

Internet Screen Time and Related Factors: Threat to Adolescents in Indonesia

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Abstract

The widespread use of the internet has produced both positive and negative impacts. Among the latter is internet addiction (IA). The worldwide prevalence of this addiction has been measured at approximately 6%, although the specific prevalence in Indonesia is uncertain because no validated instrument to measure IA has been developed for the Indonesian context. Hence, screen time was used in this study as an alternative measure of the magnitude of IA in Indonesia, where more than 6 hours is considered risk for IA. Researchers measured internet screen time (IST) and potential related factors in adolescents. The subjects of this cross-sectional study were 200 junior and senior high school students in Jakarta, Indonesia, who completed a questionnaire assessing IST and related factors. IST duration was divided into two categories: short (<6 hours/day) and long (>6 hours/day). Out of 200 students, 68 (34%) had long ISTs, with related factors being senior high education, positive perception of IA, and excessive body mass index. The percentage of students with long ISTs was quite high. A valid and reliable diagnostic tool for IA is a necessity. Prompt prevention is necessary to prevent adolescent IA, especially in higher-risk adolescents.

Lama Penggunaan Internet dan Faktor yang Berkaitan: Sebuah Ancaman untuk Remaja di Indonesia

Abstrak

Penggunaan luas dari Internet memiliki dampak positif maupun negatif, diantaranya adiksi internet (AI). Prevalensi adiksi internet di seluruh dunia sekitar 6%, sementara di Indonesia masih diperdebatkan dikarenakan keterbatasan instrumen pengukuran adiksi internet yang masih dalam tahap pengembangan. Maka digunakan metode alternatif untuk mengukur AI yaitu durasi penggunaan internet (DPI) dimana DPI lebih dari 6 jam berhubungan dengan AI. Peneliti ingin mengukur besaran masalah AI di Indonesia melalui DPI beserta faktor yang berhubungan pada remaja. Studi potong lintang melibatkan siswa SMP dan SMA di Jakarta yang mengisi kuesioner yang menanyakan DPI dan faktor yang berkaitan. Durasi dibagi menjadi dua; pendek (<6 jam/hari) dan lama (>6 jam/hari). Dari 200 siswa, 68 (34%) memiliki DPI lama dengan faktor yang berhubungan antara lain tingkat pendidikan SMA, persepsi mengenai adiksi internet yang baik, dan indeks massa tubuh berlebih. Persentase DPI lama masih cukup tinggi di Jakarta. Oleh sebab itu, instrumen diagnostik yang valid dan terpercaya sangat dibutuhkan. Tindakan pencegahan yang dini dibutuhkan untuk mencegah AI, khususnya pada remaja dengan risiko yang lebih tinggi.

Keywords: adolescents, internet addiction, internet screen time

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1. Introduction

In the contemporary world, the internet plays an essential role in a large part of the world's population, who use it for seeking information, communication, and

pleasure (Anderson, Steen, & Stavropoulos, 2017). Propelled by increasing demand around the world, the development of the internet is moving at an incredible speeds. According to data from Internet World Stats, almost 49.5% of the world population are internet users

in December 2016, and this figure increased to 54.4% in December 2017. Asia has the most internet users of any continent, with 48.7% of its population, totaling more than 2 billion people, including such countries such as South Korea, Japan, and Indonesia (Group, 2018). In Indonesia, a study conducted by Indonesia Internet Service Provider Association found that the penetration number of internet users reached approximately 143 million, meaning that 54.68% of the Indonesian population had access to the internet.

Internet usage has benefits, but its negative effects have also been a subject of discussion, as well as the threats it may cause. One threat that has spurred countries to closer investigation of internet use (Cheng & Li, 2014) and pushed the Indonesian government to create national guidelines is the threat of IA, a form of behavioral addiction that is subject to emerging research (Kemenkes, 2017). One subgroup of IA that has become a focus of research is gaming disorder. Although it is grouped under section III, requiring further study, in the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5), its definition is included in the International Classification of Diseases (ICD-11) as gaming disorder, due to its addictive nature, which imitates substance addiction (American Psychological Association, 2013; World Health Organization, 2017). Thus, researchers and clinicians alike agree that IA is important to take note of, especially during adolescence because people at this developmental stage often engage in risky internet usage that may have psychological and biological consequences (Karacic & Oreskovic, 2017).

In Indonesia, 75.5% of adolescents use the internet (Indonesia, 2017). A descriptive study of digital addiction in Indonesian adolescents found that their main motive for internet usage was maintaining communication using social media platforms. This motive may be that Indonesian adolescents use the internet as a medium to develop identity, where the desire to seek friends and peers may be given greater importance than interactions with family members. Adolescents tend to have multiple social media accounts, increasing the risk of exposure and access to the internet, thus promoting addiction (Faidah, Wibawa, & Ekawati, 2018). This indicates the large threat that the negative risks of internet pose to Indonesian adolescents, most of whom use the internet and are a sizable portion of Indonesian internet users all told, whose habits may threaten addiction.

In reaction to this potential threat, numerous studies have been conducted to develop a measurement instrument to detect and diagnose IA. The first instrument developed to assess internet addiction is the Internet Addiction Test (IAT), developed by Young (Young, 2011). In addition to the IAT, other instruments have been developed to diagnose internet addiction and are in widespread use in epidemiology studies,

including the Compulsive Internet Use Scale/CIUS (Meerkerk, Eijnden, Vermulst, & Garretsen, 2009), Chen's IA Scale/CIAS (Chen, Weng, Su, Wu, & Yang, 2003), and the Problematic Internet Use Questionnaire/PIUQ (Thatcher & Goolam, 2005). A meta-analysis study by Cheng and Li found that IA has reached 6% globally (Cheng & Li, 2014). Unfortunately, no extensive epidemiological study has been published in Indonesia.

The absence of prevalence data on IA in Indonesia is caused by the absence of a standardized instrument developed for Indonesian conditions to measure IA. Despite the existence of various means of measurement, no instrument has been found that is well translated and tested in Indonesia and has good validity and reliability. This is a concerning issue, especially considering the constantly increasing number of internet users in Indonesia.

Young, a pioneer in the research field of IA, asserted that even though it should not be the only means of diagnosing IA, internet screening time (IST) can be considered to be related to IA. People with IA are known to spend an average of >40 hours per week on the internet (Young, 2011). Based on that observation, this exploratory study measures the prevalence of adolescents with greater IST (>40 hours per week, roughly averaged to 6 hours per day) and factors associated with internet usage.

2. Methods

Participant. This study uses cross-sectional design to assess 200 junior and high school students from two schools in Jakarta, Indonesia, which were a junior high school (SMP Al Jihad) and a senior high school (SMA 27). Participants were selected randomly from these two schools. Selected participants were asked to complete an informed consent form and a self-report questionnaire. Participants who experienced severe mental illness were excluded from this study.

Measures. In order to evaluate subject's IST, each participant was asked to complete a self-report questionnaire which included, aside for IST, demographic data, main internet access, internet cost per months, sleeping time, body mass index (BMI), type of activities done through internet, and insight into subjects' own internet usage. According to the literature, internet addicts exhibit longer ISTs, reaching as much as 40–80 hours per week (S Young, 1999). Another study also found that internet usage of more than 5 hours daily was associated with a 2.6 times greater risk of IA overuse compared to internet use of less than 2 hours per day (Boonvisudhi & Kuladee, 2017). Hence, we chose 6 hours per day as our cutoff for long duration of internet use. We divided duration of internet usage into two categories: short, defined as

durations below 6 hours, and long, defined as durations of over 6 hours.

Statistical Analysis. The collected data were analyzed using the SPSS version 23. Aside from descriptive analysis, bivariate analysis was performed to evaluate relationship between IST and several factors. Furthermore, multivariate analysis was performed including several factors which were fulfilled the criteria.

3. Results

Demographics of subjects. The subjects were 101 junior high school students and 99 senior high school students (table 1). Majority of participants was female (44.5% male, 55.5% female) with the average age of subjects being 14.5±1.33 years. Vast majority of this study participants were living with their parents, only 3 participants were living with their relatives and none of the subjects were living separately with their family or alone. Around 54.5% of subjects used cellular data as their main source of internet access and mostly spent > 250.000 IDR for internet per month although most of the subjects received < 250.000 IDR per month for their

pocket money. Most of the participants lacked sleeping time and 18.5% of them were overweight.

The subjects' internet use behavior is displayed in Table 2. A total of 68 (34%) subjects reported using the internet more than 6 hours per day. The internet activities conducted included playing online games (77%), using social media (65%), and recreational use (55.5%). Among the groups that played online games, most played on either a PC or a smartphone (84%), and the remainder played on both devices (16%). Most of the participants (69%) perceived that they might suffer from internet addiction.

Relationship of longer IST to demographic and internet behavioral factors. Furthermore, analysis of a relationship between IST and others variable were conducted (table 3). It was shown that gender was not related to longer IST, but higher level of education was associated significantly with longer screen time. Having a larger amount of monthly pocket money (250.000 IDR, or about \$17) was also found to be correlated with longer IST

Table 1. Demographic Data of Subjects (n = 200)

Variables		Amount	Percentage
Gender	Male	89	44.5%
	Female	111	55.5%
Level of education	Junior high	101	50.5%
	Senior high	99	49.5%
Living with	Parents	197	98.5%
	Relatives	3	1.5%
Pocket money/month	<Rp 250,000	112	56%
	>Rp 250,000	88	44%
Main internet access	Cellular data	109	54.5%
	Others	91	45.5%
Internet cost/month	<Rp 250,000	54	27%
	>Rp 250,000	146	73%
Sleeping time	Enough	86	43%
	Lacking	114	57%
Body mass index	Overweight	37	18.5%
	Normal or underweight	163	81.5%

Table 2. Internet Usage Behavior

Variables		Percentage
Duration of internet use	<6 hours	34%
	>6 hours	66%
Social media use	Yes	65%
	No	35%
Online gameplay	Yes	77%
	No	23%
Recreational use	Yes	55.5%
	No	44.5%
Gameplay devices	PC or smartphone	84%
	PC and smartphone	16%
Perception of internet addiction	Yes	69%
	No	31%

Table 3. Relationship between Longer IST and Related Factors

Variable		Percentage	Odds ratio (CI 95%)	p-value
Gender	Male	44.5%	0.744	>0.05
	Female	55.5%	(0.411–1.347)	
Level of education	Senior high	49.5%	20.043	<0.001*
	Junior high	50.5%	(8.433–47.638)	
Pocket money	>Rp 250,000	44%	4.921	<0.001*
	<Rp 250,000	56%	(2.491–9.723)	
Main internet access	Cellular data package	54.5%	0.831	>0.05
	Others	45.5%	(0.462–1.495)	
Monthly internet cost	>Rp 250,000	73%	2.854	<0.001
	<Rp 250,000	27%	(1.496–5.444)	
Social media use	Yes	65%	9.725	<0.001
	No	35%	(3.935–24.037)	
Online gameplay	Yes	77%	0.589 (0.3-1.157)	>0.05
	No	23%		
Recreational use	Yes	55.5%	8.645	<0.001
	No	44.5%	(4.059–18.412)	
Gameplay device	PC and smartphone	16%	3.549	<0.001
	PC or smartphone	84%	(1.627–7.743)	
Perception of internet addiction	Yes	69%	3.263	<0.001
	No	31%	(1.565–6.8)	
Amount of sleeping time	Enough	43%	1.12	>0.05
	Less	57%	(0.619–2.026)	
Body mass index	Overweight	18.5%	3.73	<0.001
			(1.781–7.816)	

Table 4. Logistic regression between IST and related factor.

No	Factor/variable	Odds ratio (CI 95%)	p-value
1	Gender	0.912 (0.334–2.488)	0.857
2	Level of education	6.791 (1.486–31.026)	0.013
3	Pocket money	2.194 (0.922–5.221)	0.76
4	Main internet access	0.524 (0.221–1.240)	0.141
5	Monthly internet cost	1.445 (0.586–3.561)	0.424
6	Social media use	1.478 (0.344–6.360)	0.600
7	Online gameplay	0.693 (0.273–1.759)	0.441
8	Recreational use	1.435 (0.431–4.772)	0.556
9	Gameplay device	1.568 (0.431–4.772)	0.428
10	Perception of IA	3.240 (1.236–8.497)	0.017
11	Amount of sleeping time	1.187 (1.103–7.354)	0.669
12	Body mass index	2.848 (1.103–7.354)	0.031

Beyond demographic factors, behavioral factors for internet use were also found to correlate with longer IST, namely, higher monthly internet cost, using internet mainly for social media, and recreational internet use. Even so, internet access was not related duration of use. Similarly, using the internet to play games was not found to be related to screen time in this study; nevertheless, playing games on two devices (PCs and smartphones) was found to be related. In addition, longer IST was also related to the subjects' insight.

Furthermore, beside univariate analysis, multivariate analysis was performed to evaluate relationship between IST and all other factors. From the twelve factors included for multivariate analysis, educational level ($p = 0.013$), perception of internet addiction ($p = 0.017$), and BMI ($p = 0.031$) significantly correlated with IST as shown in Table 4. Higher educational level was found to be associated with longer IST with OR 6.791 (CI 95% 1,486–31,026). Corresponding to educational levels, positive perception of IA (subjects think that they might have internet addiction) was linked to higher IST with OR 3.240 (CI 95% 1.236–8.497). Furthermore, being overweight also related to higher IST with OR 2.848 (CI 95% 1.103–7.354).

4. Discussion

The prevalence of longer IST among our sample of adolescents in Jakarta was found to be quite high (34%). Although this result cannot be used to represent IA, subjects who experience IA do have longer IST (Young, 2011). Several studies showed that increased IST could lead to internet addiction and internet addiction itself could increase IST. A study conducted in Turkey (Sasmaz, 2013) showed that internet addiction group tend to have higher duration of internet use/day dan connected to internet in longer durations compared to non-internet addiction group. Increase in exposure to the internet could made a person more vulnerable to experience internet addiction. In addition, increase of duration spent online could be defined as one of the symptoms of internet addiction: tolerance. Although not included as a diagnostic criteria for gaming disorder in ICD-11, tolerance is still closely related to internet addiction. Prolonged internet use could increase the sensory threshold of an individual to get the same level of excitement due to decreasing number of dopamine transporters and receptors. Therefore, in order to get same excitement, time spent on playing internet must be increased. This behavior, if performed repeatedly, could create an addiction loop and lead a person to internet addiction. Thus, our study indicates the possibility that the proportion of IA in Indonesia, specifically in our study population, is quite high. On the other hand, due to the lack of verified and reliable instruments for the diagnosis of IA in Indonesia, it is impossible to obtain

precise data on IA in Indonesian populations. Thus, the development and adaptation of diagnostic tools to detect IA for the Indonesian context is crucial.

In this study, we analyzed the relationships between demographic factors, internet behavior, and biological factors. Among demographic factors, gender was found to be unrelated to longer IST. Kuss et al. conducted a similar study on IA and other risk factors and obtained similar results to our findings, wherein gender was found to be unrelated to IA (Kuss, van Rooij, Shorter, Griffiths, & van de Mheen, 2013). However, other studies have shown that IA and IST were related with gender (Dufuor, 2016; Sasmaz, 2013). These studies have suggested that boys tend to spend greater time online and thus easier to suffer internet addiction compared to girls. This contradictory result could be explained by the different characteristics of internet use between each gender. Female adolescents mostly use internet for social media while males mostly use the internet for playing games. Social media is preferred by female adolescents because it allows them to present their ideal image to others and provides narcissistic gratification when their posts are appreciated by friends or others. Nevertheless, male adolescents mostly used the internet for playing online games because online games usually contain competition and challenges which could increase their self-esteem through finishing certain task/quest or winning a game. In addition, certain games, e.g. Massively Multiplayer Role-Playing Games (MMORG), Multiplayer Online Battle Arena (MOBA), enables them to select an avatar. In these types of games, adolescent might project their desirable self-image in their avatar which could increase their self-esteem. Both genders, through differing paths, were equally at risk of internet addiction. Therefore, gender was not consistently related to internet addiction.

We found that level of education correlated with longer IST. Previous studies have shown similar results and found a relationship between level of education and IST. A study conducted in China comparing senior high school students to junior high school students, indicated greater risk of internet addiction among high school students. Wang et al. stated that stress level was associated with IA (Wang et al., 2011). The greater demands on high school students results in higher stress levels, which causes them to be more vulnerable towards pressures that induce longer IST. In addition, increasing ages and level of education, is related to more lenient parental supervision. Lack of parental supervision, especially towards internet related behavior, enables internet addiction. Due to immaturity of the adolescent brain, adolescences are at risk to experience internet addiction. Hence, parental supervision towards duration, activity, and content of internet use in adolescence is vital in preventing internet addiction.

Other demographic factors, such as more pocket money and greater amount of money spent on the internet, were not found to correlate with IST in logistic regression analysis. In our study, greater amount of pockets money was related with longer IST in bivariate analysis, but not in multivariate analysis. This finding contradicts the previous literature. For example, a study conducted by Lee et al. determined that low socioeconomic status was related to IA (Lee & McKenzie, 2015). Lee argued that this is because low socioeconomic status can lead to other conditions, such as depression and anxiety. These psychiatric problems have been shown to be associated with IA (Ko, Yen, Chen, Yeh, & Yen, 2009). This contradictory result in our study may be due to greater pockets money provided towards senior high school students compared to junior high school students. Therefore, in this study, pocket money was not the main risk of longer IST but only a confounding factor. In conclusion, further studies must be conducted in order to crystallize the role of socioeconomic status in IST and IA.

Greater amount of money spent for internet activity, similar with pocket money, was found to be related with longer IST through bivariate analysis but not in multivariate analysis. This result was congruent with the study performed by Rho et al., where a group with a gaming disorder spent a significantly greater amount of money on gaming relative to the group without a disorder (Rho et al., 2017). Greater amount of money spent on internet behavior, especially gaming (for buying items in games or buying voucher for games), and its relation to IA could be justified by categorizing increasing amounts of money as tolerance in conjunction with increasing time spent online. Money was used to purchase items or open premium features in online games. In gaming disorder, tolerance is not only associated with increasing amounts of time spent online, but also with increasing challenges or upgrading their equipment for playing games (Griffith, 2014). Therefore, players usually spent their money to upgrade their equipment. Upgrading could be performed offline (i.e. buying better computer or hardware) or online (i.e. upgrading their avatar by purchase exclusive item online). In addition, some features/levels also could only be played if they spend a certain amount of money. These exclusive features give them new challenges which would provide them with the same or greater excitement compared to previous levels. In addition, greater amounts of money spent for internet activity also could be linked to greater IST because increasing time would consume greater phone credit/internet quota. However, through multivariate analysis, our study showed that monthly internet costs were not related with greater IST. This finding suggests that amount of money spent for internet activity might be a mediating factor for IST instead. Accordingly, further studies must be conducted

in order to evaluate relationship between IST and money spent online.

Main internet access was not found to be related with longer IST. This finding corresponds with another study (Sasmaz, 2013) which showed that main internet access through cellular data was unrelated to IA. Nowadays, most adolescents in Indonesia have personal smartphones with cellular data packages, enabling them to stay connected. However, staying connected to the Internet is not the most important risk factor in IA. Staying connected was not equal to playing internet. Therefore, having cellular package data was not directly related to IA and longer IST.

In this study the purpose of internet use, specifically using the internet for non-working and/or learning process (social media and recreational use), was related to IA. Using the internet for social media was also linked to greater IST. As stated above, social media and online gameplay was related with IA through euphoric experiences they provide. This is also in line with Kuss et al.'s work, where use of the internet for social media (Twitter and other social media) and entertainment (YouTube) were related to IA (Kuss et al., 2013). In addition, recreational use, such as using the internet to listen to music or watching videos (e.g. in YouTube) was also linked to longer IST. Using the internet for amusement purposes was not a problematic issue, but when uncontrolled, recreational use of the internet could lead to IA. Euphoric experiences, in the neurophysiological model of internet addiction, plays a major role as it leads to repeated use (Young, 2011). Persistence of repeated and continuous internet use may establish an addiction loop, wherein an individual no longer uses the internet simply for amusement, but rather requires the internet to alleviate negative emotions that emerge when they stop using it. Thus, use of the internet for recreational or amusement purposes, alongside gaming and social media use, plays a major role in IA.

One finding in our study that was not similar to the previous literatures was that no relation was found between playing online games and longer IST. Kuss et al. found that playing online games was related to IA (Kuss et al., 2013). Other scholars have concluded that games, especially massively multiplayer online role-playing games (MMORPG), are highly addictive (Müller et al., 2014). In MMORPG, players could create several roles that suitable for them. This phenomenon made players might project their desirable image unto the avatar. In addition, MMORPG can be played in real time and players are able to interact (chat, compete, battle) with others player, creating an illusion of social interaction. Finally, MMORPG players are able to fully immerse themselves within the game, leading to IA. However, the absence of relationship between IST and

playing online games could be explained by the lack of inclusion criteria for the type of games played.

In relation to online gaming, even though no relationship was found between IST and playing online games, the group that played games with both PCs and smartphones had a tendency to have longer ISTs. The idea of tolerance predicts this: people with a gaming disorder have more equipment for playing games than groups without a disorder (Canan et al., 2013; Müller, Beutel, Egloff, & Wölfling, 2014). Additionally, players who played games through several gadgets were more likely to have greater IST and IA because it enables players to play different type of games in different devices. Greater variation of games and devices made player less likely feel bored and made them continue their gaming behavior.

Subjects' insight was related to longer IST. The group that featured longer ISTs perceived themselves as addicted to the internet. Thus, it can be concluded that insight in this group is quite good. This phenomenon was very important, especially in order to screen for IA. Nowadays, there are a multitude of self-report questionnaires to detect IA (e.g internet addiction test/IAT, Chen Internet Addiction scale/CIAS, Korean Internet Addiction Scale/KIAS). Because these questionnaires are of a self-reporting nature, insight of the subjects plays an important role. Our findings showed that adolescents who had IA had good insight. Therefore, self-reporting questionnaire results might reflect the true condition of an individual and produce more reliable results. However, as an early detection tool, results from these self-report questionnaires must be evaluated by clinicians through interviews in order to create a definite diagnosis.

Aside from internet addiction, high IST could lead to other problems, i.e. physical and psychological problems. Biological factors were also analyzed in this study, specifically, sleeping time and BMI. This study found no relationship between longer IST and sleeping time which was contradictory to other studies (Lin, 2019). A study in Taiwan by Lin et al showed that the total score of IAT was connected to unsatisfactory quality of sleep (subjective and objective sleep quality). However, after multivariate analysis, duration of sleep was also not found to be significantly associated with IA (Lin, 2019). Hence results from our study does not differ entirely with other studies. As stated by Lin et al, self-reported sleep parameters, included duration of sleep, although frequently used, lacked objectivity and accuracy which could introduce potential recall bias. Further studies using objective and accurate parameters are required to further evaluate the correlation between sleep and IA.

Lastly, our study showed that adolescents with longer ISTs are of a higher risk of having unhealthy BMIs. In

accordance with a study by Canan et al., adolescents with high IAT scores and longer screen times were at risk of having higher BMI (Canan et al., 2013). A study in Turkey also found a significant correlation between BMI and IA ($p < 0.001$), wherein adolescents with obesity had higher rates of IA than non-obese subjects (Bozkurt, Özer, Şahin, & Sönmezgöz, 2018). Internet related behavior could be categorized as a sedentary behavior, which is highly connected to being overweight and obese. Adolescents who experience IA tend to have more sedentary lifestyles compared to adolescents without IA. This correlation urges clinicians to be more aware of physical health problems related to IA, one of which is obesity.

5. Conclusion

The prevalence of longer screen times among adolescents in Jakarta is quite high. Internet screen time is related to a multitude of factors and in itself portrays a vulnerability towards IA. A valid and reliable diagnostic tool for the Indonesian context is needed to properly diagnose IA in a way that can lead to a more precise and accurate calculation of the prevalence of IA in Indonesia. Further research is needed on various factors related to IA, especially investigation of variables that have been found to be related to longer IST, such as higher BMI and level of education. Further education on IA should be given at an early stage to high-risk adolescents as part of a national policy for schools and homes.

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