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EFFECTS OF ADOLESCENT SMARTPHONE ADDICTION ON CYBERSEXUAL DELINQUENCY

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We analyzed the relationship between smartphone addiction and cybersexual delinquency in a sample of Korean adolescents; further, we specifically delineated and analyzed the risk factors for smartphone addiction. Statistical analyses were performed based on the responses to a survey conducted with 1,020 high school students across South Korea. Results showed that adolescent smartphone addiction had a significantly positive effect on the likelihood of accessing cybersexual content and the frequency of engaging in cyber-verbal violence. Furthermore, the accessing of cybersexual content had a significantly positive effect on the frequency of engaging in cyber-verbal violence, and the frequency of engaging in cyber-verbal violence had a significantly positive effect on the development of cybersexual delinquency. Specifically, because adolescents are still in the process of developing socially, they are vulnerable to smartphone addiction; therefore, there is a need for appropriate interventions to be developed for use with this population.

Keywords: adolescents, smartphone addiction, cybersexual content, cyber-verbal violence, cybersexual delinquency.

Alongside the rapid increase in smartphone use and the accompanying phenomenon of strong and pervasive smartphone addiction, in the past 10 years

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there has been a continuing increase in studies on smartphone addiction (Chiu, 2014). The focus in the majority of these studies has been on identifying the factors associated with addiction (Chiu, 2014), which researchers have identified as smartphone usage behavior (e.g., Hong, Chiu, & Huang, 2012; Walsh, White, Cox, & Young, 2011), home environment (e.g., Toda, Lin, Meghraoui, & Stein, 2008), and psychological (e.g., Chiu, 2014) factors.

Because adolescents are still in the process of developing psychologically and have less self-control compared to adults, the seriousness of the side effects of smartphone addiction is of greater concern for the former population (Hyun, Park, & Ha, 2013). In particular, smartphone addiction is an important factor that inhibits adolescents' social development (Kim, 2013). Furthermore, unlike traditional cellular phones, smartphones have various entertainment functions that are extremely user-friendly and involve using the Internet and applications, making it easy for adolescents to access games, social networking sites (SNS), and sexual content. Therefore, addiction to these types of content can have serious implications, such as cybersexual delinquency (Kim, 2013).

Although adolescent, versus adult, smartphone addiction can have more serious side effects relating to cybersexual delinquency (Hyun, Park, & Ha, 2013), there have been no direct studies into this relationship. In previous studies conducted with adolescent samples, researchers have reported negative effects of smartphone addiction on psychological health (e.g., Choi, Lee, & Ha, 2012), school life (e.g., Choi et al., 2012), social interaction (e.g., Kim, 2013), and social adaptation (e.g., Kim, 2013), which act as the causes of behavioral problems (e.g., Park, Oh, Jin, Baek, & Chung, 2015). These researchers have analyzed only the relationship between adolescent smartphone addiction and the environment of adolescents, and they have claimed that these environmental problems are just potential causes of adolescent problematic behaviors. However, the functions and features of smartphones mean that adolescent smartphone addiction can have side effects (e.g., cybersexual content, cyber-verbal violence), and this type of addiction can lead to cybersexual delinquency (Landau, 2009; Lee & Jeong, 2014; Weiss & Samenow, 2010).

Therefore, we analyzed the relationship between adolescent smartphone addiction and cybersexual delinquency. Specifically, we collected empirical data on the effects of adolescent smartphone addiction on the accessing of cybersexual content, frequency of engaging in verbal violence, and likelihood of developing cybersexual delinquency, with the aim of providing practical solutions that could be implemented by families to counter this type of addiction.

Theoretical Background and Development of Hypotheses

Smartphone Addiction

Addiction can be defined as a state in which one cannot tolerate being unable to

continually use a specific stimulus, and this can apply to Internet or smartphone usage (Kwon et al., 2013). *Smartphone addiction* can cause users to become deeply engrossed in the virtual world, leading to problems such as cybersexual crime in real life (Young, 2007). Smartphone addiction does not refer to the use of smartphones for practical purposes in one's daily life but, rather, the abusive usage of smartphones to the point where it affects one's daily life, and where inability to access one's smartphone causes psychological side effects, such as depression and stress. Furthermore, smartphone addiction can reduce self-control and lead to continuous seeking of provocative content (Lee & Jeong, 2014), which can manifest as forms of aggression, such as cybersexual delinquency (Nam, 2002; Weiss & Samenow, 2010). Therefore, in this study, we examined the relationship between smartphone addiction and cybersexual delinquency.

Smartphone Addiction and the Accessing of Cybersexual Content

Smartphone addiction in adolescents results in the constant seeking of sexual content, that is, pornography; therefore, it greatly increases the chances of accessing sexual content. Smartphones allow easy access to the Internet and to various applications at any time and in any place, which makes it convenient for adolescents to access sexual content. Adolescents, in particular, have high levels of sexual curiosity; therefore, they are likely to seek out this type of sexual content (Nam, 2002). For example, Nam (2002) indicated that adolescents who were addicted to the Internet were highly likely to be addicted to cybersexual content. Landau (2009) reported that 54% of surveyed adolescents using the SNS MySpace, had posted or searched for content on topics such as sex, drugs, and violence. In summary, adolescents with a strong addiction to smartphones have been found to seek sensational content, and to typically favor violent or sexual content. Therefore, we proposed the following hypothesis:

Hypothesis 1: Adolescent smartphone addiction will have a significantly positive effect on the accessing of cybersexual content.

Smartphone Addiction and Cyber-verbal Violence

The advent of the Internet and smartphones has led to the emergence of *cyber-verbal violence* (Ayas & Deniz, 2014), which occurs when an individual or group of individuals verbally harass another person by utilizing communication technologies, such as email, cell phones, and smartphones (Arıcak, 2009). Cyber-verbal violence is a relevant facet of smartphone addiction, in that the latter causes the individual to concentrate on the virtual world (Young, 2007), resulting in difficulties with forming relationships in the real world and, thus, decreased social support (Nie & Erbring, 2000). In this context, Lee (2006) suggested that adolescent Internet addiction has a high likelihood of leading to adolescent delinquency. Specifically, because adolescents use the Internet for long periods of time, there is a high chance of them engaging in online

verbal violence (Lee, 2006). Furthermore, Lee and Jeong (2014) showed that more time spent on smartphones was positively associated with cyber-verbal violence among adolescents. Internet and cell phone addiction are major factors that increase the possibility of adolescents behaving in ways associated with cyber-verbal violence. Moreover, because smartphones have both Internet and cell phone functions and have various applications that enable communication, there is a high likelihood of smartphone addiction leading to cyber-verbal violence. Therefore, we proposed the following hypothesis:

Hypothesis 2: Adolescent smartphone addiction will have a significantly positive effect on cyber-verbal violence.

Smartphone Addiction and Cybersexual Delinquency

Addiction to mass media, which includes smartphone addiction, requires the individual to have undergone online experiences that can be used to predict whether they are likely to develop cybersexual problems (Jeong, Kim, Yum, & Hwang, 2016). Koo and Kim (2007), who targeted middle and high school students, showed that there was a strong positive correlation between cybersexual addiction and sexual assault in the real world. Nam (2002) revealed that adolescent Internet addiction facilitates cybersexual addiction, which can possibly lead to cybersexual delinquency. Furthermore, Weiss and Samenow (2010) highlighted the fact that chatting on SNS through smartphones can trigger sexual problems (obscenity, sexual dialogue, and other sexual acts). Therefore, addiction to a smartphone, the Internet, or a cellular phone triggers impulses to seek more sexual experiences, and can affect the individual's emotions, behavioral patterns, and values; this, in turn, increases the likelihood of developing cybersexual delinquency. Therefore, we proposed the following hypothesis:

Hypothesis 3: Adolescent smartphone addiction will have a significantly positive effect on cybersexual delinquency.

Accessing of Cybersexual Content in Relation to Cyber-Verbal Violence and Cybersexual Delinquency

Cybersexual content includes sexual games, X-rated images and videos, and sexual chats. Unlike in the past, sexual content is now easy to access and one can do so anonymously; moreover, the availability of enhanced multimedia functions maximizes sexual arousal (Nam & Hong, 2012). Such cybersexual content can serve as an important factor that stimulates various types of online violence, such as cyber-verbal violence or cybersexual delinquency. Adolescents' cyber violence and related behaviors in the context of the Internet and technology that involve causing harm to others can be explained using Bandura's (1977) social learning theory, in which it is suggested that an individual can learn violent behaviors through social environmental factors, namely, one's family, peers,

school, and mass and social media (Lee & Jeong, 2014). From the perspective of social learning theory, cyber violence can be the result of observing or mimicking other people's behaviors and situations (Bandura, 1977). Lee and Jeong (2014) surveyed adolescents who were exposed to provocative sexual environments, that is, environments wherein there are numerous opportunities to view cybersexual content, and found that those with greater exposure to these environments learned more about cyber violence behaviors, leading them to be more likely to become cybersexual offenders. Nam and Hong (2012) analyzed the relationship between adolescent exposure to sexual content on the Internet and inappropriate sexual behaviors, basing their analysis on social learning theory. The results revealed that such exposure not only reduced sexual self-control but also increased verbal violence and was a major predictor of sexual delinquency. Furthermore, Lee and Jeong suggested that adolescents seeking sexual stimulation are more likely to become offenders who perform acts of cyber-verbal violence and sexual delinquency. Within these contexts, a strong positive relationship can be predicted between accessing of cybersexual content, and engaging in both cyber-verbal violence and cybersexual delinquency. From the perspective of social learning theory, there is a strong possibility that exposure to provocative cybersexual content will lead to cybersexual delinquency. Therefore, we proposed the following hypotheses:

Hypothesis 4: Adolescents' accessing of cybersexual content will have a significantly positive effect on their engaging in cyber-verbal violence.

Hypothesis 5: Adolescents' accessing of cybersexual content will have a significantly positive effect on their engaging in cybersexual delinquency.

Hypothesis 6: Adolescents' engagement in cyber-verbal violence will have a significantly positive effect on their engaging in cybersexual delinquency.

Method

Measures

We assessed smartphone addiction using four of the 12 items developed by Kwon et al. (2013) for measuring smartphone addiction related to the Internet, substances, or drugs: "I cannot stand being unable to use my smartphone," "I always fail when trying to reduce the time spent on my smartphone," "I feel like I have lost my connection the world if I cannot use my smartphone," and "I feel anxious when I do not have my smartphone."

To measure the accessing of cybersexual content, we used four of the 10 items developed by Nam and Hong (2012) for assessing addiction to online sexual content: "It is fun to watch sexual content on my smartphone," "Watching sexual content on my smartphone relieves my sexual desire," "I find myself sexually aroused when I watch sexual content on my smartphone," and "Watching sexual content on my smartphone allows me to escape from academic stress."

To assess cyber-verbal violence, we used four of the 10 items developed by Lee (2011) to assess cyber-verbal violence in the form of verbal aggression: "I have used foul language with other people by using my smartphone," "I have personally attacked others by revealing their weaknesses through my smartphone," "I have left comments mocking and degrading other people by using my smartphone," and "I have left comments criticizing others by using my smartphone."

Finally, to measure cybersexual delinquency, we used four of the 12 items developed by Koo and Kim (2007) to measure sexual violence: "I have shamed others with obscenities by using my smartphone," "I have shown sexual videos or pictures to others without their request with my smartphone," "I have demanded sexual conversation with others using my smartphone," and "I have displayed sexual acts to others without their request with my smartphone."

Responses to all items were made using a 5-point Likert scale (smartphone addiction/accessing of cybersexual content, from 1 = *never* to 5 = *very likely*; cyber-verbal violence/cybersexual delinquency, from 1 = *never* to 5 = *very frequently*). In our analysis, we summed the measurement values for each variable and used the average.

Participants and Data Collection

We conducted the survey from September 3–13, 2015. The respondents lived all over South Korea and were public and private high school students in Grades 10 to 12. We ensured that the distribution of the locations in which the students lived, school grades, and school types were evenly distributed. Before administering the survey, we distributed letters containing details about the survey content and study objective, and requested cooperation from the relevant sources/individuals. We distributed 1,200 copies of the survey among 59 schools, and 1,072 (89.3%) students from 40 schools agreed to participate. We excluded the data from 52 survey forms because of incomplete responses; therefore, the data from 1,020 (95.1%) students were used for the statistical analyses.

The proportion of male respondents (51.6%) was slightly greater than that of female respondents (48.4%). The proportion of grade levels was as follows: 34.5% were 10th graders; 32.2% were 11th graders; and 33.3% were 12th graders. Most respondents were students at general high schools (61.2%), with the rest being at specialized high schools (29.8%), autonomous private and public high schools (5.3%), and special-purpose high schools (3.7%). The proportion of students who lived in the major cities of Seoul, Gyeonggi, and Incheon was 31.4%, and 68.6% lived in other metropolitan cities and provincial areas.

Results

Reliability and Validity Analysis

We assessed the convergent validity, discriminant validity, and reliability of the variables. Table 1 shows the factor loadings and Cronbach's alphas obtained from the confirmatory factor analysis of the measurement model, which was performed using LISREL version 9.1. Table 2 shows the correlation coefficients between each of the variables.

The factor loadings (λ) for the measurement of each concept (Table 1) were all significant and very large. Furthermore, in the case of the composite reliability, the loadings of all the concepts were greater than the threshold value of .60. The average variance extracted (AVE) values were all greater than the threshold value of .50. Further, Cronbach's α was greater than the minimum accepted value of .70. Thus, the measured values for each concept satisfied the convergent validity criteria.

Table 1. *Analysis of Results of Measurement Model*

Variables	Items	Factor loading (λ)*	*t*	R^2	CR	AVE	Cronbach's α
Smartphone addiction	1	.770	27.431	.593	.847	.584	.843
	2	.619	20.612	.384			
	3	.828	30.337	.686			
	4	.821	29.983	.674			
Accessing of cybersexual content	1	.864	34.246	.746	.92	.743	.880
	2	.933	38.922	.870			
	3	.926	38.429	.857			
	4	.707	25.499	.499			
Cyber-verbal violence	1	.668	23.451	.447	.894	.681	.916
	2	.836	32.200	.700			
	3	.924	37.766	.854			
	4	.851	33.054	.724			
Cybersexual delinquency	1	.872	34.791	.760	.952	.832	.950
	2	.906	37.282	.820			
	3	.932	39.220	.870			
	4	.938	39.638	.880			

Note. * Standardized estimated values. CR = composite reliability, AVE = average variance extracted.

Table 2. *Correlation Coefficients Among the Study Concepts (Φ Matrix)*

Variables	1	2	3	4
1. Smartphone addiction	.764			
2. Accessing of cybersexual content	.319	.862		
	(10.117)			
3. Cyber-verbal violence	.365	.482	.825	
	(11.763)	(18.269)		
4. Cybersexual delinquency	.281	.382	.567	.912
	(8.783)	(13.448)	(24.277)	

Note. Values in parentheses are *t* values, and diagonal values are average variance extracted square root values.

We assessed the measures' discriminant validity using the method recommended by Anderson and Gerbing (1988). There was a significant difference (216.41, $\Delta df = 12$) between the chi-square (χ^2) values of the concepts of the constrained model (959.87, $df = 110$, $p < .001$)—in which the correlation coefficient of all the concepts was limited to 1.0—and the unconstrained model (743.46, $df = 98$, $p < .001$). The AVE was calculated using the testing method proposed by Fornell and Larcker (1981). A comparison between the square root value of the AVE and the correlation coefficient values of each concept (see Table 2) revealed that the AVE square root value for all the concepts was greater than the correlation coefficients between the relevant concepts and other concepts. On the basis of these results, we evaluated the measurement values for the concepts included in the research model and found that they had satisfactory discriminant validity.

Hypotheses Testing

Figure 1 shows the structural model utilized in parameter estimation, and Table 3 shows the test results for the major estimation and hypotheses of the models.

As shown in Table 3, the goodness of fit for the structural model with estimation of path coefficients was above the threshold value; therefore, it was considered satisfactory. The significance test for each estimation revealed that smartphone addiction had a direct effect on the accessing of cybersexual content. Therefore, Hypotheses 1 and 2 were supported, which indicates that individuals with greater smartphone addiction are more likely to access cybersexual content and to engage in cyber-verbal violence.

On the other hand, the direct effect of smartphone addiction on cybersexual delinquency was nonsignificant; therefore, Hypothesis 3 was not supported. However, the estimate of .271 ($t = 9.671$), which indicated the indirect effect of smartphone use on cybersexual delinquency as mediated by the relationship between the likelihood of accessing of cybersexual content and the frequency of accessing cyber-verbal violence, was significant. The estimate for the total

Figure 1. *Analysis model.*

effect (.281, $t = 8.253$) was also significant. According to the steps proposed by Baron and Kenny (1986), the simple correlation coefficients between smartphone addiction and the likelihood of accessing of cybersexual content, and between the frequency of accessing cyber-verbal violence and cybersexual delinquency, were significant (see Table 2). However, the results of testing the structural model (see Table 3), including the likelihood of accessing of cybersexual content and frequency of employing cyber-verbal violence, showed that the direct effect of smartphone addiction on cybersexual delinquency was nonsignificant. Thus, the likelihood of accessing cybersexual content and frequency of accessing cyber-verbal violence mediated the relationship between smartphone addiction and cybersexual delinquency.

Table 3. *Analysis of Results of the Structural Model*

Relationship	Estimate			Hypothesis results
	Symbol	Maximum likelihood estimate	*t*	
Smartphone addiction → Accessing cybersexual content	γ11	0.319**	9.325	H1: Supported
Smartphone addiction → Cyber-verbal violence	γ21	0.235*	2.548	H2: Supported
Smartphone addiction → Cybersexual delinquency	γ31	0.010	-1.418	H3: Not supported
Accessing cybersexual content → Cyber-verbal violence	γ21	0.407**	11.596	H4: Supported
Accessing cybersexual content → Cybersexual delinquency	γ31	0.129	0.403	H5: Not supported
Cyber-verbal violence → Cybersexual delinquency	γ32	0.481**	12.460	H6: Supported
Fit statistics	Chi square = 743.461, $p < .001$, degrees of freedom = 98, normed fit index = .967, Tucker-Lewis index = .964, incremental fit index = .971, goodness-of-fit index = .916, root mean square residual = .061, root mean square error of approximation = .080			

Note. * $p < .05$, ** $p < .01$.

The accessing of cybersexual content had a direct effect on cyber-verbal violence; however, it did not have a direct effect on cybersexual delinquency. Therefore, Hypothesis 4 was supported but Hypothesis 5 was not. However, the indirect effect (estimate = .196, $t = 9.380$) and total effect (estimate = .325, $t = 9.783$) on cybersexual delinquency, as mediated by cyber-verbal violence, were both significant. This shows that cyber-verbal violence mediated the relationship between the accessing of cybersexual content and cybersexual delinquency.

Finally, cyber-verbal violence had a direct effect on cybersexual delinquency; therefore, Hypothesis 6 was supported.

Discussion

In order to identify the specific risk factors for smartphone addiction, we analyzed the relationship between adolescent smartphone addiction and cybersexual delinquency. As predicted, adolescent smartphone addiction was an important predictor of cybersexual delinquency, increasing the likelihood of accessing of cybersexual content and the frequency of employing cyber-verbal violence. These results support prior findings on the relationship between Internet addiction and the accessing of sexual content (e.g., Nam, 2002) and on the relationship between Internet and smartphone addiction and cyber-verbal violence (e.g., Lee & Jeong, 2014). Smartphone use can cause adolescents to become confused about the difference between the virtual world and reality (Young, 2007), which reduces self-control and increases the likelihood of engaging in cybersexual delinquency (Caplan, 2010). Therefore, smartphone use is an important factor in the accessing of cybersexual content and cyber-verbal violence.

Second, we found that the accessing of cybersexual content had an effect on cyber-verbal violence; thus, there is a strong possibility that the accessing of cybersexual content causes cybersexual delinquency. This supports conclusions drawn by the proponents of social learning theory (Bandura, 1977). Our results are also in line with those of previous scholars (e.g., Lee, 2011), who found that sensation-seeking motives that are fulfilled and stimulated by games and entertainment are factors that trigger engaging in verbal violence on cell phones. In the case of adolescents who are addicted to use of smartphones, these sensation-seeking motives may lead to more serious delinquency.

Third, smartphone addiction did not have a direct effect on cybersexual delinquency; rather, it had an indirect effect that was mediated by the accessing of cybersexual content and cyber-verbal violence. Furthermore, the accessing of cybersexual content also had an indirect effect on cybersexual delinquency, which was mediated by cyber-verbal violence. Thus, we can conclude that adolescents who are addicted to smartphones tend to seek sensational stimulation by accessing cybersexual content and by engaging in cyber-verbal violence. These experiences of stimulation increase the likelihood of adolescents engaging in sexual delinquency via their smartphone.

Our findings also have practical implications. First, in contemporary society, where the rate of smartphone use is growing rapidly, our empirical results indicate that smartphone addiction in adolescents, who are still in the process of growing physically, psychologically, and socially, has side effects that can result in negative consequences, such as cybersexual delinquency. Specifically,

because adolescents are still in the process of developing socially, they are more vulnerable than adults are to smartphone addiction; therefore, there is a need for appropriate interventions to prevent adolescents from becoming addicted to their smartphone. Given that smartphone addiction can increase the risk of cybersexual delinquency through engaging in cyber-verbal violence, parents should monitor their children consistently to ensure that they are not exposed to violent content on their smartphones and that they do not become addicted to the Internet. This could be by turning off Wi-Fi when the family is not using smartphones together, installing monitoring applications on their children's phones, or having smartphone-free periods of time for certain hours or days.

Our study also has some limitations. First, although we collected data from schools all over South Korea, we recruited the participants using convenience sampling; therefore, the results cannot be very widely generalized. In future research, the study sample should be selected by considering the number of students in each region of the country. Second, we analyzed the relationship between smartphone addiction and the accessing of cybersexual content and that between cyber-verbal violence and cybersexual delinquency. However, the negative side effects of smartphone use are not limited to cyber violence, but can also extend to social interactions, such as parent–child, teacher–student, and peer relationships, and can also have other negative effects, such as inhibiting social development. Therefore, because cybersexual delinquency can lead to the committing of sexual crimes in real life, the various side effects of smartphone use should be analyzed using more multidimensional methods.

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