



AN EMPIRICAL INVESTIGATION ON THE FACTORS AFFECTING SMARTPHONE ADDICTION IN DIGITAL ERA: EFFECT OF SOCIAL NETWORKING SERVICES AND INSTANT MESSAGING APPLICATIONS USAGE

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ABSTRACT

In today's digital era severe smartphone usage is increased by several smartphone applications such as social networking services and instant messaging applications. In this study, we argue that use of social networking services and instant messaging applications may cause an individual's inevitable dependence to the smartphone which consequently leads to addiction. Thus, the current research examines use of both social networking services and instant messaging applications as predictors of smartphone addiction with some other antecedents of social networking services and instant messaging applications usage. Results show that use of social networking services and use of instant messaging applications are important predictors of smartphone addiction. Findings also represent that use of social networking services applications is affected by social networking services network size and use of instant messaging applications is affected by instant messaging network size and the number of instant messaging applications actively being used on smartphone. Moreover, social anxiety and peer influence are examined as the moderating effects between relationships of usage of social networking services and instant messaging applications and smartphone addictions. Results of these tests show that social anxiety moderates the relationship between use of social networking services applications and smartphone addiction and peer influence moderates the relationship between use of instant messaging applications and smartphone addiction. This study has contributions to the addiction research, and also implications to governments and health institutions pertaining to the effect of smartphone addiction on society and individual's health.

CCS CONCEPTS

• **smartphone addiction**; • **social networking service (SNS) applications**; • **instant messaging (IM) applications**; • **social anxiety**; • **social peer influence**;

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1 INTRODUCTION

Being smart enough on many aspects of communication, smartphones have already replaced a lot of devices. Today smartphones can facilitate us with several functions such as mobile phone, TV, Internet, games, chatting, navigation and so many others anywhere we are. Due to these features, smartphones are penetrating into our life incredibly fast. Especially youngsters can't imagine life with absence of smartphone. For those who have smartphone the first thing to glance at is smartphone after waking up in the morning and the last thing to glance at is also smartphone before bed [Yu-Kang Lee et al., 2014].

Nowadays many people use smartphones for various purposes daily. Calling, messaging, gaming, social networking, instant messaging, reading news, searching information, using location-based services and navigation, picture sharing and so many others are of examples of smartphone usage [Salihan&Negahban, 2013]. Smartphones can also be means of entertainment or relaxing from stress for many people [Yu-Kang Lee et al., 2014]. Among these, online social networking services (SNS) and instant messaging (IM) are of most commonly used smartphone applications [Salihan&Negahban, 2013; Abdullah J. Sultan, 2014].

Use of social networking services has been already shifted to smartphones from computers. Now all social networking services provide their certain applications on smartphones for easy access anytime. It is a place that gives individuals an opportunity to share their photos, feelings, experiences, chatting and even videos by personal profiles and groups which can be created within the network. In 2014 39.9% of smartphone holders use social networking services

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on their smartphones in South Korea [KISDISTAT REPORT, 2015]) KakaoStory is the most famous social networking service in Korea.

Today Whats App, Telegram, Google Hangouts, KakaoTalk (in Korea) and so many other instant messaging services are already actively used by almost all smartphone users. They vary with their special features from one another. Now instant messaging applications can provide not only instant chatting, but also voice sending, video chatting and unlimited picture sharing features. Most popular instant messaging application is KakaoTalk in South Korea having 140 million users currently. 93% of smartphone users run KakaoTalk application in South Korea.

But due to these applications, smartphone usage presents its negative side that leads people to be addicted to the smartphone. Many people mostly stay online on social networking services and instant messaging services in order to be in contact with friends and be aware of their current posts and new things they upload. These enable people enjoy participating in these networks totally anywhere they want. This can increase frequency of habitual checking of smartphone users which further causes addiction [Lee, 2015]. Traditionally Internet addiction was caused via personal computers, portable laptops. Today it is widely caused by smartphone through its applications such as social networking service, instant messaging applications, games and other applications [Salihan&Negahban, 2013; Se-HoonJeong et al., 2016]. Smartphone addiction, being a part of technology addiction, creates many problems in an individual, organizational, and also society levels. This shows that there is a great demand on conducting research works on smartphone addiction and its antecedents in order to establish a strong prevention people from modern form of technology addiction and its harms.

Variety of research has been conducted on the antecedents of smartphone addiction. But little attention has been paid to some effects of social networking and instant messaging applications on smartphone addiction. Following purposes are put forward in the current research:

- A research model is proposed in order to explain how social networking service applications and instant messaging applications have relationship with smartphone addiction by testing moderating effects of peer influence and social anxiety.
- Our model will be tested empirically by using data collected from smartphone users in South Korea.
- Effects of social networking service applications and instant messaging applications will be well explained. Contributions and suggestions to the literature and researchers will be provided and implications to the practitioners will be presented.

In short, this is a study which continues one of the series of research on the factors effecting smartphone addiction.

2 THEORETICAL BACKGROUND

2.1 SMARTPHONE ADDICTION

Today technology is offering its next phase of addiction called smartphone addiction. Smartphone addiction has almost all same symptoms of Internet and game addiction. But its specific aspect is that a user of a smartphone can be addicted to all kinds of technology addiction within a smartphone. A smartphone can facilitate all these things by its applications which are installed and ran in

its operating system with the help of smartphone's connectivity to the Internet. On a smartphone now we can play games, watch TV, surf the Internet, connect to our social networking sites, chat with friends instantly, take pictures and share them and do so many other things. These things can lead us to be addicted to the smartphone.

Research on Internet addiction shifted to investigating the specific aspects of the Internet such as online game addiction [Brian et al., 2005], online chatting addiction [Simkova & Cincera, 2004], online auction addiction [Ofir et al., 2011], addiction to social networking sites [Yang Ji et al., 2014; Jesse et al., 2015; Jih-Hsin et al., 2016] and addiction to instant messaging [Abdullah J. Sultan, 2014].

Several studies indicate that smartphone is also a seductive artifact that can lead to addiction. Nowadays we see young people at universities, cafeterias, bus stops, clubs, parties and many other gatherings are busy with their smartphones rather than talking to each other face-to-face. People text message, check their e-mails through their smartphones even while walking and driving which is really dangerous [Kristie et al., 2014; Abdullah J. Sultan, 2014].

We don't find a formal definition of smartphone addiction in the literature. Definitions differ by how researchers approach to smartphone addiction. But all definitions fill one another. But we can give a general definition based on the general definition of technology addiction which their symptoms are almost similar. Due to the existence of variety of definitions for technology addiction, researchers combined several definitions given by researchers and gave a concluded definition as such as technology addiction is a psychological state of unsuitably adapted overreliance on the use of a technology to a certain level that following typical behavioral addiction symptoms occur: (1) salience – the technology preoccupies a user's thoughts and behaviors; (2) withdrawal – negative emotions arise if an individual cannot use the technology; (3) conflict – technology usage creates conflict with other assignments weakening normal functioning; relapse and reinstatement – a user cannot reduce the use of the technology by him/herself; (4) tolerance – to achieve excitement, a person has to use the technology to greater degree, otherwise short usage is not enough to enjoy; and (6) mood modification – using the technology provides thrill and relief resulting mood changes [Ofir et al., 2011]. We think smartphone addiction shares similar symptoms of general technology addiction.

Prior to smartphone addiction studies, research on problematic mobile phone use was on the stage. A research discovers that specific components of impulsivity such as high urgency and low perseverance are significant predictors of feeling of dependence on the mobile phone [J. Billieux et al., 2008]. A research shows that smartphone addiction is marked by certain symptoms like craving, loss of control and withdrawal of a heavy user of smartphone [Billieux, 2014]. Another research found on their study that high stress levels, low physical activity, higher body mass index (BMI), longer duration of smart phone usage, higher frequency of usage, shorter time period until first smart phone use in the morning and social networking sites (SNS) were linked significantly with the smart phone addiction [Elluru Vencatesh et al., 2017].

Mobile phone addiction is caused mostly by its various applications. Effect of social networking service applications is linked by SNS intensity and network size. Those who have larger network, use SNS application more than others. And intensive use of SNS application leads to smartphone addiction [Salihan & Negahban,

2013]. Some psychological traits such as external locus of control, materialism, and social interaction anxiety affect smartphone addiction. People use smartphones for show-off, as well [Yu-Kang Lee et al., 2014]. Alexander J.A.M. van Deursen et al. (2015) relates habitual smartphone usage behavior to addictive smartphone usage behavior through particular predictors such as self-regulation, social stress and social usage of smartphone. According this study, women experience more social stress than men do and use their phones for more social relationships. A lot of other factors of smartphone addiction have been studied. People use smartphones for entertainment and escape from real life problems being moderated by perceived stress of users [Jin-Liang et al., 2015]. A research [James A. Roberts et al., 2015] on the effect of personality traits found that people who want to avoid temporarily from daily problems and worries, and who tend to be frequently changeable in mood are more vulnerable to be addicted to smartphones. Some luxury smartphones are also good reason for customers to frequently change their smartphones. Smartphone users who are more materialistic will get faster addicted to smartphones due to expensiveness and beauty of some luxury smartphone brands [Yu-Kang Lee et al., 2014; James A. Roberts et al., 2015].

Smartphone addiction has negative effects on productivity, availability of employees and academic performance of students. Smartphone addiction increases stress and social guiltiness, and some addicted users feel frustrated and more stressed when they cannot use smartphone [Liette et al., 2013]. Like addiction to other technology, smartphone addiction causes some health problems. Addicted people tend to be more nervous, and have some pain in neck side, headache, hand tremor and discomfort of finger due to one-handed use [Minkyung Lee et al., 2011]

2.2 SOCIAL NETWORKING SERVICE APPLICATIONS

A social networking service (SNS) site is a place where people meet each other virtually and socialize no matter where they are in the globe. SNS subscribers can socialize with their friends and share general interests using social features of SNS such as: (1) users can fortify their friendship online and offline through SNS; (2) via SNS users can establish new social relationships; (3) people use other variety of essential, cutting edge services of SNS (Sang et al., 2014). Subscribers upload profile picture, post about their interests, hobbies, share information, latest news, post many other pictures of their recent activities. And all these things are shared with friends. Friends around them on SNS like or dislike those pictures, some people comment on them and owner of the picture and post feedback to those comments. Some people have even long discussions on everything on SNS. Along with these activities, people socialize well even though they don't see each other face-to-face. Via SNS services, users receive news from their friends, discern that they are always in touch, and share their interests and experiences [Myungsuh L. & Yoon Y., 2015].

People utilize SNS for variety of purposes. A recent survey on 514 users by Vladlena et al. (2015) represents that most of the users mainly use SNS for keeping in touch with friends (93%), instant messaging (66%) and to seek information (60%). Nowadays most

popular SNS sites are Facebook, Twitter, Google+, LinkedIn, Myspace, KakaoStory (in Korea), V Kontakte, Odnoklassniki (in Russia and former Soviet Republics) and so many others are used actively worldwide. Nowadays people access their social networking sites through their smartphones. A survey by KISDISTAT of South Korea in 2014 revealed that SNS subscribers access their SNS sites via smartphones more comparing to other devices like desktop PCs, laptop PCs, tablet PCs and others. Average time spent by SNS users through smartphones was 47.7 minutes a day [KISDISTAT REPORT, 2015.03]. Thus SNS is one of the major reasons to use a smartphone excessively. SNS applications are also considered a remarkable predictor of smartphone addiction [Salihan & Negahban, 2013].

2.3 INSTANT MESSAGE APPLICATIONS

Instant messaging has already shifted to smartphones from personal computers. Now people mostly use IM smartphone applications. There were few chats from yahoo.com (Yahoo! Messenger), google.com (Google Talk), and so many others that one could log in through personal computers. They appeared as online chats or chat rooms which offer a real-time text transmission over the Internet. Since smartphones penetrated to our life, instant messaging smartphone applications are being utilized. Smartphone IM applications are much more different and advanced from traditional ones. The emergence of Internet-based mobile text messaging applications has enabled users to socialize and stay connected with friends via smartphones. There is no payment for messaging service to the operator except Internet data fee. This is much cheaper and more convenient [Abdullah J. Sultan, 2014].

Nowadays WhatsApp, Telegram, Viber, Imo, Yahoo! Messenger, Google Hangouts, Kakao Talk (in Korea), Instagram, BlackBerry Messenger (BBM), IMO and some other smartphone applications are commonly used by smartphone users. They vary one another with their special technical features and localities. Some of them provide instant chatting only, while others add some other functions such as sending pictures, videos, voice messages, calling, video calling and organizing groups among friends or other people who have common interests or work together. According to quality of communication and performance, some IM applications are targeted for some areas like Kakao Talk in South Korea, Mxit in South Africa, Gadu-Gadu in Poland, WeChat, Tencent QQ in China and so many others in different parts of the globe.

The bulk of research on IM applications focused on the social, behavioral and psychological outcomes of the artifact. Initial research started studying the characteristics of computer IM applications. It was found that shy people are more likely to use IM in order to reduce their loneliness. Shyness was found as one of the main predictors of IM use to motivate people to seek social ease and personal contact [C. Albert Bardi & Michael F. Brady, 2010]. Since IM users started to simplify texting with emoticons, along with a lot of benefits of emoticons there caused some problems of misunderstanding each other, as well. Using "flaming" emoticons were the reasons of such misreading the text among employees [Tainyi et al., 2010]. IM use at work has a little effect on work interruption of employees. However, this effect is much less than its positive effect on work interactivity, communication quality, and trust in

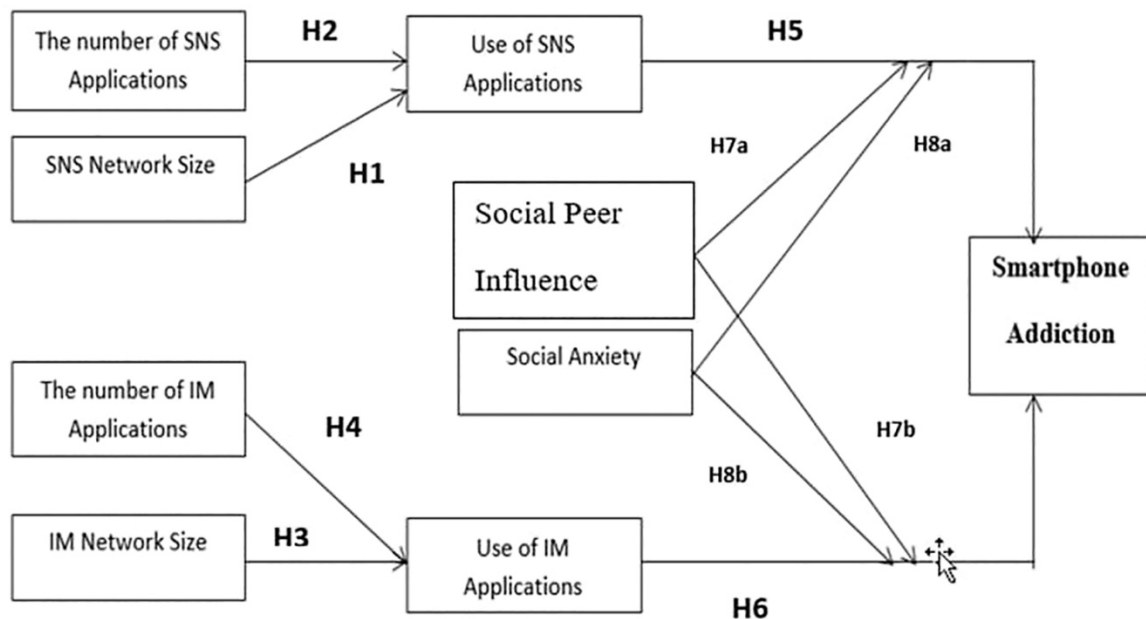


Figure 1: Proposed research model

team work [Carol X.J. Ou& Robert M. Davison, 2011]. In addition, people enjoy more using mobile IM than computer IM tools due to facility of mobile IM that enables users to interact with their peers any time anywhere they want that is, being always online.

Moreover, IM application's potential provides communication and collaboration among individuals and groups within and across workplaces and even countries through its safe on-time one-to-one and multi-party instant messaging. This potential increases users' social presence and satisfaction from the communication via the current artifact (Solomon et al., 2014). As an example of Snapchat IM application, IM applications are also viewed as tools of bonding social capital facilitating closer relationship with intimate friends comparing to SNS applications [Lukasz Piwek& Adam Joinson, 2016].

As smartphone addiction can be caused by SNS applications by users over utilization of this application, similarly IM applications can cause smartphone addiction. In this study we purposed to investigate how much IM applications lead users to smartphone addiction.

3 RESEARCH MODEL AND HYPOTHESIS

In this research, our main purpose is to investigate the effects of SNS and IM applications usage on smartphone addiction along with two socio-psychological moderating effects, such as peer influence and social anxiety. Figure 1 depicts our research model. Our research model is based on Salihan & Negahban's model (2013) and add some variables according to the suggestions and limitations of previous researches. As described in the model, we define SNS network size and IM network size as the number of a user's friends or contacts in SNS and IM applications, respectively, in which there are the most number of friends or contacts. By the number of SNS

applications and IM applications we simply mean that the number of SNS and IM applications respectively which are actively ran by the user on smartphone. Use of SNS application is defined as the amount or degree to which an individual uses smartphone to connect to SNS [Salihan & Negahban, 2013]. Use of IM application is defined as the degree to which a user utilizes smartphone to make total use of IM applications. We define peer influence how much a person is influenced by his/her peers in the society. Social anxiety is described as fear or phobia of a person in social interaction about being watched or evaluated by others. We want to start with some antecedents of SNS smartphone application and IM smartphone application usage.

In this research, our main purpose is to investigate the effects of SNS and IM applications usage on smartphone. As it was studied and proved in recent researches, SNS network size of a user represents how much he/she utilizes SNS applications. As friends or contacts on SNS site increases, user will have to communicate and socialize with them by sharing pictures, videos, opinions, experience, commenting on them, liking and disliking, messaging through SNS more and more. People get more involved in SNS sites by finding and adding new friends, groups and communities. This leads them use SNS sites frequently. As a user gets more involved in SNS he/she will have to install a smartphone SNS application in order to communicate and be always in touch with friends even though the user is still using SNS site via personal computer [Salihan & Negahban, 2013]. Therefore, we will derive a following hypothesis.

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messaging through SNS more and more. People get more involved in SNS sites by finding and adding new friends, groups and communities. This leads them use SNS sites frequently. As a user gets more involved in SNS he/she will have to install a smartphone SNS application in order to communicate and be always in touch with friends even though the user is still using SNS site via personal computer [Salihan&Negahban, 2013]. Therefore, we will derive a following hypothesis:

H1. SNS network size of a user will have positive effect on the use of smartphone SNS applications.

According to the SNS sites' different services and facilities people are having various SNS sites at the same time. It has several reasons such as different functions, different localities, communication qualities, and many other properties of SNS sites. Nowadays many people have Facebook, Twitter, Google+, LinkedIn, Odnoklassniki accounts and their applications in their smartphones. A very few people have only one SNS application on their smartphones. Users often connect their SNS site via their smartphones. Because it is convenient, fast and anytime they can connect. The more numbers of SNS applications exist, the more usage of those applications will automatically occur. If we have many SNS applications, we will have to log in them more than usual in order to check the new messages, posts, and discussions in order to stay aware of all of them and actively participate in them. Effect of the number of a certain variable on some other dependent variables have been already observed and tested in several researches [Walter R. Gove & Michael R. Geerken, 1977, Greg Hundley, 2000]. Previous researches show that there is a general freedom of selecting the arrangements of age groups, number of contacts or friends of a person to investigate their effects on a certain variable [Junghyun Kim and Jong-Eun Roselyn Lee, 2011; Sonja Utz. et al., 2012]. This freedom gives us also a chance to test the effect of the number of SNS applications on their usage. Thus, we propose the following hypothesis:

H2. The number of SNS applications will have positive effect on the use of smartphone SNS applications.

Being smaller and compact type of SNS, instant messaging applications also connect people over many aspects. These days IM applications are offering many several services from chatting up to video calling. These all happens when an individual has a number of contacts or friends within IM applications. It is pretty clear that people nowadays have more friends or contacts on IM application than their telephone contacts that are actively in contact by calling and messaging. People always can't call to their friends who live in abroad. Therefore, they have a chance to instantly chat via IM applications. Hanging out with friends on IM applications creates a network. A network is activated by participants. As the number of participants increases, involvement in that network increases as well. People even use group chats via IM applications now. As the analogy of the hypothesis 1 we can derive a following hypothesis about the network size of IM applications.

H3. IM network size of a user will have positive effect on the use of smartphone IM applications.

Same thing happens with the number of IM applications as the number SNS applications. It is clear to everybody that people have at least more than one IM applications on their smartphones. Some people have even 5 or 6 IM applications actively used through smartphones. Users have to download and activate different IM

applications due to many reasons. While some individuals use because of various useful functions of IM applications, others utilize them because of their friends or co-workers use. Even some people invite their friends to download and activate a certain IM application by sending a traditional message. In this way people are willingly having several IM applications and utilizing them on a daily life. If we have many IM applications, we will automatically have to deal with all of them. We have to check all messages coming from all those applications and answer them. It leads us to check many notifications coming from IM applications and participate in chats more and more. Therefore, we want to hypothesize following statement.

H4. The number of IM applications will have positive effect the on use of smartphone IM applications.

Today SNS applications are widely used via smartphones. Through Internet data connectivity of smartphones users can access to SNS sites anytime at any place. This enables users visit their SNS sites through smartphone applications more than via PCs. Smartphones have property of check habit forming [Oulasvirta et al., 2012], especially checking habits. But these checking habits are caused by smartphone applications. Among smartphone applications, SNS applications have special role. In a recent research on the frequency of users' smartphone application revisit, SNS applications such as Facebook and Twitter were of the most frequently revisited applications [Jones et al., 2015]. There are serious reasons why people frequently revisit or stay online in SNS sites via smartphones. They chat with people around the world within social network. They can share important and interesting information by posting some notes, web links, videos or voice records. Individuals can interact with more people than the people on their mobile phone contacts and even offline friends [Salihan & Negahban, 2013]. People get much enjoyment from SNS site by posting personal pictures, videos and receiving comments, discussions over them by others, watching videos, finding old friends, making new friends and so many other activities [Kuan-Yu Lin & Hsi-Peng Lu, 2010]. Some people even do shopping on SNS sites [Jiyoung Cha, 2009]. These all activities in SNS sites significantly involve users daily and they can't help themselves visiting those sites. Thus SNS applications strongly tie users to their smartphones leading to smartphone addiction. Thus, we derive following hypothesis:

H5. Use of smartphone SNS applications will positively affect smartphone addiction.

Many people prefer messaging by IM applications rather traditional text messaging and calling, because it is cheaper and faster. Furthermore, as we mentioned before, smartphone applications create smartphone checking habits. Checking habits are caused by several times making a visit to smartphone applications in a short interval of time over and over again. In a recent research on the frequency of users' smartphone application revisits, IM application such as WhatsApp was one of the most frequently revisited applications [Jones et al., 2015]. Lots of reasons stand behind why people use IM applications so frequently. Firstly, almost all smartphone IM applications are downloadable for free. Everyone who has Internet Data service or Wi-Fi connectivity can download those applications and start real-time chatting with one-to-one or multiple friends [Solomon O. Ogara et al., 2014]. Secondly, because of low cost prices of using IM applications people can stay connected with

friends or co-workers via IM applications in phone call restricted areas or situations such as classes, meetings, movie theaters, some government offices, airports and so many others. This usage leads users frequently check and utilize their smartphones because of the usage of the IM applications. Thirdly, IM applications such as WhatsApp and BlackBerry Messaging (BBM) provide communication which generates less social anxiety than face-to-face meetings do. It is very convenient for people with shyness to face-to-face interactions or social phobia [Abdullah J. Sultan, 2014]. Meanwhile some researchers conclude that extraverts are more prone to instant messaging than shy introverts. They tend to be active both offline and online [Wilson et al., 2010; Buckner, Castille, & Sheets, 2012]. Finally, addiction to mobile instant messaging such as WhatsApp and BBM highly exists among users [Abdullah J. Sultan, 2014]. This addiction happens over smartphone. Their second stage of addiction can be smartphone addiction. Hence we hypothesize following statement.

H6. Use of smartphone IM applications will positively affect smartphone addiction.

People want to be up-to-date in modern life. For this, they are affected by social surrounding of their modern lives. Most of the people follow what their society do. Social surrounding of an individual is his or her family, neighborhood, friends in school or co-workers in workplace, peers and etc. An individual might have to use a smartphone because of people around him or her are using smartphones. It is mentioned by information systems researchers that social influence has a great effect on user behavior of information technology [Venkatesh et al., 2003]. In a research, peer influence was one of the four major groups of social influence on the use of knowledge management systems [Shen, Cheung, Lee, and Wang, 2007]. Zhiyang Yang et al. (2015) found that there is significant informational influence of peers on unauthorized music downloading among university students. Nowadays most people are engaged in SNS sites such as Facebook, Twitter, Google+ and others because of their friends are there and participating actively. In a research, people are mostly engaged in SNS sites because of peer support and many of them depressed of using SNS [Yoshimitsu et al., 2009]. People also download several IM applications because of their friends' request. Now people who are using a certain IM application send a mobile message to invite their friends to join that IM application. Friends accept, download and join that IM application. Now it is common that some people are just requesting friends to join an IM application and chat there together. Even though smartphone users don't need some IM applications, they have to download and join those applications because of friends' request or almost many friends are using that. In order to achieve a sense belonging, to identify with peers or to be recognized by friends, to stay always with friends and to obtain social approval people will have normative peer influence. On the other hand, people have informational influence of peers. Because they don't know much about somethings, don't know what brand to buy. So they tend to ask or discuss with friends or people around them [Bearden et al., 1989]. That's why people who are more sensitive to social peer influence are actively utilizing SNS and IM applications because of their friends are engaging them. And through this way they are becoming smartphone addicts. People who are not so much

sensitive to peer influence might have a controlled usage of SNS and IM applications. Thus, we propose following two hypotheses:

H7a. The relationship between use of SNS applications and smartphone addiction will be moderated by peer influence.

H7b. The relationship between use of IM applications and smartphone addiction will be moderated by peer influence.

Researches show that people with high level of social anxiety prefer online computer-mediated communication rather than face-to-face communication [Leary & Kowalski, 1995; Donna J. & Fraser J., 2007; Sheldon, 2008; Tamyra Pierce, 2009; Fernandez, Levinson, & Rodebaugh, 2012; Bethany et al., 2014]. Socially anxious individuals feel much confident when they communicate with others in online communications such as online chat rooms, online messaging, and instant messaging. It helps them avoid from social fear and hesitations [Erwin et al., 2004]. Some people with social anxiety use few voice calls on the phone, rather they prefer to text [Donna J. & Fraser J., 2007]. Therefore, we propose following hypothesis.

H8a. The relationship between use of SNS applications and smartphone addiction will be moderated by social anxiety.

In the CMC literature, researchers support the statement that socially anxious individuals easily form relationships over CMC media because of the nonexistence of many of the anxiety-generating factors that occur in face-to-face interactions [McKenna & Bargh, 2000]. Individuals with high levels of social anxiety are scared of being the center of surrounding people's attention and are likely to be shy individuals, whereas others with low levels of social anxiety communicate without fear in their surroundings [Abdullah J. Sultan, 2014]. Compared to smartphone users who have low levels of social anxiety, other users high level of social anxiety is more likely fall into excessive usage of SNS and IM applications that can lead to smartphone addiction. Thus, we propose following hypothesis

H8b. The relationship between use of IM applications and smartphone addiction will be moderated by social anxiety.

4 METHODOLOGY

4.1 MEASUREMENT

We made our measurement scales taking from previous studies and adjusting them into our research subject. It is given in the Appendix. We developed following measurement scales.

For network size of SNS and IM applications, we adapted SNS network size measurement scale of Mohammad Salehan and Arash Negahban's study (2013) and modified it to our case. We asked respondents to select the number of their friends in SNS and IM applications respectively in which they have most number of friends. We made 5 point-scale such as 1) less than 50 friends; 2) 51-100 3) 101-250; 4) 251-400 4) more than 400 friends. For the number of SNS and IM applications, we simply asked respondents to choose the number of SNS and IM applications they are actively running in their smartphones. We arranged the numbers of SNS and IM applications ranging from 1 to 5 applications. Measurement scale for the constructs of use of SNS applications and use of IM applications were adapted from Mohammad Salehan and Arash Negahban (2013) and modified it into our study purpose. Due to a wide range of existence of smartphone addiction scales in the literature of technology addiction, we chose different questions from various researches [Young, 1998; Davis, 2011; Negahban, 2012; Negahban&Salehan,

Table 1: PLS loadings.

	Addiction	SNSUse	IMUse	Influence	Anxiety	SNSNumber	IMNumber	SNSNet Size	IMNet Size
Add1	0.86	0.32	0.44	-0.16	0.21	0.14	0.21	0.07	0.15
Add2	0.83	0.31	0.42	-0.15	0.11	0.13	0.24	0.04	0.13
Add3	0.84	0.28	0.40	-0.11	0.13	0.12	0.21	0.06	0.12
Add4	0.82	0.47	0.54	-0.21	0.14	0.17	0.23	0.08	0.27
Add5	0.77	0.21	0.35	-0.08	0.15	0.20	0.21	0.01	0.10
SNS_U1	0.38	0.83	0.43	-0.23	-0.01	0.07	0.07	0.11	0.22
SNS_U2	0.23	0.81	0.48	-0.26	0.02	0.02	0.04	0.24	0.35
SNS_U3	0.38	0.92	0.51	-0.27	-0.01	0.06	0.08	0.20	0.30
SNS_U4	0.38	0.92	0.51	-0.28	-0.01	0.05	0.09	0.25	0.27
IM_U1	0.50	0.48	0.88	-0.48	0.08	-0.01	0.25	0.10	0.36
IM_U2	0.41	0.49	0.84	-0.44	0.09	-0.08	0.22	0.18	0.48
IM_U3	0.50	0.48	0.93	-0.49	0.07	-0.04	0.25	0.12	0.43
IM_U4	0.48	0.51	0.91	-0.46	0.09	-0.02	0.26	0.10	0.41
Influ2	-0.15	-0.24	-0.48	0.88	-0.04	0.02	-0.19	0.00	-0.24
Influ3	-0.09	-0.19	-0.39	0.79	-0.05	-0.03	-0.18	-0.01	-0.21
Influ4	-0.18	-0.31	-0.48	0.92	-0.08	0.06	-0.18	-0.05	-0.24
Influ5	-0.17	-0.27	-0.46	0.87	-0.07	0.00	-0.15	-0.02	-0.22
Anxi2	0.11	-0.16	-0.04	0.00	0.74	0.11	0.05	-0.21	-0.11
Anxi3	0.10	-0.09	0.04	-0.04	0.77	0.08	0.03	-0.14	0.01
Anxi4	0.13	0.03	0.11	-0.07	0.84	-0.08	0.01	-0.08	0.03
Anxi5	0.20	0.09	0.13	-0.09	0.87	-0.03	0.02	-0.05	0.04
SNS Num	0.18	0.06	-0.04	0.02	0.01	1.00	0.30	0.11	0.04
IM Num	0.27	0.08	0.28	-0.20	0.03	0.30	1.00	0.07	0.19
SNS Net	0.06	0.23	0.14	-0.03	-0.13	0.11	0.07	1.00	0.41
IM Net	0.20	0.32	0.47	-0.26	0.00	0.04	0.19	0.41	1.00

2013; E. Bun Lee, 2015], then made them suitable to our study. For the measurement of peer influence, we took five scale items from previous researches [William et. Al., 1989; Oswald A. J. Mascarenhas & Mary A. Higby, 1993; Zhiyong Yang & Michel Laroche, 2011; Zhiyong Yang et. Al., 2015] and transformed them into our study by slightly modifying. Five scale items were also chosen for the measurement of social anxiety construct adapting from earlier researches [Richard P. Mattick & J. Christopher Clarke, 1998; Tamyra et. Al., 2009; Abdullah J. Sultan, 2014; Bethany et. Al., 2014; Jon-Chao et. al., 2015].

4.2 DATA COLLECTION

We conducted an online survey among students in one of the large universities of South Korea during two months in 2020 through Korean instant messaging application KakaoTalk. Participants were local and international students. They were rewarded with some additional credit for participating in the survey. We organized our survey by spreading questionnaires in the class and also sending online. We collected total 441 responses. Out of 436 questionnaires, a total of 429 responses were obtained making 97 % of response rate. Due to some respondents' reckless filling out the questionnaires, out of 429 responses 421 of them were considered to be useful for further analysis.

4.3 DATA ANALYSIS

To analyze our collected data and validate our model we used Partial Least Squares (PLS). Smart PLS computer software package was utilized to examine measurement model initially. Then we assessed validity and reliability of the measurement items. Structural model was examined and the significance of each hypothesis was evaluated. And then we calculated R-square.

Believing that discriminant validity can be established if item-to-construct correlations are higher with each other than with other construct measures and their composite values [Loch et. al., 2003], we employed two tests to examine the discriminant validity of the reflective measure. In the first test we calculated each item's loading on its own construct and its cross-loadings on all other constructs (Table 1). The loadings of the indicators for each construct were higher than the cross-loadings of the items in the other constructs. All of the items had a high loading on their corresponding constructs showing minimum value of 0.74 which is suggested to be greater than the cutoff point of 0.40 [Hulland, 1999].

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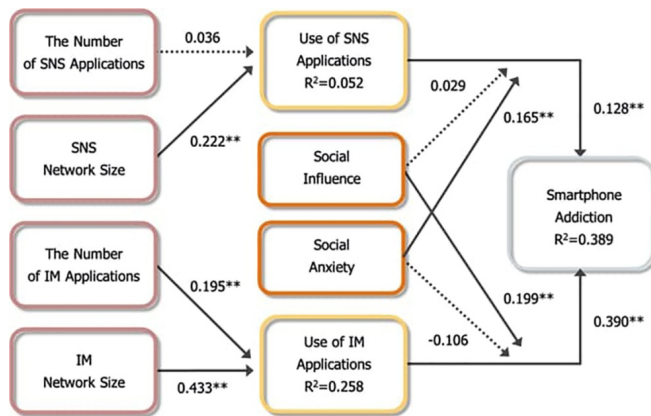


Figure 2: Results of Path Analysis

higher than the cross-loadings of the items in the other constructs. All of the items had a high loading on their corresponding constructs showing minimum value of 0.74 which is suggested to be greater than the cutoff point of 0.40 [Hulland, 1999].

In the second second test of discriminant validity, we examined whether the square root of the AVE score of each construct was greater than its correlations with other latent constructs [Chin, 1998]. With this test we are able to assess whether the variance that is shared between the construct and its items is greater than the variance shared with other constructs. As the Table 2 indicates (the square root of the AVEs are shaded), all of measures passed this test. Based on this evidence, it appears that the measures in our study exhibited appropriate reliability and discriminant validity.

Convergent validity of the constructs was also assessed by calculating construct reliabilities [Fornell&Larcker, 1981]. Providing internal consistency Cronbach's alpha for all constructs was above 0.80. Table 2 shows that values of Cronbach's alpha range from 0.83 to 0.91. The composite reliabilities of all of the items were also greater than the threshold of 0.70 [Hulland, 1999].

By Table 3 we can get to know how network sizes of SNS and IM applications range. Such as most respondents, that is 163 of them have from 101 to 250 SNS friends while 173 of them have 101 to 250 IM application contacts. Almost 12 % of respondents have more than 401 SNS friends. 12.7 % of respondents have more than 401 contacts in their IM applications.

Structural model was assessed by PLS Path analysis. Figure 2 describes the results of path analysis along with standardized path coefficients $p=0.01$ significance levels. All paths between constructs were significant at $p=0.01$. The paths between the number of SNS applications and use of SNS applications; social influence and relationship between use of SNS applications and smartphone addiction; social anxiety and the relationship between use of IM applications and smartphone addiction were not significant. Figure 2 shows model analysis results. The results show that SNS network size is a significant predictor of use of SNS applications ($b = 0.22$) accounting for 5% of variance in the dependent variable. H2 is supported. IM network size also has a positive effect on the use of IM applications ($b = 0.19$) showing for 25% of variance (R^2 square) in the dependent variable. So H3 is supported. H4 is also supported by the result that the number of IM application is a significant predictor of use IM applications ($b = 0.43$) accounting for 25% of variance in the dependent variable. Path analysis also show that use of SNS applications have a positive effect on smartphone addiction ($b = 0.12$) with the variance of 38% on the dependent variable. We find support for H5. H6 is also supported with the result that use of IM applications is a significant predictor of smartphone addiction ($b = 0.39$) accounting same variance (R^2 squared = 38%) on the dependent variable. Proposed moderation effect of social peer influence on the relationship between use of IM applications and smartphone addiction is supported (H7b) with a path coefficient of 0.19. H8a is supported with a path coefficient of 0.16, as well, meaning that the relationship between use of SNS applications and smartphone addiction will be moderated by social anxiety. The effect of the number of SNS applications on the use of SNS applications is not significant ($b = 0.03$). So H1 is not supported. The proposed moderation effect of social peer influence on the relationship between use of SNS applications and smartphone addiction is not supported (H7a). We either did not find support for moderation effect of social anxiety on the relationship between use of IM applications and smartphone addiction. So H8b is not supported.

5 DISCUSSION

5.1 SUMMARY

As heavy usage of smartphones among population is incredibly increasing, negative consequences of smartphone usage are hidden behind merits of the artifact. Smartphone addiction is one of the bad effects of smartphone usage. It is caused by what smartphones offer

Table 2: Reliability, Correlations, and AVEs.

	AVE	C.R.	Cronbach's Alpha	1	2	3	4	5	6	7	8	9
1. Addiction	0.68	0.91	0.88	0.82								
2. SNS Use	0.76	0.93	0.90	0.40	0.87							
3. IM Use	0.79	0.94	0.91	0.53	0.55	0.89						
4. Influence	0.75	0.92	0.89	-0.18	-0.30	-0.53	0.87					
5. Anxiety	0.65	0.88	0.83	0.18	-0.01	0.09	-0.07	0.81				
6. SNS Number	1.00	-	-	0.18	0.06	-0.04	0.02	0.01	-			
7. IM Number	1.00	-	-	0.27	0.08	0.28	-0.20	0.03	0.30	-		
8. SNS Net Size	1.00	-	-	0.06	0.23	0.14	-0.03	-0.13	0.11	0.07	-	
9. IM Net Size	1.00	-	-	0.20	0.32	0.47	-0.26	0.00	0.04	0.19	0.41	-

Table 3: Distribution of network size values (SNS/IM)

	<50	51-100	101-250	251-400	>401
SNS	41	52	163	113	52
IM	39	66	173	102	41

people through smartphone applications. This research investigates some antecedents of smartphone addictions. Two main smartphone applications – SNS and IM applications which are widely utilized among smartphone users were taken as predictors of smartphone addiction. Results of our study confirm that use of SNS applications lead to smartphone addiction, which was previously proven by researchers [Muhammad Salehan & Arash Negahban, 2013]. Today most log-ins of SNS applications is done through smartphones. Results of our study also support that use of IM applications will have a positive effect on smartphone addiction (H6). It is pretty clear that today people prefer chatting through IM applications rather than traditional messaging and calling when they have Internet Data service or free open Wi-Fi access. This all happens due to the cheaper costs and convenience of using IM applications on their smartphones. Moreover, many restaurants, shopping malls, public service centers, work places, airports and even trains are offering free open Wi-Fi access to their customers. This is also increasing the usage of SNS and IM smartphone applications by smartphone users. But smartphone owners are falling into heavy usage of SNS and IM applications. They frequently and just automatically check their smartphones to know whether there are new messages in their SNS or IM applications. This causes users' habitually dependence on their smartphones. Smartphone addiction develops also by checking habits [Oulasvirta et. al., 2012].

In our study we proposed some antecedents of use of SNS and IM applications. The number of SNS applications and SNS network size were proposed as the factors of SNS application usage. As results of data analysis present that the number of SNS applications will not have a positive effect on use of SNS applications. Thus, H1 is not supported. Use of SNS application may happen even though a user does not have many of them. Since an individual has at least one smartphone SNS application, he or she might be involved in heavy usage of it. Just one SNS application such as Facebook or Twitter might indulge a user due to all of his or her friends are only there or that individual has many friends or contacts just only there. Or any other additional social and technical factors can satisfy the user. We also proposed SNS network size as a factor of SNS application usage. This hypothesis is one more time supported in our researched as previous researchers proved [Muhammad Salehan & ArashNegahban, 2013]. By path analysis, our hypothesis (H2) is supported. That means the large SNS network size users have the more they use the network. Participation of a user in SNS will increase as the number of friends grows.

The number of IM applications and IM application network size were predictors of IM application usage in our study. Hypothesis 3, that is, the number of IM applications is supported in data analysis meaning that the larger number of IM applications a smartphone user has, the more he or she will be involved in IM applications.

We link this with that users will install and use various IM applications because of their friends and acquaintances use them or different features of those applications. And since someone has several IM applications, it is naturally expected that notifications of messages, chatting, group discussions will increase. And user will have to answer or at least check them. That means the user is actively utilizing those applications automatically. In our study the second predictor of IM application usage was the IM application network size. Similar to SNS application network size, it is proposed that if friends or contacts of a user in IM network are enlarging user's attachment in use will be more. Hypothesis 4 is supported by statistical path analysis. Thus, we claim that the larger network size of IM applications in users' smartphones, the more they are involved in the usage of IM applications.

In previous researches it was found that people who are prone and sensitive to social influence, especially peer influence, are mostly active in SNS sites [Yoshimitsu et al., 2009]. From social influence we took peer influence as a moderator of the relationship between use of SNS applications and smartphone addiction. H7a is not supported in path analysis. It means that relationship of users' utilization of SNS applications and smartphone addiction is not moderated by peer social influence. We think that people who are already engaged in SNS sites themselves willingly participate in the network because of merits and a lot of attractive features of SNS sites. Once an individual signed up into an SNS site, gradually he or she learns about the network what can be done there. Then that user might continuously visit SNS site with self-interest to get some news, relax and relieve. We also took peer influence as the moderator the relationship between use of IM applications and smartphone addiction (H7b). This hypothesis is supported in path analysis meaning that peer influence will moderate the relationship between use of IM applications and smartphone addiction. People who are more prone and sensitive to peer influence, that is, they do things according to peers' thoughts and evaluations, use IM applications more. And it leads gradually smartphone addiction through usage of IM applications. Differently from SNS applications, IM applications can't facilitate more joyful aspects as same as SNS applications do. People might have everyday use of IM applications because they build daily communications through IM applications and also friends always send messages and expect quick feedbacks. Therefore, today messaging is being done even while doing other things such as work, social gatherings and meetings [Harrison, M. A., & Gilmore, A. L., 2012; Abdullah J. Sultan, 2014].

Proposed moderation effect of social anxiety over relationship between use of SNS applications and smartphone addiction is well supported by statistical path analysis (H7a). This hypothesis proves again the statement that people who are more socially anxious are more likely to use online social interactions [Leary & Kowalski, 1995; Harman et. al., 2005; Donna J. & Fraser J., 2007; Sheldon,

2008; Tamyra Pierce, 2009; Fernandez, Levinson, & Rodebaugh, 2012; Bethany et al., 2014] such as SNS. Even though some researchers found that people who are not socially anxious like extraverts can be prone to SNS use because of SNS provides wider way of communication [Kathryn et. al., 2010], but SNS is such a platform for social anxious people that can facilitate a place to self-disclosure for only targeted people while they can't reveal any information about themselves in face-to-face communications [Tom Green et. al., 2016]. Social anxious people may find a convenient way to communicate with people in SNS rather than offline conversations. Moreover, SNS provides also more enjoyment for social anxious people through its various media facilities. Thus, more they become heavy users of SNS applications, the more they use smartphone and that can lead smartphone addiction.

In our study H8b is not supported. Social anxiety doesn't appear as a moderator of the relationship between use of IM applications and smartphone addiction. It seems that our finding contradicts some of the earlier findings of the researchers claiming that socially anxious people more likely prefer text messaging rather than face-to-face communications [Erwin et al., 2004; Donna J. & Fraser J., 2007; Weinstein and Lejoyeux, 2010]. But today people who are not even socially anxious, rather socially active, outgoing and extravert are also using computer mediated communications such as IM applications to much more extent than their counterparts [McKenna & Bargh, 2002; Butt and Phillips, 2008; Igrarashi et al., 2008]. And there are other factors of IM applications such as cheap, fast and real-time that attracts all personality type of people to download and use daily.

5.2 IMPLICATIONS AND FUTURE RESEARCH SUGGESTIONS

There are several findings in our research that can be theoretical and practical contributions as followings. Firstly, this study is continuation of the previous researches that investigate smartphone applications as factors of smartphone addiction. We took two types of smartphone applications as the main factors of smartphone addiction. Use of SNS applications as a positive factor of smartphone addiction is one more time proved in our study. IM application was additional factor of smartphone addiction in our study. By this study we can conclude that use of IM applications can be an important predictor of smartphone addiction. This is a vital theoretical contribution because of the inevitable occupation of IM applications not even among youth, but amongst older age of smartphone users. This is like a wake-up-call to people who extremely use IM applications to be aware of the negative aspects of heavy usage of IM applications and to decrease the usage rates to the possible minimum extent to healthy usage. And for researchers it is required to work more on other side effects of intensive use of both SNS and IM applications and ways to prevent from heavy usage. In practice, governments, educational and health organizations should take these findings into account when taking actions to prevent people, especially youth from smartphone addiction. It is also suggested for future researchers to investigate other smartphone applications as smartphone addiction factors such as game applications, video watching, uploading and sharing applications like YouTube, Dropbox and other applications such as TV, VOIP.

Secondly, network size and the number of applications were studied as the antecedents of use of SNS and IM applications. Network sizes of both applications were found as the important factors for usage. This is also an important finding for IM applications usage. Future researches should focus on reasons how network size on people's SNS and IM applications will increase and its effects. We found that the number of SNS applications will not have a positive effect on usage, but the number of IM applications will have a positive effect on usage. This is also an essential theoretical contribution to research. Since heavy usage of IM applications which is also caused by increasing the number of them leads to smartphone addiction, IM application developers should create general and universal ones that can give all features of various IM applications offering so that people can use fewer of them. Future researchers also should work on other factors why individuals are using several different IM applications and are frequently switching from application to application. Future researchers should also investigate social and psychological factors for heavy usage of SNS and IM applications such as need for popularity, attention and compliment seeking by posting and sharing things on SNS and IM profiles, and so on.

Thirdly, our study proves that peer influence moderates the relationship between use of IM applications and smartphone addiction. As a useful contribution to research, individuals who are more likely sensitive to peer influence might use IM applications more. And social anxiety moderates the relationship between use of SNS applications and smartphone addiction, but not the relationship between IM usage and smartphone addiction. This is quite different from earlier findings. As technology advances, usage might be accepted commonly by people who have different psychological and personality traits. Future researchers can study more on other psychological moderating effects on the relationship between application usage and smartphone addiction. Furthermore, social non-profit organizations and rehabilitation centers should work on these findings when helping people from technology addiction, especially smartphone addiction.

5.3 LIMITATIONS

This study has several limitations that should be taken into account when interpreting its findings and considered by future researchers. First, the data for survey were collected in South Korea and findings might be specific to the country. Because of cultural, economic and other differences we cannot generalize our findings to other countries and cultures. Future researchers should take this fact into consideration. However, South Korea is one of the countries in which smartphone usage is very high among population. Findings can be suitable for smartphone users and smartphone-related problems of them. Second, our survey was conducted among university students. Students might represent data which is only suitable for students' case, but students are the largest users of smartphones and SNS [Mohammad Salehan & Arash Negahban, 2013]. Furthermore, some researchers claim that students can give proper data for such studies like technology addiction [Xu, Ryan, Prybutok, & Wen, 2012]. In addition, we did not investigate the relationship between gender and smartphone addiction. Future researchers should pay more attention on this matter.

6 CONCLUSION

In this study we investigated how use of SNS and IM applications affect smartphone addiction including network size and number of those two applications and also moderating effect of social anxiety and social influence on the relationships between use of SNS and IM applications and smartphone addiction. Findings of our study represent that SNS and IM applications have positive effect on smartphone addiction. Overindulgent on these applications may lead to smartphone addiction and negative consequences. According to the results, larger network size of both SNS and IM applications will increase the users' involvement to the artifact. Eventually, it leads to the smartphone addiction. Furthermore, having several IM applications (the number of IM applications) on smartphone can also be important reason to get deeply involved in IM application usage. But it is not related to the case of SNS applications. Relationship between use of SNS applications and smartphone addiction can be moderated by social anxiety. And the relationship between use of IM applications and smartphone addiction is moderated by peer social influence. Confirming the findings of previous researches related to the side-effects of smartphone, SNS and IM applications usage, this study gives additional contribution to the research and calls the future researchers, practitioners, governments, and other organizations to pay wider attention to the features and problems of smartphone and its applications usage

REFERENCES

- [1] Alexander J.A.M. van Deursen, Colin L. Bolle, Sabrina M. Hegner, Piet A.M. Kommers (2015). Modeling habitual and addictive smartphone behavior. The role of smartphone usage types, emotional intelligence, social stress, self-regulation, age, and gender. *Computers in Human Behavior*. 45, 411-420.
- [2] Barbora Simkova and Jan Cincera (2004). Internet Addiction Disorder and Chatting in the Czech Republic. *CyberPsychology & Behavior*, Volume 7, Number 5, 536-539.
- [3] Bearden, W. O., Netemeyer, R. G., & Teel, J. E. (1989). Measurement of consumer susceptibility to interpersonal influence. *Journal of Consumer Research*, 15(March), 473-481.
- [4] Bethany McCord, Thomas L. Rodebaugh, Cheri A. Levinson (2014). Facebook: Social uses and anxiety. *Computers in Human Behavior* 34 (2014) 23-27
- [5] Billieux, J., Philippot, P., Schmid, C., Maurage, P., & De Mol, J. (2014). Is dysfunctional use of the mobile phone a behavioral addiction? Confronting symptom-based versus process-based approaches. *Clinical Psychology & Psychotherapy*. Advance online publication. doi:10.1002/cpp.1920
- [6] Brian D. NG, M.S. and Peter Wiemer-Hasting (2005). Addiction to the Internet and Online Gaming. *CyberPsychology & Behavior*, Volume 8, Number 2, 110-113.
- [7] Buckner, J. V., Castille, C. M., & Sheets, T. L. (2012). The five factor model of personality and employees' excessive use of technology. *Computers in Human Behavior*, 28, 1947-1953.
- [8] Butt, S., & Phillips, J. G. (2008). Personality and self-reported mobile phone use. *Computers in Human Behavior*, 24, 346-360.
- [9] C. Albert Bardi & Michael F. Brady (2010). Why shy people use instant messaging: Loneliness and other motives. *Computers in Human Behavior*. 26, 1722-1726.
- [10] Carol X.J. Ou, Robert M. Davison (2011). Interactive or interruptive? Instant messaging at work. *Decision Support Systems*. 52, 61-72.
- [11] Donna J. Reid and Fraser J.M. Reid (2007). Text or Talk? Social Anxiety, Loneliness, and Divergent Preferences for Cell Phone Use. *Cyber Psychology & Behavior*. Volume 10, Number 3, 424-435
- [12] Dorothy Skierkowski & Rebecca M. Wood (2012). To text or not to text? The importance of text messaging among college-aged youth. *Computers in Human Behavior*. 28, 744-756.
- [13] Elluru Venkatesh, Mohammad Yousef Al Jemal and Abdullah Saleh Al Samani (2017). Smart phone usage and addiction among dental students in Saudi Arabia: a cross sectional study. *International Journal of Adolescent Medicine and Health*, Volume 31 Issue 1. Article number: 20160133.
- [14] Erwin B. A., Turk C. L., Heimberg R. G., Fresco D. M., Hantula D. A. (2004). The Internet: Home to a severe population of individuals with social anxiety. *Anxiety Disorders*, 18, pp. 629-646
- [15] Fernandez, K. C., Levinson, C. A., & Rodebaugh, T. L. (2012). Profiling: Predicting social anxiety from Facebook profiles. *Social Psychological and Personality Science*, doi: 10.1177/1948550611434967. Published 19.01.12.
- [16] Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50.
- [17] Greg Hundley (2000). Male/Female Earnings Differences in Self-Employment: The Effects of Marriage, Children, and the Household Division of Labor. *Industrial and Labor Relations Review*, Vol. 54, No. 1 (Oct., 2000), pp. 95-114
- [18] Harman JP, Hansen CE, Cochran ME, Lindsey CR. Liar (2005). Internet faking but not frequency of use affects social skills, self-esteem, social anxiety, and aggression. *Cyber Psychology & Behavior* 2005; 8:1-6.
- [19] Harrison, M. A., & Gilmore, A. L. (2012). U txt when? College students' social contexts of text messaging. *The Social Science Journal*, 49, 513-518.
- [20] Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: a review of four recent studies. *Strategic Management Journal*, 20(2), 195-204.
- [21] Igarashi, T., Motoyoshi, T., Takai, J., & Yoshida, T. (2008). No mobile, no life: Self-perception and text-message dependency among Japanese high school students. *Computers in Human Behavior*, 24(5), 2311-2324.
- [22] James A. Roberts, Chris Pullig, Chris Manolis (2015). I need my smartphone: A hierarchical model of personality and cell-phone addiction. *Personality and Individual Differences*. Volume 79, pp. 13-19.
- [23] Jesse Fox, Jennifer J. Moreland (2015). The dark side of social networking sites: An exploration of the relational and psychological stressors associated with Facebook use and affordances. *Computers in Human Behavior*, 45, 168-176
- [24] Jih-Hsin Tang, Ming-Chun Chen, Cheng-Ying Yang, Tsai-Yuan Chung, Yao-An Lee (2016). Personality traits, interpersonal relationships, online social support, and Facebook addiction. *Telematics and Informatics*. 33, 102-108.
- [25] Jin-Liang Wang, Hai-Zhen Wang, James Gaskin, Li-Hui Wang (2015). The role of stress and motivation in problematic smartphone use among college students. *Computers in Human Behavior*. 53, 181-188.
- [26] Jiyoung Cha (2009). Shopping on Social Networking Web Sites: Attitudes toward Real versus Virtual Items. *Journal of Interactive Advertising*, Vol 10 No 1, pp. 77-93.
- [27] Joël Billieux, Martial Van Der Linden & Lucien Rochat (2008). The role of impulsivity in actual and problematic use of the mobile phone. *Applied Cognitive Psychology*. 22, 1195-1210.
- [28] Jon-Chao Hong, Ming-Yueh Hwang, Chin-Hao Hsu, Kai-Hsin Tai, Yen-Chun Kuo (2015). Belief in dangerous virtual communities as a predictor of continuance intention mediated by general and online social anxiety: The Facebook perspective. *Computers in Human Behavior*, 48 (2015) 663-670
- [29] Jones, S., Ferreira, D., Hosio, S., Goncalves, J. and Kostakos, V. (2015). Revisitation analysis of smartphone app use. *ACM International Joint Conference on Pervasive and Ubiquitous Computing*, 2015. Pages: 1197-1208
- [30] Junghyun Kim and Jong-Eun Roselyn Lee (2011). The Facebook Paths to Happiness: Effects of the Number of Facebook Friends and Self-Presentation on Subjective Well-Being. *Cyber Psychology, Behavior, and Social Networking*. Volume 14(6): 359-364
- [31] Karen D. Loch, Detmar W. Straub, and SherifKamel (2003). Diffusing the Internet in the Arab World: The Role of Social Norms and Technological Culturation. *IEEE Transactions on Engineering Management*. Vol. 50, No. 1, February 2003
- [32] Kathryn Wilson, Stephanie Fornasier, and Katherine M. White (2010). Psychological predictors of young adults': use of social networking sites. *Cyber Psychology, Behavior, and Social Networking*, 13(2). pp. 173-177.
- [33] Keepers, G.A. (1990). Pathological preoccupation with video games. *Journal of the American Academy of Child and Adolescent Psychiatry*, 29, 49-50.
- [34] Kristie L. Young, Christina M. Rudin-Browna, Christopher Patten, RuggeroCecic, Michael G. Lenné (2014). Effects of phone type on driving and eye glance behavior while text-messaging. *Safety Science*. Volume 68, 47-54.
- [35] Leary, M. R., & Kowalski, R. M. (1995). Social anxiety. *New York: The Guilford Press*.
- [36] Lee, E. (2015). Too much information: heavy smartphone and Facebook utilization by African American young adults. *Journal of Black Studies*, 46(1), 44e61.
- [37] LietteLapointe, Camille Boudreau-Pinsonneault, and Isaac Vaghefi (2013). Is Smartphone usage truly smart? A qualitative investigation of IT addictive behaviors. 46th Hawaii International Conference on System Sciences, 2013.
- [38] Lukasz Piwek & Adam Joinson (2016). "What do they snapchat about?" Patterns of use in time-limited instant messaging service. *Computers in Human Behavior*. 54, 358-367
- [39] McKenna, K. Y. A., & Bargh, J. A. (2002). Can you see the real me? Activation and expression of the true self on the Internet. *Journal of Social Issues*, 58, 33-48
- [40] Melanie Grellhesl&Narissra M. Punyanunt-Carter (2012). Using the uses and gratifications theory to understand gratifications sought through text messaging practices of male and female undergraduate students. *Computers in Human Behavior*. 28, 2175-2181
- [41] Minkyung Lee, Yunkyoung Hong, Seunghoon Lee, Jinyoung Won, Jinjun Yang, Sookyoung Park, Kyu-Tae Chang, and Yonggeun Hong (2015). The effects of smartphone use on upper extremity muscle activity and pain threshold. *Journal Physical Therapy Science*. 27(6), 1743-1745.

- [42] Myungsuh Lima & Yoon Yang (2015). Effects of users' envy and shame on social comparison that occurs on social network services. *Computers in Human Behavior*. 51, 300-311.
- [43] Negahban, A. (2012). Factors affecting individual's intention to purchase smartphones from technology adoption and technology dependence perspectives. *Paper presented at the 18th Americas Conference on Information Systems*, Seattle, WA.
- [44] Oswald A. J. Mascarenhas & Mary A. Higby (1993). Peer, Parent, and Media Influences in Teen Apparel Shopping. *Journal of the Academy of Marketing Science*. Volume 21, Number 1, pages 53-58.
- [45] Oulasvirta, A., Rattenbury, T., Ma, L., & Raita, E. (2012). Habits make smartphone use more pervasive. *Personal and Ubiquitous Computing*, 16(1), 105-114. <http://dx.doi.org/10.1007/s00779-011-0412-2>
- [46] Oulasvirta, A., Rattenbury, T., Ma, L., & Raita, E. (2012). Habits make smartphone use more pervasive. *Personal and Ubiquitous Computing*, 16(1), 105-114. <http://dx.doi.org/10.1007/s00779-011-0412-2>
- [47] Richard P. Mattick & J. Christopher Clarke (1998). Development and Validation of Measures of Social Phobia Scrutiny Fear and Social Interaction Anxiety. *Behavior Research and Therapy*. 36 (1998) 455-470
- [48] Salehan, M., & Negahban, A. (2013). Social networking on smartphones: when mobile phones become addictive. *Computers in Human Behavior*, 29, 2632-2639.
- [49] Sang Jib Kwona, Eunil Parka, Ki Joon Kim (2014). What drives successful social networking services? A comparative analysis of user acceptance of Facebook and Twitter. *The Social Science Journal*. 51, 534-544.
- [50] Sheldon, P. (2008). The relationship between unwillingness-to-communicate and students' Facebook use. *Journal of Media Psychology*, 20, 67-75.
- [51] Shen, A. X. L., Cheung, C. M. K., Lee, M. K. O. and Wang, W. P. (2007). We-intention to use instant messaging for collaboration: A social influence model. *11th Pacific-Asia Conference on Information Systems*
- [52] Shotton, M. (1991). The costs and benefits of "computer addiction." *Behaviour and Information Technology*, 10, 219-230.
- [53] Solomon O. Ogara, Chang E. Koh, Victor R. Prybutok (2014). Investigating factors affecting social presence and user satisfaction with Mobile Instant Messaging. *Computers in Human Behavior*. 36, 453-459
- [54] Sonja Utz & Camiel J. Beukeboom (2011). The Role of Social Network Sites in Romantic Relationships: Effects on Jealousy and Relationship Happiness. *Journal of Computer-Mediated Communication*. 16. 511-527.
- [55] Sonja Utz, Martin Tanis, and Ivar Vermeulen (2012). It Is All About Being Popular: The Effects of Need for Popularity on Social Network Site Use. *Cyber Psychology, Behavior, and Social Networking*. Volume 15(1): 37-42
- [56] Tainyi (Ted) Luor, Ling-ling Wu, Hsi-Peng Lu, Yu-Hui Tao (2010). The effect of emoticons in simplex and complex task-oriented communication: An empirical study of instant messaging. *Computers in Human Behavior*. 26, 889-895.
- [57] Tamyra Pierce (2009). Social anxiety and technology: Face-to-face communication versus technological communication among teens. *Computers in Human Behavior*. 25 (2009) 1367-1372
- [58] Tao Zhou, Yaobin Lu (2011). Examining mobile instant messaging user loyalty from the perspectives of network externalities and flow experience. *Computers in Human Behavior*. 27, 883-889.
- [59] Tom Green, Tiril Wilhelmsen, Eva Wilmots, Beth Dodd, Sally Quinn (2016). Social anxiety, attributes of online communication and self-disclosure across private and public Facebook communication. *Computers in Human Behavior*. Volume 58, May 2016, Pages 206-213
- [60] V. Venkatesh, M.G. Morris, G.B. Davis, F.D. Davis (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27 (3) (2003), pp. 425-478
- [61] Vladlena Benson, George Saridakis, Hemamalini Tennakoon (2015). Purpose of social networking use and victimisation: Are there any differences between university students and those not in HE? *Computers in Human Behavior*. 51, Part B., 867-872.
- [62] Walter R. Gove & Michael R. Geerken, (1977). The Effect of Children and Employment on the Mental Health of Married Men and Women. *Social Forces*. Volume 56-1, September
- [63] Weinstein, A., & Lejoyeux, M. (2010). Internet addiction or excessive Internet use. *The American Journal of Drug and Alcohol Abuse*, 36(5), 277-283.
- [64] Wilburn Lane & Chris Manner (2011). The Impact of Personality Traits on Smartphone Ownership and Use. *International Journal of Business and Social Science*. Vol. 2 No. 17.
- [65] William O. Bearden, Richard G. Netemeyer and Jesse E. Teel (1989). Measurement of Consumer Susceptibility to Interpersonal Influence. *Journal of Consumer Research*, Vol. 15, No. 4 (Mar., 1989), pp. 473-481
- [66] Wilson, K., Fornasier, S., & White, K. M. (2010). Psychological predictors of young adults' use of social networking sites. *Cyber Psychology, Behavior, and Social Networking*, 13(2), 173-177.
- [67] Wynne W. Chin (1998). The Partial Least Squares Approach to Structural Equation Modeling. *Modern Methods for Business Research*, Chapter 10. LEA Publisher, 1998. London
- [68] Xu, C., Ryan, S., Prybutok, V., & Wen, C. (2012). It is not for fun: An examination of social network site usage. *Information & Management*, 49(5).
- [69] Yang Ji, Guang-Ji Wang, Qi Zhang, Zhuo-Hong Zhu (2014). Online social networking behaviors among Chinese younger and older adolescent: The influences of age, gender, personality, and attachment styles. *Computers in Human Behavior*, 41, 393-402
- [70] Yi-Wen Liao, Yueh-Min Huang, Hsin-Chin Chen, Shu-Hsien Huang (2015). Exploring the antecedents of collaborative learning performance over social networking sites in a ubiquitous learning context. *Computers in Human Behavior*. 43, 313-323.
- [71] Yoshimitsu Takahashi, Chiyoko Uchida, Koichi Miyaki, Michi Sakai, Takuro Shimbo, Takeo Nakayama (2009). Potential Benefits and Harms of a Peer Support Social Network Service on the Internet for People with Depressive Tendencies: Qualitative Content Analysis and Social Network Analysis. *Journal of Medical Internet Research*. Vol 11, No 3 (2009): Jul-Sep.
- [72] Young, K. S. (1998). Internet addiction: the emergence of a new clinical disorder. *Cyber Psychology & Behavior*, 1, 237-244.
- [73] Young, K. S. (2004). Internet addiction: a new clinical phenomenon and its consequences. *American Behavioral Scientist*, 4, 402-415.
- [74] Yu-Kang Lee, Chun-Tuan Chang, You Lin, Zhao-Hong Cheng (2014) The dark side of smartphone usage: Psychological traits, compulsive behavior and technostress. *Computers in Human Behavior*, Volume 31, February 2014, Pages 373-383.
- [75] Zhiyong Yang & Michel Laroche (2011). Parental responsiveness and adolescent susceptibility to peer influence: Across-cultural investigation. *Journal of Business Research*. 64, 979-987
- [76] Zhiyong Yang, Jingguo Wang, Mehdi Murali (2015). Effect of peer influence on unauthorized music downloading and sharing: The moderating role of self-construal. *Journal of Business Research*. 68, 516-525
- [77] Zhiyong Yang, Jingguo Wang, Mehdi Murali (2015). Effect of peer influence on unauthorized music downloading and sharing: The moderating role of self-construal. *Journal of Business Research*. 68 (2015) 516-525