

## Proceedings of the 1st Tarumanagara International Conference on Medicine and Health (TICMIH 2021)

Editors: Prof. Anthony McLean, MD, FCICM; Soemiwati Holland, MD, FACE; Anthony Paulo Sunjaya, MD, SM; Bujung Hong, Dr. med; Lawrence Ong, MBBS, Ph.D; Prof. Herdiman T. Pohan, MD; Erni J. Nelwan, MD, PhD; Sharifah Shakinah, MD; Prof. Saptawati Bardosono, MD, PhD; Dr. phil. Edo Sebastian Jaya, M.Psi., Psikolog; Velma Herwanto, MD, PhD;  
Volume 41, December 2021

# Problematic Smartphone Use and Problematic Internet Use: The Two Faces of Technological Addiction

Jordain R. Taufik<sup>1</sup>, Sri Tiatri<sup>2,\*</sup>, Vencie B. Allida<sup>3</sup>

<sup>1</sup> *Professional Psychology Magister Program, Universitas Tarumanagara, Indonesia*

<sup>2</sup> *Faculty of Psychology, Universitas Tarumanagara, Indonesia*

<sup>3</sup> *Department of Graduate Education and Leadership, Northern Caribbean University, Jamaica*

\*Corresponding author. Email: sri.tiatri@untar.ac.id

## ABSTRACT

This study aims to determine the relationship between the problematic smartphone use (PSU) and the problematic internet use (PIU). It was hypothesized that there was a positive relationship between the problematic smartphone use with the problematic internet use. This non-experimental quantitative study involved 601 students from X and Y high schools, selected through the convenience sampling method. The data were collected through online questionnaire, statistically analyzed using the Pearson Correlation Coefficient, and descriptively based on empirical categorisation. Findings revealed that problematic smartphone use was positively correlated with problematic internet use. Furthermore, 42.8% or 257 of the total participants showed a mild problematic internet use. Additionally, 71% of the total participants showed moderate problematic smartphone use. Therefore, the higher the problematic internet use, the higher the problematic smartphone use. The researchers revealed to the participants that there was a 60% chance of the participants having PSU, if they experienced PIU.

**Keywords:** *Smartphone, Problematic smartphone use, Problematic internet use, Technological addiction.*

## 1. INTRODUCTION

These days, technology-based tools have become common enough that almost everyone owns and use them [1-5]. The ownership rates of personal computer or PC and of smartphone in Indonesia are around 18.78%, and around 66.31%, respectively [1,2]. Unfortunately, the use of technology-based tools often leads to symptoms of addiction [27].

Several types of technology addiction that are commonly found include problematic internet use (PIU) and problematic smartphone use (PSU). PIU can be defined as a behaviour where one compulsively accesses the internet and experiences symptoms of addiction akin to symptoms of substance use disorders and gambling disorder [6-11].

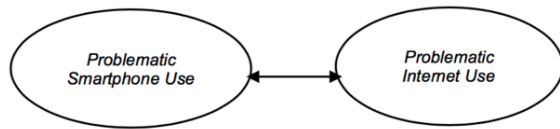
Meanwhile, PSU is the inability of the subject to regulate the use of smartphone which leads to the emergence of negative consequences on the subject's daily life [23-26]. Based on the definition of each construct, both PIU and PSU have their own similarities and differences.

One of the similarities between PIU [6-11] and PSU [13,27,30] is that the indications for the occurrence of the two constructs are similar to the symptoms of substance use disorders.

However, while PSU affects the subject's daily life due to the use of smartphone [13,30], PIU focuses on the compulsive use of the internet through a PC, which leads to the limited space and function of the subject's social interaction and isolation [29,31,32].

Several studies in the past have measured the correlation between PSU and PIU. However, these studies are outdated and PSU was largely referred to cellular phones, not smartphones. At that time, it was still known as problematic mobile phone use [25,33].

Additionally, the number of studies that concurrently examined PIU and PSU are scarce. Most studies focus only on one construct, either PIU or PSU. Only one recent study investigated both PIU and PSU, although it did not specifically address the correlation between the two [34]. Considering the scarcity of references, thus this study focuses on recognizing, finding, and understanding the correlation between PSU and PIU.



**Figure 1** The model hypothesis between problematic internet use and problematic smartphone use.

Researchers hypothesized that PSU is positively and significantly correlated with PIU. This hypothesis is in line with the two theoretical models, both from the PSU side and the PIU side, especially regarding the conditions that lead to repeated use of smartphones and the internet via PC. First, based on the Pathway Model of the mechanism of PSU occurrence or Pathway Model Problematic Smartphone Use [24-26], it is explained that there are three pathways for the occurrence of PSU.

The first pathway is the excessive reassurance pathway. This occurs when a sense of certainty and security is sought. Secondly, PSU occurs due to the inability of the subject to control their impulsivity or impulsive pathway. Thirdly, PSU occurs due to extraversion pathway or due to the need for constant stimulation and is sensitive to stimulation, especially reward [24-26].

These three pathways result in addictive, antisocial, and risky patterns of use. The addictive pattern is characterized by addiction-like symptoms and reassurance behavior of the smartphone use, whereas the antisocial pattern of use describes the violation of laws and regulations as well as social norms, accompanied by aggressive behaviors. In terms of the risky pattern of use, this could be seen in the use of smartphone while driving or committing offensive actions.

Second, based on the I-PACE Model or the Interaction of Person-Affect-Cognition-Execution Model, PIU is described as the result of the subject's view of internet use, which is ultimately considered a gratification [35,36]. This gratification works opposite to compensatory behavior. The lower the subject's gratification to the internet, the higher the compensation process by the subject. As a result, Internet use via PC becomes compulsive and increases the likelihood of PIU [35,36].

PIU highly likely leads to a vicious cycle of internet-related cognitive bias that negatively affects an individual's core characteristics including ones' personality, social function, biological function, motivation, and psychopathological tendency. Once the core characteristics are defiled by the internet-cognitive bias, a series of complications arises.

The first complication is related to the impairment of an individual's perception, particularly on how they use the internet through PC in stressful situations. The second complication is overcompensation which ranges from craving to attentional bias. Overcompensation occurs as

there is a misperception on the value of the internet and it remains unchanged until it becomes PIU.

## 2. METHODS

### 2.1. Participants

This study included 601 participants with the following criteria: (a) active high school students (b) owning and using smartphones and the internet via computers, laptops or PCs. The sampling technique used in this study was convenience sampling.

The calculation of the minimum number of samples uses the formula  $50+8m$  [17,21], as the  $m$  is the total number of research predictors. In this case, the minimum number of samples is 74 participants.

### 2.2. Measurement

This study uses two measuring tools, the Indonesian Internet Addiction Test or I-IAT with Cronbach's Alpha ( $\alpha$ ) of .85 [12] to measure PIU, and Smartphone Addiction Scale or SAS with Cronbach's Alpha ( $\alpha$ ) of .89 to measure PSU, [13].

The validity was tested through expert evaluation or expert judgment conducted by 3 clinical psychologists and 3 psychometric experts on the measuring instruments. The process of adapting measuring instruments was carried out by means of adaptation procedures for measuring instruments from the World Health Organization [15] and measurement references related to cross-cultural assessment [14].

Furthermore, the data processing technique in this study consisted of three steps using the SPSS or Statistical Package for Social Sciences version 25.0 program [22]. The first step is testing the normality of the data distribution by using the level of skewness and kurtosis not exceeding the value of 2.0 [18,19]. The second step is conducting descriptive data analysis with empirical data categorization.

The empirical data categorization consists of three levels, starting from low  $\leq X < (M - 1SD)$  or below the mean value, medium  $(M - 1SD) \leq X < (M +1SD)$  or equivalent to the mean value, and high  $(M +1SD) \leq X < \text{or above the mean}$  [20]. The third step is conducting a correlation test using the Pearson Correlation Coefficient technique on the two research constructs, namely PSU and PIU [21].

## 3. RESULTS AND DISCUSSION

### 3.1. Results

Based on the results of the correlation test using the Pearson Correlation technique, PSU is positively and significantly correlated with PIU. The  $r$  value of the

correlation between PSU and PIU is .600. Thus, the correlation between PSU and PIU can be classified as a high level correlation, because the value of *r* obtained is between .50 to .1.0 [21].

**Table 1.** Correlations, means and standard deviations of the variables

Correlation test				
	<i>M</i>	<i>SD</i>	PSU	PIU
PSU	113.51	19.46	1	
PIU	.915	3.91	.600**	1

\*\* . Correlation is significant at 0.01 (2-tailed).

\* . Correlation is significant at 0.05 (2-tailed).

Then, the researchers conducted a descriptive analysis of the data with empirical categorization. The results showed that 92 participants with a PSU score of less than 94 had low PSU (15.33%), 426 participants with a score equivalent to the average score had moderate PSU (71%), and 82 participants with a score of more than 133 had high level of PSU (13.67%). Thus, the participants consist mostly of those with moderate level of PSU.

**Table 2.** Empirical categorisation of problematic smartphone use

Category	Criteria	Frequency	Percentage
Low	< 94	92	15.33
Moderate	94 - 133	426	71.00
High	> 133	82	13.67
Total PSU		600	100.00

Meanwhile, mild level PIU is more common among the participants. Based on the results of PIU categorization with reference to the I-IAT score indicator [12], the researchers found 245 participants with PIU scores ranging from 0 to 27 were in normal condition (40.8%), 257 participants with scores ranging from 28 to 44 had mild PIU. (42.8%), 96 participants with scores ranging from 45 to 71 had moderate PIU (16.0%), and 2 participants with scores ranging from 72 to 90 had severe PIU (.3%).

**Table 3.** Empirical categorisation of problematic internet use

Category	Criteria	Frequency	Percentage
Normal	0 - 27	245	40.8
Mild Addiction	28 - 44	257	42.8

Moderate Addiction	45 - 71	96	16.0
Severe Addiction	72 - 90	2	0.3
Total PIU		600	100.00

### 3.2. Discussion

Based on the results of hypothesis testing, the researchers found a strong positive correlation between PSU and PIU. The researchers also conducted a descriptive analysis on the participants, showing that the research participants were dominated by moderate PSU and mild PIU.

The result of the correlation test between PSU and PIU in this study is in line with the results of several studies in the past [33,34]. In fact, the results of the descriptive analysis of this study, particularly regarding the empirical categorization of PSU and PIU participants, is also in line with the results of past studies [33].

When discussed theoretically, in fact these two constructs have similarities. One of them is symptoms or indications related to PSU and PIU [24-26,35,36]. The occurrence of withdrawal and tolerance which ultimately leads to repeated use [24-26,35,36]. Thus, based on the results of the hypothesis testing of this study as well as the theoretical model used, it can be concluded that the higher the PSU, the higher the PIU.

### 4. CONCLUSIONS AND RECOMMENDATIONS

This study contributes to the literature by examining the relationship between PSU and PIU. Our findings indicate to a possible phenomenon that PIU and PSU could escalate each other. This study provides a systematic perspective to comprehend the correlation and the categorization that relates to high school students PSU and PIU. These findings also offer insights for psychiatrist and clinical psychologist, especially for the consideration of the screening and intervention process.

However, this study is not without limitation. The first limitation of this study is the sampling method used, as this study used the convenience sampling method. The researchers recommend that future research can use better sampling techniques, such as probability sampling.

The second limitation is that researchers are unable control extraneous variables such as the COVID-19 pandemic. This is because the COVID-19 pandemic, can serve as a predictor, mediator and moderator [37-42]. The last limitation is that this study is a cross-sectional design. Therefore, the researchers recommend that future research can be conducted in either longitudinal or experimental quantitative design. Thus, the results of

future research can be generalized to the population and are able to explain the causality process between these two constructs.

## AUTHORS' CONTRIBUTIONS

JT and ST led the project. JT performed data analysis and wrote the manuscript. ST and VA supervised and revised the manuscript.

## ACKNOWLEDGMENTS

The researchers would like to thank several individuals who have assisted in the process of translating measuring instruments in this study, namely: Rita M. Eidulfilastri, Sandi Kartasasmita, Linda Wati, Meylisa Permata Sari, Fenny Junita, and Ni Wayan Pratiwi Dharkanti.

## REFERENCES

- [1] Kementerian Komunikasi dan Informatika Republik Indonesia. (2017, December). Survey Penggunaan TIK 2017: Indonesia Baik. Retrieved October 25, 2020, from <http://indonesiabaik.id/ebook/survey-penggunaan-tik-2017>
- [2] Statista. Computer penetration rate among households worldwide 2005–2019 [Internet], 2021. <https://www.statista.com/statistics/748551/worldwide-households-with-computer/>
- [3] Newzoo. Newzoo Global Mobile Market Report 2018: Light Version [Internet], 2018. <https://newzoo.com/insights/trend-reports/newzoo-global-mobile-market-report-2018-light-version/>
- [4] Newzoo. Newzoo Global Mobile Market Report 2019: Light Version [Internet], 2019. <https://newzoo.com/insights/trend-reports/newzoo-global-mobile-market-report-2019-light-version/>
- [5] L. Silver. Smartphone Ownership Is Growing Rapidly Around the World, but Not Always Equally [Internet], 2020. <https://www.pewresearch.org/global/2019/02/05/smartphone-ownership-is-growing-rapidly-around-the-world-but-not-always-equally/>
- [6] K.S. Young. (2016). *Internet addiction test (IAT)*. Stoelting.
- [7] K.S. Young, X.D. Yue, L. Ying. Prevalence estimates and etiologic models of Internet addiction. *Internet addiction: A handbook and guide to evaluation and treatment*, 2011, 3-17.
- [8] K.S. Young. Internet addiction: The emergence of a new clinical disorder. *Cyberpsychology and Behavior*, 1998, Volume 1(3), 237–244. DOI: <https://doi.org/10.1089/cpb.1998.1.237>
- [9] K.S. Young. Psychology of computer use: XL. Addictive use of the Internet: a case that breaks the stereotype. *Psychological reports*, 1996, Volume 79(3), 899-902.
- [10] K.S. Young. Internet addiction: Diagnosis and treatment considerations. *Journal of Contemporary Psychotherapy*, 2009, Volume 39(4), 241-246.
- [11] P.M. Yellowlees, S. Marks. Problematic Internet use or Internet addiction?. *Computers in human behavior*, 2007, Volume 23(3), 1447-1453. DOI: <https://doi.org/10.1016/j.chb.2005.05.004>
- [12] K. Siste, C. Suwartono, M.W. Nasrun, S. Bardosono, R. Sekartini, J. Pandelaki, et al. Validation study of the Indonesian internet addiction test among adolescents. *PloS one*, 2021, Volume 16(2). DOI: <https://doi.org/10.1371/journal.pone.0245833>
- [13] M. Kwon, J.Y. Lee, W.Y. Won, J.W. Park, J.A. Min, C. Hahn, et al. Development and validation of a smartphone addiction scale (SAS). *PloS one*, 2013 Volume 8(2), DOI: <https://doi.org/10.1371/journal.pone.0056936>
- [14] World Health Organization. WHO process of translation and adaptation of instruments [Internet], 2019. [https://www.who.int/substance\\_abuse/research\\_tools/translation/en/](https://www.who.int/substance_abuse/research_tools/translation/en/).
- [15] B.A. Bracken, A. Barona. State of the art procedures for translating, validating and using psychoeducational tests in cross-cultural assessment. *School Psychology International*, 1991, Volume 12(1-2), 119-132. DOI: <https://doi.org/10.1177%2F0143034391121010>
- [17] B.G. Tabachnick, L.S. Fidell. *Using multivariate statistics (new international ed. ed.)*. Harlow: Pearson, 2014.
- [18] J. D. Elhai, J.C. Levine, R.D. Dvorak, B.J. Hall. Fear of missing out, need for touch, anxiety and depression are related to problematic smartphone use. *Computers in Human Behavior*, 2016, Volume 63, 509-516. DOI: <https://doi.org/10.1016/j.chb.2016.05.079>
- [19] C.A. Wolniewicz, D. Rozgonjuk, J.D. Elhai. Boredom proneness and fear of missing out mediate relations between depression and anxiety with problematic smartphone use. *Human Behavior and Emerging Technologies*, 2019, Volume 2(1), 61-70. DOI: <https://doi.org/10.1002/hbe2.159>
- [20] R. Cohen, T. Newton-John, A. Slater. 'Selfie'-objectification: The role of selfies in self-objectification and disordered eating in young

- women. *Computers in Human Behavior*, 2018, Volume 79, 68-74. DOI: <https://doi.org/10.1016/j.chb.2017.10.027>
- [21] J. Pallant. *SPSS survival manual: a step by step guide to data analysis using IBM SPSS*: Open University Press. Open University Press, 2016.
- [22] IBM Corp. *IBM SPSS statistics for Macintosh, version 25.0*. Armonk: IBM Corp, 2017.
- [23] J. Billieux. Problematic Use of the Mobile Phone: A Literature Review and a Pathways Model. *Current Psychiatry Reviews*, 2012, Volume 8(4), 299-307. DOI: <https://doi.org/10.2174/157340012803520522>
- [24] J. Billieux, P. Maurage, O. Lopez-Fernandez, D.J. Kuss, M.D. Griffiths. Can Disordered Mobile Phone Use Be Considered a Behavioral Addiction? An Update on Current Evidence and a Comprehensive Model for Future Research. *Current Addiction Reports*, 2015, Volume 2(2), 156-162. DOI: <https://doi.org/10.1007/s40429-015-0054-y>
- [25] J. Billieux, M. Van der Linden, L. Rochat. The role of impulsivity in actual and problematic use of the mobile phone. *Applied Cognitive Psychology: The Official Journal of the Society for Applied Research in Memory and Cognition*, 2008, Volume 22(9), 1195-1210. DOI: <https://doi.org/10.1002/acp.1429>
- [26] E. Pivetta, L. Harkin, J. Billieux, E. Kanjo, D.J. Kuss. Problematic smartphone use: An empirically validated model. *Computers in Human Behavior*, 2019, Volume 100, 105-117. DOI: <https://doi.org/10.1016/j.chb.2019.06.013>
- [27] M. Griffiths. Technological addictions. In: *Clinical Psychology Forum. Division of Clinical Psychology of the British Psychol Soc*, 1995, pp. 14-14.
- [28] Y.H. Lin, C.L. Chiang, P.H. Lin, L.R. Chang, C.H. Ko, Y.H. Lee, et al. Proposed diagnostic criteria for smartphone addiction. *PloS one*, 2016, Volume 11(11), DOI: <https://doi.org/10.1371/journal.pone.0163010>
- [29] N.A. Cheever, M.A. Moreno, L.D. Rosen. When does internet and smartphone use become a problem?. In *Technology and adolescent mental health*. Springer, Cham, 2018, pp. 121-131.
- [30] T. Panova, X. Carbonell. Is smartphone addiction really an addiction?. *Journal of behavioral addictions*, 2018, Volume 7(2), 252-259. DOI: <https://doi.org/10.1556/2006.7.2018.49>
- [31] Y.H. Lin, C.L. Chiang, P.H. Lin, L.R. Chang, C.H. Ko, Y.H. Lee, et al. Proposed diagnostic criteria for smartphone addiction. *PloS one*, 2016, Volume 11(11), DOI: <https://doi.org/10.1371/journal.pone.0163010>
- [32] Reed, P., Vile, R., Osborne, L. A., Romano, M., & Truzoli, R. (2015). Correction: Problematic Internet Usage and Immune Function. *PLOS ONE*, 10(10), e0140692. DOI: <https://doi.org/10.1371/journal.pone.0140692>
- [33] C. Jenaro, N. Flores, M. Gómez-Vela, F. González-Gil, C. Caballo. Problematic internet and cell-phone use: Psychological, behavioral, and health correlates. *Addiction research & theory*, 2007, Volume 15(3), 309-320. DOI: <https://doi.org/10.1080/16066350701350247>
- [34] C. Arrivillaga, L. Rey, N. Extremera. Adolescents' problematic internet and smartphone use is related to suicide ideation: Does emotional intelligence make a difference?. *Computers in human behavior*, 2020, Volume 110, DOI: <https://doi.org/10.1016/j.chb.2020.106375>
- [35] M. Brand, K.S. Young, C. Laier, K. Wölfling, M.N. Potenza. Integrating psychological and neurobiological considerations regarding the development and maintenance of specific Internet-use disorders: An Interaction of Person-Affect-Cognition-Execution (I-PACE) model. *Neuroscience & Biobehavioral Reviews*, 2016, Volume 71, 252-266. DOI: <https://doi.org/10.1016/j.neubiorev.2016.08.033>
- [36] M. Brand, E. Wegmann, R. Stark, A. Müller, K. Wölfling, T.W. Robbins, et al. The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: Update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. *Neuroscience & Biobehavioral Reviews*, 2019, Volume 104, 1-10. DOI: <https://doi.org/10.1016/j.neubiorev.2019.06.032>
- [37] J.D. Elhai, D. McKay, H. Yang, C. Minaya, C. Montag, G.J. Asmundson. Health anxiety related to problematic smartphone use and gaming disorder severity during COVID-19: Fear of missing out as a mediator. *Human Behavior and Emerging Technologies*, 2021, Volume 3(1), 137-146 DOI: <https://doi.org/10.1002/hbe2.227>
- [38] J.D. Elhai, H. Yang, D. McKay, G.J. Asmundson. COVID-19 anxiety symptoms associated with problematic smartphone use severity in Chinese adults. *Journal of Affective Disorders*, 2020, Volume 274, 576-582. DOI: <https://doi.org/10.1016/j.jad.2020.05.080>

- [39] M.X. Zhang, J.H. Chen, K.K. Tong, E.W.Y. Yu, A. Wu. Problematic Smartphone Use during the COVID-19 Pandemic: Its Association with Pandemic-Related and Generalized Beliefs. *International Journal of Environmental Research and Public Health*, 2021, Volume 18(11). DOI: <https://doi.org/10.3390/ijerph18115724>
- [40] O. Király, M.N. Potenza, D.J. Stein, D.L. King, D.C. Hodgins, J.B. Saunders, et al. Preventing problematic internet use during the COVID-19 pandemic: Consensus guidance. *Comprehensive psychiatry*, 2020, Volume 100. DOI: <https://doi.org/10.1016/j.comppsy.2020.152180>
- [41] M.S. Islam, M.S.H. Sujan, R. Tasnim, M.Z. Ferdous, J.H.B. Masud, S. Kundu, et al. Problematic internet use among young and adult population in Bangladesh: Correlates with lifestyle and online activities during the COVID-19 pandemic. *Addictive behaviors reports*, 2020, Volume 12. DOI: <https://doi.org/10.1016/j.abrep.2020.100311>
- [42] H. Alheneidi, L. AlSumait, D. AlSumait, A.P. Smith. Loneliness and problematic internet use during COVID-19 lock-down. *Behavioral Sciences*, 2021, Volume 11(1), 5. DOI: <https://doi.org/10.3390/bs11010005>