DOI Number: 10.37506/v20/i1/2020/mlu/194637

The Effect of Workers' Smartphone Addiction on Depression: Dual Mediation of Growth Mindset and Impulsiveness

Chang-Seek Lee[1], Ha-Young Jang[2]

[1]Professor, Dept. of Health, Counseling and Welfare, Hanseo University, 31962 Korea,
[2]Ph.D. Student, Dept. of Child and Adolescent Counseling and Psychology, Hanseo University, 31962 Korea

Abstract

Background/Objectives: This study was performed to investigate the dual mediating effects of growth mindset and impulsiveness between smartphone addiction and depression of workers.

Method/Statistical Analysis: The major subjects of this study were 286 employees of 20 work-places in Seoul, Daejeon, Chungnam province, and Chungbuk areas. The collected data were analyzed using t-test, ANOVA, correlation analysis, dual mediation effect analysis by SPSS PC+ Win. 25 and SPSS PROCESS macro 3.4.

Findings: First, there was no significant difference in depression according to the general characteristics of the subjects. Second, the growth mindset had a negative correlation with impulsiveness and depression. And Impulsiveness had a positive correlation with depression. Third, mediating effect analysis revealed that there was a dual mediation effect of growth mindset and impulsiveness between smartphone addiction and depression of workers.

Improvements/Applications: Based on these findings, growth mindset is expected to act as a major defensive factor. And, we discussed ways to reduce depression caused by smartphone addiction.

Keywords: *Smartphone addiction, Growth mindset, Impulsiveness, Depression, Workers, Mediating effect.*

Introduction

Smartphone addiction generally means a situation in which the increase in usage cannot be controlled because of the excessive immersion in the smartphone[1]. Such smartphone addiction has the same context as the existing internet addiction, from which it differs because smartphones can run various applications, such as the internet and games, in any place, at any time[2]. These smartphone addictions can cause a variety of problems. In summary, previous studies discussed physical, psychological, and social problems in personal terms.

Corresponding Author:
Ha-Young Jang
Dept. of Child and Adolescent Counseling and Psychology
e-mail: besof@hanmail.net

First of all, the physical problems include Turtleneck Syndrome and Wrist Tunnel Syndrome caused by prolonged use of smartphones; dry-eye syndrome and spinal curvature were also found to be frequent. In particular, for workers, smartphone addiction worsens their vision, decreases physical fitness, and interferes with their work life because of lack of sleep[3]. Psychologically, it can cause mental illnesses, such as psychological anxiety, obsessive compulsive disorder, depression, and social avoidance[4]. In particular, if you do not have your smartphone, it may be difficult to concentrate on work or daily life, and hearing problems with ringing may occur. Socially, it has been reported to deteriorate interpersonal relationships[5]. The SNS function of smartphones has made it possible to connect with more people than the members of the society one belongs to. As a result, smartphone users can connect with various open and diverse people and feel accustomed to communicating in a virtual environment.

As a result, their communication with their family and friends has decreased, and more and more people cannot adapt to their relationships, which harms the level of mutual relations with others, social stability, autonomy, and social development[6-7].

This study was carried out with an interest in depression and impulsiveness, which are psychological problems among smartphone dysfunctions. According to previous studies, the relationship between smartphone addiction and depression appears to be very close. Lee said that the higher smartphone addiction, the higher the depression[8]. Sung further said that such depression affects their unhappiness and falls into lethargy[9].

On the other hand, smartphone addiction affects impulsiveness. Park said that impulsiveness was the most significant in the difference between the smartphone addiction group and the non-addictive group[10]. In addition, when the smartphone is used addictively, people do not control their own desire to use it, and in wanting to have a relationship with others, there is a tendency to satisfy the desire immediately[11].

Recently, growth mindset is a variable that is frequently studied as a defensive mechanism against impulsiveness and depression. Dweck calls "mindset" a belief in one's intelligence or ability[12]. He divided mindset into a fixed mindset, which means an unchanging attitude, and a growth mindset, which means that skills can be developed. People with a growth mindset excel in many areas, including goal orientation, achievement standards, thinking about effort, challenges, and frustration[13]. Recently, various empirical studies have found that growth mindset has a very positive effect on negative psychological problems, such as anxiety and depression. Thus, one can assume that growth mindset will reduce impulsiveness and depression from smartphone addiction.

These previous studies found that impulsiveness mediates between workers' smartphone addiction and depression. However, a growth mindset acts as a defense against impulsiveness. Overall, therefore, growth mindset and impulsiveness will both mediate between smartphone addiction and depression. However, most of the studies conducted so far focused on the research that identified the negative effects of smartphones.

Therefore, this study set the smartphone addiction of workers as the independent variable, depression as a dependent variable, and explored whether a worker's growth mindset and impulsiveness play a dual mediation role. In order to achieve this goal, the research questions are as follows. First, what is the difference in depression according to the general characteristics of workers? Second, what is the role of growth mindset and impulsiveness between smartphone addiction and depression?

Method

Research Model: Based on previous studies conducted to date, the research model shown in [Figure 1] was set up. In other words, a dual mediation model of growth mindset and impulsiveness was established in the relationship between smartphone addiction and depression.

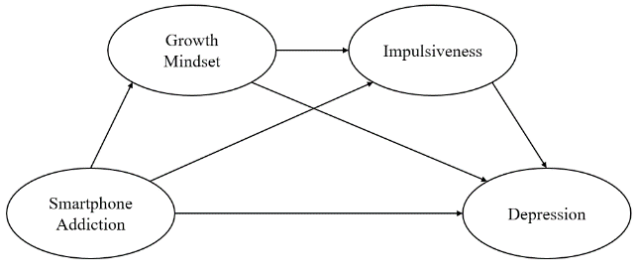


Figure 1. Research model

Research Subjects: For the study areas, 20 workplaces in Seoul, Daejeon, Chungnam, and Chungbuk were selected, and 286 workers were selected from the workplaces. The genders were 234 males (82.4%) and 50 females (17.6%). The most common age group was in the thirties, with 128 (44.8%), followed by 77 in the 40s (26.9%), 48 in the 20s (16.8%), and 30 in the 50s (10.5%). In terms of marital status, there were 174 married people (61.3%), 110 unmarried people (38.7%). Finally, the monthly salary distribution was 110 persons (35.2%) with 3 million won, 97 persons (34.2%) with 2 million won, 43 persons (15.1%) with more than 4 million won, and 34 (12.0%) with less than 2 million won.

Research Tools:

Smartphone Addiction: The measurement was done using an adult smartphone addiction self-diagnosis scale developed by the Korean Information Technology Intelligence Agency[14]. This scale is composed of sub-domains of daily living disorders, virtual world orientation, withdrawal, and tolerance, but they are summed up in this study. The smartphone addiction scale is a 5-point Likert scale and consists of 15 questions. Each

item is given a score from "not at all" to "very much" with a score of 5, with questions 4, 10, and 15 being reverse scored. A higher score means more smartphone addiction. In this study, the overall reliability was found to be Cronbach's α = .854, indicating a reliable level.

Growth Mindset: We used the scale developed by Carol Dweck[15] and translated by Lee[16]. The growth mindset is a tool for measuring how close an individual is to a fixed mindset or a growth mindset. It is divided into subfactors of intelligence and personality. It consists of 8 questions, and each sub-factor consists of 2 positive questions and 2 negative questions about intelligence, and 2 positive questions and 2 negative questions about personality. In this study, each sub-factor was summed up without any distinction of subfactors, and the range of questions was measured on a five-point Likert scale ranging from one point of "not at all" to five points of "very ". Negative questions were scored in reverse. The higher the total score, the higher the growth mindset. The reliability of this scale Cronbach 's α is .813 and is judged to be reliable.

Impulsiveness: We used the Barratt Impulsiveness Scale (BIS) developed by Barratt[17] and used by Yang[18]. It consists of 5 questions that adapt the scale of smartphone addiction to the purpose of this study. The questions were measured on a five-point Likert scale, ranging from one point of "not at all" to five points of "very much". The higher the total score, the higher the impulsiveness. In this study, Cronbach's α was .870, which was judged to be reliable.

Depression: We used five questions selected by Yang[18] based on the development and validation of Bae[19]. The questions consist of a total of five Likert scales, ranging from one point of "not at all" to five points of "very much". The higher the total score, the higher the depression. In this study, the Cronbach's α of this scale was .795.

Other Variables: The gender, age, marital status, and salary of workers were examined.

Data Analysis: We did data analysis using SPSS PC + Win. Ver. 24.0. Frequency analysis, reliability analysis, t-test, ANOVA, and correlation analysis were done using the SPSS PC + Win. 25. In addition, dual-mediation effect and bootstrapping were assessed using the SPSS PROCESS macro 3.4.

Result and Discussion

Depression According to General Characteristics: There was no significant difference in depression according to the general characteristics of the subjects, as is presented in Table 1. Specifically, gender (t = -1.553, p = .122), age range (F = .200, p = .896), marital status (t = -1.475, p = .141), or salary (F = .641, p = .589) did not show a significant difference.

Table 1. Depression according to general characteristics; N = 286

		Frequency	Depression	
			M (SD)	t value/F (Duncan)
Gender	Male	234	2.552(.755)	-1.553(p=.122)
	Female	50	2.733(.723)	
Age range	Twenties	48	2.591(.722)	.200(p=.896)
	Thirties	128	2.561(.730)	
	Forties	77	2.639(.713)	
	More than fifty	30	2.546(.709)	
Marital status	Married	174	2.532(.772)	-1.475(p=.141)
	Single	110	2.666(.705)	
Month salary	Less than 2 million	34	2.719(.710)	.641(p=.589)
	2 and 3 million	97	2.552(.701)	
	3 and 4 million	110	2.604(.720)	
	More than 4 million	43	2.497(.711)	

***: p<0.001

Correlation of key variables: The results of correlation analysis of the major variables are presented in Table 2. Smartphone addiction was negatively correlated with growth mindset and positively correlated with impulsiveness and depression. The growth mindset had a negative correlation with impulsiveness and depression. Impulsiveness had a positive correlation with depression. Impulsiveness and depression together showed the highest correlation (r = .573, p < .01), followed by smartphone addiction and depression (r = .512, p < .01), and smartphone addiction and impulsiveness (r = .487, p < .01).

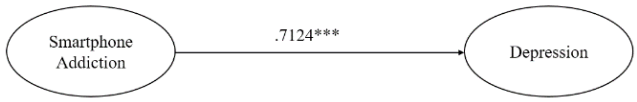
Table 2. Correlation coefficients between major variables

	1.	2.	3.	4.
Smartphone addiction	1			
Growth mindset	-.345**	1		
Impulsiveness	.487**	-.339**	1	
Depression	.512**	-.311**	.573**	1
M	2.67	3.26	2.76	2.58
SD	.53	.60	.63	.74

**: p<0.01

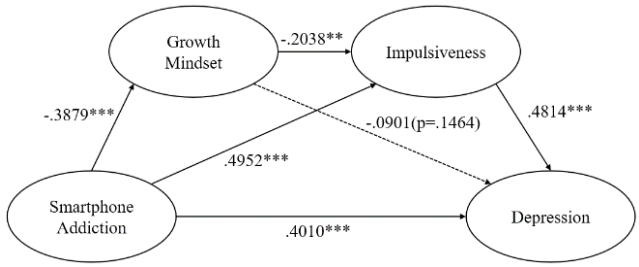
These results are mostly consistent with previous studies[10,12-13]. In other words, the more severe the smartphone addiction, the more negative the depression and the higher the impulsiveness. Growth mindset had a negative effect on depression. This is sufficiently predictable at the common-sense level and has been found in recent studies[13]. Therefore, in order to reduce the depression of workers, it is necessary to devise a way to suppress smartphone addiction. However, the reality is that smartphone addiction is difficult to suppress, because smartphone use is difficult to suppress.

Effects by Path: [Figure 2] shows the magnitude of the overall effect of workers' smartphone addiction on depression. In [Figure 3], the coefficients for each path are presented to verify the double mediating effect. Verifying the coefficients for each path showed that all of them were statistically significant, except for the influence of growth mindset on depression (-.0901, p =.1464). Smartphone addiction had a negative effect on growth mindset (-.3879, p<.001) and a positive effect on impulsiveness (.4952, p<.001) and depression (.4010, p<.001). Growth mindset had a negative effect on impulsiveness (-.2038, p<.01), and impulsiveness had a positive effect on depression (.4814, p<.001).



***: p<0.001

Figure 2. The total effect of smartphone addiction on depression



**: p<0.01, ***: p<0.001

Figure 3. The dual mediating effect of growth mindset and impulsiveness

Table 3. Dual mediating effect of growth mindset and impulsiveness

Classification	Mediating effects		
	B	S.E.	BC 95% CI
smartphone addiction → growth mindset → depression	.0350	.0273	-.0120 ~ .0957
smartphone addiction→ impulsiveness → depression	.2384	.0530	.1374 ~ .3474
smartphone addiction → growth mindset → impulsiveness → depression	.0381	.0199	.0091 ~ .0858
Total Indirect Effect	.3114	.0584	.2011 ~ .4294

Dual mediation effect verification: 15,000 bootstrapping was done to verify the dual mediation effect, and the confidence interval was set to 95%. As shown in Table 3, the total indirect or mediation effect was .3114 (.2011 ~ .4294), which was significant, because there was no 0 in the 95.0% confidence interval. In addition, the verification of the simple mediation effect of growth mindset between smartphone addiction and depression was .0350 (-. 0120 ~ .0957), which was not significant, because there was a 0 in the 95.0% confidence interval. However, the simple mediation effect of impulsiveness between smartphone addiction and depression was .2384 (.1374 ~ .3474), which was significant, because there was no 0 in the 95.0% confidence interval. In addition, the dual mediation effect of growth mindset and impulsiveness between smartphone addiction and depression was .0381 (.0091 ~

.0858), which was significant, because there was no 0 in the 95.0% confidence interval. Therefore, there is a dual mediation effect of growth mindset and impulsiveness between smartphone addiction and depression of workers.

These results indicate that growth mindset can play a positive role in both the impulsiveness and the depression that are caused by smartphone addiction. In other words, growth mindset can lower the impulsiveness and depression caused by smartphone addiction. Therefore, the policies about the smartphone addiction of workers need to be dualized. First of all, training to decrease the use of the smartphone itself is needed. However, this requires a strong will of the trainees and is likely to have a partial effect, because the reality is not so high. Therefore, the second solution is to minimize the damage even if a worker is addicted to smartphones. Therefore, in this study, growth mindset has been found to play such a role. Accordingly, it is necessary to prepare an education program to increase growth mindset in the workplace.

Conclusion

This study investigated the dual mediating effects of growth mindset and impulsiveness between workers' smartphone addiction and depression. As a result, growth mindset and impulsiveness were found to indicate serial dual mediation. Based on these findings, we discussed ways to reduce depression caused by smartphone addiction.

Suggestions about the limitations of this study are as follows. First, this study was conducted in Seoul, Daejeon, Chungnam, and Chungbuk and thus has regional limitations. Therefore, it is unreasonable to generalize the results of this study to national phenomena. In the future, national sampling will be needed. Second, we set growth mindset as a parameter that acts as a defensive factor. However, there are many variables that play this role. Later we will need to uncover further variables.

On the other hand, the research on the growth mindset conducted to date has been limited to the academic achievement of adolescents, but recently, research on adults has been actively conducted. In this study, the growth mindset may have a significant role in the positive role of adults.

Ethical Clearance: Not required

Source of Funding: Self

Conflict of Interest: Nil

References

1. Kim BN. Effect of Smart-phone Addiction on Youth's Sociality Development. The Journal of the Korea Contents Association. 2013 Apr. 13(4): 208-17. DOI: 10.5392/JKCA.2013.13.04.208.
2. Seo BK. Adult Internet Addiction and Smartphone Use Characteristics. The Journal of the Korea Contents Association. 2014 Jan; 14(1):305-17. 10.5392/JKCA.2014.14.01.305.
3. Jang R. How game addiction and smart phone addiction affects teens physical health [master's thesis]. Myungji University, Seoul; 2013.
4. Park YM. A Study on Adults' Smart Phone Addiction and Mental Health [master's thesis]. Wonju: Sangji University; 2011.
5. Pi SJ. The Difference in SNS Addiction possibility, Self-Esteem [master's thesis]. Dankuk University, Seoul; 2012.
6. Kim HJ. The Influence of Adolescents' Smart Phone Addiction on Sociality Development and School Adaptation [master's thesis]. Honam University, Kwangju; 2013.
7. Jo SJ. Relationship between Smartphone addiction and self-esteem, impulsiveness and sociability among high school students [master's thesis]. Seogang University, Seoul; 2012.
8. Lee MY. The Effects of Stress on Smartphone Addiction in University Students -Mediator Effects of Depression-. The Journal of the Korea Contents Association. 2019 Mar; 19(3):375-84. DOI: 10.5392/JKCA.2019.19.03.375.
9. Sung DH. Study of impact regarding teenagers' bullying and depression on consideration for committing suicide: based on mediator effect of social support [Doctoral thesis]. Baeksuk University, Cheonan; 2015.
10. Park HS. The Study on Predictors of Addictive Personality in Adolescents. Journal of Korean Academy of Psychiatric and Mental Health Nursing. 2012 Jul; 21(4):263-71.
11. Lee SJ, Kim BR, Choi TK, Lee SH, Yuk KH. Associations between Smartphone Addiction Proneness and Psychopathology. Journal of Korean Society of Biological Psychiatry.2014 Jul; 21(4):161-7.

12. Dweck CS. Mindset the new psychology of success. New York: Random House Inc; 2016.
13. Blackwell LS, Trzesniewski KH, Dweck CS. Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. Child Development. 2007; 20(1):246-63.
14. Shin KW, Kim DI, Jung YJ, Lee JY, Lee YH, Kim MC, et al. Development of Korean smartphone addiction proneness scale for youth and adults. Seoul: The Korean Information Technology Intelligence Agency; 2011. Available from: http://library.nia.or.kr/search/detail/CATTOT000000022558?mainLink=/search/tot&briefLink=/search/tot/result?q=%EC%9D%B4%EC%9C%A4%ED%9D%AC_A_st=FRNT_A_si=2
15. Dweck CS. Mindset: The new psychology of success, New York: Ballantine Books; 2006.
16. Lee CS, Jang HY. The roles of growth mindset and grit in relation to hope and self-directed learning. Journal of the Korea Convergence Society. 2018 Jan;9(1):95-102. DOI: 10.15207/JKCS.2018.9.1.095.
17. Barrat E, Patton J, Oisson NG, Sucker G. Impulsivity and paced tapping. Journal of Motor Behavior. 1981;13; 286-300.
18. Yang HK. The Effects of Personal, Environmental, Media Characteristics Factors on the Smartphone Addiction of Elementary School Students [Master's thesis]. Korea National University of Education, Cheongju; 2014.
19. Bae YJ. Construction and validation of child depression scale [Master's thesis]. Jeonju University of Education, Jeonju; 2009.