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Device Features and/or Personality Traits? Disentangling the Determinants of Smartphone Nomophobia and Pathology among Urban Millennials

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Abstract: Smartphones have emerged as a mobile device that provides users with "smart" functionalities, aesthetics features and capabilities. These smart devices are the “must have” advanced communication tools and have been assimilated as an integral part of the everyday life. Although academic scholars and practitioners have started to venture into a research stream that focuses on behavioral models to elucidate and predict smartphone consumption trends and behavior, however, there is limited empirical research that attempts to unleash factors that triggered smartphone users to become nomophobia (no mobile phone phobia) and consecutively in turn become pathology (also known as addiction or dependency) user. Henceforth, this work seeks to explore both emerging phenomena by developing and validating a research model which is based on the Media Dependency Theory. The structural equation modelling analysis was conducted using Smart Partial Least Square (SmartPLS3) procedure with a dataset of 272 smartphone users who belong to the urban Millennials generational cohort. Two main predictors are hypothesized, which are the smartphone features (software and hardware) and users’ personality traits (openness, neuroticism, and extraversion). The results suggest that multiple facets of smartphone users’ personalities, particularly neuroticism significantly cause the smartphone users to become nomophobia and subsequently pathological. Whereas, the device hardware features have a positive significance effect on nomophobia, nevertheless not trigger pathology. Surprisingly, software features of the smartphone do not offer evidence of their effect on nomophobia as well as pathology. The key findings uncovered from this exploratory research provide rich insights for theoretical and practical implications.

Keywords: *Smartphone Pathology, Integrative Media Dependency Theory, Nomophobia, Personality Traits.*

1. Introduction and Background

Cellphones, then smartphones, became ubiquitous in modern life and consumers have become highly dependent on them - not to make calls so much as connect to the Internet. The continuous innovation of smartphone features and design with new apps, more processing power and broad social media capabilities as well as near-ubiquitous connectivity, are making the smartphone the digital center of our lifestyles. These devices are like small computers in the pockets with vastly more processing power than the computers. Bank of America's 2022 Trends in Consumer Mobility Report found 71% of consumers sleep with their smartphones and 35% say it is the first thing they think of when they wake up in the morning. The report breaks down usage by age and finds younger Millennials (age 20 -25), who grew up with smartphone technology, are the most dependent consumers. The Millennial generational cohort who are born between 1977 and 1996, are often early adopters of new technologies as well as extensive users of the Smartphone. Millennials are tech-savvy and have never known life without being online.

Recently, academic scholars and practitioners have started to venture into a research stream that focuses on behavioral models to elucidate and predict smartphone consumption trends and behavior. Although we have had the technology to let us be connected around the clock for decades, the inclusion of a smartphone as an information enabler takes this to new levels. It makes it possible for anyone to gain access to just about anything they could want or need and that feeds their nomophobia tendencies. However, there is limited empirical research that attempts to unleash factors that triggered smartphone users to be nomophobia (no-mobile phone-phobia) and consecutively become pathological (also known as addiction or dependency) users (Molu et al., 2023). Pathological Smartphone Use (PSU) is an emerging phenomenon that needs to be implicitly understood and addressed adequately. There are extensive studies in Pathological Internet Use (PIU), but empirical research on the PSU is still lacking. On the other hand, new terminology has been

introduced, which is nomophobia (no mobile phone phobia).

Nomophobia has been conceptualized as a "no-mobile-phone" phobia, including the fear of not being able to communicate, the fear of losing connection, the fear of not being able to access information and the fear of losing convenience. Since being introduced there is still exceptionally very little empirical research that has been conducted to validate this new construct. There is limited research that attempts to unleash factors that triggered smartphone users to be nomophobia (no mobile phone phobia) and consecutively become pathological (also known as addiction or dependency) users. Henceforth, this study attempts to explore both emerging phenomena by developing and validating a research model that uses the Media Dependency Theory as the underpinning theory. Both nomophobia and pathological smartphone use are integrated into the research framework. This study aims to disentangle the factors that affected smartphone users to become nomophobia and pathological. The research introduced an integrative MSD model which affords pertinent insights into the factors that influenced PSU and its outcomes. The personality of the users is deemed to be the main factor that affects the smartphone pathology phenomenon.

Millennials are the last generation born in the 20th century and are described as the fastest-growing internet population. They are reported to have sent their selfie to social media 35% or more than the previous generation (Gen X). It is also reported that they send an average of 50 texts in a day (Nielsen Mobile Insights Malaysia, 2020). According to the Economic Planning Unit report in 2022, the number of internet users in Malaysia in 2022 was 718 for every 1000 people. It was reported that for every 1000 people, there are 1418 cellular phones owned (Economic Planning Unit, 2022). Malaysians, especially youth have shown drastically increased in accepting online technology and services. Despite the significant growth, there is still a lack of research in identifying factors influencing PSU and its impact among Millennials in Malaysia. Even though there are also a few studies that are quite similar but are restricted due to with small sample size and using convenience sampling method (Rahim et al., 2020). However, the current study will be a comprehensive study in determining the predictors of nomophobia and smartphone pathology use among Millenials who reside in urban areas, specifically in the cities of Klang Valley, Malaysia. This study will be using a modified MSD theory, which incorporates the media system and psychology system as the predictor variables and nomophobia and pathology as dependent variables.

2. Literature Review

A report from Nielson, a mobile analytics firm, says for a growing number of consumers, mobile technology dependence has crossed over into addiction, and that it's a global trend. Regular users, consumers who admit to accessing apps between once and 16 times daily, grew from 784 million to 985 million in just a year, a 25% increase. So-called super users, consumers who use apps between 16 and 60 times daily, grew even more in that same period, from 440 million to 590 million, a 34% increase. Accordingly, mobile addicts are consumers who use apps 60 times or more per day. This group is growing at the fastest rate, from 176 million in Q2 2019 to a whopping 280 million in Q2 2020, a 59% increase," the company said.

Nomophobia: Nomophobia is considered a modern-age phobia introduced to our lives as a result of the interaction between people and mobile information and communication technologies, especially smartphones (Augner & Hacker, 2012). It refers to the fear of not being able to use a smartphone and the fear of not being able to communicate, losing the connectedness that smartphones allow, not being able to access information through smartphones and giving up the convenience that smartphones provide. Researchers at Iowa State University have developed a questionnaire to determine whether a smartphone user's addiction to their phone is healthy or reaches the severity of having nomophobia. The questionnaire studied four dimensions of the "no-mobile-phone" phobia, including the fear of not being able to communicate, the fear of losing connection, the fear of not being able to access information and the fear of losing convenience. The test was evaluated on more than 300 people, and the results showed that it's an accurate predictor of whether a person actually has nomophobia, i.e. the fear of being without a phone. The test involves ranking how strongly you disagree (designated by "1" on a scale of 1 to 7) or agree (designated by "7" on the scale) with 20 statements. The result is calculated by totaling the response numbers, with the higher the score corresponding to a greater level of nomophobia.

The dependence on the phone becomes an issue and veers into homophobia territory when it interferes with daily routine and leads to a preoccupation with your phone. But nomophobia also comes with other markers, including an irrational fear of being away from your phone and unable to check it, the sudden urge to check your phone regardless of whether there was a buzz or notification that you got a message, and having difficulty waiting to check your phone in situations where you shouldn't, like during a meeting or conversation with a person. The research builds on a University of Missouri study published in January which found being separated from your iPhone can have a real psychological and physiological effect, including impaired thinking. Clayton (2016) asserts that iPhones are capable of becoming an extension of ourselves such that when separated, an individual experiences a lessening of 'self' and a negative physiological state.

Pathology: Today, smartphones are no longer devices for one-to-one communication through voice and texting services. They are used as a device for internet surfing, email checking, online chats, time management, entertainment, playing online/offline games, pictures and video sharing, self-expression, establishing identity and developing and running various mobile applications. This led to increasing concerns about the pathological use of mobile devices, for instance, technology addiction (Rahim et al., 2020). Smartphone pathology is a double-edged sword: they create and destroy opportunities. The term pathology (also known as addiction or dependency), in any context, is typically associated with negative outcomes. Therefore, it is not surprising to see many researchers have focused on the negative implications of addiction. However, this research will be conducted to investigate factors that cause an individual to become pathological with a smartphone. Looking at and understanding the major role smartphones are now playing among young adults, it is not shocking as Millennials are reported to be more dependent on their smartphones. The Millennials will constantly use and expose their smartphone openly in public. These phenomena happened because the brand and features that their smartphone, which they carried will portray who they are in the world. Recently in 2023, it was found that within 15 minutes of walking, 79 percent of the respondents will start reaching for their phones. It is also reported in the same study, that 68 percent of the respondents sleep with their phones switched on. Surprisingly 67 percent of the respondents will check their smartphones even though it is not ringing or vibrating and 46 percent admitted they cannot live without having their smartphones (Jahrami, H, 2023).

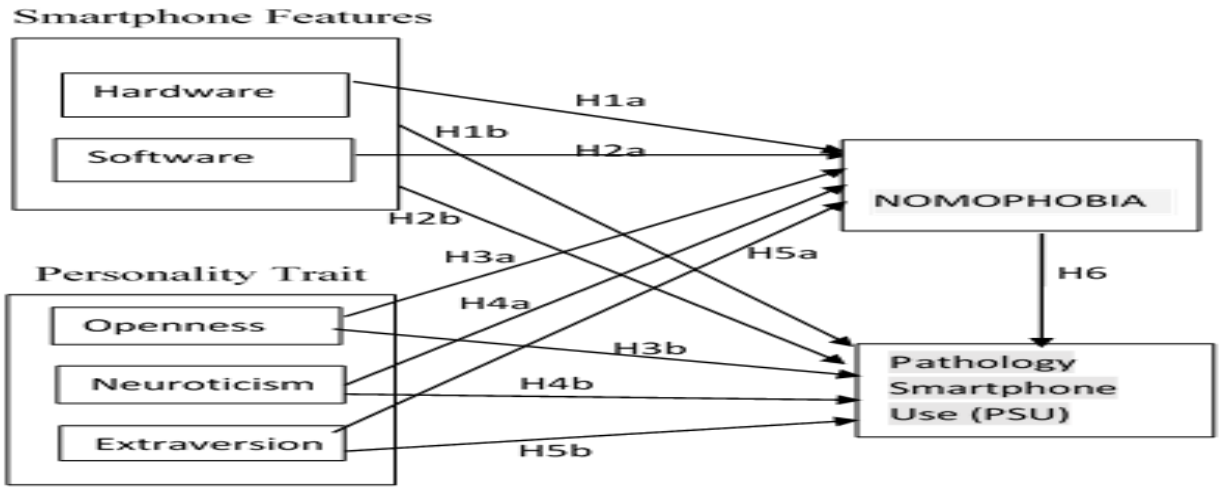
Smartphone Hardware: The hardware such as the design of the smartphone or in other words the tangible parts of the smartphone such as the shape, color and size. The screen design and quality also influence one's behavior in using the smartphone. The screen quality of a mobile device is very much related to the screen size and graphic pixels. Different consumer acts differently towards the screen quality. Some prefer a larger screen; some prefer smaller size devices and therefore, are willing to sacrifice the screen size. Some consumers never care less about the screen quality. The weight and its unique features such as its torch light and waterproof system are also being sought by smartphone users. Nevertheless, its sound system quality, logo and memory capacity are also highly important factors among smartphone users. Consequently, as users begin using mobile devices for different functions, their frequency of usage will also increase (Kheradmand, 2023). Thus, the study hypothesizes:
H1a: Mobile device hardware positively influences Nomophobia.
H1b: Mobile device hardware positively influences Pathological Smartphone Use.

Smartphone Software: Consumers who are familiar with their smartphones are quite comfortable using the device. Therefore, whether the technology is easy to use will not influence their adoption decision. These users also have good knowledge of what m-commerce can offer, and hence will not be attracted to use m-commerce based on the perceived ease of use (Eichenberg et al., 2021). The mobile device is turning into multifunctional devices that are not exclusively utilized for communication purposes, but also, they are used for calendars, instant messaging, social networking, and even playing games. That is why the researcher believes that due to the varying applications that mobile device provides to their users, this software agent can increase their pathology towards their smartphone (Rodriguez-Garcia et al., 2020). Thus, the study hypothesizes:
H2a: Mobile device software positively influences Nomophobia.
H2b: Mobile device software positively influences Pathological Smartphone Use.

User's Personality: Among many elements associated with smartphones, personality has been shown to profoundly influence Internet use (Mohtasham-Amiri & Taghinejad, 2022). One of the causes is that personality types can be utilized to identify how people prefer to take in information and what methods they utilize to process that data. These preferences are signals of the type of environment, which one feels most contented with and that will work best. Among early researchers who linked personality to the internet are Hamburger and Ben-Artzi (2000). They measured the level of extraversion and neuroticism among Internet users. Extraverts are generally impulsive, enjoy excitement, and crave social interaction. In their research, Şahin et al. (2022) found, that more extroverted students were more likely to be addicted to their cell phones than their less extroverted counterparts. In addition, extroverts are more likely to report problematic mobile phone use compared with students low on the extraversion trait. The neurotic person is characterized by moodiness, an anxious, worrying individual who is overly emotional and reacts too strongly to all types of stimuli (Dalbudak et al., 2020). Generally, neurotics are highly emotional and exhibit strong emotional responses to a variety of stimuli. The neurotic or emotionally unstable person may use their cell phone as a means of coping with stress and anxiety. A number of research studies have found that stress/anxiety is related to problematic mobile phone use (Gaurav Kohli et Al., 2021; Coenen & Gorlich, 2022). Furthermore, it was found that chronic stress and low emotional stability are significantly associated with problematic mobile phone use (Marengo et al., 2020). They reported extroverts and neurotics are positively related to social-leisure activities such as random surfing.

Therefore, the study hypothesizes:
H3a: Openness personality traits will positively influence nomophobia.
H3b: Openness personality trait will positively influence Pathological Smartphone Use.
H4a: Neuroticism personality trait will positively influence nomophobia.
H4b: Neuroticism will positively influence Pathological Smartphone Use.
H5a: Extraversion personality traits will positively influence nomophobia.
H5b: Extraversion personality trait will positively influence Pathological Smartphone Use.
H6: Nomophobia positively influences Pathological Smartphone Use.

Figure 1: Research Model



3. Research Methodology

The research used two phases of methodology design where at the preliminary phase qualitative approach via focus group discussion was conducted. A preliminary study was carried out by having three sessions of focus groups. Relevant findings are adopted and observable facts are subsequently used in developing the quantitative survey instrument. The preliminary study was conducted to gain deeper insights into the antecedents of smartphone pathology and the factors influencing mobile shopping. This study will be a quantitative study with empirical testing of the prevailing research questions by using primary data to achieve the research objective. The data will be collected using self-administered structured questionnaires.

To the researcher's best knowledge, no prior information on the stipulated population units was available, which suggests there is no sampling frame available for reference. Therefore, the use of probability sampling is impossible. As an alternative, this study needs to employ non-probability sampling.

Under nonprobability sampling, quota sampling is recognized to be superior compared to convenience and judgment sampling. Hence, this study will use quota sampling, where the sample will be selected purposively. Thus, in this sense, the demographic characteristics of interest reflect the actual proportion of the population distribution (Tull and Hawkins, 1987). The target population for this study is the millennial smartphone users that reside in urban areas (KL/Selangor/Putrajaya) aged 20 to 40 years old. Since the main research objective is to explore and predict which factors influence nomophobia and smartphone pathology SEM variance-based is the most appropriate analysis software. Using the snowball method, the data was then collected through an online questionnaire. 272 respondents qualified to proceed until the end. Since this is an exploratory survey, therefore Smart Partial Least Squares (SmartPLS) will be utilized to analyze the data. The respondents are confined to millennials ranging from age 20 to 40 years old who own smartphones. Based on exploratory research, six subscales have been adapted and extended to suit the research setting. The scale consists of 52 items covering the subjects of hardware, software, personality, smartphone pathology and nomophobia. The instrument was employed by using a seven-point Likert scale (1 denotes strongly disagree, while 7 denotes strongly agree).

4. Results

Four questions were included in the questionnaire to obtain the demographic characteristics of the respondents, and they were gender, age, education and income. The personal information of the respondents in this research is presented in Table 1. Of the 272 respondents, 39.7 percent (108) were male and 60.3 percent (164) were female. In the age category, 27.9 percent of the respondents were aged between 20 – 25, 33.5 percent were between 26 to 30 years old, 18.8 percent were aged 31 to 35 years old and 19.8 percent were 36 to 40 years old. The majority of the respondents have completed tertiary education (91.5 percent). With regards to monthly personal income, 27.9 percent (76) were less than RM2, 000; 33.1 percent (90) between RM2, 001 to RM4, 000; 19.9 percent (54) earned between RM4, 001 to RM6, 000; 8.5 percent (23) earned RM6, 001 to RM8, 000 and 4.0 percent (11) have income more than RM10, 000.

Table 1: Summary of Respondent's Profile

Characteristic	Frequency	Percentage
Age		
20 – 25 years old	76	27.9
26 – 30 years old	91	33.5
31 – 35 years old	51	18.8
36 – 40 years old	54	19.8
Gender		
Male	108	39.7
Female	164	60.3
Education		
SPM	23	8.5
Diploma	36	13.2
Bachelor Degree	156	57.4
Master Degree	47	17.3
PhD	7	2.6
Others	3	1.1
Income		

Less than RM2,000	76	27.9
RM2,001 - RM4,000	90	33.1
RM4,001 - RM6,000	54	19.9
RM6, 001 - RM8, 000	23	8.5
RM8, 001- RM10, 000	18	6.6
Above RM10, 000	11	4.0

Measurement Model Analysis: To conduct the regression analysis, the data need to be valid and reliable. Validity was measured by using two criteria which are convergent validity and discriminant validity. Convergent validity consists of factor loadings, average variance extracted (AVE) and composite reliability (CR) as in Table 2.

Table 2: Convergent Validity

Construct	Item	Loadings	CR	AVE
Hardware	HW1	0.795	0.906	0.660
	HW2	0.790		
	HW4	0.792		
	HW6	0.820		
	HW7	0.862		
Software	SW1	0.799	0.936	0.708
	SW2	0.834		
	SW3	0.917		
	SW4	0.888		
	SW5	0.858		
	SW7	0.742		
Personality			0.735	0.957
Extraversion	PE1	0.945		
	PE2	0.752		
Neuroticism	PN1	0.789		
	PN3	0.845		
	PN4	0.910		
	PN5	0.846		
Openness	PO4	0.887		
	PO5	0.866		
Pathology	PSU4	0.709	0.866	0.670
	PSU5	0.712		
	PSU6	0.730		
	PSU8	0.808		
	PSU9	0.793		
Nomophobia		0.888	0.903	0.651
		0.888		
		0.701		
		0.788		
		0.754		

While discriminant validity using Fornell and Larcker as summarized in Table 3. Within this study, the factor loadings mostly exceeded 0.7 at the acceptance rate of 0.7 (Hair et al., 2010). The factor loadings ranged from 0.701 to 0.917. The AVE of the result indicates that all the variables have a value greater than 0.5 which means that less error remains (Hair et al., 2022). The highest AVE is personality which is 0.957 followed by smartphone software at 0.708. The lowest AVE is smartphone pathology which is 0.670. Based on Table 2, it is initiated that all of the AVE and CR values are more than 0.5. Fornell and Larcker's analysis summarized in Table 3 also shows that all the diagonal values are above their horizontal and verticals values respectively. Hence, all variables achieved reliable and valid results as they are near 1.0 (Henseler et al., 2015).

Table 3: Discriminant Validity

	Extroversion	Hardware	Neuroticism	Nomophobia	Openness	Pathology	Software
Extroversion	**0.876**						
Hardware	0.273	**0.775**					
Neuroticism	0.011	0.101	**0.847**				
Nomophobia	0.210	0.229	0.384	**0.822**			
Openness	0.426	0.383	0.066	0.232	**0.857**		
Pathology	0.150	0.196	0.413	0.808	0.190	**0.813**	
Software	0.286	0.704	-0.017	0.109	0.410	0.057	**0.824**

Structural Model Analysis: Figure 2 illustrates diagrammatically the results of conducting an SEM Analysis by using SmartPLS 3 and six hypothesized paths were tested.

Figure 2: Structural Analysis

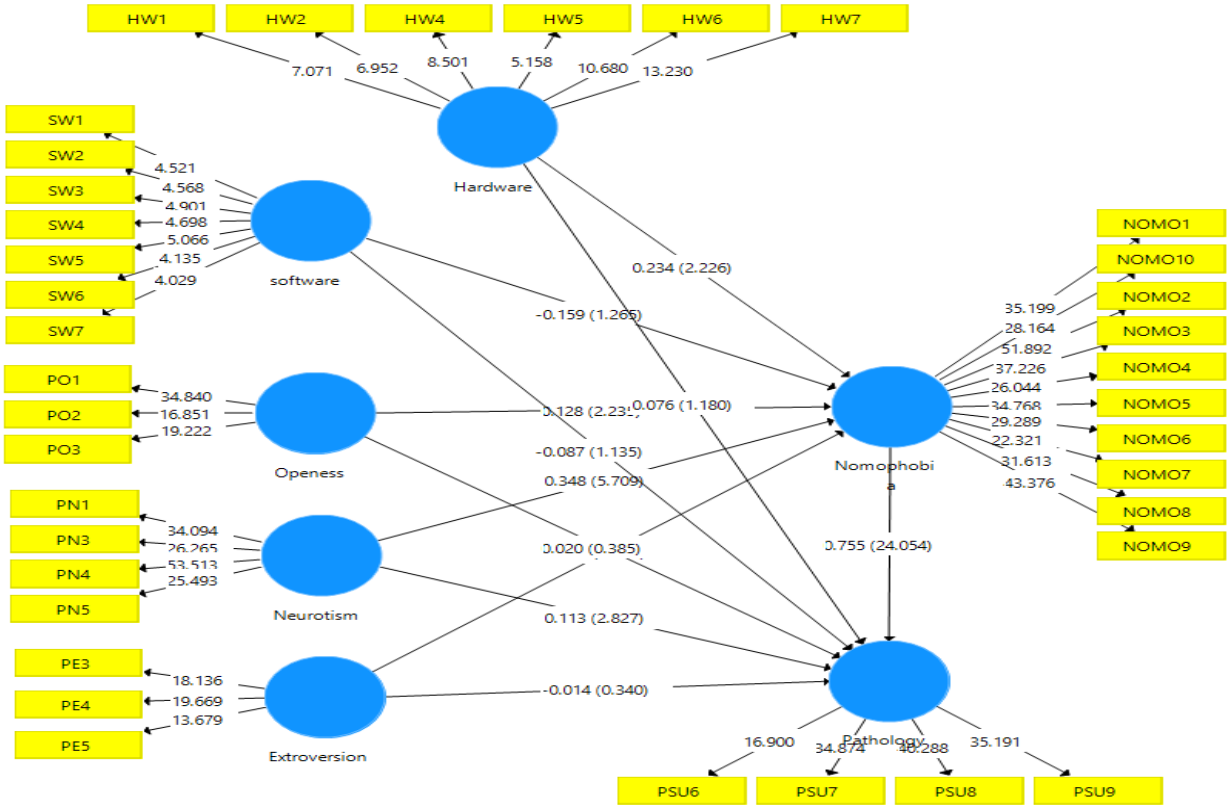


Table 4 summarizes the results of tested hypotheses and answers the research objective of the study. To test the hypotheses, we estimated a structural equation model with 7 latent variables (three personality traits, two smartphone feature dimensions, Nomophobia and Pathological use of smartphones) Specifically, the predictors are regressed against two dependent variables which are homophobia and pathology. Six hypotheses are supported and five are not supported. The strongest path is Nomophobia and Pathology, significant path is indicated by the highest t-value (24.049). The findings illustrate that personality traits play an important role in influencing respondents to be nomophobia and pathological. Openness, Neuroticism and Extraversion have significant positive influences on the formation of Nomophobia. However, Neuroticism affects Pathology smartphone use. Thus, it shows that the personality of a person and the hardware feature of the smartphone are very important in determining a person to become Nomophobia. A person who is moody

and temperamental may be more likely to be nomophobia and subsequently pathological. The finding also indicates that there is a strong relationship between Nomophobia and Pathology.

Table 4: **Hypothesis Testing**

HYPOTHESIS	Std Beta	T-value	P-Values	Decision
H1a: Hardware -> Nomophobia	0.234	2.280	0.023	Supported
H1b: Hardware -> Pathology	0.076	1.230	0.219	Not supported
H2a: software -> Nomophobia	-0.159	1.281	0.200	Not supported
H2b: software -> Pathology	-0.087	1.130	0.259	Not supported
H3a: Openness -> Nomophobia	0.128	2.175	0.030	Supported
H3b: Openness -> Pathology	0.020	0.377	0.706	Not supported
H4a: Neuroticism -> Nomophobia	0.348	5.808	0.001	Supported
H4b: Neuroticism -> Pathology	0.113	2.746	0.006	Supported
H5a: Extraversion -> Nomophobia	0.133	2.247	0.025	Supported
H5b: Extraversion -> Pathology	-0.014	0.335	0.738	Not supported
H6: Nomophobia -> Pathology	0.755	24.049	0.001	Supported

5. Discussion and Conclusion

In conclusion, the result indicates that the hardware feature of a smartphone could inflict a person to become nomophobia. Surprisingly, the software features have no evidence to inflict a person to become nomophobia. Generally, all personality traits that have been hypothesized in this study have evidence to inflict a person to become nomophobia. However, only neuroticism personality traits found to inflict an individual to be smartphone pathology. The result indicates that an individual who suffers from Nomophobia could lead to smartphone pathology. The personality trait of neuroticism is deemed to be the main factor that inflicts a person to be nomophobic and has smartphone pathology. To the best knowledge of the authors, this is the first research endeavor to incorporate both Nomophobia and Smartphone Pathogy in a research model. However, a replication study to further validate the plausibility of this new Media Dependency model in predicting smartphone Pathology and Nomology is fertile for further research endeavors in gaining deeper insights into who is more susceptible to nomophobia, probably based on generational cohort or by education attainment. It is also interesting to unravel why several hypotheses were not supported.

The research findings intrigue the researchers of why software features do not significantly contribute to the formation of nomophobia as well as Smartphone Pathology. Future research should unlock these surprising results as we expect that respondents become nomophobia because of the advanced communication technology and innovative apps that influence individual consumption of smartphone behaviour. Notably, the research finding unveils that the key predictor of Nomophobia and Smartphone Pathology is neuroticism. This finding was in line with the findings mentioned by Mohtasham-Amiri and Taghinejad (2022). The significance of the study lies in the fact that it adds new insight into the understanding of the predictors of Nomology and Smartphone Pathology. Thus, future research should be conducted to further validate and test the present model to further advance the knowledge of these emerging phenomena by a different generational cohort of consumers, such as Gen Z. The present findings afford important implications for smartphone marketers and product designers in developing new apps that could reduce the dark side effects of smartphones.

References

Andreassen, C. S., Griffiths, M. D., Gjertsen, S. R., Krossbakken, E., Kvam, S. & Pallesen, S. (2013). The relationships between behavioral addictions and the five-factor model of personality. *Journal of Behavioural Addiction*, 2, 90-99.

Augner & Hacker. (2012). Associations between problematic mobile phone use and psychological parameters in young adults. *International Journal of Public Health*, 57, 437-441.

Coenen, M. & Gorlich, Y. (2022). Exploring nomophobia with a German adaption of the nomophobia questionnaire (NMP-Q-D). *PLoS ONE.* 17(12).

Dalbudak, I., Yilmaz, T. & Yigit, S. (2020). Nomophobia levels and personalities of university students. *Journal of Education and Learning*, 9(2), 166.

Economic Planning Unit Malaysia. (2022). Syndicated Report. Retrieved on 25th July 2022 from http://www.epu.gov.my/documents/

Eichenberg, C., Schott, M. & Schroiff, A. (2021). Problematic smartphone use—comparison of students with and without problematic smartphone use in light of personality. Frontiers in Psychiatry, 11.

Fornell, C. G. & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50.

Gaurav, K., Manu, K. & Poonam, J.. (2021). Nomophobia: An assessment of no phone phobia among adolescents. *Medico Legal Update*, 21(1), 269–274.

Hair, J. F., Black, W., Babin, B. & Anderson, R. (2010). Multivariate data analysis, 7/e, Pearson Prentice Hall.

Hair, J. F., Hult, G. T. M., Ringle, C. M. & Sarstedt, M. (2022). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). 3rd Ed., Sage: Thousand Oaks.

Hair, J. F., Sarstedt, M., Ringle, C. M. & Mena, J. A. (2011). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, 40 (3), 414-433.

Hamburger, Y. A. & Ben-Artzi, E. (2000). The relationship between extraversion and neuroticism and the different uses of the Internet. *Computers in Human Behavior*, 16, 441-449.

Henseler, J., Ringle, C. M. & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135.

Hill, W. W. & Beatty, S. E. (2011). A model of adolescents' online consumer self-efficacy (OCSE). *Journal of Business Research*, 64(10), 1025-1033.

Jahrami, H. (2023). The relationship between nomophobia, insomnia, chronotype, phone in proximity, screen time, and sleep duration in adults: A mobile phone app-assisted cross-sectional study. *Healthcare*. 11(10), 1503-1512.

Kheradmand, A., Amirlatifi, E. & Rahbar, Z. (2023). Personality traits of university students with smartphone addiction. *Frontiers in Psychiatry*, 14.

Marengo, D., Sindermann, C., Hackel, D., Settanni, M., Elhai, J. & Montag, C. (2020). The association between the big five personality traits and smartphone use disorder: A meta-analysis. *Journal of Behavioral Addictions*, 9(3), 534-550.

Mohtasham-Amiri, Z. & Taghinejad, N. (2022). Prediction of nomophobia based on self-esteem, five personality factors and age in undergraduate students. *Iranian Evolutionary Educational Psychology Journal*, 4(1), 136-145.

Molu, N., Icel, S. & Aydogan, A. (2023). Relationship between nomophobia levels and personality traits of nursing students: A multicenter study. *Modern Care Journal*, 20(3).

Nielsens Mobile Insights Malaysia. (2020). Syndicated Report. Retrieved on 25th July 2020 from http://www.nielsen.com/my.html.

Rahim, N., Siah, Y., Tee, X. & Siah, P. (2020). Smartphone addiction: Its relationships to personality traits and types of smartphone use. *International Journal of Technology in Education and Science*, 5(1), 128-140.

Roberts, J. A. (2016). The Talking Dead: How personality drives smartphone addiction. The Conversation. Retrieved on 6th August 2021 from https://theconversation.com/the-talking-dead-how-personality-drives-smartphone-addiction-62411.

Roberts, J. A., Pullig, C. & Manolis, C. (2015). I need my smartphone: A hierarchical model of personality and cellphone addiction. *Journal of Personality and Individual Differences*, 79 (1), 13-19.

Roberts, J. A., Yaya, L. H. P. & Manolis, C. (2014). The invisible addiction: Among male and female college students. *Journal of Behavioral Addictions*, 79, 13-19.

Rodriguez-Garcia, A., Moreno-Guerrero, A. & Belmonte, J. L. (2020). Nomophobia: An individual's growing fear of being without a smartphone—a systematic literature review. *International Journal of Environmental Research and Public Health*, 17(2), 580

Şahin, Y., Sarsar, F., Sapmaz, F. & Hamutoglu, N. (2022). The examination of self-regulation abilities in high school students within the framework of an integrated model of personality traits, cyberloafing and nomophobia. *Cukurova University Faculty of Education Journal*, 51(1), 501-537.