 (4.7)	3 (4.8)	1 (2.0)	1 (33.3)
2 to 4 times	7 (25.9)	24 (26.4)	13 (18.8)	0 (0.0)	15 (34.9)	16 (25.4)	5 (10.2)	0 (0.0)
Five times or more	18 (66.7)	62 (68.1)	54 (78.3)	5 (83.3)	26 (60.5)	44 (69.8)	43 (87.8)	2 (66.7)

Data on the frequency of accessing the Internet and IA level are shown in *Table 6.4*. The majority of students 18 to 26 years of age accessed the Internet five or more times in a day. It may be observed that there was a greater proportion of students from this age group in the moderate (78.3%) and severe (83.3%) IA category than those in the normal (66.7%) and mild (68.1%) IA category. For students aged 27 to 54, most of them said to have accessed the Internet five times or more daily. There was a higher proportion of students of this age group who were in moderately addicted (87.8%) than those who were mildly addicted (69.8%) and reported to have gone on the Internet through their smartphones five times or more per day.

Table 6.5 Time spent on the Internet through the smartphone and IA level (n = 351)

Time spent on the Internet (hours/day)	18 – 26 years of age (n = 193) n (%)				27 – 54 years of age (n = 158) n (%)			
	IA level				IA level			
	Normal (n = 27)	Mild (n = 91)	Moderate (n = 69)	Severe (n = 6)	Normal (n = 43)	Mild (n = 63)	Moderate (n = 49)	Severe (n = 3)
Weekends								
< 1 hour	2 (7.4)	2 (2.2)	1 (1.4)	0 (0.0)	5 (11.6)	2 (3.2)	0 (0.0)	0 (0.0)
1 – 2 hours	4 (14.8)	11 (12.1)	3 (4.3)	0 (0.0)	10 (23.3)	12 (19.0)	4 (8.2)	0 (0.0)
3 – 4 hours	8 (29.6)	27 (29.7)	13 (18.8)	0 (0.0)	11 (25.6)	18 (28.6)	13 (26.5)	0 (0.0)
5 – 6 hours	7 (25.9)	21 (23.1)	24 (34.8)	0 (0.0)	8 (18.6)	20 (31.7)	16 (32.7)	2 (66.7)
≥ 7 hours	6 (22.2)	30 (33.0)	28 (40.6)	6 (100.0)	9 (20.9)	11 (17.5)	16 (32.7)	1 (33.3)
Weekdays								
< 1 hour	3 (11.1)	6 (6.6)	2 (2.9)	0 (0.0)	5 (11.6)	6 (9.5)	0 (0.0)	0 (0.0)
1 – 2 hours	7 (25.9)	19 (20.9)	8 (11.6)	0 (0.0)	11 (25.6)	16 (25.4)	10 (20.4)	0 (0.0)
3 – 4 hours	9 (33.3)	32 (35.2)	26 (37.7)	1 (16.7)	13 (30.2)	22 (34.9)	20 (40.8)	1 (33.3)
5 – 6 hours	4 (14.8)	15 (16.5)	16 (23.2)	0 (0.0)	8 (18.6)	11 (17.5)	11 (22.4)	1 (33.3)
≥ 7 hours	4 (14.8)	19 (20.9)	17 (24.6)	5 (83.3)	6 (14.0)	8 (12.7)	8 (16.3)	1 (33.3)

Data for the amounts of time spent on the Internet through a smartphone and IA level is shown in *Table 6.5*. There was a greater portion of students, 18 to 26 years of age, who reported having spent seven or more hours and were moderately and severely addicted to the Internet compared to the group of students aged 27 to 54.

Data on IA level across age groups are presented in this section. A greater portion of students, 18 to 26 years of age, were found to be moderately and severely addicted to the Internet through their smartphone when compared to students aged 27 to 54. This study found a significant difference in IA level between the two age groups. IA level and its relationship with smartphone Internet activities are shown in the section as well. For the younger age group, activities such as information seeking, social networking, texting, and mobile social gaming were found to be more prevalent among those with higher IA level. The majority of students aged 18 to 26 access the Internet through their smartphones several times a day. For students aged 27 to 54, activities that were more prevalent among those with higher IA level included calling, watching videos and social networking. More than half of them access the Internet more than five times a day.

7. Health problems (separated by gender)

Table 7.1 Association between IA level and health problems from Internet use through the smartphone (n = 351)

Health problems	Males (n = 155) n (%)					Females (n = 196) n (%)				
	IA level					IA level				
	Normal (n = 29)	Mild (n = 72)	Moderate (n = 51)	Severe (n = 3)	*p*-value	Normal (n = 41)	Mild (n = 82)	Moderate (n = 67)	Severe (n = 6)	*p*-value
Eye strain[+]										
- Never	14 (48.3)	24 (33.3)	16 (31.4)	1 (33.3)	.646	14 (34.1)	17 (20.7)	9 (13.4)	1 (16.7)	**.021***
- Has not occur in the last 30 days/Rarely	9 (31.0)	21 (29.2)	15 (29.4)	1 (33.3)		17 (41.5)	32 (39.0)	20 (29.9)	1 (16.7)	
- Occasionally/Often	6 (20.7)	27 (37.5)	20 (39.2)	1 (33.3)		10 (24.4)	33 (40.2)	38 (56.7)	4 (66.7)	
Headache[+]										
- Never	20 (69.0)	47 (65.3)	34 (66.7)	1 (33.3)	.658	31 (75.6)	44 (53.7)	29 (43.3)	2 (33.3)	.017
- Has not occur in the last 30 days/Rarely	7 (24.1)	15 (20.8)	10 (19.6)	2 (66.7)		5 (12.2)	21 (25.6)	24 (35.8)	1 (16.7)	
- Occasionally/Often	2 (6.9)	10 (13.9)	7 (13.7)	0 (0.0)		5 (12.2)	17 (20.7)	14 (20.9)	3 (50.0)	
Inadequate sleep[+]										
- Never	19 (65.5)	37 (51.4)	22 (43.1)	0 (0.0)	**.004****	29 (70.7)	25 (30.5)	27 (40.3)	0 (0.0)	**.000*****
- Has not occur in the last 30 days/Rarely	6 (20.7)	17 (23.6)	5 (9.8)	2 (66.7)		6 (14.6)	17 (20.7)	7 (10.4)	1 (16.7)	
- Occasionally/Often	4 (14.8)	18 (25.0)	24 (47.1)	1 (33.3)		6 (14.6)	40 (48.8)	33 (49.3)	5 (83.3)	

Hand/wrist/arm cramping†										
- Never	21 (72.4)	51 (70.8)	28 (54.9)	0 (0.0)	**.034***	29 (70.7)	46 (56.1)	34 (50.7)	3 (50.0)	.249
- Has not occur in the last 30 days/Rarely	7 (24.1)	15 (20.8)	28 (54.9)	1 (33.3)		9 (22.0)	17 (20.7)	17 (25.4)	2 (33.3)	
- Occasionally/Often	1 (3.4)	6 (8.3)	7 (13.7)	2 (66.7)		3 (7.3)	19 (23.2)	16 (23.9)	1 (16.7)	
Accidents†										
- Never	25 (86.2)	60 (83.3)	36 (70.6)	2 (66.7)	.370	37 (90.2)	64 (78.0)	50 (74.6)	4 (66.7)	.369
- Has not occur in the last 30 days/Rarely	4 (13.8)	10 (13.9)	11 (21.6)	1 (33.3)		4 (9.8)	16 (19.5)	16 (23.9)	2 (3.3)	
- Occasionally/Often	0 (0.0)	2 (2.8)	4 (7.8)	0 (0.0)		0 (0.0)	2 (2.4)	1 (1.5)	0 (0.0)	

Significant at * $p < .05$; $p < .01$; *** $p < .001$

†Fisher exact test

Among the study sample, 72.6% of them reported having experienced eye strain during or immediately following the use of the Internet on their smartphone. While 40.7% have experienced headaches, 54.7% inadequate sleep, 39.6% cramped hand/wrist/arm, and 20.8% accidents. The percent of males who reported having occasional eye strain was higher in the moderate group (39.2%) than the mild group (29.2%). A similar situation may be spotted for the report of occasional headaches—13.7% were from the moderate group and 12.5% from the mild group. This is also seen for inadequate sleep, hand/wrist/arm cramping, and accidents. The proportion of females who reported having often experienced eye strain were greater in the moderate group (11.9%) than in the mild group (8.5%). This was the case for reported headaches, inadequate sleep, hand/wrist/arm cramping, and accidents that occurred often. When comparing gender groups, a higher percentage of females reported having occasionally or often experienced eye strain (43.4%), a headache (19.9%), inadequate sleep (42.9%), and hand/wrist/arm cramping (19.9%) than their male counterparts (34.8%, 12.3%, 30.3%, 10.3%, and 3.9% respectively). More males were found to have reported occasionally and often experienced an accident than females did (3.9% and 1.5% respectively). This research further sought to determine the association between IA level and self-reported health problems. *Table 7.1* shows the association between IA level and self-reported health problems from Internet use. Among the male participants, IA was associated with inadequate sleep. As for the female participants, IA level was found to be significantly associated with the presence of eye strain and inadequate sleep. (Note that a few of the cells had less than 5 count, the categories were pooled together.)

Table 7.2 Time spent on the Internet through a smartphone during the weekends and health problems (n = 351)

Health problems	Males (n = 155) n (%)					Females (n = 196) n (%)				
	Time spent on the Internet (hours/day)					Time spent on the Internet (hours/day)				
	< 1 (n = 8)	1 – 2 (n = 24)	3 – 4 (n = 44)	5 – 6 (n = 37)	≥ 7 (n = 42)	< 1 (n = 4)	1 – 2 (n = 20)	3 – 4 (n = 46)	5 – 6 (n = 61)	≥ 7 (n = 65)
Eye strain										
Never	6 (75.0)	6 (22.2)	19 (43.2)	9 (24.3)	15 (35.7)	0 (0.0)	8 (40.0)	6 (13.0)	11 (18.0)	16 (24.6)
Has not occur in the last 30 days	1 (12.5)	4 (14.8)	3 (6.8)	1 (2.7)	2 (4.8)	1 (25.0)	1 (5.0)	7 (15.2)	11 (18.0)	4 (6.2)
Rarely	1 (12.5)	4 (14.8)	9 (20.5)	12 (32.4)	9 (21.4)	0 (0.0)	2 (10.0)	15 (32.6)	12 (19.7)	17 (26.2)
Occasionally	0 (0.0)	8 (29.6)	12 (27.3)	13 (35.1)	14 (33.3)	2 (50.0)	7 (35.0)	13 (28.3)	25 (41.0)	20 (30.8)
Often	0 (0.0)	2 (7.4)	1 (2.3)	2 (5.4)	2 (4.8)	1 (25.0)	2 (10.0)	5 (10.9)	2 (3.3)	8 (12.3)
Headache										
Never	6 (75.0)	17 (63.0)	29 (65.9)	27 (73.0)	23 (54.8)	2 (50.0)	15 (75.0)	19 (41.3)	31 (50.8)	39 (60.0)
Has not occur in the last 30 days	1 (12.5)	3 (11.1)	1 (2.3)	4 (10.8)	9 (21.4)	0 (0.0)	0 (0.0)	5 (10.9)	2 (3.3)	4 (6.2)
Rarely	1 (12.5)	1 (3.7)	8 (18.2)	1 (2.7)	5 (11.9)	1 (25.0)	2 (10.0)	9 (19.6)	16 (26.2)	12 (18.5)
Occasionally	0 (0.0)	3 (11.1)	6 (13.6)	5 (13.5)	4 (9.5)	0 (0.0)	3 (15.0)	10 (21.7)	12 (19.7)	8 (12.3)
Often	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.4)	1 (25.0)	0 (0.0)	3 (6.5)	0 (0.0)	2 (3.1)
Inadequate sleep										
Never	7 (87.5)	16 (59.3)	22 (50.0)	14 (37.8)	19 (45.2)	1 (25.0)	13 (65.0)	20 (43.5)	28 (45.9)	19 (29.2)
Has not occur in the last 30 days	1 (12.5)	2 (7.4)	4 (9.1)	3 (8.1)	1 (2.4)	0 (0.0)	1 (5.0)	0 (0.0)	5 (8.2)	4 (6.2)
Rarely	0 (0.0)	2 (7.4)	7 (15.9)	6 (24.3)	4 (9.5)	0 (0.0)	3 (15.0)	5 (10.9)	4 (6.6)	9 (13.8)
Occasionally	0 (0.0)	3 (11.1)	8 (18.2)	9 (24.3)	13 (31.0)	3 (75.0)	3 (15.0)	18 (39.1)	17 (27.9)	23 (35.4)
Often	0 (0.0)	1 (3.7)	3 (6.8)	5 (13.5)	5 (11.9)	0 (0.0)	0 (0.0)	3 (6.5)	7 (11.5)	10 (15.4)

Hand/wrist/arm cramping										
Never	6 (75.0)	19 (70.4)	29 (65.9)	23 (62.2)	23 (54.8)	2 (50.0)	14 (70.0)	26 (56.5)	32 (52.5)	38 (58.5)
Has not occur in the last 30 days	0 (0.0)	2 (7.4)	3 (6.8)	3 (8.1)	6 (14.3)	1 (25.0)	1 (5.0)	5 (10.9)	7 (11.5)	9 (13.8)
Rarely	2 (25.0)	2 (7.4)	7 (15.9)	7 (18.9)	7 (16.7)	0 (0.0)	1 (5.0)	7 (15.2)	8 (13.1)	6 (9.2)
Occasionally	0 (0.0)	1 (3.7)	4 (9.1)	4 (10.8)	4 (9.5)	0 (0.0)	4 (20.0)	4 (8.7)	7 (11.5)	10 (15.4)
Often	0 (0.0)	0 (0.0)	1 (2.3)	0 (0.0)	2 (4.8)	1 (25.0)	0 (0.0)	4 (8.7)	7 (11.5)	2 (3.1)
Accidents										
Never	5 (62.5)	20 (74.1)	36 (81.8)	32 (86.5)	30 (71.4)	2 (50.0)	17 (85.0)	38 (82.6)	47 (77.0)	51 (78.5)
Has not occur in the last 30 days	0 (0.0)	2 (7.4)	1 (2.3)	1 (2.7)	1 (2.4)	1 (25.0)	2 (10.0)	2 (4.3)	4 (6.6)	6 (9.2)
Rarely	2 (25.0)	2 (7.4)	5 (11.4)	4 (10.8)	8 (19.0)	1 (25.0)	0 (0.0)	6 (13.0)	10 (16.4)	6 (9.2)
Occasionally	1 (12.5)	0 (0.0)	2 (4.5)	0 (0.0)	2 (4.8)	0 (0.0)	1 (5.0)	0 (0.0)	0 (0.0)	1 (1.5)
Often	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.5)

Table 7.2 presents a cross tabulation of the amount time spent on the Internet through a smartphone during the *weekends* and self-reported health problems. Problems like eye strain and inadequate sleep tend to be more prevalent among males who spent more hours on their device. For females, eye strain, inadequate sleep, and cramping were more prevalent among those who spent more hours.

Table 7.3 Time spent on the Internet through a smartphone during the weekdays and health problems (n = 351)

Health problems	Males (n = 155) n (%)					Females (n = 196) n (%)				
	Time spent on the Internet (hours/day)					Time spent on the Internet (hours/day)				
	< 1 (n = 11)	1 – 2 (n = 38)	3 – 4 (n = 55)	5 – 6 (n = 23)	≥ 7 (n = 28)	< 1 (n = 11)	1 – 2 (n = 33)	3 – 4 (n = 69)	5 – 6 (n = 43)	≥ 7 (n = 40)
Eye strain										
Never	6 (54.5)	16 (42.1)	20 (36.4)	6 (26.1)	7 (25.0)	3 (27.3)	9 (27.3)	14 (20.3)	5 (11.6)	10 (25.0)
Has not occur in the last 30 days	2 (18.2)	4 (10.5)	2 (3.6)	1 (4.3)	2 (7.1)	1 (9.1)	3 (9.1)	9 (13.0)	9 (20.9)	2 (5.0)
Rarely	2 (18.2)	5 (13.2)	14 (25.5)	7 (30.4)	7 (25.0)	3 (27.3)	6 (18.2)	16 (23.2)	10 (23.3)	11 (27.5)
Occasionally	1 (9.1)	12 (31.2)	16 (29.1)	8 (34.8)	10 (35.7)	2 (18.2)	13 (39.4)	24 (34.8)	16 (37.2)	12 (30.0)
Often	0 (0.0)	1 (2.6)	3 (5.5)	1 (4.3)	2 (7.1)	2 (18.2)	2 (6.1)	6 (8.7)	3 (7.0)	5 (12.5)
Headache										
Never	9 (81.8)	26 (68.4)	39 (70.9)	14 (60.9)	14 (50.0)	9 (81.8)	20 (60.0)	32 (46.4)	24 (55.8)	21 (52.5)
Has not occur in the last 30 days	1 (9.1)	3 (7.9)	3 (5.5)	5 (21.7)	6 (21.4)	0 (0.0)	3 (9.1)	2 (2.9)	2 (4.7)	4 (10.0)
Rarely	0 (0.0)	6 (15.8)	3 (5.5)	3 (13.0)	4 (14.3)	1 (9.1)	2 (6.1)	18 (26.1)	9 (20.9)	10 (25.0)
Occasionally	1 (9.1)	3 (7.9)	10 (18.2)	1 (4.3)	3 (10.7)	0 (0.0)	6 (18.2)	16 (23.2)	8 (18.6)	3 (7.5)
Often	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.6)	1 (9.1)	2 (6.1)	1 (1.4)	0 (0.0)	2 (5.0)
Inadequate sleep										
Never	8 (72.7)	24 (63.2)	22 (40.0)	10 (43.5)	14 (50.0)	5 (45.5)	19 (57.6)	30 (43.5)	15 (34.9)	12 (30.0)
Has not occur in the last 30 days	1 (9.1)	2 (5.3)	7 (12.7)	0 (0.0)	1 (3.6)	1 (9.1)	0 (0.0)	3 (4.3)	4 (9.3)	2 (5.0)
Rarely	0 (0.0)	6 (15.8)	7 (12.7)	2 (8.7)	4 (14.3)	1 (9.1)	3 (9.1)	7 (10.1)	3 (7.0)	7 (17.5)
Occasionally	1 (9.1)	4 (10.5)	13 (23.6)	8 (34.8)	7 (25.0)	4 (36.4)	10 (30.3)	21 (30.4)	17 (39.5)	12 (30.0)
Often	1 (9.1)	2 (5.3)	6 (10.9)	3 (13.0)	2 (7.1)	0 (0.0)	1 (3.0)	8 (11.6)	4 (9.3)	7 (17.5)

Hand/wrist/arm cramping										
Never	7 (63.6)	31 (81.6)	35 (63.6)	10 (43.5)	17 (60.7)	8 (72.7)	23 (69.7)	38 (55.1)	21 (48.8)	22 (55.0)
Has not occur in the last 30 days	0 (0.0)	0 (0.0)	6 (10.9)	5 (21.7)	3 (10.7)	1 (9.1)	2 (6.1)	9 (13.0)	4 (9.3)	7 (17.5)
Rarely	3 (27.3)	5 (13.2)	9 (16.4)	4 (17.4)	4 (14.3)	0 (0.0)	5 (15.2)	8 (11.6)	4 (9.3)	5 (12.5)
Occasionally	1 (9.1)	1 (2.6)	4 (7.3)	4 (17.4)	3 (10.7)	1 (9.1)	1 (3.0)	9 (13.0)	10 (23.3)	4 (10.0)
Often	0 (0.0)	1(2.6)	1 (1.8)	0 (0.0)	1 (3.6)	1 (9.1)	2 (6.1)	5 (7.2)	4 (9.3)	2 (5.0)
Accidents										
Never	8 (72.7)	29 (76.3)	46 (83.6)	20 (87.0)	20 (71.4)	9 (81.8)	31 (93.9)	54 (78.3)	31 (72.1)	30 (75.0)
Has not occur in the last 30 days	0 (0.0)	2 (5.3)	3 (5.5)	0 (0.0)	0 (0.0)	1 (9.1)	1 (3.0)	3 (4.3)	8 (18.6)	2 (5.0)
Rarely	2 (18.2)	5 (13.2)	6 (10.9)	2 (8.7)	6 (21.4)	1 (9.1)	1 (3.0)	12 (17.4)	3 (7.0)	6 (15.0)
Occasionally	1 (9.1)	2 (5.3)	0 (0.0)	1 (4.3)	1 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.3)	1 (2.5)
Often	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.5)

Table 7.3 shows a cross tabulation between the time spent on the Internet through a smartphone during the *weekdays* and self-reported health problems. For males, problems like eye strain and inadequate sleep tend to be more prevalent among those who spent more hours on their device. For females, eye strain, inadequate sleep, and cramping were more prevalent among those who spent more hours.

Table 7.4 Frequency of Internet access through a smartphone and health problems (n = 351)

Health problems	Males (n = 155) n (%)			Females (n = 196) n (%)		
	Frequency of Internet access (per day)			Frequency of Internet access (per day)		
	0 – 1 (n = 5)	2 – 4 (n = 38)	≥ 5 (n = 112)	0 – 1 (n = 12)	2 – 4 (n = 42)	≥ 5 (n = 142)
Eye strain						
Never	2 (40.0)	18 (47.4)	35 (31.3)	4 (33.3)	11 (26.2)	26 (18.3)
Has not occur in the last 30 days	0 (0.0)	0 (0.0)	11 (9.8)	2 (16.7)	8 (19.0)	14 (9.9)
Rarely	1 (20.0)	9 (23.7)	25 (22.3)	3 (25.0)	11 (26.2)	32 (22.5)
Occasionally	2 (40.0)	9 (23.7)	36 (32.1)	3 (25.0)	9 (21.4)	55 (38.7)
Often	0 (0.0)	2 (5.3)	5 (4.5)	0 (0.0)	3 (7.1)	15 (10.6)
Headache						
Never	2 (40.0)	28 (73.7)	72 (64.3)	7 (58.3)	29 (69.0)	70 (49.3)
Has not occur in the last 30 days	1 (20.0)	3 (7.9)	14 (12.5)	1 (8.3)	2 (4.8)	8 (5.6)
Rarely	0 (0.0)	5 (13.2)	11 (9.8)	3 (25.0)	4 (9.5)	33 (23.2)
Occasionally	2 (40.0)	2 (5.3)	14 (12.5)	0 (0.0)	6 (14.3)	27 (19.0)
Often	0 (0.0)	0 (0.0)	1 (0.9)	1 (8.3)	1 (2.4)	4 (2.8)
Inadequate sleep						
Never	3 (60.0)	18 (47.4)	57 (50.9)	6 (50.0)	21 (50.0)	54 (38.0)
Has not occur in the last 30 days	1 (20.0)	3 (7.9)	7 (6.3)	1 (8.3)	2 (4.8)	7 (4.9)
Rarely	1 (20.0)	6 (15.8)	12 (10.7)	3 (25.0)	4 (9.5)	14 (9.9)
Occasionally	0 (0.0)	10 (26.3)	23 (20.5)	2 (16.7)	13 (31.0)	49 (34.5)
Often	0 (0.0)	1 (2.6)	13 (11.6)	0 (0.0)	2 (4.8)	18 (12.7)

Hand/wrist/arm cramping						
Never	2 (40.0)	27 (71.1)	71 (63.4)	5 (41.7)	31 (73.8)	76 (53.5)
Has not occur in the last 30 days	1 (20.0)	1 (2.6)	12 (10.7)	1 (8.3)	4 (9.5)	18 (12.7)
Rarely	0 (0.0)	7 (18.4)	18 (16.1)	4 (33.3)	5 (11.9)	13 (9.2)
Occasionally	2 (40.0)	3 (7.9)	8 (7.1)	0 (0.0)	1 (2.4)	24 (16.9)
Often	0 (0.0)	0 (0.0)	3 (2.7)	2 (16.7)	1 (2.4)	11 (7.7)
Accidents						
Never	4 (80.0)	34 (89.5)	85 (75.9)	8 (66.7)	39 (92.9)	108 (76.1)
Has not occur in the last 30 days	1 (20.0)	0 (0.0)	4 (3.6)	2 (16.7)	1 (2.4)	12 (8.5)
Rarely	0 (0.0)	1 (2.6)	20 (17.9)	2 (16.7)	2 (4.8)	19 (13.4)
Occasionally	0 (0.0)	3 (7.9)	2 (1.8)	0 (0.0)	0 (0.0)	2 (1.4)
Often	0 (0.0)	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)	1 (0.7)

The relationship between the frequency of Internet access and self-reported health problems were examined (*Table 7.4*). A higher proportion of males who accessed the Internet five or more times per day reported to experiencing the listed health problems occasionally and often than those who accessed the internet less than five times per day. For instance, 26.5% of males who accessed the Internet five times or more reported to occasionally and often have eye strain, while only 29.0% of those who accessed the Internet 2 to 4 times per day reported having experience eye strain occasionally or often. As for females, a similar trend was observed. A higher proportion of females who access the Internet more frequently reported to occasionally and often experiencing health problems than those who accessed the Internet less frequently. A higher percentage of females reported having health problems occur occasionally and often than males.

Table 7.5 Use of smartphones in dark places and health problems (n = 351)

Health problems	Males (n = 155) n (%)		Females (n = 196) n (%)	
	Use of smartphones in dark places		Use of smartphones in dark places	
	No (n = 45)	Yes (n = 110)	No (n = 59)	Yes (n = 137)
Eye strain				
Never	23 (51.1)	32 (29.1)	22 (37.3)	19 (13.9)
Has not occur in the last 30 days	3 (6.7)	8 (7.3)	8 (13.6)	16 (11.7)
Rarely	9 (20.0)	26 (23.6)	9 (15.3)	37 (37.2)
Occasionally	8 (17.8)	39 (35.5)	16 (27.1)	51 (37.2)
Often	2 (4.4)	5 (4.5)	4 (6.8)	14 (10.2)
Headache				
Never	34 (75.6)	68 (61.8)	37 (62.7)	69 (50.4)
Has not occur in the last 30 days	5 (11.1)	13 (11.8)	4 (6.8)	7 (5.1)
Rarely	4 (8.9)	12 (10.9)	13 (22.0)	27 (19.7)
Occasionally	2 (4.4)	16 (14.5)	4 (6.8)	29 (21.2)
Often	0 (0.0)	1 (0.9)	1 (1.7)	5 (3.6)
Inadequate sleep				
Never	32 (71.1)	46 (41.8)	40 (67.8)	41 (29.9)
Has not occur in the last 30 days	2 (4.4)	9 (8.2)	3 (5.1)	7 (5.1)
Rarely	4 (8.9)	15 (13.6)	6 (10.2)	15 (10.9)
Occasionally	5 (11.1)	28 (25.5)	8 (13.6)	56 (40.9)
Often	2 (4.4)	12 (10.9)	2 (3.4)	18 (13.1)
Hand/wrist/arm cramping				
Never	32 (71.1)	68 (61.8)	39 (66.1)	73 (53.3)
Has not occur in the last 30 days	2 (4.4)	12 (10.9)	5 (8.5)	18 (13.1)
Rarely	8 (17.8)	17 (15.5)	7 (11.9)	15 (10.9)
Occasionally	3 (6.7)	10 (9.1)	8 (13.6)	17 (12.4)
Often	0 (0.0)	3 (2.7)	0 (0.0)	14 (10.2)
Accidents				
Never	39 (86.7)	84 (76.4)	54 (91.5)	101 (73.7)
Has not occur in the last 30 days	0 (0.0)	5 (4.5)	3 (5.1)	12 (8.8)
Rarely	6 (13.3)	15 (13.6)	2 (3.4)	21 (15.3)
Occasionally	0 (0.0)	5 (4.5)	0 (0.0)	2 (1.5)
Often	0 (0.0)	1 (0.9)	0 (0.0)	1 (0.7)

Two hundred forty-seven (70%) participants used their smartphones in places of insufficient lighting (*Table 7.5*). Those who used their smartphone where there is poor lighting tended to report eye strain, headache, and inadequate sleep.

This section presented data on self-reported health problems, separated by gender groups. An association was found between IA level and inadequate sleep for males. A greater

proportion of females were found to have experienced health problems related to Internet use than males. IA level was found to be associated with the occurrence of eye strain and inadequate sleep for females. Using a smartphone in places of insufficient lighting was related to eye strain, inadequate sleep, and accidents among females.

8. Health problems (separated by age)

Table 8.1 Association between IA level and health problems from Internet use through the smartphone (n = 351)

Health problems	18 – 26 years of age (n = 193) n (%)					27 – 54 years of age (n = 158) n (%)				
	IA level					IA level				
	Normal (n = 27)	Mild (n = 91)	Moderate (n = 69)	Severe (n = 6)	*p*-value	Normal (n = 43)	Mild (n = 63)	Moderate (n = 49)	Severe (n = 3)	*p*-value
Eye strain[†]										
- Never	10 (37.0)	25 (27.5)	15 (21.7)	2 (33.3)	.520	18 (41.9)	16 (25.4)	10 (20.4)	0 (0.0)	**.017***
- Has not occur in the last 30 days/Rarely	11 (40.7)	33 (36.3)	25 (36.2)	1 (16.7)		15 (34.9)	20 (31.7)	10 (20.4)	1 (33.3)	
- Occasionally/Often	6 (22.2)	33 (36.3)	29 (42.0)	3 (50.0)		10 (23.3)	27 (42.9)	29 (59.2)	2 (66.7)	
Headache[†]										
- Never	21 (77.8)	51 (56.0)	38 (55.1)	1 (16.7)	.068	30 (69.8)	40 (63.5)	25 (51.0)	2 (66.7)	.325
- Has not occur in the last 30 days/Rarely	3 (11.1)	25 (27.5)	23 (33.3)	3 (50.0)		9 (20.9)	11 (17.5)	11 (22.4)	0 (0.0)	
- Occasionally/Often	3 (11.1)	15 (19.5)	8 (11.6)	2 (33.3)		4 (9.3)	12 (19.0)	13 (26.5)	1 (33.3)	
Inadequate sleep [†]										
- Never	17 (63.0)	34 (37.4)	25 (36.2)	0 (0.0)	**.008****	31 (72.1)	28 (44.4)	24 (49.0)	0 (0.0)	**.001****
- Has not occur in the last 30 days/Rarely	4 (14.8)	22 (24.2)	8 (11.6)	2 (33.3)		8 (18.6)	12 (19.0)	4 (8.2)	1 (33.3)	
- Occasionally/Often	6 (22.2)	35 (38.5)	36 (52.2)	4 (66.7)		4 (9.3)	23 (36.5)	21 (42.9)	2 (66.7)	

Hand/wrist/arm cramping†										
- Never	20 (74.1)	59 (64.8)	37 (53.6)	3 (50.0)	.416	30 (69.8)	38 (60.3)	25 (51.0)	0 (0.0)	**.005****
- Has not occur in the last 30 days/Rarely	4 (14.8)	18 (19.8)	22 (31.9)	2 (33.3)		12 (27.9)	14 (22.2)	11 (22.4)	1 (33.3)	
- Occasionally/Often	3 (11.1)	14 (15.4)	10 (14.5)	1 (16.7)		1 (2.3)	11 (17.5)	13 (26.5)	2 (66.7)	
Accidents†										
- Never	22 (81.5)	71 (78.0)	46 (66.7)	4 (66.7)	.510	40 (93.0)	53 (84.1)	40 (81.6)	2 (66.7)	.281
- Has not occur in the last 30 days/Rarely	5 (18.5)	17 (18.7)	18 (26.1)	2 (33.3)		3 (7.0)	9 (14.3)	9 (18.4)	1 (33.3)	
- Occasionally/Often	0 (0.0)	3 (3.3)	5 (7.2)	(0.0)		0 (0.0)	1 (1.6)	(0.0)	(0.0)	

Significant at * $p < .05$; ** $p < .01$

†Fisher exact test

Table 8.1 shows self-reported health problems and IA level separated by age groups. There was a higher percentage of students, 18 to 26 year of age, who said to have occasional and often occurrence of inadequate sleep (42.2%) and accidents (4.1%) compared to students aged 27 to 54 (31.6% and 0.6% respectively). A greater proportion of older students reported occasionally having and often experienced eye strain (43.0%), headache (19.0%), and hand/wrist/arm cramping (17.1%). The occurrence of inadequate sleep was found to be associated with IA level among students 18 to 26 years of age. However, the occurrence of eye strain, inadequate sleep, and hand/wrist/arm cramping were associated with IA level for student older students.

Table 8.2 Time spent on the Internet through a smartphone during the weekends and health problems (n = 351)

Health problems	18 – 26 years of age (n = 193) n (%)					27 – 54 years of age (n = 158) n (%)				
	Time spent on the Internet (hours/day)					Time spent on the Internet (hours/day)				
	< 1 (n = 5)	1 – 2 (n = 18)	3 – 4 (n = 48)	5 – 6 (n = 52)	≥ 7 (n = 70)	< 1 (n = 7)	1 – 2 (n = 26)	3 – 4 (n = 42)	5 – 6 (n = 46)	≥ 7 (n = 37)
Eye strain										
Never	3 (60.0)	4 (22.2)	13 (27.1)	13 (25.0)	19 (27.1)	3 (42.9)	10 (38.5)	12 (28.6)	7 (15.2)	12 (32.4)
Has not occur in the last 30 days	0 (0.0)	1 (5.6)	7 (14.6)	6 (11.5)	4 (5.7)	2 (28.6)	4 (15.4)	3 (7.1)	6 (13.0)	2 (5.4)
Rarely	0 (0.0)	5 (27.8)	16 (33.3)	11 (21.2)	20 (28.6)	1 (14.3)	1 (3.8)	8 (19.0)	13 (28.3)	6 (16.2)
Occasionally	1 (20.0)	6 (33.3)	11 (22.9)	22 (42.3)	23 (32.9)	1 (14.3)	9 (34.6)	14 (33.3)	16 (34.8)	11 (29.7)
Often	1 (20.0)	2 (11.1)	1 (2.1)	0 (0.0)	4 (5.7)	0 (0.0)	2 (7.7)	5 (11.9)	4 (8.7)	6 (16.2)
Headache										
Never	3 (60.0)	15 (83.3)	25 (52.1)	32 (61.5)	36 (51.4)	5 (71.4)	17 (65.4)	23 (54.8)	26 (56.5)	26 (70.3)
Has not occur in the last 30 days	0 (0.0)	0 (0.0)	5 (10.4)	4 (7.7)	10 (14.3)	1 (14.3)	3 (11.5)	1 (2.4)	2 (4.3)	3 (8.1)
Rarely	1 (20.0)	2 (11.1)	10 (20.8)	10 (19.2)	12 (17.1)	1 (14.3)	1 (3.8)	7 (16.7)	7 (15.2)	5 (13.5)
Occasionally	0 (0.0)	1 (5.6)	8 (16.7)	6 (11.5)	10 (14.3)	0 (0.0)	5 (19.2)	8 (19.0)	11 (23.9)	2 (5.4)
Often	1 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.9)	0 (0.0)	0 (0.0)	3 (7.1)	0 (0.0)	1 (2.7)
Inadequate sleep										
Never	3 (60.0)	10 (55.6)	17 (35.4)	21 (40.4)	25 (35.7)	5 (71.4)	19 (73.1)	25 (59.5)	21 (45.7)	13 (35.1)
Has not occur in the last 30 days	0 (0.0)	3 (16.7)	3 (6.3)	4 (7.7)	3 (4.3)	1 (14.3)	0 (0.0)	1 (2.4)	4 (8.7)	2 (5.4)
Rarely	0 (0.0)	1 (5.6)	6 (12.5)	5 (9.6)	11 (15.7)	0 (0.0)	4 (15.4)	6 (14.3)	5 (10.9)	2 (5.4)
Occasionally	2 (40.0)	3 (16.7)	18 (37.5)	14 (26.9)	18 (25.7)	1 (14.3)	3 (11.5)	8 (19.0)	12 (26.1)	18 (48.6)
Often	0 (0.0)	1 (5.6)	4 (8.3)	8 (15.4)	13 (18.6)	0 (0.0)	0 (0.0)	2 (4.8)	4 (8.7)	2 (5.4)

Hand/wrist/arm cramping										
Never	3 (60.0)	12 (66.7)	35 (72.9)	30 (57.7)	39 (55.7)	5 (71.4)	21 (80.8)	20 (47.6)	25 (54.3)	22 (59.5)
Has not occur in the last 30 days	0 (0.0)	3 (16.7)	1 (2.1)	3 (5.8)	9 (12.9)	1 (14.3)	0 (0.0)	7 (16.7)	7 (15.2)	6 (16.2)
Rarely	1 (20.0)	2 (11.1)	9 (18.8)	10 (19.2)	8 (11.4)	1 (14.3)	1 (3.8)	5 (11.9)	5 (10.9)	5 (13.5)
Occasionally	0 (0.0)	1 (5.6)	2 (4.2)	4 (7.7)	12 (17.1)	0 (0.0)	4 (15.4)	6 (14.3)	7 (15.2)	2 (5.4)
Often	1 (20.0)	0 (0.0)	1 (2.1)	5 (9.6)	2 (2.9)	0 (0.0)	0 (0.0)	4 (9.5)	2 (4.3)	2 (5.4)
Accidents										
Never	1 (20.0)	12 (66..7)	37 (77.1)	42 (80.8)	51 (72.9)	6 (85.7)	25 (96.2)	37 (88.1)	37 (80.4)	30 (81.1)
Has not occur in the last 30 days	1 (20.0)	4 (22.2)	2 (4.2)	2 (3.8)	6 (8.6)	0 (0.0)	0 (0.0)	1 (2.4)	3 (6.5)	1 (2.7)
Rarely	2 (40.0)	2 (11.1)	7 (14.6)	8 (15.4)	8 (8.6)	1 (14.3)	0 (0.0)	4 (9.5)	6 (13.0)	6 (16.2)
Occasionally	1 (20.0)	0 (0.0)	2 (4.2)	0 (0.0)	3 (4.3)	0 (0.0)	1 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)
Often	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

This study also examined the amount of time spent on the Internet through a smartphone and health problems (*Table 8.2*). Problems like eye strain, inadequate sleep, and cramping tend to be more prevalent among younger students who spent more hours on their device. For older students, eye strain and inadequate were more prevalent among those who spent more hours.

Table 8.3 Time spent on the Internet through a smartphone during the weekdays and health problems (n = 351)

Health problems	18 – 26 years of age (n = 193) n (%)					27 – 54 years of age (n = 158) n (%)				
	Time spent on the Internet (hours/day)					Time spent on the Internet (hours/day)				
	< 1 (n = 11)	1 – 2 (n = 34)	3 – 4 (n = 68)	5 – 6 (n = 35)	≥ 7 (n = 45)	< 1 (n = 11)	1 – 2 (n = 37)	3 – 4 (n = 56)	5 – 6 (n = 31)	≥ 7 (n = 23)
Eye strain										
Never	4 (36.4)	14 (41.2)	17 (25.0)	5 (14.3)	12 (26.7)	5 (45.5)	11 (29.7)	17 (30.4)	6 (19.4)	5 (21.7)
Has not occur in the last 30 days	0 (0.0)	4 (11.8)	6 (8.8)	6 (17.1)	2 (4.4)	3 (27.3)	3 (8.1)	5 (8.9)	4 (12.9)	2 (8.7)
Rarely	5 (45.5)	6 (17.6)	18 (26.5)	11 (31.4)	12 (26.7)	0 (0.0)	5 (13.5)	12 (21.4)	6 (19.4)	6 (26.1)
Occasionally	1 (9.1)	9 (26.5)	25 (36.8)	13 (37.1)	15 (33.3)	2 (18.2)	16 (43.2)	15 (26.8)	11 (35.5)	7 (30.4)
Often	1 (9.1)	1 (2.9)	2 (2.9)	0 (0.0)	4 (8.9)	1 (9.1)	2 (5.4)	7 (12.5)	4 (12.9)	3 (13.0)
Headache										
Never	9 (81.8)	24 (70.6)	38 (55.9)	20 (57.1)	20 (44.4)	9 (81.8)	22 (59.5)	33 (58.9)	18 (58.1)	15 (65.2)
Has not occur in the last 30 days	0 (0.0)	2 (5.9)	5 (7.4)	2 (5.7)	10 (22.2)	1 (9.1)	4 (10.8)	0 (0.0)	5 (16.1)	0 (0.0)
Rarely	1 (9.1)	4 (11.8)	13 (19.1)	8 (22.9)	9 (20.0)	0 (0.0)	4 (10.8)	8 (14.3)	4 (12.9)	5 (21.7)
Occasionally	0 (0.0)	4 (11.8)	12 (17.6)	5 (14.3	4 (8.9)	1 (9.1)	5 (13.5)	14 (25.0)	4 (12.9)	2 (8.7)
Often	1 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	2 (4.4)	0 (0.0)	2 (5.4)	1 (1.8)	0 (0.0)	1 (4.3)
Inadequate sleep										
Never	5 (45.5)	17 (50.0)	24 (35.3)	13 (37.1)	17 (37.8)	8 (72.7)	26 (70.3)	28 (50.0)	12 (38.7)	9 (39.1)
Has not occur in the last 30 days	1 (9.1)	2 (5.9)	6 (8.8)	3 (8.6)	1 (2.2)	1 (9.1)	0 (0.0)	4 (7.1)	1 (3.2)	2 (8.7)
Rarely	0 (0.0)	3 (8.8)	9 (13.2)	2 (5.7)	9 (20.0)	1 (9.1)	6 (16.2)	5 (8.9)	3 (9.7)	2 (8.7)
Occasionally	4 (36.4)	9 (26.5)	20 (29.4)	13 (37.1)	9 (20.0)	1 (9.1)	5 (13.5)	14 (25.0)	12 (38.7)	10 (43.5)
Often	1 (9.1)	3 (8.8)	9 (13.2)	4 (11.4)	9 (20.0)	0 (0.0)	0 (0.0)	5 (8.9)	3 (9.7)	0 (0.0)

Hand/wrist/arm cramping										
Never	7 (63.6)	25 (73.5)	44 (64.7)	19 (54.3)	24 (53.3)	8 (72.7)	29 (78.4)	29 (51.8)	12 (38.7)	15 (65.2)
Has not occur in the last 30 days	0 (0.0)	0 (0.0)	8 (11.8)	2 (5.7)	6 (13.3)	1 (9.1)	2 (5.4)	7 (12.5)	7 (22.6)	4 (17.4)
Rarely	2 (18.2)	7 (20.6)	11 (16.2)	3 (8.6)	7 (15.6)	1 (9.1)	3 (8.1)	6 (10.7)	5 (16.4)	2 (8.7)
Occasionally	1 (9.1)	1 (2.9)	3 (4.4)	8 (22.9)	6 (13.3)	1 (9.1)	1 (2.7)	10 (17.9)	6 (19.4)	1 (4.3)
Often	1 (9.1)	1 (2.9)	2 (2.9)	3 (8.6)	2 (4.4)	0 (0.0)	2 (5.4)	4 (7.1)	1 (3.2)	1 (4.3)
Accidents										
Never	6 (54.5)	28 (82.4)	51 (75.0)	27 (77.1)	31 (68.9)	11 (100.0)	32 (86.5)	49 (87.5)	24 (77.4)	19 (82.6)
Has not occur in the last 30 days	1 (9.1)	2 (5.9)	5 (7.4)	5 (14.3)	2 (4.4)	0 (0.0)	1 (2.7)	1 (1.8)	3 (9.7)	0 (0.0)
Rarely	3 (27.3)	2 (5.9)	12 (17.6)	2 (5.7)	8 (17.8)	0 (0.0)	4 (10.8)	6 (10.7)	3 (9.7)	4 (17.4)
Occasionally	1 (9.1)	2 (5.9)	0 (0.0)	1 (2.9)	2 (4.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.2)	0 (0.0)
Often	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (4.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

In looking at the amount of time spent on the Internet through a smartphone during the *weekdays* and self-reported health problems, Problems like eye strain, inadequate sleep, and cramping tend to be more prevalent among younger students who spent more hours on their device. For older students, eye strain and inadequate were more prevalent among those who spent more hours (*Table 8.3*).

Table 8.4 Frequency of Internet access through a smartphone and health problems (n = 351)

Health problems	18 – 26 years of age (n = 193) n (%)			27 – 54 years of age (n = 158) n (%)		
	Frequency of Internet access (per day)			Frequency of Internet access (per day)		
	0 – 1 (n = 10)	2 – 4 (n = 44)	≥ 5 (n = 139)	0 – 1 (n = 7)	2 – 4 (n = 36)	≥ 5 (n = 115)
Eye strain						
Never	5 (50.0)	15 (34.1)	32 (23.0)	1 (14.3)	14 (38.9)	29 (25.2)
Has not occur in the last 30 days	0 (0.0)	3 (6.8)	15 (10.8)	2 (28.6)	5 (13.9)	10 (8.7)
Rarely	2 (20.0)	13 (29.5)	37 (26.6)	2 (28.6)	7 (19.4)	20 (17.4)
Occasionally	3 (30.0)	11 (25.0)	49 (35.3)	2 (28.6)	7 (19.4)	42 (36.5)
Often	0 (0.0)	2 (4.5)	6 (4.3)	0 (0.0)	3 (8.3)	14 (12.2)
Headache						
Never	6 (60.0)	31 (70.5)	74 (53.2)	3 (42.9)	26 (72.2)	68 (59.1)
Has not occur in the last 30 days	2 (20.0)	2 (4.5)	15 (10.8)	0 (0.0)	3 (8.3)	7 (6.1)
Rarely	1 (10.0)	5 (11.4)	29 (20.9)	2 (28.6)	4 (11.1)	15 (13.0)
Occasionally	1 (10.0)	5 (11.4)	19 (13.7)	1 (14.3)	3 (8.3)	22 (19.1)
Often	0 (0.0)	1 (2.3)	2 (1.4)	1 (14.3)	0 (0.0)	3 (2.6)
Inadequate sleep						
Never	6 (60.0)	14 (31.8)	56 (40.3)	3 (42.9)	25 (69.4)	55 (47.8)
Has not occur in the last 30 days	1 (10.0)	3 (6.8)	9 (6.5)	1 (14.3)	2 (5.6)	5 (4.3)
Rarely	2 (20.0)	5 (11.4)	16 (11.5)	2 (28.6)	5 (13.9)	10 (8.7)
Occasionally	1 (10.0)	19 (43.2)	35 (25.2)	1 (14.3)	4 (11.1)	37 (32.2)
Often	0 (0.0)	3 (6.8)	23 (16.5)	0 (0.0)	0 (0.0)	8 (7.0)

Hand/wrist/arm cramping						
Never	4 (40.0)	34 (77.3)	81 (58.3)	3 (42.9)	24 (66.7)	66 (57.4)
Has not occur in the last 30 days	1 (10.0)	1 (2.3)	14 (10.1)	1 (14.3)	4 (11.1)	16 (13.9)
Rarely	2 (20.0)	7 (15.9)	21 (15.1)	2 (28.6)	5 (13.9)	10 (8.7)
Occasionally	2 (20.0)	2 (4.5)	15 (10.8)	0 (0.0)	2 (5.6)	17 (14.8)
Often	1 (10.0)	0 (0.0)	8 (5.8)	1 (14.3)	1 (2.8)	6 (5.2)
Accidents						
Never	8 (80.0)	38 (86.4)	97 (69.8)	4 (57.1)	35 (97.2)	96 (83.5)
Has not occur in the last 30 days	1 (10.0)	1 (2.3)	13 (9.4)	2 (28.6)	0 (0.0)	3 (2.6)
Rarely	1 (10.0)	2 (4.5)	24 (17.3)	1 (14.3)	1 (2.8)	15 (13.0)
Occasionally	0 (0.0)	3 (6.8)	3 (2.2)	0 (0.0)	0 (0.0)	1 (0.9)
Often	0 (0.0)	0 (0.0)	2 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)

Table 8.4 shows the frequency of Internet access and health problems among age groups. Those who access the internet more frequently tend to report health problems occurring more occasionally and often when compared to those who do not access the Internet as frequently. This was observed among students aged 27 to 54 (*Table 8.4*).

Table 8.5 Use of smartphones in dark places and its association to health problems (n = 351)

Health problems	18 – 26 years of age (n = 193) n (%)		27 – 54 years of age (n = 158) n (%)	
	Use of smartphones in dark places		Use of smartphones in dark places	
	No (n = 47)	Yes (n = 146)	No (n = 57)	Yes (n = 101)
Eye strain				
Never	23 (48.9)	29 (19.9)	22 (38.6)	22 (21.8)
Has not occur in the last 30 days	3 (6.4)	15 (10.3)	8 (14.0)	9 (8.9)
Rarely	7 (14.9)	45 (30.8)	11 (19.3)	18 (17.8)
Occasionally	12 (25.5)	51 (34.9)	12 (21.1)	39 (38.6)
Often	2 (4.3)	6 (4.1)	4 (7.0)	13 (12.9)
Headache				
Never	31 (66.0)	80 (54.8)	40 (70.2)	57 (56.4)
Has not occur in the last 30 days	5 (10.6)	14 (9.6)	4 (7.0)	6 (5.9)
Rarely	7 (14.9)	28 (19.2)	10 (17.5)	11 (10.9)
Occasionally	3 (6.4)	22 (15.1)	3 (5.3)	23 (22.8)
Often	1 (2.1)	2 (1.4)	0 (0.0)	4 (4.0)
Inadequate sleep				
Never	31 (66.0)	45 (30.8)	41 (71.9)	42 (41.6)
Has not occur in the last 30 days	3 (6.4)	10 (6.8)	2 (3.5)	6 (5.9)
Rarely	7 (14.9)	16 (11.0)	3 (5.3)	14 (13.9)
Occasionally	4 (8.5)	51 (34.9)	9 (15.8)	33 (32.7)
Often	2 (4.3)	24 (16.4)	2 (3.5)	6 (5.9)
Hand/wrist/arm cramping				
Never	34 (72.3)	85 (58.2)	37 (64.9)	56 (55.4)
Has not occur in the last 30 days	2 (4.3)	14 (9.6)	5 (8.8)	16 (15.8)
Rarely	5 (10.6)	25 (17.1)	10 (17.5)	7 (6.9)
Occasionally	6 (12.8)	13 (8.9)	5 (8.8)	14 (13.9)
Often	0 (0.0)	9 (6.2)	0 (0.0)	8 (7.9)
Accidents				
Never	42 (89.4)	101 (69.2)	51 (89.5)	84 (83.2)
Has not occur in the last 30 days	1 (2.1)	14 (9.6)	2 (3.5)	3 (3.0)
Rarely	4 (8.5)	23 (15.8)	4 (7.0)	13 (12.9)
Occasionally	0 (0.0)	6 (4.1)	0 (0.0)	1 (1.0)
Often	0 (0.0)	2 (1.4)	0 (0.0)	0 (0.0)

It was found that more of the participants from the younger age group used their smartphones in dark places (75.6%) when compared to the participants in the older age group (63.9%) (*Table 8.5*).

Table 8.6 Smartphone screen size and health problems (n = 351)

Health Problems	Smartphone screen size (inches)						
	3.5 (n = 9) n (%)	**4.0 (n = 64) n (%)**	**4.7 (n = 101) n (%)**	**5.1 (n = 53) n (%)**	**5.5 (n = 87) n (%)**	**5.7 (n = 35) n (%)**	**Other (n = 2) n (%)**
Eye strain							
Never	3 (33.3)	13 (20.3)	27 (26.7)	17 (32.1)	27 (31.0)	8 (22.9)	1 (50.0)
Has not occur in the last 30 days	0 (0.0)	6 (9.4)	9 (8.9)	5 (9.4)	12 (13.8)	3 (8.6)	0 (0.0)
Rarely	1 (11.1))	20 (31.3)	19 (18.8)	12 (22.6)	17 (19.5)	11 (31.4)	1 (50.0)
Occasionally	4 (44.4)	22 (34.4)	39 (38.6)	14 (26.4)	26 (29.9)	9 (25.7)	0 (0.0)
Often	1 (11.1)	3 (4.7)	7 (6.9)	5 (9.4)	5 (5.7)	4 (11.4)	0 (0.0)
Headache							
Never	6 (66.7)	42 (65.6)	59 (58.4)	31 (58.5)	52 (59.8)	17 (48.6)	1 (50.0)
Has not occur in the last 30 days	0 (0.0)	6 (9.4)	12 (11.9)	2 (3.8)	5 (5.7)	4 (11.4)	0 (0.0)
Rarely	2 (22.2)	8 (12.5)	10 (9.9)	13 (24.5)	16 (18.4)	6 (17.1)	1 (50.0)
Occasionally	1 (11.1)	7 (10.9)	18 (17.8)	7 (13.2)	13 (14.9)	5 (14.3)	0 (0.0)
Often	0 (0.0)	1 (1.6)	2 (2.0)	0 (0.0)	1 (1.1)	3 (8.6)	0 (0.0)
Inadequate sleep							
Never	5 (55.6)	29 (45.3)	43 (42.6)	30 (56.6)	37 (42.5)	14 (40.0)	1 (50.0)
Has not occur in the last 30 days	1 (11.1)	4 (6.3)	7 (6.9)	1 (1.9)	5 (5.7)	3 (8.6)	0 (0.0)
Rarely	1 (11.1)	4 (6.3)	12 (11.9)	5 (9.4)	11 (12.6)	7 (20.0)	0 (0.0)
Occasionally	1 (11.1)	22 (34.4)	31 (30.7)	13 (24.5)	24 (27.6)	5 (14.3)	1 (50.0)
Often	1 (11.1)	5 (7.8)	8 (7.9)	4 (7.5)	10 (11.5)	6 (17.1)	0 (0.0)

Hand/wrist/arm cramping							
Never	4 (44.4)	35 (54.7)	65 (64.4)	37 (69.8)	51 (58.6)	18 (51.4)	2 (100.0)
Has not occur in the last 30 days	1 (11.1)	7 (10.9)	12 (11.9)	3 (5.7)	11 (12.6)	3 (8.6)	0 (0.0)
Rarely	2 (22.2)	8 (12.5)	10 (9.9)	6 (11.3)	13 (14.9)	8 (22.9)	0 (0.0)
Occasionally	1 (11.1)	10 (15.6)	8 (7.9)	6 (11.3)	10 (11.5)	3 (8.6)	0 (0.0)
Often	1 (11.1)	4 (6.3)	6 (5.9)	1 (1.9)	2 (2.3)	3 (8.6)	0 (0.0)
Accidents							
Never	7 (77.8)	47 (73.4)	82 (81.2)	43 (81.1)	72 (82.8)	25 (71.4)	2 (100.0)
Has not occur in the last 30 days	0 (0.0)	8 (12.5)	5 (5.0)	3 (5.7)	3 (3.4)	1 (2.9)	0 (0.0)
Rarely	1 (11.1)	9 (14.1)	13 (12.9)	6 (11.3)	8 (9.2)	7 (20.0)	0 (0.0)
Occasionally	1 (11.1)	0 (0.0)	1 (1.0)	1 (1.9)	3 (3.4)	1 (2.9)	0 (0.0)
Often	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.1)	1 (2.9)	0 (0.0)

Since screen size was a possible factor for health problems, the relationship between the two was investigated in this study (*Table 8.6*). Having eye strain occur occasionally and often was most reported by individuals who owned smartphones with a screen size of 3.5 inches (55.5%). People who reported having headaches that occurred occasionally and often mostly owed a 5.7-inch smartphone (22.9%). For those who said to have had inadequate sleep occasionally and often, the large proportion of them owned 4.0-inch smartphones (42.2%). The people who reported to occasionally and often having hand/wrist/arm cramping owned 3.5-inch smartphones (22.2%). And finally, the participants that have experienced accidents occasionally and often mostly owned a 5.7-inch smartphone (5.8%). The data, however, shows that there was no significant association between a smartphone's screen size and self-reported health problems.

9. Alcohol use, IA, and health problems

This section details the prevalence of alcohol use among participants in the last 30 days, its association with IA level, and health problems.

Table 9.1 Alcohol use in the last 30 days (n = 351)

Alcohol use in the last 30 days	Males (n = 155) n (%)	Females (n = 196) n (%)
No	82 (52.9)	154 (78.6)
Yes	73 (47.1)	42 (21.4)

In this study, the students were asked if they have consumed alcohol in the last 30 days. More than half of the participants recounted to have not used alcohol in the past 30 days (*Table 9.1*). In comparing alcohol use among gender groups, twice as many males reported having had consumed alcohol (47.1%) than females (21.4%).

Table 9.2 IA level and alcohol use (n = 351)

	IA level			
Alcohol use in the last 30 days	**Normal (n = 70) n (%)**	**Mild (n = 154) n (%)**	**Moderate (n = 118) n (%)**	**Severe (n = 9) n (%)**
No	52 (74.3)	107 (69.5)	73 (61.9)	4 (44.4)
Yes	18 (25.7)	47 (30.5)	45 (38.1)	5 (55.6)

From the literature review, alcohol use was said to be linked to various addictive behaviors, one being IA. This study, therefore, investigated whether there was a relationship between the two. From the data, it may be observed that the proportion of people who reported to consuming alcohol in the past 30 days increased with IA severity (*Table 9.2*). There were 30.5% of mildly Internet addicted respondents who said yes to using alcohol in the past 30 days; while there were 38.1% of moderately addicted participants and 55.6% of whom were severely addicted to the Internet. However, there was no significant association between drinking alcohol in the past 30 days and IA level.

Table 9.3 Alcohol use in the last 30 days and health problems (n = 351)

Health problems	Alcohol use in the last 30 days					
	Males (n = 155) n (%)			Females (n = 196) n (%)		
	No (n = 82)	Yes (n = 73)	*p*-value	No (n = 154)	Yes (n = 42)	*p*-value
Eye strain						
- Never	30 (36.6)	25 (34.2)	.892	34 (22.1)	7 (16.7)	.745
- Has not occur in the last 30 days/Rarely	23 (28.0)	23 (31.5)		54 (35.1)	16 (38.1)	
- Occasionally/Often	29 (35.4)	25 (34.2)		66 (42.9)	19 (45.2)	
Headache						
- Never	59 (72.0)	43 (58.9)	.211	83 (53.9)	23 (54.8)	.654
- Has not occur in the last 30 days/Rarely	14 (17.1)	20 (27.4)		42 (27.3)	9 (21.4)	
- Occasionally/Often	9 (11.0)	10 (13.7)		29 (18.8)	10 (23.8)	
Inadequate sleep						
- Never	46 (56.1)	32 (43.8)	.313	69 (44.8)	12 (28.6)	.143
- Has not occur in the last 30 days/Rarely	14 (17.1)	16 (21.9)		24 (15.6)	7 (16.7)	
- Occasionally/Often	22 (26.8)	25 (34.3)		61 (39.6)	23 (54.8)	
Hand/wrist/arm cramping						
- Never	58 (70.7)	42 (57.5)	.192	88 (57.1)	24 (57.1)	.943
- Has not occur in the last 30 days/Rarely	16 (19.5)	23 (31.5)		36 (23.4)	9 (21.4)	
- Occasionally/Often	8 (9.8)	8 (11.0)		30 (19.5)	9 (21.4)	
Accidents†						
- Never	72 (87.8)	51 (69.9)	**.022***	125 (81.2)	30 (71.4)	.091
- Has not occur in the last 30 days/Rarely	8 (9.8)	18 (24.7)		28 (18.2)	10 (23.8)	
- Occasionally/Often	2 (2.4)	4 (5.5)		1 (0.6)	2 (4.8)	

Significant at * $p < .05$

† Fisher exact test

This research explored the relationship between alcohol use in the past 30 days and health problems (*Table 9.3*). After cross-examining alcohol use with health problems, it was found that a number of students who have used alcohol reported having had some of the health problems occur occasionally and often. More male students who had drunk alcohol reported to occasionally and often occurrence of headaches (13.7%), inadequate sleep (34.3%), hand/wrist/arm cramping (11.0%), and accidents (5.5%) than the ones who did not consume alcohol. Inadequate sleep and accidents were found to be significantly associated with alcohol

use among males (p = .022). For females, the occasional and often occurrence of eye strain (45.2%), headache (23.8%), inadequate sleep (54.7%), hand/wrist/arm cramping (21.4%) and accidents (4.8%) were more reported among those who said to have consumed alcohol in the past 30 days than those who did not. In comparing males and females, it may be seen that a higher proportion of females reported to the occasional and often occurrence of health problems than their male counterparts. The same can be seen in females who said to had drunk alcohol, except for reported accidents—a higher percentage of males who have drunk alcohol reported to the occasional and often occurrence of accidents. That said, alcohol use is a risk behavior to consider.

10. Tobacco use, IA, and health problems

In this section, data on tobacco use, its link with IA level, and the reported health problems are presented.

Table 10.1 Tobacco use in the last 30 days (n = 351)

Tobacco use in the last 30 days	Males (n = 155) n (%)	Females (n = 196) n (%)
No	130 (83.9)	188 (95.9)
Yes	25 (16.1)	8 (4.1)

Less than a quarter of participants have used tobacco in the past 30 days (*Table 10.1*). When comparing gender groups, more males were found to have used tobacco than females (16.1% and 4.1% respectively). The percentage of males who reported having used tobacco in the last 30 days was four times greater than the percentage of females who said to used tobacco.

Table 10.2 IA level and tobacco use (n = 351)

	IA level			
Tobacco use in the last 30 days	**Normal (n = 70) n (%)**	**Mild (n = 154) n (%)**	**Moderate (n = 118) n (%)**	**Severe (n = 9) n (%)**
No	63 (90.0)	139 (90.3)	108 (91.5)	8 (88.9)
Yes	7 (10.0)	15 (9.7)	10 (8.5)	1 (11.1)

This study also looked into the relationship between IA level and tobacco use (*Table 10.2*). Interestingly the proportion of those who reported yes to using tobacco lessened as IA level increased. There were 9.7% mild and 8.5% moderate Internet addicts who said to had tobacco.

Table 10.3 Tobacco use in the past 30 days and health problems (n = 351)

Health problems	Tobacco use in the last 30 days					
	Males (n = 155) n (%)			Females (n = 196) n (%)		
	No (n = 130)	**Yes (n = 25)**	***p*-value**	**No (n = 188)**	**Yes (n = 8)**	***p*-value**
Eye strain†						
- Never	43 (33.1)	12 (48.0)	.309	40 (21.3)	1 (12.5)	.643
- Has not occur in the last 30 days/Rarely	39 (30.0)	7 (28.0)		68 (36.2)	2 (25.0)	
- Occasionally/Often	48 (36.9)	6 (24.0)		80 (42.6)	5 (62.5)	
Headache†						
- Never	86 (66.2)	16 (64.0)	.964	102 (54.3)	4 (50.0)	.487
- Has not occur in the last 30 days/Rarely	28 (21.5)	6 (24.0)		50 (26.6)	1 (12.5)	
- Occasionally/Often	16 (12.3)	3 (12.0)		36 (19.1)	3 (37.5)	
Inadequate sleep†						
- Never	66 (50.8)	12 (48.0)	.812	80 (42.6)	1 (12.5)	.196
- Has not occur in the last 30 days/Rarely	24 (18.5)	6 (24.0)		29 (15.4)	2 (25.0)	
- Occasionally/Often	40 (30.8)	7 (28.0)		79 (42.0)	5 (62.5)	
Hand/wrist/arm cramping†						
- Never	85 (65.4)	15 (60.0)	.594	110 (58.5)	2 (25.0)	.053
- Has not occur in the last 30 days/Rarely	33 (25.4)	6 (24.0)		43 (22.9)	2 (25.0)	
- Occasionally/Often	12 (9.2)	4 (16.0)		35 (18.6)	4 (50.0)	
Accidents†						
- Never	106 (81.5)	17 (68.0)	**.009****	153 (81.4)	2 (25.0)	**.000*****
- Has not occur in the last 30 days/Rarely	22 (16.9)	4 (16.0)		34 (18.1)	4 (50.0)	
- Occasionally/Often	2 (1.5)	4 (16.0)		1 (0.5)	2 (25.0)	

Significant at * $p < .05$; ** $p < .01$, *** $p < .001$

†Fisher exact test

The relationship between tobacco use in the past 30 days and the occurrence of health problems are displayed in *Table 10.3*. It may be observed that, overall, a higher percentage of those who reported having health problems that occurred occasionally and often had used tobacco. Among males who used tobacco in the past 30 days, a greater proportion of them reported often experiencing inadequate sleep (24.0%) than the nonusers (6.2%). Moreover, a higher percentage of them reported to occasional and often occurrence of hand/wrist/arm cramping (16.0%) and accidents (16.0%) than those who did not use tobacco (9.2% and 1.5%

respectively). Inadequate sleep and accidents were found to be significantly associated with smoking among the male participants in this study. As for the female participants, there was a higher percentage of tobacco users who reported to the occasional and often occurrence of eye strain (62.5%), headache (37.5%), inadequate sleep (62.5%), hand/wrist/arm cramping (50.0%), and accidents (25.0%). An association was found between tobacco use and accidents among females, nonetheless. In comparing the gender groups, more female users reported to having occasion and often problems with eye strain, headache, inadequate sleep, hand/wrist/arm cramping, and accidents than males. Accordingly, tobacco use is a risk behavior to consider as well.

CHAPTER V
DISCUSSION

The objective of this cross-sectional study was to assess IA level, determine health problems related to their smartphone Internet use and to report the association between IA level and health problems among international students at a university in Bangkok. Through a self-reported online questionnaire, the participating students were asked of their socio-demographic background, the pattern of their Internet use, IA level, and health problems. Young's IAT was used to measure IA level. Data were collected through purposive sampling. The sample consisted of 351 international students of various backgrounds. The proportion of males (n = 155) to females (n = 196) were approximately similar. The mean age was 26.8 years (*SD* ± 7.1).

For the pattern of Internet use among males, more than 90% reported engaging in social networking and information seeking. More than 90% of females reported to engage in social networking, information seeking, and text messaging. Roughly 70% of males used their smartphones when doing homework; more than 50% of females used their smartphones while eating. More than 70% of males and females said to mostly accessed the Internet through their smartphones at home. Over 70% of males and females go on the Internet more than five times per day. Nearly 30% of males spent three to four hours on the Internet during the weekends; while one-third of females spent seven hours or more during the weekends. More than one-third of males and females spent three to four hours during the weekdays.

Almost 100% of students from the younger group (aged 18 to 26) reported to engage in social networking, information seeking, and text messaging. More than 90% of students from the older group (aged 27 to 54) engaged in social networking, information seeking, and e-mailing. Approximately 80% of younger students reported to being preoccupied on the Internet when doing homework; while 71% of older students reported to accessing the Internet when doing work. More than three-quarters of students from both age groups said to mostly access the Internet through a smartphone at home. More than 70% of students from both age groups access the Internet more than five times per day. Over one-third of younger students spent seven or more hours on the Internet on the weekends; nearly one-third of older students reported having spent five to six hours during the weekends. More than 20% of students from both age groups spent three to four hours on the Internet during the weekdays.

For IA level, 44% of all participants had mild IA, 34% had moderate, and 3% had severe. IA level was compared with the students' socio-demographic characteristics. Concerning education level, male master students had the highest proportion of people in the moderate (49%) and severe level (67%). For females, the majority of moderate addicts were at

the master's level (49%). However, there was a higher proportion of female undergraduates with severe addiction (67%). In terms of average GPA for males, the portion of those with an average GPA of 3.5 and greater were found to decrease with the increase in IA severity. A similar trend was found for females.

More females were found be moderately (34%) and severely (3%) addicted to the Internet than males (33% and 2%, respectively). Though, there was no significant association between IA level and gender. This study looked at the association between smartphone activities and IA level and found that they were different for gender groups. For males, activities associated to IA included: information seeking, emailing, social networking, calling, and mobile social gaming. For females, these activities were: streaming music, social networking, and texting. The frequency of accessing the Internet was found to be associated with IA level among females. Whereas, the amount of time spent on the Internet was associated with IA level for both males and females.

There were more students from the younger age group who had moderate (36%) to severe addiction (3%) than students of the older age group (31% and 2%, respectively). IA level was found to be significantly associated with age. Smartphone Internet activities that were associated with IA level among the younger group included: information seeking, social networking, texting, and mobile social gaming. For older students, activities associated with IA level consisted of calling, watching videos and social networking. The amount of time spent on the Internet was associated with IA level among younger students. There was an association between the frequency of Internet access and IA level for older students.

Nearly three-quarters of the study sample reported having experiencing eye strain during or immediately following smartphone Internet use. More than 40% of all participants reported having had headaches, inadequate sleep, and cramped hand/wrist/arm. Approximately 20% of the study sample said having had accidents. A greater proportion of females reported occasionally having and often experienced eyestrain, headaches, inadequate sleep, and hand/wrist/arm cramping than males. A higher percentage of males said to have occasionally and often suffered accidents than females.

In looking at IA level and health problems among gender groups, for males, an association was found between IA level and inadequate sleep. For females, IA level was significantly associated with eye strain and inadequate sleep. The reports of occasionally and often having health problems tended to be more prominent among those with moderate IA than mild IA for both genders.

Among the younger group, an association was found between IA level and having inadequate sleep. For older students, IA level was associated with eye strain, inadequate sleep, and hand/wrist/arm cramping.

Reported health problems were found to be linked to various factors. The amount of time spent on a smartphone was related to inadequate sleep and headaches. The frequency of use was linked to hand/wrist/arm cramping and accidents. Using a smartphone in places with insufficient light was related to eye strain, headaches, inadequate sleep, hand/wrist/arm cramping, and accidents. Smartphone screen size was not significantly associated with any of the listed health problems. Alcohol and tobacco use were significantly associated with inadequate sleep and accidents. However, alcohol and tobacco use were not associated with IA level.

Discussion

There were subtle differences in smartphone Internet usage pattern between males and females. In the present study, social networking and information seeking were found to be the most popular activity for both genders. Findings are concurrent with the ETDA (Electronic Transactions Development Agency, 2016). In the current study, most students from both gender groups accessed the Internet five or more times a day. Results from this research show that more females spent seven hours or more on their smartphones than males. Most males spent three to four hours a day on the Internet. A study, by Roberts and colleagues, found that females spent an average of 10 hours, while males spent 8 hours a day (Roberts et al., 2014).

In this study, more than 90% of students from both age groups engaged in social networking and information seeking (Electronic Transactions Development Agency, 2016). This study found that students of both age groups reported to going on the Internet through their smartphones five or more times per day. However, students from the younger group spent more time on their device than students from the older age group. Khan et al. had noted in a study that Internet activity decrease with age (Khan, Khan, Rehman, & Ghouse, 2017). Students of both age groups commonly spent more time during the weekends as opposed to weekdays when most of them would not be occupied with school or work.

The present study found that 34% of all participants had moderate IA and 3% had severe IA. This is considerably greater than the prevalence from studies conducted in Iran (11%), Chile (12%), and Greece (8%) (Berner, Santander, Contreras, & Gómez, 2014; Christos C Frangos, 2009; Ghamari, Mohammadbeigi, Mohammadsalehi, & Hashiani, 2011). In a study conducted among Thai medical students, the researchers found the prevalence of "possible IA"

to be 24.4% (Boonvisudhi & Kuladee, 2017). A study in Nepal found that 42.0% of students were among the moderate and severe IA group (Marahatta, Adhikari, Aryal, & Regmi, 2015). The difference in the measurement tools used to assess IA is likely the cause of the discrepancy of IA prevalence rates. Some studies used Young's Diagnostic Questionnaire for Internet Addiction which lacks IA severity grading. Another probable reason for explaining the variance in prevalence data is time. IA prevalence raises as Internet use increases through time; it may be observed that findings from prior studies have lower prevalence as compared to the more recent studies. In any case, it is critical to highlight that roughly one out of three international students who participated in this study was moderately or severely addicted to the Internet via a smartphone.

Socio-demographic played a role in IA level. Regarding education level, this study found that master and undergraduate level students tended to be the one with more addiction than those studying at the Ph.D. level. Previous research found that those with lower education level are more prone to forming an addiction (Kwon, Lee, et al., 2013). In the present study, students with a lower average GPA tended to have moderate or severe IA. An earlier study found GPA to be negatively related to Internet use (S. Lee, 2009).

The current study found that a greater proportion of females were moderately and severely addicted to the Internet than males. Previous studies have yielded similar findings (Geser, 2006; Roberts et al., 2014). According to Hakoama and colleague, females tend to be more attached to their devices because they use the Internet as a way to cultivate and maintain relationships (Hakoama & Hakoyama, 2011). Activities that drive addiction differs across gender (Roberts et al., 2014). In the present study, social networking was found to be the activity that may have driven IA among males and females. In a previous study, Roberts et al. suggest that the time spent on SNS is a good indicator of addiction among mobile phone users (Roberts et al., 2014). The present study found the amount of time spent on social networking to be significantly associated with IA level across both gender groups. For males and females, IA was associated with the amount of time spent on the Internet. Several other studies also found usage time to be closely linked to addiction severity (Lin et al., 2015; Roberts et al., 2014). An association was found between frequency of Internet access and IA level among females. Perhaps it is because females depend more heavily on their devices to sustain social relationships as proposed by Hakoama and colleague (Hakoama & Hakoyama, 2011).

The results from this study revealed that a more of younger students had moderate to severe IA than older students. The current study found that IA level was significantly associated with age; this is consistent with a previous study (Okwaraji, Aguwa, Onyebueke, Arinze-Onyia, & Shiweobi-Eze, 2015). The present study also found that social networking was associated

with IA for both age groups. The use of social networking is a strong predictor of addiction (Roberts et al., 2014). The amount of time spent on the Internet was associated with IA among the younger group.

Of the five health problems, eye strain was the most reported one among all of the participants (73%)—especially by females and older students. According to Rosenfield, roughly 80% of teens and 40% of adults may experience significant visual symptoms during or right after gazing at an electronic display (Rosenfield, 2016).

The current study found that nearly half of all the participants (41%) have experienced a headache during or immediately following smartphone use—most of those who reported having headaches were the females and older aged students. A study on 437 students at King Saud University, Saudi Arabia, revealed that 21.6% of the participant had had headaches when using their mobile device (Al-Khlaiwi & Meo, 2004). The high variance in percentage may be explained by the difference in the time at which the study was performed.

Over half of all the participating students (55%) were found to have experienced inadequate sleep due to Internet use on their smartphones—most of them consisted of females and younger aged students. This was more than previous studies. Demirci and colleagues found that 46% of smartphone users experienced poor sleep (Demirci et al., 2015).

More than one-third of all the participants (40%) reported having experienced hand/wrist/arm cramping during or immediately following Internet use through their smartphone device—most who reported were females and older students. The findings of the current study are less than that of Berolo et al. where 50% of the participants for their study reported to any hand pains due to mobile hand-held devices (Berolo, Wells, & Amick, 2011). Accidents were the least reported problem among students—of those who reported; the majority were males and students of the younger group.

The prevalence rate found in the present study (21%) is less than what was found in a study conducted on 608 college students (28%) (H.-J. Kim, Min, Kim, & Min, 2017). Kim and colleagues also found that males were more likely to experience traffic accidents than females (H.-J. Kim et al., 2017).

The current study found an association between IA level and the occurrence of eye strain among female participants. This may be because of those with higher IA level, many of the females, in particular, tend to devote more time viewing their device (Hakoama & Hakoyama, 2011; Roberts et al., 2014). An association also was found between eye strain and IA level among students aged 27 to 54. A reason that may help to explain this finding would

be the fact the functioning of our eyes degrade with age (Guirao et al., 1999). Exposure to digital displays may have more impact on the eyes of older adults. There is a good chance that prolonged use of smartphones may lead to ocular discomfort (Dr. Kimberly S. Young & De Abreu Cristiano, 2017).

The result of the present study reveals an association between IA level and inadequate sleep among both gender and age groups. A study of 319 university students in Turkey shown sleep quality to be associated with smartphone overuse (Demirci et al., 2015). Canan et al. generated similar findings (Canan et al., 2013). Students with higher addiction to the Internet through their smartphones are presumably disposed to insufficient sleep.

The present study found an association between IA level and the occurrence of hand/wrist/arm cramping among student aged 27 to 54. The finding is in agreement with a study done by Inal et al. where they found a correlation between an addiction to the smartphone and hand movement pain (Inal et al., 2015). According to the researchers, the median nerve may become enlarged due to smartphone overuse. This leads to pain in the thumb, lessened pinch strength, and ultimately decreased hand function (Inal et al., 2015). Aggarwal coined this form of repetitive strain injury as “blackberry thumb” (Aggarwal, 2013). If users consistently retain unhealthy positions when on their devices, they are inclined to develop some form of musculoskeletal disorders (H. Lee, Lee, Choi, Seo, & Shim, 2013).

The present study found the amount of time spent on the Internet was significantly associated with inadequate sleep and headaches. A previous study, by Lee and colleague, have shown, extended hours spent in front of a smartphone screen to be associated with the occurrence of headaches in a previous study (J. I. Lee & Song, 2014).

In the present study, the frequency of accessing the Internet through a smartphone was found to be related to hand/wrist/arm cramping. Repetitive strain tends to happen to those who frequently used their smartphones than those who do not (Inal et al., 2015). The frequency of Internet access was also associated with the occurrence of accidents. It could be interpreted that student who frequently goes on their smartphones are more distracted by it and therefore suffers more accidents due to their inattention to surroundings (H.-J. Kim et al., 2017).

Use of a smartphone in dark places was linked to eye strain, headaches, inadequate sleep, hand/wrist/arm cramping, and accidents. According to Aggarwal, Improper lighting conditions may aggravate eye strain (Aggarwal, 2013). The bright light produced by smartphones could inhibit sleep by suppressing melatonin secretion (Higuchi, Motohashi, Liu, Ahara, & Kaneko, 2003). The occurrence of hand/wrist/arm cramping may be due to the fact that users are using their smartphones for extended hours (Berolo et al., 2011), well into the

night when lights are usually out. As for accidents, a plausible explanation would be that using a smartphone in places of insufficient lighting impair vision—as the eyes could only see the brightly lit screen—resulting in accidents.

Regarding screen size, the results showed no association between health problems and the size of a person's screen. However, students who owned smaller screen size tended to report having eye strain occasionally and often than students who owned larger screen size. According to Rosenfield, images and texts tend to be reduced to accommodate small screens; this contributes to eye strain (Rosenfield, 2016).

The results of the present study showed that alcohol and tobacco users tended to report having experienced health problems occasionally and often, generally more so than nonusers. This study found that alcohol and tobacco use were not associated with IA level. However, past studies have found an association (Korkeila et al., 2010). In a large study comprising of a nationally represented sample, Lee et al. found that smoking predisposes to a higher risk of IA (Y. S. Lee, Han, Kim, & Renshaw, 2013). The present did not identify such associations though. Alcohol consumption and tobacco use are still risk behavior worth considering.

This research had several benefits. First, this is an evidence-based study; findings can be applied in intervention design. Second, knowing IA level may elicit the need put together a method of prevention tailored to the groups affected. Third, this study collected participants' e-mails. Students received their IAT scores and IA level via e-mail within two weeks. Those who were found to have IA at severe levels were given suggestions to monitor and reduce their Internet usage. Fourth, this study helped to raise awareness on the emerging issue of IA. Fifth, the proportions of males and females respondents were approximately similar; comparison between gender groups was able to be carried out in the study.

There were several notable limitations in this study. First, there were limits with the survey system. The text size, font, and color cannot be changed. The system cannot detect repeating responses; submissions with repeating emails and phone numbers were deleted manually. The system will not save their entry if it is not complete, participants had to start from the beginning. Second, data collection was carried out during the end of summer semester, so many of the students were either not present or available. Third, this study used a self-administered questionnaire. It was difficult to get students to respond to the survey and to control who could take it. There is no way to know if participants answer truthfully or wholly comprehend the questions. However, they were able to contact the researcher with any questions, comments, or concerns during the whole time this study was conducted. Fourth, the health problems may have been caused by other factors that is study did not account for. There

were no medical record to confirm of health problems. The study did not include physical check-ups. There was no instrument to diagnose specific diseases or health problems. Fifth, this study was also prone to social desirability bias; results may have been under-reported. Sixth, recall bias involving time estimation may have occurred. Seventh, this study used purposive sampling technique. Readers should take caution in generalizing the study's results.

Recommendations

To prevent the possible negative impacts of IA on students' health institutions must consider its surveillance, especially among the younger group (e.g., schools may conduct annual IA tests for a start). The present study revealed that moderate and severe IA was more prevalent among females and younger students. Based on this finding, policymakers and those involved should primarily focus on female university students between the ages of 18 and 26. Appropriate interventions should be organized and implemented to address the emerging issue of IA through smartphones. Given that many students today use the Internet to engage in social networking, SNS is recommended to be used as a platform for future IA interventions (e.g., these may come in the form of links to free IA test on the university's Facebook page or even an Instagram account devoted to topics of IA). Limiting smartphone usage times and monitoring posture is key to reducing the physical symptoms; it is suggested that students take frequent breaks from the screen. There are a number of existing applications that alerts the smartphone user about their usage time and behavior. However, applications such as this are not commonly used. Therefore, awareness must be raised to promote the utilization of these useful apps. They should be made free and widely available for students.

Further research

This was a cross-sectional study, so it is not possible to determine cause and effect. Longitudinal research should be conducted in order to see whether addiction to the Internet through the smartphone causes health problems. Moreover, prospective studies should determine the extent of symptoms taking into account usage behavior. Other health problems that are potentially related to smartphone use and IA could be investigated as well (e.g., poor physical fitness). Further studies should include physical check-up and medical data; more evidence needs to be integrated (e.g., assess mental health).

The present research was carried out purposive sampling on a particularly small sample that only included international program students; thus, generalizing findings is limited. Further studies should be done on a larger scale (inclusive of students of other programs) using stratified sampling technique to allow for more generalizable results. Additionally, future studies should

examine Internet usage behavior and IA through different portable digital electrons capable of Internet access (e.g., tablet). Several individuals may have used the Internet through other devices for numerous hours, but because this research focuses exclusively on the smartphone, he/she could not consider that time.

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APPENDICES

APPENDIX A

QR Code and Link to Questionnaire

1. QR code to questionnaire:

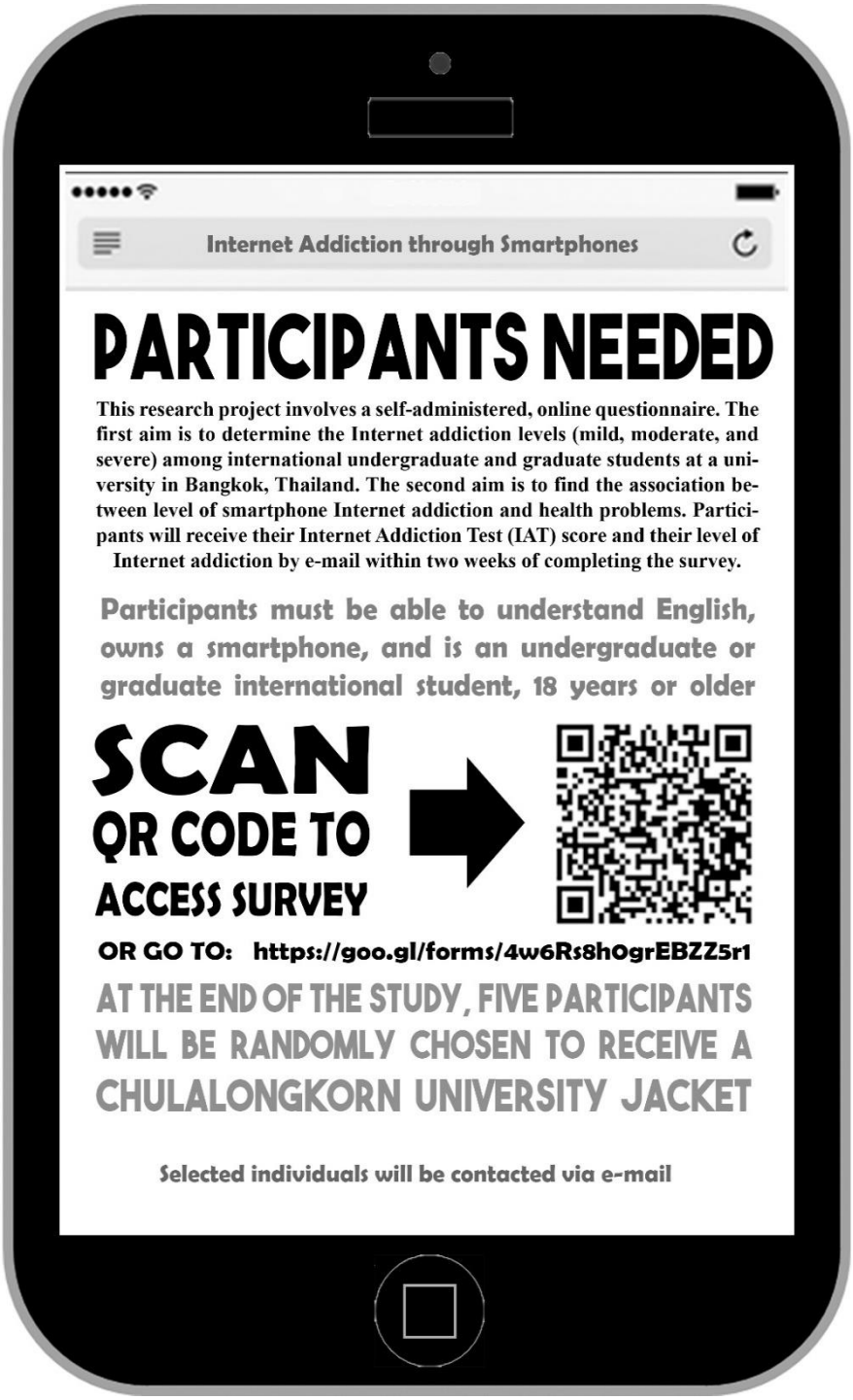
2. Link to questionnaire:

   Extended version: https://docs.google.com/forms/d/e/1FAIpQLSe01zMF1L7liu7y3-mQS5hUcl3XpKcwAjh4iYD4uWwCFGr77g/viewform

   Shortened version: https://goo.gl/forms/4w6Rs8h0grEBZZ5r1

APPENDIX B

Study Announcement



APPENDIX C

Questionnaire

Note: *This study uses a questionnaire that is online version only. The survey shown in the appendix display the contents that will appear in the online questionnaire in a slightly different format for ease of understanding.*

Internet Addiction Survey

PARTICIPANT INFORMATION PAGE

Title of research project: Internet Addiction and Health Problems through Smartphone among International Students in a University in Bangkok, Thailand: Online Questionnaire

Principle researcher's name: Supattra Phromsiri

Position: Master student at the College of Public Health Sciences, Chulalongkorn University

Phone number: 094-847-8271

E-mail: SupattraPhromsiri@gmail.com

1. You are invited to take part in a research project. Before you decide to participate it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully and do not hesitate to ask if anything is unclear or if you would like more information.

2. This research project involves a self-reported online questionnaire that is meant to determine the Internet addiction levels (mild, moderate, and severe) among international program students—undergraduate and graduate—at a university in Bangkok, Thailand. The aim of this research is to determine the association between level of Internet addiction through smartphones and health problems. 351 participants are required for this study.

3. Participants must be able to understand English, owns a smartphone, and is an undergraduate or graduate international student, 18 years or older. Those who cannot provide informed consent will not be able to proceed to the following sections in the questionnaire, thus excluded from this study.

4. The questionnaire may be accessed by going to https://goo.gl/forms/4w6Rs8h0grEBZZ5r1 or scanning the QR code.

5. This survey has a total of 80 questions regarding smartphone ownership status, socio-demographic characteristics, smartphone description, and Internet usage, frequency, self-diagnosis of addiction, IAT, health related problems from smartphone Internet use, as well as

substance use. It will take approximately 30 minutes to complete. A confirmation e-mail will be sent to participant automatically after successfully completing and submitting the survey. As an incentive, five participants will be selected at random to receive a free-size Chulalongkorn University jacket at the end of the study. Selection process: Each participant will have a number attached to their submission entry. A random number generator will be used in selecting the participants. The five chosen individuals will be contacted through the e-mail. If the participant does not reply within 1 week, the prize will be dropped and the participant will no longer be eligible. A date will be set as to when and where the participant can claim the item. If he/she does not claim within the allotted time, then he/she will no longer be eligible.

6. The participant is free to contact the researcher via e-mail with any questions, comments, or concerns.

7. The benefit of this study is that participants will receive their Internet Addiction Test (IAT) score and what level of Internet addiction they are in, through the e-mail address that was provided, within two weeks of completing the survey.

8. Joining this research project involves no risk, only minor inconvenience and loss of personal time.

9. Participation to the study is voluntary and the participant has the right to deny and/or withdraw from the study at any time, there is no need to give a reason, and there will be no bad impact upon that participant.

10. Information related directly to you will be kept confidential. Results of the study will be reported as total picture. Any information which could be able to identify you will not appear in the report.

11. If researcher does not perform upon participants as indicated in the information, the participants can report the incident to the Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University (RECCU). Jamjuree 1 Bldg., 2nd Fl., 254 Phyathai Rd., Patumwan district, Bangkok 10330, Thailand, Tel. /Fax. 0-2218-3202 E-mail: eccu@chula.ac.th.

Survey Sections

1. Smartphone Ownership Status
2. Socio-Demographic Characteristics
3. Smartphone Description
4. Smartphone Usage
5. Frequency
6. Situation
7. Environment
8. Place
9. Your Opinion
10. Internet Addiction Test (IAT)
11. Health Problems
12. Alcohol and Substance Use

Informed Consent Form

Checking "agree" indicates that:

I have read about the rationale and objectives of the project, what I will be engaged with in detail, and the benefit of this project. The researcher has explained to me in the text, and I clearly understand with satisfaction.

I willingly agree to participate in this project and consent the researcher to respond to the questionnaire that will take approximately 30 minutes. I also understand that one submission is allowed per person.

I have the right to withdraw from this research project at any time as I wish with no need to give any reason. This withdrawal will not have any negative impact upon me.

Researcher has guaranteed that procedures acted upon me would be kept confidential. Results of the study will be reported as a total picture. Any of personal information which could be able to identify me will not appear in the report.

If I am not treated as indicated in the information sheet, I can report to the Research Ethics Review Committee University (RECCU). Jamjuree 1 Bldg., 2nd Fl., 254 Phyathai Rd., Patumwan district, Bangkok 10330, Thailand, Tel. /Fax. 0-2218-3202 Email: eccu@chula.ac.th.

If you do not wish to partake in the study, please decline participation by checking "disagree".

Please select your choice below:

◯ Agree

◯ Disagree

Section 1: Smartphone Ownership Status

Do you own a smartphone?

- ◯ No
- ◯ Yes

Section 2: Socio-demographic Characteristics

This section will ask for your background information. Please answer all of the questions below.

1. What is your age?

   _____

2. What is your gender?
   - ◯ Male
   - ◯ Female

3. What is your marital status at present?
   - ◯ Single
   - ◯ Married
   - ◯ Widowed
   - ◯ Divorced

4. What is your nationality?

   _____

5. What is your faculty/department?
   - ◯ College of Public Health Sciences
   - ◯ Faculty of Allied Health Sciences
   - ◯ Faculty of Architecture
   - ◯ Faculty of Arts
   - ◯ Faculty of Commerce and Accountancy
   - ◯ Faculty of Communication Arts
   - ◯ Faculty of Dentistry
   - ◯ Faculty of Economics
   - ◯ Faculty of Education

◯ Faculty of Engineering
◯ Faculty of Law
◯ Faculty of Medicine
◯ Faculty of Nursing
◯ Faculty of Pharmaceutical Science
◯ Faculty of Political Science
◯ Faculty of Psychology
◯ Faculty of Science
◯ Graduate School
◯ Sasin Graduate Institute of Business Administration
◯ The Petroleum and Petrochemical College
◯ Other

6. What is your level of education at present?
◯ First year undergraduate
◯ Second year undergraduate
◯ Third year undergraduate
◯ Fourth year undergraduate
◯ Fifth year undergraduate
◯ Sixth year undergraduate
◯ Master
◯ Ph.D.
◯ Other: _____

7. What is your average GPA?
It is sometimes referred to as GPAX. Please round to the nearest tenths (for example, if you have a cumulative of GPA is 3.57, round to 3.60)

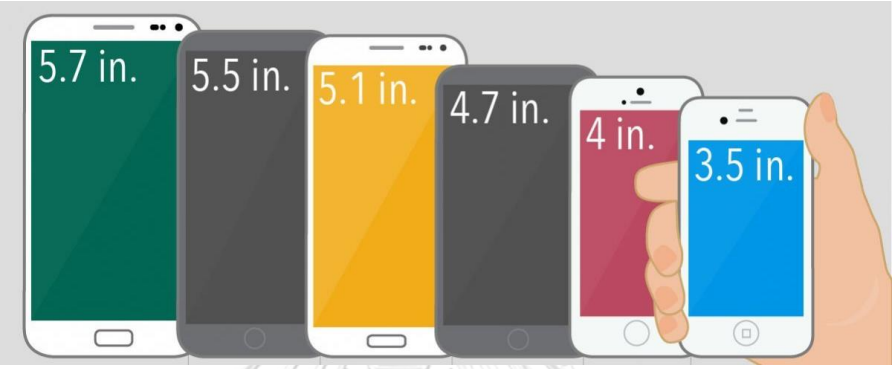
_____

8. What is your monthly household income?
◯ Less than 45,000 baht (1319.26 USD)
◯ More than or equal to 45,000 baht (1319.26 USD)
◯ Rather not share

Section 3: Smartphone Description

For the following question, please select the choice that applies to you. Note: You may estimate and chose the screen size that is closest to your smartphone. In the case that you own more than one smartphone and they are of different sizes, select the size of the smartphone that you use more often. Please exclude tablets. This question is asked because the size of the device may or may not be correlated with the self-reported problems concerning health and Internet use.

What is the screen size of your smartphone?



◯ 3.5 inches (e.g. iPhone 4S)
◯ 4.0 inches (e.g. iPhone 5S)
◯ 4.7 inches (e.g. iPhone 6)
◯ 5.1 inches (e.g. Samsung Galaxy S5)
◯ 5.5 inches (e.g. Samsung Galaxy S7)
◯ 5.7 inches (e.g. Samsung Galaxy Note 3)
◯ Other: _____

Section 4: Smartphone Usage

Average total time spent using the Internet through a smartphone (hours/day) in the **last 30 days**:

(Answers should be rounded to the nearest hour. In the case that your answer falls at two hours and 30 minutes, for instance, round up to three hours.)

On weekends:	**On weekdays:**
◯ Less than 1 hour	◯ Less than 1 hour
◯ 1-2 hours	◯ 1-2 hours
◯ 3-4 hours	◯ 3-4 hours
◯ 5-6 hours	◯ 5-6 hours
◯ 7 hours or more	◯ 7 hours or more

Have you done the following activities on your smartphone in the **last 30 days**?

Activities	**No / Yes**	**If 'YES'** (Answers should be rounded to the nearest hour. In the case that your answer falls at 2 hours and 30 minutes, for instance, round up to 3 hours.)	
		How many hours per day, on average, do you spend doing this activity in a **weekend**?	How many hours per day, on average, do you spend doing this activity in a **weekday**?
1. Streaming music	◯ No ◯ Yes	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more
2. Watching videos online	◯ No ◯ Yes	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more
3. Seeking information online	◯ No ◯ Yes	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more
4. News and weather update	◯ No ◯ Yes	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more
5. Online shopping	◯ No ◯ Yes	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more

Activities	No / Yes	If 'YES' (Answers should be rounded to the nearest hour. In the case that your answer falls at 2 hours and 30 minutes, for instance, round up to 3 hours.)	
		How many hours per day, on average, do you spend doing this activity in a **weekend**?	How many hours per day, on average, do you spend doing this activity in a **weekday**?
6. E-mailing (It can be for business, academic, or personal reasons)	◯ No ◯ Yes	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more
7. Social networking (e.g. Facebook, Instagram, Twitter)	◯ No ◯ Yes	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more
8. Calling (includes LINE voice/video calling and calls using data)	◯ No ◯ Yes	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more
9. Texting/messaging (This means sending/receiving brief, instant messages. An example would be messaging through LINE application)	◯ No ◯ Yes	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more
10. Mobile social gaming (e.g. Pokémon Go, Angry Bird, Candy Crush Saga)	◯ No ◯ Yes	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more	◯ Less than 1 hour ◯ 1-2 hours ◯ 3-4 hours ◯ 5-6 hours ◯ 7 hours or more

Section 5: Frequency of Internet Use

On average, how often do you access the Internet through your smartphone per day in the **past 30 days**?

◯ 0 – 1 times per day

◯ 2 – 4 times per day

◯ 5 or more times per day

Section 6: Situation

Have you **ever** done the following? (*Please check all that applies*)

I've used the Internet through my smartphone when I am:

☐ driving
☐ doing work
☐ doing homework
☐ eating
☐ walking

Section 7: Environment

Do you use the Internet through your smartphone in dark places (example: in a room with the lights turned off)?

◯ No

◯ Yes

Section 8: Place

Where do you **MOSTLY** use the Internet through your smartphone? (*Choose one*)

◯ Home

◯ School

◯ Workplace

Section 9: Your Opinion

Do you think you are addicted to using the Internet through the smartphone?

◯ No, I am not addicted

◯ Yes, I am addicted

Section 10: Internet Addiction Test (IAT)

For each question, please mark the choice that applies to you. Since this study will be looking at 'smartphone' Internet addiction, **when the question say on-line use, it means Internet use through the smartphone exclusively.**

0 = Does not apply (it means 0% of the time)
1 = Rarely (occurs roughly 5% of the time)
2 = Occasionally (30% of the time)
3 = Frequently (50% of the time)
4 = Often (about 70% of the time)
5 = Always (occurs 100% of the time)

	0	1	2	3	4	5
1. How often do you find that you stay on-line longer than you intended?	○	○	○	○	○	○
2. How often do you neglect household chores to spend more time on-line?	○	○	○	○	○	○
3. How often do you prefer the excitement of the Internet to intimacy with your partner?	○	○	○	○	○	○
4. How often do you form new relationships with fellow on-line users?	○	○	○	○	○	○
5. How often do others in your life complain to you about the amount of time you spend on-line?	○	○	○	○	○	○
6. How often do your grades or school work suffers because of the amount of time you spend on-line?	○	○	○	○	○	○
7. How often do you check your email before something else that you need to do?	○	○	○	○	○	○
8. How often does your job performance or productivity suffer because of the Internet?	○	○	○	○	○	○
9. How often do you become defensive or secretive when anyone asks you what you do on-line?	○	○	○	○	○	○
10. How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	○	○	○	○	○	○
11. How often do you find yourself anticipating when you will go on-line again?	○	○	○	○	○	○

0 = Does not apply (it means 0% of the time)
1 = Rarely (occurs roughly 5% of the time)
2 = Occasionally (30% of the time)
3 = Frequently (50% of the time)
4 = Often (about 70% of the time)
5 = Always (occurs 100% of the time)

	0	1	2	3	4	5
12. How often do you fear that life without the Internet would be boring, empty, and joyless?	○	○	○	○	○	○
13. How often do you snap, yell, or act annoyed if someone bothers you while you are on-line?	○	○	○	○	○	○
14. How often do you lose sleep due to late-night log-ins?	○	○	○	○	○	○
15. How often do you feel preoccupied with the Internet when off-line, or fantasize about being on-line?	○	○	○	○	○	○
16. How often do you find yourself saying "just a few more minutes" when online?	○	○	○	○	○	○
17. How often do you try to cut down the amount of time you spend on-line and fail?	○	○	○	○	○	○
18. How often do you try to hide how long you've been on-line?	○	○	○	○	○	○
19. How often do you choose to spend more time on-line over going out with others?	○	○	○	○	○	○
20. How often do you feel depressed, moody or nervous when you are off-line, which goes away once you are back on-line?	○	○	○	○	○	○

(Young, 1998)

Section 11: Health Problems

1. Have you ever experienced **eye strain** during or after Internet use through a smartphone? *(Eye strain: eyes feel fatigued or tired during or immediately following use)*

◯ No

◯ Yes

If "yes"…

How often do you experience eye strain while or after using the Internet through a smartphone in the **last 30 days**?

◯ I have not experienced this in the last 30 days (0 times)

◯ Rarely (once or twice)

◯ Occasionally (about 3 or 4 times)

◯ Often (five or more times)

2. Have you ever experienced a **headache** during or after Internet use through a smartphone?

◯ No

◯ Yes

If "yes"…

How often do you experience a headache while or after using the Internet through a smartphone in the **last 30 days**?

◯ I have not experienced this in the last 30 days (0 times)

◯ Rarely (once or twice)

◯ Occasionally (about 3 or 4 times)

◯ Often (five or more times)

3. Have you had **inadequate sleep** because of Internet use through a smartphone? *(Inadequate sleep: refers to the number of sleep hours less than the standard 7-9 hours)*

◯ No
◯ Yes

If "yes"…

How often have you had inadequate sleep because of smartphone Internet use in the **last 30 days**?

◯ I have not experienced this in the last 30 days (0 times)
◯ Rarely (once or twice)
◯ Occasionally (about 3 or 4 times)
◯ Often (five or more times)

4. Have you ever experienced **hand/wrist/arm cramping** during or after Internet use through a smartphone? *(Cramped hand/wrist/arm: refers to the presence of tired muscle, cramps, or soreness at the hand, wrist, or arm during use or immediately following use)*

◯ No
◯ Yes

If "yes"…

How often have you experienced hand/wrist/arm cramping while or after using the Internet through a smartphone in the **last 30 days**?

◯ I have not experienced this in the last 30 days (0 times)
◯ Rarely (once or twice)
◯ Occasionally (about 3 or 4 times)
◯ Often (five or more times)

5. Have you ever experienced an **accident** during smartphone Internet use? (*The question refers to any type accidents involving smartphone Internet use. It could be as minor as tripping and falling or as major as a motor vehicle accident*.)

◯ No

◯ Yes

If "yes"…

How often have you experienced an accident while using the Internet through a smartphone in the **last 30 days**?

◯ I have not experienced this in the last 30 days (0 times)

◯ Rarely (once or twice)

◯ Occasionally (about 3 or 4 times)

◯ Often (five or more times)

Section 12: Alcohol and Substance Use

Have you **ever** drunk alcohol?

◯ No

◯ Yes

If yes, have you drank alcohol in the past 30 days?

◯ No

◯ Yes

Have you **ever** used tobacco?

◯ No

◯ Yes

If yes, have you used tobacco in the past 30 days?

◯ No

◯ Yes

Almost done! Just one last thing…

Thank you for your participation!!!

FIVE participants will be selected at random to receive a free-size Chulalongkorn University jacket at the end of the study.

***Selection process: Each participant will have a number attached to their submission entry. A random number generator will be used in selecting the participants.

The five chosen individuals will be contacted through e-mail. If the participant does not reply within one week, the prize will be dropped, and the participant will no longer be eligible. A date will be set as to when and where the participant can claim the item. If he/she does not claim within the allotted time, then he/she will no longer be eligible.

<<Please fill out your phone number and current email address below>>

Phone number *

_____

Email *

_____

END OF SURVEY

APPENDIX D

Ethical Approval Form

AF 02-12

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University
Jamjuree 1 Building, 2nd Floor, Phyathai Rd., Patumwan district, Bangkok 10330, Thailand,
Tel/Fax: 0-2218-3202 E-mail: eccu@chula.ac.th

COA No. 126/2017

Certificate of Approval

Study Title No. 077.1/60 : INTERNET ADDICTION AND HEALTH PROBLEMS THROUGH SMARTPHONE AMONG INTERNATIONAL STUDENTS IN A UNIVERSITY IN BANGKOK, THAILAND: ONLINE QUESTIONNAIRE

Principal Investigator : SUPATTRA PHROMSIRI

Place of Proposed Study/Institution : College of Public Health Sciences, Chulalongkorn University

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University, Thailand, has approved constituted in accordance with the International Conference on Harmonization – Good Clinical Practice (ICH-GCP).

Signature: ..... Signature: .....

(Associate Professor Prida Tasanapradit, M.D.) (Assistant Professor Nuntaree Chaichanawongsaroj, Ph.D.)

Chairman Secretary

Date of Approval : 9 June 2017 Approval Expire date : 8 June 2018

The approval documents including

1) Research proposal
2) Patient/Participant Information Sheet and Informed Consent Form
3) Researcher
4) Questionnaire

Protocol No. 077.1/60
Date of Approval -9 JUN 2017
Approval Expire Date -8 JUN 2018

The approved investigator must comply with the following conditions:

1. *The research/project activities must end on the approval expired date of the Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University (RECCU). In case the research/project is unable to complete within that date, the project extension can be applied one month prior to the RECCU approval expired date.*
2. *Strictly conduct the research/project activities as written in the proposal.*
3. *Using only the documents that bearing the RECCU's seal of approval with the subjects/volunteers (including subject information sheet, consent form, invitation letter for project/research participation (if available).*
4. *Report to the RECCU for any serious adverse events within 5 working days*
5. *Report to the RECCU for any change of the research/project activities prior to conduct the activities.*
6. *Final report (AF 03-12) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project. For thesis, abstract is required and report within 30 days after the completion of the research/project.*
7. *Annual progress report is needed for a two- year (or more) research/project and submit the progress report before the expire date of certificate. After the completion of the research/project processes as No. 6.*

VITA

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E-mail: supattraphromsiri@gmail.com

EDUCATIONAL BACKGROUND

2009-2012 High School Diploma

Spencerport High School

2707 Spencerport Road, Spencerport, NY 14559

2012-2015 Bachelor of Science

The College at Brockport

350 New Campus Drive, Brockport, NY 14420

2016-2017 Master of Public Health

College of Public Health Sciences, Chulalongkorn University

Institute Building 2-3, Soi Chulalongkorn 62, Phyathai Rd,

Pathumwan, Bangkok 10330, Thailand

WORK EXPERIENCE

2016 - Teaching Assistant at the College of Public Health Sciences

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Pathumwan, Bangkok 10330, Thailand