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CAUSAL FACTORS AFFECTING THE SMARTPHONE ADDICTION OF GENERATION Z IN BANGKOK DURING THE COVID-19 PANDEMIC

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ABSTRACT

The objectives of this research were to understand the smartphone addiction of Generation Z (Gen Z) in Bangkok, Thailand and investigate the causal factors in smartphone addiction among this sample group during the 2019 Coronavirus (COVID-19) pandemic. A sequential exploratory design was adopted in this study. In the qualitative phase, five Gen Z informants living in Bangkok and addicted to smartphones participated in interviews. In the quantitative phase, multistage sampling was employed for the sample selection, which consisted of 400 respondents who exhibited smartphone addiction and lived in Bangkok. The following instruments were used: 1) smartphone addiction scale: Thai short version, 2) the Thai version of the self-regulation scale, 3) the Thai multi-dimensional scale of perceived social support, 4) the new media literacy scale: Thai version, and 5) the Thai version of the Alabama parenting questionnaire short form. The Cronbach's alpha coefficients equaled 0.87, 0.84, 0.89, 0.75, and 0.79, respectively. Structural equation modeling was used to analyze the data. The results revealed that the factors associated with smartphone addiction were personal factors, such as new media literacy and self-regulation, and environmental factors, such as social support and parenting style. Moreover, the hypothesized model was considered to be suitable for predicting smartphone addiction among Gen Z respondents based on the following statistics: Chi-square = 36.31, p = 0.07, df = 25, Chi-square/df = 1.45, SRMR = 0.03, RMSEA = 0.03, CFI = 1.00, and GFI = 1.00. New media literacy, perceived social support, and parenting significantly influenced self-regulation, which in turn influenced smartphone addiction. After considering R2, the prediction of smartphone addiction by causal factors and self-regulation were 94% and 46%, respectively. This study proposes the implementation of additional educational programs that focus on enhancing media literacy, fostering self-regulation, and encouraging social support. Moreover, these results may provide valuable information to support the creation of effective intervention approaches to facilitate clinical programs for addiction rehabilitation which promote healthier lifestyles as a means of regulating smartphone usage.

Keywords: Generation Z; healthy lifestyle; mixed-method research; smartphone addiction

1. INTRODUCTION

Following the COVID-19 pandemic and the rapid development of technology, the smartphone has taken on a significant role in people's daily routine as a mobile device that facilitates them in various ways, such as limitless communication, searching for information, online learning, online shopping, watching movies, listening to music, and playing games (Hosen et al., 2021). Recently, excessive smartphone use has rapidly become a serious social issue, particularly among Generation Z or "Gen Z," born in the period from the mid-1990s to 2000s, who are digital natives and spend most of their time on websites and communicating via the internet (Ahmed, 2019). For this reason, they are capable of accessing the internet and large amounts of information very quickly. Moreover, they have no experience of a world without internet access, and it is therefore almost certain that their processing of information differs from that of earlier generations (Gentina, 2020). Additionally, the Statista Research Department (2023) reported that Gen Z in Thailand was more likely to be at risk of smartphone addiction than other age groups. Most of them are unaware of smartphone addiction or overlook the problem.

In this research, smartphone addiction refers to the excessive or uncontrollable use of smartphones, leading to negative consequences on the body, mind, and society (Kwon et al., 2013; Panova & Carbonell, 2018). Wacks and Weinstein (2021) found that smartphone addiction was strongly related to negative effects on health and productivity. It has become a serious issue, and many countries are interested in studying its causes to prevent and improve such behavior. This current research studies the causal factors of smartphone addiction based on the problem behavior theory of Jessor (2014), a systematic study of behavior to explain the differences between individuals and whether they result from the interaction between persons and the environment. Based on previous research, causal factors in smartphone addiction can be divided into two groups: social psychological variables and background variables.

1) Social psychological variables consist of self-regulation: a self-control process involving self-monitoring in which perceptual appraisal or feedback is used to direct one's behavior toward a goal (Gestsdottir et al., 2010; Zimmerman, 2002). Many previous studies have clearly indicated a relationship between self-regulation and smartphone addiction, more specifically, self-regulation's negative direct effect on smartphone addiction. For example, a study by Yildiz (2017) reveals that self-regulation mechanisms play a vital role in smartphone addiction; an individual's failure to self-regulate leads to the uncontrollable use of smartphones. Another example is from a study by Fatkuriyah and Sun-Mi (2021), who provided an additional example, noting that those who exhibit high levels of self-regulation show a lower tendency toward smartphone addiction. According to these studies, self-regulation is the key factor affecting smartphone addiction.

Moreover, perceived social support refers to one's understanding and perception of the emotional, tangible, and informational support they receive from their family members, friends, and others (Zimet et al., 1988). Previous research has shown that users with lower levels of perceived social support show higher levels of smartphone addiction (Konan et al., 2018). For example, a study by Akturk and Budak (2019) found that the perceived social support of university students has a negative relationship with their smartphone addiction. Another example is a study by Herrero et al. (2019), who discovered that high social support is related to a reduction in smartphone addiction. Furthermore, perceived social support is associated with self-regulation (Mo et al., 2018). It could be asserted that perceived social support has a direct negative impact on smartphone addiction while having a direct positive impact on self-regulation.

2) Antecedent background variables consist of parenting: the process of raising children performed by a child's parents or responsible persons. Previous studies have revealed that positive parenting styles, comprising a greater sense of democracy or higher level of authority, are associated with lower levels of smartphone addiction (Bae, 2015; Bakar et al., 2021; Kwan & Leung, 2015). Budiarti et al. (2022) further demonstrated that parents who select appropriate parenting styles can reduce the incidence of smartphone addiction, and Ching and Tak (2017) confirmed that positive parenting style has an indirect effect on smartphone addiction by promoting self-regulation. According to these studies, parenting is a potential factor affecting smartphone addiction directly and negatively while having a direct positive impact on self-regulation.

Previous studies have also revealed that new media literacy, or the capacity to critically engage with media, develop knowledge via digital media, and make use of digital media for communication purposes, can also affect smartphone addiction (Chen et al., 2011; Lee et al., 2015). For example, a study by Shirzad et al. (2019) reveals that media literacy negatively affects internet addiction. This is consistent with a study by Deonisius et al. (2019), who demonstrated that digital literacy has an influence on internet addiction. The research results of Lee et al. (2015) illustrate that digital literacy has a direct influence on learning and self-regulation and an indirect effect on learning via self-regulation. Similarly, Perera et al. (2016) also suggest that

digital literacy directly affects self-regulation. From these studies, it is obvious that new media literacy has a direct negative impact on smartphone addiction while having a direct positive effect on self-regulation.

Gen Z members become addicted to their smartphones for a number of reasons, though consensus has not yet been reached with regard to the risk factors. It is widely believed that the causal factors leading to smartphone addiction have their basis in the complex interactions arising due to social psychological factors and the antecedent background factors (Ting & Chen, 2020). Therefore, the researchers are interested in studying and understanding smartphone addiction among members of Gen Z in Bangkok because young people play an important role in changing and driving a country's future. The research methodology consists of mixed methods based on Creswell and Plano Clark's (2018) concept. The qualitative research method is applied in this study to obtain in-depth data to determine the causal variables to set the framework for the second phase of the research. The quantitative research method is used to determine the causal relationship in smartphone addiction of Gen Z in Bangkok, resulting in explanations of the circumstances among the sample group. The acquired results have the potential to be utilized and expanded upon in the development of a manual for utilizing smartphones creatively, which would promote appropriate smartphone usage for the benefit of society and the country. The following hypotheses are set for conducting this study:

H1: Self-regulation has a direct effect on smartphone addiction.
H2: New media literacy has a direct effect on smartphone addiction and self-regulation.
H3: Perceived social support has a direct effect on smartphone addiction and self-regulation.
H4: Perceived parenting style has a direct effect on smartphone addiction and self-regulation.
H5: New media literacy has an indirect effect on smartphone addiction.
H6: Perceived social support has an indirect effect on smartphone addiction.
H7: Perceived parenting style has an indirect effect on smartphone addiction.

2. RESEARCH METHODS

This is a mixed-method research study consisting of an exploratory sequential design based on Creswell and Plano Clark's (2018) concept. The research is divided into two phases.

2.1 Phase 1: Studying the smartphone addiction of Gen Z members in Bangkok by applying the qualitative research method.

2.1.1 Sampling procedure

A case study in Bangkok was conducted involving five key informants, who were Gen Z informants living in Bangkok and addicted to smartphones. They were selected with the purposing sampling method and had the following prescribed qualities: 1) be a Gen Z who was addicted to a smartphone. To be considered a member of Gen Z addicted to smartphones, a score of at least 31 points, for men, or at least 33 points, for women, is the benchmark on the Thai short version of the smartphone addiction scale (Charoenwanit & Soonthornchaiya, 2019); 2) be able to communicate in the Thai language; and 3) be willing to participate in the research voluntarily. The participants should have the ability to transfer their experience and reflect on smartphone addiction, as well as the factors affecting smartphone addiction.

2.1.2 Measures

The researchers possessed the necessary experience and ability to collect the qualitative data. The data were collected from the documents relating to the case study and in-depth interviews. During the interview process, the researchers made notes and recorded the conversations. Other tools used in this phase consisted of a voice recorder, note-taking equipment, and an interview form containing the guideline questions for the interviews on the smartphone addiction of Gen Z informants in Bangkok and the causes of such behavior.

As for the validation of the interview form, the content was processed by five experts in qualitative research and behavioral sciences. The interview form was then improved according to their suggestions before piloting with Gen Z members in Bangkok, who met the required criteria to adapt the interview before use.

2.1.3 Procedure and analysis

The data analysis in the first phase of the research was conducted during and after data collection to determine the missing aspects and obtain approval to collect additional data. Data analysis in this phase applied the concept of Miles and Huberman (1994), consisting of three steps: 1) data reduction by summarizing, encoding, categorizing, and creating the classification criteria to determine that the statements were consistent with the research questions from the interview; 2) data display, involving data manipulation using the connection and relationship process, and presenting to the reader in a simple to understand format,

e.g., in a descriptive form, table, or diagram; and 3) drawing of the conclusions and verification by applying more than one concept and theory to analyze and understand the data, interpret that understanding, and confirm the connecting relationship between the collected data to formulate the conclusion.

2.2 Phase 2: Studying the causal factors in smartphone addiction among Gen Z members in Bangkok during the COVID-19 pandemic

2.2.1 Sampling procedure

This current research was conducted as a survey, and the study area was Bangkok. The population consisted of 934,936 Gen Z members living in Bangkok, born between 1997 and 2009 (Administrative Strategy Division, 2021), 400 of whom were selected for the research sample. The sample size was determined following the method proposed by Kline (2011), who stated that the size of the sample group should be between 10 and 20 persons per one observed variable, applying multi-stage sampling. The researchers processed the stratified random sampling classified by the administrative regions: 1) 21 districts of inner Bangkok, 18 districts of central Bangkok, and 11 districts of outer Bangkok. Simple random sampling was applied for the selection of two districts from each administrative region, with six districts in total. Quota sampling was then processed based on the population ratio in each district.

2.2.2 Measures

2.2.2.1 The smartphone addiction scale: Thai short version

The smartphone addiction scale: Thai short version, developed by Charoenwanit and Soonthornchaiya (2019), was utilized to evaluate the participants' levels of excessive smartphone usage. It contains 10 items measured on a 6-point Likert-type scale, ranging from "absolutely" (6 points) to "absolutely not" (1 point), with the possible score ranging between 10 and 60 points. For the interpretation criteria, if the total points of a male participant are more than or equal to 31 and those of a female participant more than or equal to 33 points, smartphone addiction is considered to exist. Conversely, if the total points of a male participant are less than or equal to 31 and those of a female participant are less than or equal to 33, they are considered to have creative behavior of smartphone use. Sample items include statements such as, "I experience feelings of restlessness and anxiety when I find myself without a smartphone," "Despite recognizing the need to discontinue, I persist in utilizing my smartphone," and "Using my smartphone excessively has turned into a habitual behavior." The Cronbach's alpha coefficient was 0.87.

2.2.2.2 Thai version of the self-regulation scale

This study made use of the Thai version of the self-regulation scale which was initially developed from the self-regulation scale proposed by Diehl et al. (2006) and subsequently translated into Thai. To ensure the accuracy and validity of the translation, a process of translation and back-translation was carried out by three native speakers of Thai, who were also considered highly proficient in English. The scale was then applied in order to assess the level of self-regulation of participants in controlling thoughts, effects, and performance when encountering both internal and external stimuli. The evaluation assessed ten items using a 6-point Likert scale ranging from "absolutely" (6 points) to "absolutely not" (1 point). The total possible score therefore lay in a range of 10–60 points. For the interpretation criteria, the participants receiving a higher total score were considered to have more self-regulation than those with a lower total score. Sample items included statements such as, "I maintain my concentration on my objective and refuse to let anything distract me from my plan of action," "I have the ability to sustain my focus on a single task for an extended duration, if necessary," and "Following an interruption, I effortlessly resume my focused working style without encountering any difficulties." The Cronbach's alpha coefficient was 0.84.

2.2.2.3 The Thai multi-dimensional scale of perceived social support

The Thai multi-dimensional scale of perceived social support developed by Wongpakaran and Wongpakaran (2012), adapted from that of Zimet et al. (1988), was used. The questionnaire comprised 12 items on social support from family, friends, and special persons, based on a 7-point rating scale ranging from strongly agree (7 points) to strongly disagree (1 point). The total possible score ranged between 12 and 84 points. For interpretation, the perception of social support was classified into three levels. A participant with a total score of between 12 and 36 points was considered to have a lower perception of social support. A participant with a total score of between 37 and 60 had a moderate perception of social support. Finally, a participant with a total score of between 61 and 84 points was considered to have a high perception of social support. Sample items included statements such as, "During times when I required it, my family provided me with encouragement and moral support," "I have a friend with whom I can share both my intense happiness and sorrow," and "I have someone significant in my life who cares about my feelings." The Cronbach's alpha coefficient was 0.89.

2.2.2.4 The new media literacy scale: Thai version

Koc and Barut (2016) created the new media literacy scale using the NML framework proposed by Lin et al. (2013) to assess the participant's level of proficiency in new media literacy. The scale was translated into the Thai language for the purposes of this study. The translation and back-translation processes were carried out by three native Thai speakers proficient in both Thai and English languages. The new media literacy scale comprises four components: 1) functional consumption, referring to the ability to access, receive, and arrange the content of new media efficiently and ethically; 2)critical consumption, referring to the decision-making, comparison, and evaluation of the media content; 3) functional presumption, referring to the ability to create new media content and take part in new media creatively and ethically; and 4) critical presumption, referring to the capability to analyze and decide on the information technology produced. There were 35 items measured on a 5-point rating ranging from "absolutely" (5 points) to "absolutely not" (1 point). The average score ranged from 1 to 5 points. For the interpretation criteria, a participant with a higher average score was considered to have greater media literacy than a participant with a lower average score. Sample items included statements such as, "Analyze the positive and negative impacts of media content on individuals," "Evaluate the credibility, reliability, objectivity, and currency of media," and "Acquire the skills to utilize search tools effectively in order to obtain the desired information from the media." The Cronbach's alpha coefficient was 0.75.

2.2.2.5 Thai version of the Alabama parenting questionnaire short form

The Alabama parenting questionnaire short form, developed by Elgar et al. (2007), is a quick, simple, and accurate tool for measuring parental styles. The scale was translated into the Thai language for the purposes of this study. The translation and back-translation processes were carried out by three native Thai speakers proficient in both Thai and English languages. The questionnaire contained nine questions, divided into three parts: 1) the role of being a good parent, 2) the use of flexible regulations, and 3) the lack of parental nurturing. A 5-point rating scale was used for the answers, ranging from "regularly" (5 points) to "never" (1 point). The average score ranged from 1 to 5 points. For the interpretation criteria, the participant with a higher average score was considered to have a greater perception of parental nurturing than the participant who had a lower average score. Sample items included statements such as, "If you behave well, your parents will give you praise," "You are out with friends your parents don't know," and "Your parents make threats of punishment but ultimately do not follow through with them." The Cronbach's alpha coefficient was 0.79.

2.2.3 Procedure

This research has been certified by The Srinakharinwirot University Ethics Committee on Human Research. The certification code is SWUEC 114/2563E. The participants of the research were asked to give their consent to take part in the research prior to data collection and given an explanation of the objectives, details of the research, and the reason for being selected as a participant. To ensure confidentiality, the participants' forenames and surnames would not be disclosed. The sample group consisted of 400 participants.

2.2.4 Statistical analysis

Data analysis was performed using descriptive statistics (i.e., frequency, percentage, mean, and standard deviation) and inferential statistics (i.e., Pearson's product moment coefficient and structural equation modeling (SEM)). Analyses were performed using LISREL version 8.72. The Maximum Likelihood Estimator (MLE) was employed to assess the goodness-of-fit and test the hypotheses for the hypothetical model according to its capability to generate unbiased estimates. The goodness-of-fit criteria, such as the ratio of the Chi-square, RMSEA, CFI, SRMR, and GFI, were used to examine the overview of the model and establish whether or not it was consistent with the empirical data (Bentler, 1990; Kline, 2011), as shown in Table 1.

Table 1: Criteria for Goodness-of-Fit

Model-fit statistics	Criteria for goodness-of-fit
The ratio of the Chi-square (x^2)/df	≤2
The root mean square error of approximation (RMSEA)	0<RMSEA<0.05
The confirmatory fit index (CFI)	0.90≤ CFI< 1
The standardized root mean squared (SRMR)	0< SRMR <0.08
The goodness-of-fit index (GFI)	0.90≤ GFI< 1

3. RESULTS

3.1 Phase 1: Studying the smartphone addiction of Gen Z informants in Bangkok by applying the qualitative research method

The definition of smartphone addiction is the excessive and intensive smartphone usage behavior of the user who cannot control themselves to stop using it or feel nervous and anxious about doing so, as demonstrated by the following statement:

> ...I use it and do nothing else. A smartphone has become part of my routine life. I have it with me all the time and pay attention to the online world with applications such as Instagram, Facebook, YouTube, and Netflix, and ignore the outside world. Once, I didn't have it, and I felt bad, like I had lost something. Shortly afterward, I had to pick it up to check on things. I use it from when I wake up until I go to bed. It's like the 33rd organ that I can't miss and am addicted to.
>
> Informant No. 1

Moreover, the conditions or causes of smartphone addiction can be divided into two categories.

1. Personal factors, such as the lack of media literacy and self-regulation.

1.1 Lack of media literacy skills

Media literacy is a significant skill. The smartphone contains many applications that fulfill the user's demand. Thus, a lack of media literacy would mean the user would be unable to access, analyze, and assess the media. Therefore, Gen Z teenagers in Bangkok who lacked media literacy skills consumed it without wisdom. Consequently, they used their smartphones excessively and could not stop using them, as demonstrated by the following statement:

> I post or share things via social media quickly to keep up-to-date, no matter they are true or not. First, I might have used it for relaxation, but later on, my demand for it increased, and finally, I became addicted to it. More applications were also developed, so I couldn't give up my smartphone.
>
> Informant No. 4

1.2 Lack of self-regulation

Self-regulation is an important factor in deciding to achieve a goal. If a person cannot regulate themselves, they might not be able to refrain from using a smartphone for any length of time, as demonstrated by the following statement:

> No time management has become a habit. Mom always says I don't have discipline. The applications fulfil my demand, so I spend more time on them.
>
> Informant No. 4

2. Social factors could be divided into two variables: social support and parenting style.

2.1 Social support

This was the key variable that led to smartphone addiction. Gen Z informants wanted to be accepted, be part of society, and be recognized for their self-esteem, particularly by friends. Moreover, the smartphone assisted with data searching for many activities, as demonstrated by the following statement:

> PubG and ROV are games where you play as a team. You can play with friends, and they are addictive. Some play them around the clock. There is something very attractive about them. Personally, I download many games to my smartphone to relax. I search for movies, talk to my friends via video call, listen to music, and contact others easily, quickly, and conveniently. I couldn't live without it.
>
> Informant No. 2

2.2 Parenting style

The study findings revealed that most parents overlooked the use of the smartphone, were not strict about it, and did not have enough time to take care of their children. Consequently, the children used their smartphones excessively. Furthermore, parents tended to their children and did not stop them when they were irritable, as demonstrated by the following statement:

> My parents have allowed me to use it since I was young, so I have always focused on the phone. I don't limit the time I use it. My parents always work, so I'm alone by myself and choose the mobile phone as my friend. The more I use it, the more I am addicted to it. More interesting applications draw my attention. It's simply that because my parents have no time for me, I am addicted to the smartphone.
>
> Informant No. 2

3.2 Phase 2: Studying the causal factors in smartphone addiction among Gen Z in Bangkok during the COVID-19 pandemic

The socio-demographic characteristics of the 400 participants showed that 205 were female (51.25%); their mean age was 18.05 ± 2.39 years; 241 participants were aged between 16 and 20 (60.25%); 160 lived in the inner-city area (40.00%); and 298 had an average monthly income of 10,001–20,000 baht (74.50%).

As can be observed from Table 2, the correlation coefficients between the variables in the research model were different from zero with a significance level of .01, ranging between 0.34 and 0.77. Smartphone addiction and self-regulation had the highest correlation ($r = 0.77$, $p < .01$) while poor parental supervision and functional presumption had the lowest correlation ($r = 0.34$, $p < .01$). The data indicated no multicollinearity arising from the identification of a normal distribution of all variables. In SEM analysis, kurtosis and skewness are commonly used indicators to test for normality. If the absolute value of the kurtosis index is less than 7 and the skewness index value is less than 2, the indicator's normality is considered acceptable (Radzi et al., 2015). All the scales utilized in the current study were observed to have met the required criteria for skewness and kurtosis values. Most of the dependent variables had skewness and kurtosis coefficients of less than 1, consistent with the primary agreement of the path analysis; therefore, the maximum likelihood estimation could be applied.

According to the above data, it can be concluded that the correlation coefficients between the variables were no greater than 0.80, indicating no multicollinearity; therefore, the researchers could proceed with the analysis of causal relationships among factors affecting smartphone addiction among Gen Z participants in Bangkok.

Table 2: Descriptive Statistics and Pearson Correlation Coefficients Among the Measured Scores

Variables	1	2	3	4	5	6	7	8	9	10
Smartphone addiction	1.00									
Self-regulation	-0.77**	1.00								
Functional consumption	-0.69**	0.47**	1.00							
Critical consumption	-0.63**	0.44**	0.46**	1.00						
Functional presumption	-0.59**	0.38**	0.49**	0.42**	1.00					
Critical presumption	-0.63**	0.42**	0.41**	0.38**	0.41**	1.00				
Positive parenting	-0.64**	0.43**	0.41**	0.38**	0.42**	0.63**	1.00			
Inconsistent discipline	0.65**	-0.48**	-0.46**	-0.36**	-0.43**	-0.53**	-0.44**	1.00		
Supervision	0.63**	-0.52**	-0.45**	-0.36**	-0.34**	-0.43**	-0.47**	0.69**	1.00	
Social support	-0.76**	0.55**	0.54**	0.48**	0.48**	0.53**	0.53**	-0.44**	-0.47**	1.00
Mean	43.68	33.27	2.81	2.58	3.08	3.24	3.24	2.88	2.95	33.95
SD	7.07	8.81	1.23	1.27	1.16	0.94	0.93	1.01	0.99	15.41
Skewness	0.39	-0.70	-0.19	0.34	-0.56	-0.50	-0.58	-0.24	-0.46	-0.06
Kurtosis	-1.20	-0.48	-1.25	-1.36	-0.80	-0.56	-0.46	-0.94	-0.95	-1.37

Note: * $p<0.05$, ** $p<0.01$

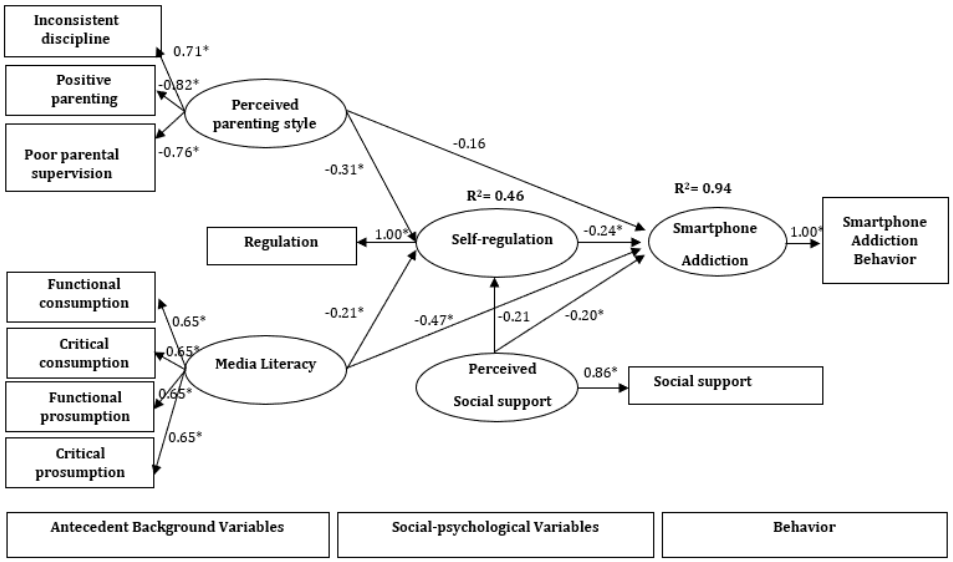
After the model adjustment, the result of the causal factors of smartphone addiction of Gen Z participants in Bangkok showed concordance with the empirical data by considering Chi-square = 36.31, p = 0.07, df = 25, Chi-square/df = 1.45, SRMR = 0.03, RMSEA = 0.03, CFI = 1.00, and GFI = 1.00, as shown in Figure 1.

Consequently, Structural Equation Modeling (SEM) was used to evaluate the structural model. The hypothesized model was tested with the maximum likelihood method, Chi-square = 36.31, p = 0.07, df = 25, Chi-square/df = 1.45, SRMR = 0.03, RMSEA = 0.03, CFI = 1.00, GFI = 1.00, as shown in Table 3 and Figure 1.

Table 3: Standard Scores of Direct Effects (DE), Indirect Effects (IE), and Total Effects (TE) Between Independent and Dependent Variables

Exogenous variables	Self-regulation			Smartphone addiction		
	DE	IE	TE	DE	IE	TE
Parenting style	0.31*	-	0.31*	-0.16	-0.08	-0.24
Social support	0.21	-	0.21	-0.20*	-0.05	-0.25*
Media literacy	0.21*	-	0.21*	-0.47*	-0.05*	-0.52*
Self-regulation	-	-	-	-0.24*	-	-0.24*
R^2		0.46			0.94	

Note: * $p<0.05$



Note: * $p<0.05$

Figure 1: The Adjusted Causal Relationship Model for Smartphone Addiction Among Gen Z Participants in Bangkok During the COVID-19 Pandemic

When considering the direct, indirect, and overall impact of the causal model of smartphone addiction of Gen Z participants in Bangkok, self-regulation was found to have a direct effect on smartphone addiction with a statistical significance of .05, while the standard effect size was -0.24. Meanwhile, new media literacy had a direct effect on smartphone addiction with a statistical significance of .05, while the standard effect size was -0.47. Moreover, it had an indirect effect on smartphone addiction via self-regulation, with a statistical significance of .05, while the standard effect size was -0.05. Additionally, perceived social support had a direct effect on smartphone addiction with a statistical significance of .05, while the standard effect size was -0.20. Furthermore, it had an indirect effect on smartphone addiction via self-regulation with no statistical significance at .05, while the standard effect size was -0.05. Moreover, the parenting style had a direct effect on smartphone addiction with no statistical significance at .05, while the standard effect size was -0.16. In addition, it had an indirect effect via self-regulation with no statistical significance at .05, while the standard effect size was -0.05.

When considering the direct effect of the causal relationship on the self-regulation of Gen Z participants in Bangkok, new media literacy was found to have a direct effect on self-regulation with a statistical significance of .05, while the standard effect size was 0.21. Likewise, the parenting style had a direct effect on self-regulation with a statistical significance of .05, while the standard effect size was 0.31. On the other hand, perceived social support had a direct effect on self-regulation with no statistical significance at .05, while the standard effect size was 0.21.

After considering R^2, the variables in the model explained 94% of the variance in smartphone addiction. New media literacy, perceived social support, and parenting were found to be significant determinants of self-regulation, equaling 46% of the total variance.

4. DISCUSSION

The results of the first phase of the study, which examined the conditions of smartphone addiction exhibited by Gen Z in Bangkok, illustrated that smartphone addiction and obsession with the smartphone were prevalent, and people could not control themselves to stop using it. This resulted in moodiness and anxiety. These findings concurred with those of Billieux (2012), who proposed that smartphone addiction was due to the loss of self-regulation for the appropriate use of the smartphone. Such behavior can lead to problems with well-being, such as being unable to stop using the smartphone or doing online activities, being unhappy, and having a negative relationship with others. Moreover, Ghosh (2020) suggested that although there were no international criteria for diagnosing smartphone addiction, the Internet Gaming Disorder DSM-5 might be applied since an increase in smartphone use and ignoring other activities, being anxious when not using it, and lack of concentration could potentially affect routine life. The conditions and causes could be classified into two

main categories: personal factors, such as new media literacy and self-regulation, and environmental factors, such as social support and parenting style. Smartphone addiction can also be caused by personal factors such as gender, emotional control, anxiety, social support and parenting style. Furthermore, this could be explained by the problem behavior theory by Jessor (2014), who proposed that problematic behavior was an action different from the social norm. Personal and environmental factors have also been found to affect and encourage potential malpractice from the social norm.

The researchers explored the structural causal relationships of smartphone addiction among Gen Z members based on the problem behavior theory (PBT) framework developed by Jessor (2014) and previous research findings. The results of this study support the hypothesis that the structural causal relationships of smartphone addiction among Gen Z, which is consistent with the empirical data in the modified structural equation model. This indicates that new media literacy, self-regulation, perceived social support, and parenting are predictive variables of smartphone addiction among Gen Z. Interestingly, the findings of this study reveal that smartphone addiction is negatively predicted by new media literacy; individuals with a low level of new media literacy tend to exhibit a high level of smartphone addiction. This is because media literacy refers to the ability to creatively consume and utilize media using critical thinking skills without being controlled or becoming a slave to media and technology. These results are supported by previous research investigating similar relationships in the smartphone context. Moreover, the effects of new media literacy on smartphone addiction can vary depending on the level of self-regulation. Perera et al. (2016) suggested that the high levels of digital literacy exhibited by undergraduates led to their improved self-regulation.

New media literacy, perceived social support, and parenting style were found to affect the smartphone addiction of Gen Z in Bangkok, with self-regulation being a mediator with a statistical significance level of .05. Furthermore, the factor most affecting smartphone addiction was new media literacy because it refers to the ability to use the media or new technology to initiate or consume digital content appropriately and creatively. Additionally, it was the critical thinking ability to perceive new media reasonably and responsibly that helped the participants to use the smartphone sensibly, finally resulting in less use. This was in line with the study by Ghosh (2020), which suggested that media literacy plays a role in helping children and teenagers manage their smartphones properly and reduce their usage. Social institutes, such as families, educational institutions, and the community, should encourage them to constantly learn and enhance their media literacy skills.

In addition, according to the study findings, social support pressures affected the smartphone addiction of Gen Z in Bangkok, with self-regulation acting as a mediator. It was likely that this age group wanted to be accepted by society, particularly among friends, so they constructed more relationships in the online society. Meanwhile, some of them wanted to have the freedom to think, give vent to repression, or escape from reality by watching films, listening to music, playing games, etc., all of which are easily managed on a smartphone. Consequently, it affected relationships with people in the real world. Moreover, less social support forced them to increasingly use smartphones, and they became smartphone-addicted, unable to regulate themselves. According to a study by Akturk and Budak (2019), who examined the relationship between the perception of social support and smartphone addiction in 1,149 Turkish nursing students, the perception of social support from family, friends, or important persons in their lives had a negative relationship with smartphone addiction. That said, a person who has a high perception of social support has a low level of smartphone addiction. Likewise, Herrero et al. (2019) investigated smartphone addiction and social support for three years and found that increasing social support minimized smartphone addiction.

Furthermore, self-regulation had a direct impact on smartphone addiction for Gen Z in Bangkok because it is used to control oneself in terms of thought, knowledge, and action to achieve goals (Zimmerman, 2013). A person who cannot regulate themselves would be more addicted to the smartphone (van Deursen et al., 2015). Similarly, Gökçearslan et al. (2016) examined the causal relationship model of smartphone addiction in 498 Turkish youths and discovered that self-regulation had a direct negative impact on smartphone addiction.

However, this research discovered that the parenting style had direct and indirect effects on the smartphone addiction of Gen Z in Bangkok, with self-regulation being the mediator with no statistical significance at .05. It was likely that most parents and guardians of the youths and adolescents in Bangkok lacked knowledge about parenting and nurturing, so did not catch up with the development of technology. They focused on earning money and neglected their children. For this reason, most parents supported their children by giving them a smartphone. This finding aligns with that of Tripathi (2013), who proposed that families in large cities tended to be small, and while the parents had sufficient knowledge, they did not know how to support their children. They lacked an understanding of developmental psychology, preventing them from keeping up with technological changes. Bae (2015) investigated the long-term causal relationship between the perception of the parenting model, satisfaction toward the relationship, and how learning motivation affected smartphone addiction in 2,376 Korean children and youths. The research revealed that children and youths

subjected to a close and warm parenting style had a lower level of smartphone addiction. Besides, it had an indirect impact on smartphone addiction via satisfaction toward the relationship and learning motivation. Meanwhile, Kwak et al. (2018) studied the effect of parental neglect on smartphone addiction among 1,170 Korean adolescents and found that the neglect of parents was a factor in increased smartphone addiction.

For further research, the creative use of a smartphone user guide should be developed by conducting experimental research and following up long term to examine the effectiveness of such a guide toward smartphone usage behavior of children and youths. Moreover, the variables omitted from the research framework should be included, such as economic, physical, and mental health factors, to explain the variance of smartphone addiction more effectively. In addition, the quality of the research tool should be examined with other methods to ensure the accuracy of the components and questions. For instance, for the construct validity check, apart from the IOC value, the known group technique that compares the score of the smartphone addiction group and the smartphone creative use group might be adapted. If the smartphone addiction group has a higher score than the creative use group, it indicates that the assessment form is reliable.

5. CONCLUSION

The definition of smartphone addiction is excessive and intensive smartphone use by someone unable to control themselves to stop using it or, if they did, would be nervous and anxious. Moreover, the hypothesized model was considered suitable for predicting smartphone addiction among Gen Z based on the following statistics. The causal factors could explain the 94% variance in smartphone addiction. However, since this research was conducted during the COVID-19 pandemic, there are two limitations. First, face-to-face data collection was difficult, so the online method was applied. As a result, it was not possible to collect other data, such as on well-being, lifestyle, etc. Furthermore, the response rate was low, so additional data was obtained to provide an adequate amount for analysis. To solve this problem, future research should employ different data collection methods, such as interviews and observations. Secondly, the response rate and the number of completed questionnaires returned might not be sufficient for the sample size. Future research should include more participants in the data collection process. Lastly, this study focuses on smartphone use among Gen Z in Bangkok. To generalize the findings, future research should investigate and compare smartphone use in different contexts and larger groups since the smartphone addiction of individuals may be affected by different cultures or social values.

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