

Impact of Excessive Smartphone Usage (ESU) on Online Distance Learning (ODL) From Ergonomic Perspective Among Public University Students in Klang Valley, Selangor, Malaysia

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Abstract

The number of smartphone users in Malaysia continues to rise. In 2015, the nation had approximately 14.5 million smartphone users, and this figure is predicted to climb to more than 20 million by 2020. During the COVID-19 pandemic, the rate of smartphone use among public university students has risen since Online Distance Learning (ODL) was adopted, and students must adhere to it to stay safe and away from the Covid-19 virus. The aim of this study is to investigate the ergonomic effects of excessive smartphone usage among public university students in Klang Valley, Selangor, Malaysia. A cross-sectional study was conducted, with 200 public university students from Klang Valley taking part. Non-probability sampling was utilized, and data was gathered using a set of online surveys created by Google Form. The data was analyzed using SPSS software version 20.0, and Chi-square was used to examine the association of health problems with MSDs. The majority (46.0 %) are between the ages of 22 and 23, and 55.0 % are female. The Chi-square test revealed that a few factors are associated with musculoskeletal disorders and excessive smartphone usage (MSDs). Excessive smartphone usage has been shown to have a negative influence on human health, both physically and emotionally. Further studies should cover all public universities and schools in Malaysia's area to investigate the influence of excessive smartphone usage during COVID-19 during ODL, as well as other activities, to generate better data and findings.

Keywords: COVID-19, Smartphone, Ergonomic, Online Distance Learning, Malaysia

Introduction

The technology that makes smartphones work is also always changing and getting better. Meanwhile, the number of smartphone users in Malaysia continues to increase by 99.6% in 2021 after the peak of the Covid-19 pandemic (Department of Statistics Malaysia, 2022). The

telecommunications industry is seen as a platform for a country's entire growth. This industry makes a considerable contribution to the overall well-being of society. According to Al-Barashdi et al (2015), university students are one of the largest and most important consumer audiences, as well as the most active smartphone users. Smartphone usage among university students rose during the COVID-19 outbreak. This is due to the implementation of Online Distance Learning (ODL), which students need to follow to stay secure and away from the COVID-19 virus. According to Ma'azer and Jusoh (2017), smartphone and other gadget use, such as laptops, has almost reached 100% during this epidemic. This is because, during the epidemic, students are unable to return to university and engage in face-to-face studies, so the government instructs them to take part in online distance learning (ODL).

Aside from that, smartphone usage during pandemics shows a very positive trend. According to Saaadeh et al (2021), the majority of participants (85%) reported that their smartphone usage increased or considerably increased during the quarantine (26.7% to 57.2%), with 42% using their smartphones for more than 6 hours per day. Based on the past research, smartphone use is rapidly increasing as a consequence of the pandemic and the influence of quarantine. The COVID-19 pandemic home quarantine enforced a significant shift in lifestyle, necessitating a protracted lockdown with harsh conditions for being at home.

While this is going on, using a smartphone might be problematic for students at higher education institutions. Their problems are with their academic performance. According to Abdullah et al (2012), university students often use their smartphones for personal communication rather than educational purposes. This is due to the plethora of smartphone applications that distract students from their intended task of studying. Prior to study, using a smartphone was first seen favorably, but subsequent research showed that students really saw smartphone as damaging to their academic objectives (Tossell et al., 2015). According to Al-Barashdi et al (2015), students were observed to spend more time playing games on their smartphones and engaging in other leisure activities than in class. The widespread use of smartphones for education has been hampered by technical, psychological, and physical obstacles. In addition, White and Mills (2012) discovered that students were acquiring smartphones more often, with a preference for personal usage over academic purposes. According to research by Lepp et al (2015), students who used their phones more often on a daily basis were more likely to have poorer grade point averages (GPA) than those who used them less frequently. The use of smartphones won't cause problems for a person if they are used moderately. If they are used excessively, problems will arise. According to a study by Tayseer et al (2014), there is a relationship between students' GPAs and how often they use social media sites like Twitter and Facebook. They also found out that many of the respondents who answered their survey don't look for academic content on social media.

The fact is that the smartphone has transformed from a technological to a social tool. When it comes to meeting their information-seeking needs for learning and research, students in higher education heavily rely on their smartphones. There were few indications of mobile phone addiction in the survey by (North et al., 2014). Students who own smartphones are more likely to access social networks and spend time communicating with others (Stollak et al., 2011). Students can enhance their academic performance by using internet tools, but

educators should take precautions when assigning them project work that involves social media. According to Gregorio et al (2021), the average duration per day of smartphone use during the pandemic was greater than previously, with 66.3% of participants spending more than 4 hours per day during the COVID-19 pandemic, compared to 16.3% before to the pandemic. This data indicates that, as a result of the COVID-19 pandemic, students spend more time utilising their smartphones to pass the time. The pattern of smartphone usage reveals that online news channels and media were the most consumed, as were social networks, which rose in prominence among the millennial population as avenues of communication and confirmed consumption of news on official channels and government spokespersons (Tejedor et. al., 2020).

Excessive smartphone use has a variety of side effects, some of which include increasing levels of loneliness and depression. According to Toh et al (2019), we may locate numerous items and learn about various news stories on social media. In fact, in the life of someone who is wealthy and lives in luxury, those who are born into poor households may feel inferior, leading to depression. Depression is one of the top ten mental health problems that Malaysian students face. Aside from that, Shoukat (2019), discovered that students who spend excessive time on social media acquire a bad characteristic identified as narcissism. A narcissist constantly believes that their life, personality, and appearance are far superior to others, and they frequently snap or flee at the smallest criticism or disagreement. Taking frequent selfies and sharing all of one's own opinions or facts about one's own life can lead to an unhealthy feeling of self-centeredness, isolating oneself from real-life connections, and making stress more difficult to handle.

Furthermore, excessive smartphone use has been linked to obesity, headaches, and visual issues (Ma'azer & Jusoh, 2017). This is due to the fact that blue light emissions from smartphones have been linked to a variety of visual issues, including eye discomfort, blurred vision, and conjunctivitis (Ma'azer & Jusoh, 2017). Some individuals use their smartphones while eating, which can lead to obesity, high blood pressure, and cardiac issues if not addressed appropriately. Long-term problematic smartphone usage has been associated with an increase in sleep interruptions and mental suffering, both of which were reduced when the device was switched off (Shoukat et. al., 2019). A poor sleep pattern and quality have been associated with excessive smartphone usage. According to Tossell et al (2015), excessive smartphone usage has been associated with reduced physical activity, decreased muscle mass, increased fat mass, as well as worse sleep quality and greater levels of felt stress. According to Coleman et al (2018), they discovered that using a smartphone for five or more hours a day increased the risk of obesity by approximately 43%. Students who participated in the research had a "twice as probable" tendency to eat more unhealthy foods, sweets, and snacks, as well as to be less active. According to Hens et al (2016), obese and overweight people, with corresponding usage rates of 26% and 4.6%, spent more than five hours on their smartphones. Addiction to smartphones might reduce social contact. This is due to the fact that those who are smartphone addicts frequently priorities their phones over other things.

In this study, ergonomic principles will be addressed to limit the likelihood of students being unwell as a result of excessive smartphone exposure. By using ergonomics, the health and

productivity of the students may be improved and taken care of. This is since ergonomics is proven and a strong indicator for addressing these problems. According to Zunjic et al (2015), ergonomics applications can assist in increasing student education quality by enhancing the educational process and training. Therefore, the main goal of this study is to study the ergonomic impact of excessive smartphone usage (ESU) on online distance learning (ODL) among public university students in Klang Valley, Selangor, Malaysia, while the COVID-19 pandemic is occurring. According to the authors' best knowledge, this is the first research to analyses this problem in the context of Malaysia.

Excessive Smartphone Usage and Online Distance Learning

Since the widespread usage of smartphones, researchers have attempted to operationalize smartphone addiction in terms of compulsive mobile phone usage (Kim & Byrne, 2011), mobile phone addiction (Eduardo et al., 2012), mobile phone dependence (Wang et al., 2013), heavy smartphone use (Lee, 2014), excessive smartphone use (Chen et al., 2016), smartphone overuse (Lee, 2017), and problematic mobile phone usage (Billieux et al., 2007; Rozgonjuk et al., 2018). Thus, the idea of smartphone addiction has sparked debates among researchers.

Smartphone addiction is characterized as excessive usage of smartphones in an uncontrollable manner. Its influence has a detrimental impact on other essential tasks of everyday living (Park & Lee, 2012). The majority of the literature on the association between problematic smartphone use and academic achievement finds varied degrees of negative consequences (Kuznekoff & Titsworth, 2013; Li et al., 2015; Longnecker, 2017; Mendoza et al., 2018; Olufadi, 2015; Rozgonjuk et al., 2018). Previous study indicates that excessive smartphone use in the classroom might have a negative impact on academic achievement. Lepp et al (2015) discovered that excessive smartphone use had a detrimental impact on students' academic performance as measured by lower GPA scores.

Technological advancements in smartphones should not be disregarded, especially in educational institutions (Tikoria & Agariya, 2017). According to Emerson and Berge (2018), the smartphone has become a means for correlating the education system with students in an unmutual interaction. The centerpiece of distance education is the mobile learning system. According to Tagoe and Abakah (2014), e-learning is progressing as technology progresses. Iyengar et al (2020), also explained that smartphones have produced various android and IOS applications that function as an online educational medium for students. However, excessive use of smartphones will have negative effects, especially on health.

Excessive smartphone use can also affect musculoskeletal health problems. Posture adoption and its danger when using a smartphone may lead to a health concern that has yet to be established, particularly among university students who use a smartphone for study purposes. Sharan et al (2014) explained that the effects of smartphone use can lead to stress, causing pain in the neck, hands, and shoulders. Keeping the neck and leg in the same posture for an extended period of time can create muscular and nerve discomfort. As a result, the usage of smartphones in a pandemic situation is seen as a beneficial instrument in the distance learning system. However, excessive smartphone use will cause tension in the students, resulting in a severe damage to any region of the body.

Materials and Methods

Convenience sampling was employed in this cross-sectional study that made use of a number of online surveys. This study is being carried out in Klang Valley, Selangor's. Klang Valley is located in Kuala Lumpur, a significant urban agglomeration with an estimated 8.6 million residents in 2023 and a population density that is almost as high as that of the city itself (Kuala Lumpur Population, 2022). In fact, there are several famous public universities around the Klang Valley, Selangor. However, this study only looked at six (6) public universities, one of which was Universiti Malaya (UM), Universiti Putra Malaysia (UPM), Universiti Kebangsaan Malaysia (UKM), International Islamic University of Malaysia (UIAM), National Defense University of Malaysia (UPNM) and Universiti Teknologi Mara (UITM) (Table 1). However, only 200 samples were taken to represent public universities in the Klang Valley.

The primary inclusion criteria that were applied to choose the samples included being above 19 years old, attending a public university in the Klang Valley region of Selangor, being a full-time student, having studied for one to four years, using a smartphone more than four hours per day, and possessing more than one year of experience user smartphone. Students who do not own a smartphone or tablet, attend private universities outside of Klang Valley, have used smartphones for less than a year, and do not participate in online distance learning were excluded from participating.

Table 1

Distribution of Public University students in Klang Valley, Selangor

Public University	No. Of Students	No. of students by gender		Numbers of faculty
		Male	Female	
UPM	28,587	10,397	18,190	16
UKM	30,844	11,388	19,456	13
UPNM	4,972	3,412	1,560	4
UIAM	29,254	11,761	17,493	14
UM	35,885	14,193	21,692	13
UITM	23,066	10,011	13,055	9

Source: Ministry of Higher Education (2020)

The online survey approach was implemented using a Google form survey. A letter of consent was provided before the questionnaire was given, and the respondent was required to check the box as proof of their agreement to participate in the study. Due to the flexibility and simplicity of Google Form, respondents may complete the questionnaire whenever they have leisure time. The survey form has four sections: demographic data, smartphone information in general, a Nordic questionnaire, and lifestyle. All personal information about the respondent is kept strictly secret and will not be publicly disclosed. Statistical software, namely IBM Statistical Package for Social Sciences (IBM SPSS) version 20, was used to evaluate all the data and information gleaned from the survey form. All the study variables were given descriptive statistics and the Chi-square method was applied.

Results and Discussion

Demographic

Table 2 presents the demographic results for respondents, with more than half (55.5%) are male. Distribution of ethnicity, 61.5% are Malay, followed by Chinese (23.0%). The majority of age student respond into the survey range between 20-24 years old (95.5%). For marital status, 84.0% are single and only 1.0% are divorced. In addition, 79.0% of the respondent are currently pursuing Degree and follow by Diploma (12.0%) for educational level. Apart from that, UPM recorded the highest percentage of respondents with 23.5% of responses in the online survey, followed by UITM (19.5%), UKM (15.5%), UM and UIAM (14.0%), and UPNM (13.5%).

Table 2

Socio-demographic of smartphone usage among public university students at Klang Valley, Selangor

Factors	N	Percentage (%)
Gender	111	55.5
Male	89	44.5
Female		
Ethnicity	123	61.5
Malay	31	15.5
India	46	23.0
Chinese		
Age	191	95.5
20>24	9	4.5
>25		
Marital Status	168	84.0
Single	30	15.0
Married	2	1.0
Divorced		
Education Level	24	12.0
Diploma	158	79.0
Degree	16	8.0
Master	2	1.0
PhD	111	55.5
Public University		
UPM	47	23.5
UM	28	14.0
UPNM	27	13.5
UIAM	28	14.0
UITM	39	19.5
UKM	31	15.5

*N = 200

Characteristic of Smartphone Usage

IOS is utilized by 67.5% of respondents, while Android is utilized by 52.0%. 40% of students use their smartphones for 5–6 hours every day, while 17.5% use them for 3–4 hours per day. However, 13.0% of smartphone users spend more than 8 hours each day on their devices, while 11.5% spend between 1 and 2 hours per day on theirs. Table 3 reveals that 45.0% of smartphone users spend more than eight hours each week on their device, followed by 21.0% who spend between five and six hours and 19.0% who spend between seven and eight hours. This result is comparable to that of Ma'azer and Jusoh (2017), who found that 77% of students use their smart phones for more than five hours each day, whereas 27% use them for less than two hours.

Table 3

Characteristic of smartphone usage

Items	N	Percentage (%)
The operating system smartphone use.		
IOS	135	67.5
ANDROID	104	52
WINDOWS	3	1.5
BLACKBERRY	1	0.5
The time usage smartphone on a WEEKLY basis		
1-2 hour	7	3.5
3-4 hours	22	11.0
5-6 hours	42	21.0
7-8 hours	38	19.0
8 > hours	91	45.5
Main purpose of using smartphone (chose more than one)		
Entertainment (social media, movie etc)	129	64.5
Studying	129	64.4
Online shopping	99	49.5
Playing mobile games	82	41.0
Texting & calling	85	43.0
The time of the day usually use smartphone		
Whole Day	18	9.0
Afternoon	16	8.0
Evening	26	13.0
Night	37	18.5
Midnight	26	13.0
Inconsistent	77	38.5
Type of application use frequently		
YouTube	111	55.5
Instagram	118	59.0
Facebook	96	48.0
WhatsApp	126	63.0
Mobile legend	69	34.5
PUBG Mobile	35	17.5

Twitter	42	21.0
How many days use your smartphone in a week		
1 – 2 Days	10	5.0
3 – 4 Days	30	15.0
5 – 6 Days	46	23.0
Whole a week	114	57.0
Use smartphone before going sleep		
Yes	64	32.0
No	136	68.0
Use smartphone in dark setting before going to sleep		
Yes	67	33.5
No	133	66.5
If answer Yes, state how many hour use your smartphone in dark.		
1-2 hour	102	51.0
3-4 hours	43	21.5
5-6 hours	28	14.0
7-8 hours	16	8.0
8> Hours	11	5.5
Position in body posture when using a smartphone		
Lying down	141	70.5
crossed- leg	80	40.0
Squatting	49	24.5
Sitting	62	31.0
Feeling pain while using smartphone		
Neck Pain	91	45.5
Shoulder Pain	65	32.5
Headache	94	47.0
Double vision	58	29.0
Back pain	63	31.5
Numbness in finger	54	27.0
Trouble sleeping	57	28.5
Dry eyes	39	19.5
In the last 12-month, experience health problem at eyes, neck and hand due of smartphone usage.		
Yes	95	47.5
No	105	52.5
In the last 7 days, experience health problem at eyes, neck and hand due of smartphone usage. Always adjust the brightness of smartphone.		
Yes	60	30.0
No	140	70.0
Fully utilize smartphone during ODL in this pandemic time.		

Yes	96	48.0
No	104	52.0
Smartphone usage experience based on years.		
1 years	6	3.0
2 years	20	10.0
3 years	52	26.0
4 years	39	19.5
>5 years	83	41.5

*N=200

The majority of students (64.5%) concur that social networking, movies, and other forms of entertainment are the primary reasons they use their smartphones. Therefore, nearly half (49.5%) of respondents cite online shopping as their primary reason for using a smartphone. However, playing mobile games (41.0%) and texting and calling (43.0%) are the leading reasons for smartphone usage. While 38.5% use their smartphones inconsistently during the day, only 9.0% agree throughout the entire day and 8.0% afternoon, respectively. Respondent said WhatsApp is the most frequently used application among students (63.0%), followed by Instagram and YouTube (59.0% and 55.5%), and PUBG Mobile (17.5%). This result is also in line with what Kibona and Mgaya (2015) found. They found that the majority of respondents (48%) spend an average of 5–7 hours per day on social smartphone use, which is a lot more time than they spend on academic activities. In addition, this study also found that 57.0% of respondents use their smartphones throughout the week, while 68.0% said they do not use smartphones before bed. Meanwhile, 66.5% of students do not use their smartphones in dark settings, while 33.5% use them in dark settings. Respondents also use their smartphones most frequently while lying down (70.5%) and with their legs crossed (40.0%).

In the last 12 months (52.2%) and the last 7 days (55%), most respondents did not experience any health problems in the eyes, neck, or hands due to the use of smartphones. More than 70% of respondents admit they do not always adjust the brightness of their smartphone. Nearly half of respondents (48%) utilize smartphone ODL entirely during pandemics, whereas the other half (52%) do not use smartphone ODL fully. The majority of respondents (41.5%) have been using smartphones for more than five years, and the second largest group (26%) has been for three years. The next lowest percentage has been for two years (10%), followed by 3% for smartphone users with one year of experience. The effects of long-term smartphone use can affect psychiatric, cognitive, emotional, medical, and brain changes. Kibona and Mgaya (2015) indicated that college students are addicted to their smartphones and can't afford to turn them off because they have trained their minds to expect calls, texts, and emails from their peers.

Health problem (Musculoskeletal Disorder) related to smartphone activities

Table 4 reveals that throughout the past year, people have experienced health issues such as pain, discomfort, and numbness. The most common complaint among respondents is neck pain (83.9%), followed by lower back pain (81.8%) and ankle pain (76.9%). According to Berolo et al. (2011), smartphone tasks require users to stare down or hold their hands out in front of

them to read the screen, which causes their head to move forward and can cause excessive anterior curvature of the lower cervical vertebrae and excessive posterior curvature.

Table 4

Health problem related to smartphone activities

Items	N	Percentage (%)
The last 12 months had trouble (such as ache, pain, discomfort, numbness) in:		
Neck	235	83.9
Shoulder	121	43.2
Upper Back	197	70.4
Elbows	23	8.2
Wrists	86	30.7
Lower Back	229	81.8
Ankles	65	76.8
During the last 12 months have been prevented from carrying out normal activities (e.g. job, housework, hobbies) because of this trouble in:		
Neck	163	58.2
Shoulder	83	29.6
Upper Back	150	53.6
Elbows	11	3.9
Wrists	88	31.4
Lower Back	118	42.1
Ankles	59	21.1
During the last 12 months have seen a physician for this condition:		
Neck	37	13.2
Shoulder	19	6.8
Upper Back	39	13.9
Elbows	2	0.7
Wrists	7	2.5
Lower Back	25	8.9
Ankles	8	2.9
Feel the pain experiencing due to using smartphone		
Neck	217	77.5
Shoulder	168	60.0
Upper Back	215	76.8
Elbows	30	10.7
Wrists	53	18.9
Lower Back	226	80.7
Ankles	90	32.1
Smoking status		
Yes	117	58.5

No	83	41.5
Experienced symptoms such as fatigue, joint and vein pain, numbness, tingling and related problems because of smartphone usage		
Yes	81	40.5
No	119	59.5
Experience insomnia after using smartphone before going to bed.		
Yes	90	45.0
No	110	55.0
Visual discomfort using the smartphone.		
Yes	92	46.0
No	108	54.0
The discomfort has used the smartphone		
Watery eyes	34	17.0
Blurry vision	37	18.5
Irritation in eyes	28	14.0
Feel like something in eyes	25	12.5
No effect	76	38.0
Feel any pain/numbness/discomfort at fingers after using smartphone for hours.		
Yes	71	35.5
No	129	64.5

*N=200

In the past 12 months, respondents also experienced health issues at the upper back (13.9%) and neck (13.2%). The lower back (80.7%), neck (77.5%), upper back (76.9%), and shoulders (60%) are the body areas in which respondents experience the most pain as a result of smartphone use. Ankles, wrists, and elbows are the lower body parts (32.2%, 18.7%, and 10.0%) that experience pain due to smartphone use. Zirek et al (2019) found that the number of musculoskeletal problems in the hand, wrist, forearm, arm, and neck has been rising around the world because of the long, strong, low-amplitude, repeated use of portable devices.

The results of the study also found that 58.5% of respondents did not smoke. Additionally, 59.5% reported that they did not experience any symptoms related to smartphone use, including fatigue, joint and vein discomfort, numbness, tingling, and related issues. Besides, 55% of respondents did not experience sleep disturbances after using smartphones before bedtime. In fact, 54% of respondents did not experience any visual discomfort while using a smartphone. However, there are some respondents who experience pain due to the use of visual smartphones, such as watery eyes 17.0%, blurred vision 18.5%, irritation in the eyes 14.0% and feeling something in the eyes 12.0%. A total of 64.5% of respondents did not experience any pain, numbness or discomfort in their fingers after using a smartphone for

hours. However, only 35.5% reported finger pain, numbness or discomfort after a few hours of using a smartphone.

Risk factors of the Excessive Smartphone Usage (ESU) on Online Distance Learning (ODL)

Table 5 explains the influence of excessive smartphone use and health issues. Based on the chi-square test is statistically significant, χ^2 (N = 200) = 5.036, $p < 0.05$, indicate the associate between the characteristics of smartphone use and adjusting the brightness of the smartphone. Nath and Mukherjee (2015) also explained that using a smartphone or tablet before going to bed can seriously disrupt sleep because the type of light entering from the screen has a negative effect on the sleep cycle.

Table 5

Risk factors for association between Excessive Smartphone Usage (ESU) on Online Distance Learning (ODL)

Variables	Excessive smartphone usage and health problems		Chi-Square value (χ^2)	P-value
	No (%)	Yes (%)		
Smoking Status			0.008	0.928
No	50	36		
Yes	67	47		
Experienced symptoms such as fatigue, joint and vein pain, numbness, tingling and related problems due of smartphone usage			4.352	0.037**
No	42	44		
Yes	39	75		
Have insomnia after using smartphone before going to bed			3.271	0.70
No	45	41		
Yes	45	69		
Experience visual discomfort using a smartphone			5.850	0.016**
No	48	38		
Yes	44	70		
Feel any pain/numbness/discomfort at your fingers after using smartphone for hours			7.990	0.005**
No	40	46		
Yes	31	83		
Use smartphone before going to sleep			0.025	0.873
No	27	59		
Yes	37	77		
Use smartphone in dark before going to sleep			0.130	0.719
No	30	56		
Yes	37	77		
Always adjust the brightness of your smartphone.			5.036	0.025**
No	33	53		

Yes	27	87		
Average hours spend on social media per day				
			14.989	0.006**
1-2 hour	21	10		
3-4 hours	19	36		
5-6 hours	19	42		
7-8 hours	13	14		
8> Hours	14	12		
Practice healthy eating habit			4.269	0.039**
No	37	49		
Yes	33	81		
Use social media			5.052	0.025**
Yes	43	43		
No	39	75		

** Significant on $(p) \leq .01$

* Significant on $(p) \leq .05$

In addition, there is a significant correlation χ^2 ($N = 200$) = 14.989, $p < 0.01$, between the average hours spent on social media per day with excessive smartphone use and health problems. In fact, a study from White & Mills (2012) found that students use smartphones more for personal use than to learn new information. The excessive use of smartphones also had a significant effect χ^2 ($N = 200$) = 4.269, $p < 0.05$, to the practice of healthy eating habits. The reduction in smartphone use has an impact on better eating practices (Manzoor et al., 2020). Therefore, the frequency of smartphone use affects a person's lifestyle.

In addition, health analysis revealed a significant relationship between smartphone use and symptoms such as fatigue, joint and vein pain, numbness and tingling χ^2 ($N = 200$) = 4.352, $p < 0.05$, visual discomfort while using a smartphone χ^2 ($N = 200$) = 5.850, $p < 0.05$, as well as feeling any pain, numbness or discomfort in your fingers after using a smartphone for hours χ^2 ($N = 200$) = 7.990, $p < 0.01$. Sharan et al (2014) explained that all individuals using handheld devices reported pain in the thumb and forearm, as well as burning, numbness, and tingling around the palm of the hand. Other factors, such as pain when using a smartphone, sleeplessness before bed, having a high-risk illness, and smoking, did not have an impact on the negative effects of excessive smartphone use among students at public universities in the Klang Valley. The findings are in line with a recent study that also said that there is consistent evidence linking excessive smartphone use to other psychiatric problems like Internet addiction, melancholy, anxiety, and OCD (Weinstein, 2014). This further demonstrates how using a smartphone for an extended period of time has a detrimental effect on one's health.

Conclusion

In conclusion, this study provides a solid framework for understanding the relationship and association between health issues and the negative impacts of excessive smartphone use. The most prevalent smartphone activities include messaging, calling, checking social media, and

searching the internet. Previous research by Hossain & Ahmed (2016) and the Mobile Ecosystem Forum has revealed comparable outcomes. On average, university students have used smartphones for 3.25 years. Numerous surveys have revealed that a high number of college students own and routinely use mobile phones. This is consistent with the findings of Kim, Briley, and Ocepek (2015), who found that "younger, better educated, and wealthier people are more likely to use smartphones and associated applications." Excessive smartphone use has been shown to have both physical and mental effects on the human body. Martin-Gutierrez et al (2016) emphasize that smartphone addiction is physically and psychologically harmful to the user. They discovered that smartphone use is linked to sleep deprivation, anxiety, stress, and sadness. All of these issues can be discovered in this research, and insomnia accounts for a large proportion of them. This problem affects 50.0% of respondents. Another study conducted by Augner and Hacker (2012) revealed a correlation between excessive smartphone usage and psychological wellbeing. They noted that low emotional stability, persistent stress, and depression are linked to excessive smartphone use. In addition, these findings illustrate the negative influence of musculoskeletal disorders on consumer health when excessive smartphone use is prevalent.

Future studies should include a wider regional coverage to gather a diversity of perspectives, and it is suggested to a longitudinal research procedure throughout the year to collect more accurate and up-to-date results. In fact, the effects of excessive smartphone use among public university students may change over time or new problems will arise as a result of technology improvements. Consequently, it is crucial to examine the effects of excessive smartphone use at various stages of the decision-making process. It also says that more research should be done to understand the effects and build any new effects carefully. This is so that more research can be done through the approach of this field, especially in the context of Malaysia, and compared with other countries to get more accurate data and results.

This study sheds light on the detrimental effects of excessive smartphone uses on the mental and physical health of Malaysian university students. Although we cannot fully blame smartphones for the poor physical or mental health of adolescents, it is clear that smartphone addiction is associated with the physical and mental health of university students.

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