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The relationship between the type of smartphone use and smartphone dependence of Korean adolescents: National survey study☆

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ABSTRACT

The purpose of this study is to verify the relationship between the type of smartphone use and smartphone dependence. We analyzed 2212 data of middle and high school students of the survey on internet addiction by the Korea Information Society Agency in 2016. We conducted a hierarchical multiple regression analysis to examine the effects of smartphone use for information seeking, entertainment seeking, gaming, mobile SNS, and mobile instant messenger on smartphone dependence after controlling smartphone usage frequency, and smartphone usage time. As a result of the analysis, the frequency of smartphone use of weekday ($p < 0.001$) and weekend ($p < 0.001$) was related to the dependence on smartphones. In addition, the amount of smartphone use for information seeking ($p < 0.01$), entertainment seeking ($p < 0.05$), and gaming ($p < 0.001$) were associated with the dependence of smartphone. The amount of smartphone use for mobile SNS and mobile instant messenger are not related to smartphone dependence. The results suggest that different strategies need for the psychological intervention of smartphone dependence according to the main type of smartphone use of adolescents.

1. Introduction

Due to the portability and connectivity of smartphones, the use of smartphones has quickly replaced the use of PC. In Asia, the overall prevalence of smartphone ownership among adolescents is 62% (Mak et al., 2014).

In particular, the penetration rate of smartphones in Asian countries such as South Korea, China, and Japan is > 80% of the people over 12 years old (Bae, Kim, & Sung, 2014). Smartphone offers positive functions in providing health information (Zhang & Ho, 2017a), educating professionals (Zhang et al., 2016), rehabilitation (Zhang, Yeo, & Ho, 2015) and monitoring of alcohol intake (Zhang, Ward, Ying, Pan, & Ho, 2015). In spite of the various positive functions by the use of smartphones, studies exploring predictors of smartphone dependence are increasing, due to the dysfunctional aspects (e.g., poor academic achievement, interpersonal problem) by excessive smartphone use. In particular, adolescents tend to be vulnerable to smartphone dependence because of their lack of self-control relative to adults (Choliz, 2012; Young, 2007).

The amount of smartphone use, which is one of the major predictors of smartphone dependence, is included in the prediction model of smartphone dependence in many studies. As the amount of smartphone usage increased, the dependence on smartphone increased (Augner & Hacker, 2012; Haug et al., 2015). Early studies focused on smartphone usage time, but based on recent studies, the frequency of smartphone usage has a greater impact on smartphone dependence than smartphone usage time (Lin et al., 2015). The frequency of smartphones usage is associated with habitual behavior and ultimately can lead to smartphone dependence (Lee, Chang, Lin, & Cheng, 2014) and internet addiction (Mak et al., 2014).

Recently, studies have focused on the type of smartphone usage (Bian & Leung, 2015). However, it is difficult to integrate the effect of smartphone usage type on smartphone dependence because researchers lack consensus on the classification of smartphone usage type. Information seeking is a representative type of smartphone use. Information seeking may include news search, web surfing, product/service information search. Especially, repeated use of smartphones to search for news or surf the web for no specific purpose can lead to automatic and unintentional behavioral habits, which can result in difficulties in controlling smartphone usage (Baturay & Toker, 2015). In a few studies, it has been shown that as the degree of smartphone use for information seeking increased, the dependence on smartphones increased (Bian & Leung, 2015). Previous some studies included learning activities by smartphone in information seeking type. However, it is necessary to classify smartphone usage related to learning independently rather than to include them in information seeking type

(Jeong, Kim, Yum, & Hwang, 2016). Unlike news search and web surfing, the use of smartphones related to learning is clearly aimed, and it can help to improve academic achievement.

The entertainment seeking through smartphones includes watching movies/vides/web toons/web novels, listing music. Using a smartphone to watch movies and listen to music can help to relieve mental and physical stress. However, listening to music and watching movies is a function provided by various entertainment media (e.g., radio, television), and when based on past communication researches, the amount of smartphone usage for entertainment seeking can have a significant impact on smartphone dependence (Horvath, 2004; Mcllwraith, 1998). Importantly, some studies included gaming in the type of entertainment seeking. However, researchers need to analyze the effects of type of entertainment seeking such as watching movies and listening music on smartphone dependence separately from the effects of gaming on smartphone dependence. It is in the same context that Google detailed categories separated game and entertainment seeking type (Ahn, Wijaya, & Esmero, 2014).

Gaming using smartphones is more rewarding than the types of entertainment seeking such as listening music or watching movies. Based on previous studies, online gaming is a key variable of internet addiction (Kardefelt-Winther, 2014; Tone, Zhao, & Yan, 2014). As the use of games by smartphone increases, smartphone dependence is likely to increase due to the strong compensation of enjoyment (Yang & Tung, 2007). Actually, recent studies have shown that smartphone dependence was related to the amount of gaming by smartphones (Jeong et al., 2016; Kim, Nam, Oh, & Kang, 2016). However, some researchers emphasize that the game through the smartphone may not be as immersive as the PC-based game, because screen size of the smartphone is smaller than that of the PC (Hou, Nam, Peng, & Lee, 2012). So, at the present, it is hard to say that gaming using smartphones has a direct impact on smartphone dependence.

In the use of smartphones, Social Network Services (SNS) is the most popular in recent years (Ku, Chu, & Tseng, 2013; Park, Cho, & Lee, 2014). SNS can be classified into web-based SNS (e.g., Face-book) and Instant Messenger-based SNS (e.g., face-book messenger, LINE, WhatsApp). The former is referred to as the SNS, and the latter as the Instant Messengers (IM).

SNS is used for maintaining and expanding social relations as well as self-exposure (Kim, 2015). The researchers in this field reported that the amount of SNS use was positively associated with internet addiction (Chen & Kim, 2013; Hong & Chiu, 2016; Wang, Gaskin, Wang, & Liu, 2016). In contrast, in recent years, research has also been reported the use of SNS help adolescents maintain friendship and increase social capital (Frison & Eggermont, 2015; Valkenburg & Peter, 2009). Currently, most of the Internet-based SNS run mobile versions, and mobile SNS provides portability and constant connectivity compared to internet-based SNS. In other words, mobile SNS has all characteristics of social networks, the internet and mobility (Ha, Kim, Libaque-Saenz, Chang, & Park, 2015). Although the use of mobile SNS is rapidly increasing due to these characteristics, the impact of mobile SNS use on smartphone dependence is rarely known (Jang, 2014). In a study by Salehan and Negahban (2013) of adults aged 18–30, the increase in mobile SNS usage was related to greater smartphone dependence.

Mobile instant messenger (MIM) is another form of SNS (Chou & Liu, 2016). KakaoTalk, the most famous MIM in South Korea, is used by > 90% of smartphone users (Jang, 2014). With MIM, people can send messages or files (e.g., pictures, videos) to friends and acquaintances in real time, and make sound and video calls. People can also chat on a one-to-one basis or in a group through a chat room. MIM is a mobile application that is optimized for instant communication and interaction with family and friends (Park et al., 2014).

Several studies have examined the relationship between MIM use and user satisfaction. In the study of Yao and Kim (2015), the motivation for using MIM was classified as entertainment/relaxation, convenience, and interaction with other people, and user satisfaction

increased, as these motivations increased. Park et al. (2014) found that the greater the self-disclosure, flow, and social presence by MIM usage, the higher the satisfaction of users. In addition, Jang (2014) confirmed that the use intensity of MIM increased social capital of adults between 20 and 30 years. On the other hand, little is known about the impact of MIM usage on smartphone dependence.

Therefore, this study examines how smartphone usage types (information seeking, entertainment seeking, game, mobile SNS, MIM) influence smartphone dependence after controlling smartphone use time and frequency. This study will provide basic data for establishing psychological interventions for smartphone dependence according to the main type of smartphone use.

2. Material and methods

2.1. Participants and survey

This study utilized the survey data of internet overdependence by National Information Society Agency (NIA) in 2016. The survey was conducted on 24,386 persons aged 3 to 70 years old in 17 areas nationwide (e.g., Seoul, Busan, Daegu, Daejeon, and Gwangju). In this study, 2212 youth data were used for the analysis. The sampling process is as follows. In the first step, systematic sampling method was used to select 17 survey districts. In the second stage, 10 households were selected by one sampling point. In the third stage, the interviewers visited the selected households to identify the residence status of the subjects, and replaced with neighboring households if the subject were not resident. Trained interviewers visited the selected households and filled in the responses of participants to the questionnaire. The ratio of male and female students was 51.4% (1138 people) for male students and 48.6% (1074 people) for female students. There were 772 middle school students (32.6%) and 1490 high school students (67.4%).

2.2. Measures

2.2.1. Smartphone usage time and smartphone usage frequency

Two items were used to measure the time of smartphone use (usage time of weekday, usage time of weekend). Each item was composed of 8 points scale (< 5 min $= 1$, > 5 min and < 10 min $= 2$, > 10 min and < 15 min $= 3$, > 15 min and < 20 min $= 4$, > 20 min to 25 min $= 5$, > 25 min and < 30 min $= 6$, > 30 min and < 1 h $= 7$, > 1 h $= 8$). The higher the total score, the greater the use time of smartphones, and the Cronbach Alpha was 0.92. Two items were used to measure the frequency of smartphone use (weekday usage frequency and weekend usage frequency). Each item consisted of 7 points (< 5 times $= 1$, > 5 times and < 10 times $= 2$, > 10 times and < 15 times $= 3$, > 15 times and < 20 times $= 4$, > 20 times and > 25 times $= 5$, > 25 times and > 30 times $= 6$, > 30 times $= 7$). The higher the total score, the greater the frequency of smartphone usage and the Cronbach Alpha was 0.90.

2.2.2. The types of smartphone use

The types of smartphone usage are classified into information seeking, entertainment seeking, games, MIM, and mobile SNS. Information seeking includes four items: news search, web surfing, product/service information search, and traffic/location information search. Entertainment seeking includes three items: movie/TV/video, music, and e-book/web-toon/web-novel. Seven-point scale was used to measure the degree of smartphone use for each type (ranged from never 1 to very frequently 7), and the higher the total score, the higher the degree of smartphone use for each type. Gaming, MIM, and mobile SNS usage were measured as one item (ranged from never 1 to frequently 7). The higher the total score, the higher the degree of smartphone use for games, MIM and mobile SNS use (Table 1).