

# The Effect of Stress on Smartphone Addiction in Nursing Students: The Mediating Effect of Interpersonal Relationship

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## Abstract

Exploration of the variables that mediate or moderate the force of stress on smartphone addiction is required. The present contrivance aimed to determine the mediating effect of interpersonal relationship in relation to stress and smartphone addiction among nursing students. Subjects consisted of 261 nursing students. A survey was conducted with organized questionnaires. Stress was measured with the Stress Response Inventory (SRI). Smartphone addiction was evaluated with the S-scale (Smartphone addiction proneness scale) for adults. The ability for interpersonal relationship was measured using the Relationship Change Scale (RCS). Data were analyzed using Baron and Kenny's mediating analysis, and Sobel test which was used to testify the signification of mediating effect. The degree of smartphone addiction in nursing students according to individual characteristics was significantly different according to gender. Stress was positively correlated with smartphone addiction and negatively correlated with interpersonal relationship, while smartphone addiction was negatively correlated with interpersonal relationship. These findings also showed a partial mediating effect of interpersonal relationship on the force of stress on smartphone addiction. This result indicates that interpersonal relationship can act as a protective factor which contributes to reducing smartphone addiction. Programs or activities to facilitate interpersonal relationship are recommended to reduce smartphone addiction in nursing students. In addition, factors influencing smartphone addiction should be further explored in future studies.

**Keywords:** Stress; Smartphone addiction; Interpersonal relationship; Nursing student; Mediating effect

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## Introduction

Within the advent of ubiquitous networks and development of smartphone devices, the use of smartphones is increasing day by day. As various applications (apps) have been developed, so has the range of smartphone use expanded. Problems such as addiction due to excessive use have increased continuously by smartphone usage throughout life, so the need of intervention

measures or policies to prevent smartphone addiction seem appropriate (Park *et al.*, 2014). According to a survey (Ministry of Science and ICT *et al.*, 2019), the rate of smartphone overdependence among high risk and potential risk groups in Korea was 20.0% in 2019 – an increase of 0.9% compared to the previous year. The influence of smartphones has grown tremendously among college students, and the proportion of addictions resulting from smartphone usage has increased (Kang *et al.*, 2020). It has been reported that rates of excessive smartphone usage by college students is 27.4% (Cho and Kim, 2014) higher than the 26.7% for high school students (Lee and Eo, 2015). A study (Lee, 2019) investigated smartphone dependency (SD) based on school level employing materials from the Seventh Korean Children and Youth Panel Survey, and reported that college students had the highest SD score, followed by high school students and middle school students. Another study (Kim, 2020) showed that nursing college students demonstrated higher levels of smartphone addiction (30.0%) than general university students (Cho and Kim, 2014). Therefore, studying the factors affecting smartphone addiction and the variables that mediate or moderate the influence of such addiction are needed for the nursing student population.

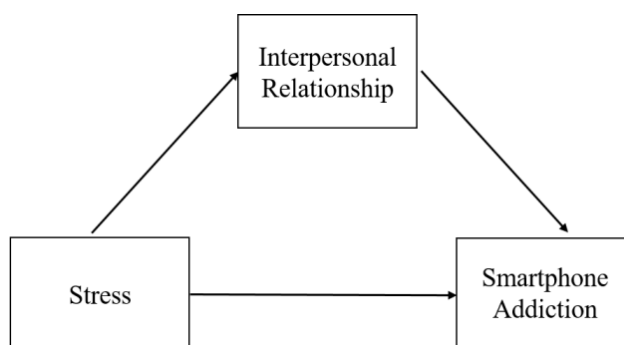
Stress had been found as a hazard component for smartphone addiction amongst college students (Jue *et al.*, 2019); the same result was also observed in a study (Kim, 2020) of nursing students. It is said that students suffer psychological distress or conflict from various causes and that smartphone addiction could arise as a form of stress avoidance from such experiences (Jeon and Jang, 2014). Kang and colleagues (Kang *et al.*, 2016) examined the force of stress on interpersonal relationships in 222 university students and determined that students displayed lower human relationship skills as the level of stress from their studies increased. Lee and colleagues (Lee *et al.*, 2014) revealed a negative correlation ( $r = -.285, p < .001$ ) between stress and interpersonal relationship in 170 nursing students. Several studies have exposed that interpersonal relationships and smartphone addiction are related. A study of college students (Cho and Jeon, 2016) reported that the mean score of interpersonal relationship in a problematic mobile phone use (PMPU) set was lower than that of the non-PMPU set. In addition, interpersonal relationship was significantly associated with PMPU (OR 0.95 [95% CI 0.91-1.00],  $p < .05$ ), after controlling for other covariates. In a study of 260 health science students (Lee and Cha, 2014), smartphone overuse was negatively related with an individual's interpersonal relationship which, in turn, was negatively related to depression. Failure to form mellifluent interpersonal relationships or confrontation by others in an unfamiliar situation can cause interpersonal anxiety. Researchers (Park and Park, 2017) confirmed a positive correlation between interpersonal relationship anxiety and smartphone addiction in 173 nursing students. Nursing students must communicate effectively with friends and professors at university and

with patients, nurses, and healthcare workers in clinical institutions while maintaining good interpersonal relationships. Therefore, the ability for interpersonal relationship is an important capacity for nursing students (Lee *et al.*, 2018). Interpersonal relationship was a factor influencing the level of smartphone usage among nursing students (Kim and Kim, 2016). Most of the existing studies have only looked partially at the relationship between stress and smartphone addiction or interpersonal relationship and smartphone addiction. There is a paucity of studies that evaluate the relationship between stress, smartphone addiction, and interpersonal relationship concurrently. A recent study of university students (Baek *et al.*, 2016) investigated the mediating effect of interpersonal relationship between stress and smartphone addiction; however, research on nursing students has not yet been conducted. Therefore, this research was carried out to identify the mediating strength of interpersonal relationship in relation to nursing students' stress and smartphone addiction.

## Materials and Methods

### Research design

This research is a cross-sectional predicative study to affirm the mediating effect of interpersonal relationship between stress and smartphone addiction amongst nursing students. Figure 1 shows the mediation model of the present study.



**Figure 1. Mediation model of the present study**

### Research participants

The participants of this research were students attending the nursing department of a university in Chungcheongnam-do. Students who got the end of the research and assented in writing to partake in the research were included. The survey was conducted from September 10, 2018 to September 19, 2018 using structured questionnaires. The numeral of participants was computed by G\*Power 3.1.9.2. In the regression analysis, sample size was calculated as 146 when the effect size was .15, significance level was .05, and power was .95, with 6 predictive variables. Accordingly, the questionnaires were distributed to 270 people, and the data of 261

persons, excluding 9 missing cases, were analyzed.

### **Research instruments**

Stress was measured by using the Stress Response Inventory (SRI) (Kohet *al.*, 2000). It is composed of 39 items with a 5-point Likert scale and possible points reach from 0 to 156; higher total score indicates higher perceived stress. The Cronbach's  $\alpha$  was .96 in this research.

The S-scale (Smartphone addiction proneness scale) for adults (National Information Society Agency, 2011) was used to size the degree of smartphone addiction. It is made up 15 items with a 4-point Likert scale with a scaled score ranging from 15 to 60; higher total score indicates more addictive use of the smartphone. It is classified into three user groups according to the total score; high risk ( $\geq 44$ ) / potential risk (40-43) / general ( $\leq 39$ ) user group. The Cronbach's  $\alpha$  was .78 in this research.

The ability for interpersonal relationship was utilized as the mediating variable. The level of ability for interpersonal relationship of participants was evaluated by the Relationship Change Scale (RCS) (Schleinand Guerney, 1971). It was subsequently translated to the Korean language (Moon S M, 1980). There are 25 queries with a 1 to 5 scale (1, very dissatisfactory; 5, very satisfactory) with the total score reaching from 25 to 125, the higher the score indicating higher satisfaction of one's interpersonal relationships. The Cronbach's  $\alpha$  was .91 in this study.

### **Statistical analysis**

Data were analyzed descriptively to examine participant characteristics and level of stress, smartphone addiction, and interpersonal relationship. To appraise dissimilarity in smartphone addiction by characteristics of participators, ttest or one-way analysis of variance was computed. The IBM SPSS version 24.0 was employed for all data analysis. Baron and Kenny's mediating analysis according to the three-step procedure and Sobel test using Statistics Calculator 4.0 were performed to determine the mediating effect of interpersonal relationship on the force of stress on smartphone addiction.

### **Results and Discussion**

General characteristics of participators are shown in Table 1. Of the 261 participants total, 80.5% (n = 210) were female and 19.5% (n = 51) were male students. As for participant age, 63.2% (n = 165) were between 20 and 24 years old, and 29.5% (n = 77) were under 19 years old. The mean age was 21.25 years (SD = 3.32). Students in the first, second, and fourth grades of nursing college were each 27.9% (n = 72), while 23.0% (n = 60) were in their third year. The relationship between general characteristics of the study subjects and smartphone addiction is summarized in Table 1. Smartphone addiction was significantly associated with gender ( $p <$

.01). The average score of smartphone addiction among female pupils was higher than that of male pupils; however, there were no differences according to age or grade.

**Table 1: Smartphone addiction according to general characteristics (N = 261)**

Variables	Categories	n(%)	M±SD	t/F	p
Gender	Male	51(19.5)	31.27±6.18	-3.52	.001
	Female	210(80.5)	34.50±5.80		
Age (year)	≤ 19	77(29.5)	34.06±5.76	0.06	.944
	20-24	165(63.2)	33.78±6.16		
	≥ 25	19(7.3)	33.84±5.93		
Grade	Grade 1	67(25.7)	33.42±6.22	1.80	.147
	Grade 2	67(25.7)	32.90±5.47		
	Grade 3	60(23.0)	34.00±5.89		
	Grade 4	67(25.7)	35.18±6.28		

Means of stress, smartphone addiction, and interpersonal relationship are shown in Table 2. The mean (±SD) for stress was 51.48 (±29.98), 33.87 (±6.00) for smartphone addiction, and 92.39 (±12.65) for interpersonal relationship.

**Table 2: Means of stress, smartphone addiction, and interpersonal relationship (N = 261)**

	Minimum	Maximum	M±SD
Stress	0	134	51.48±29.98
Smartphone addiction	15	52	33.87±6.00
Interpersonal relationship	49	125	92.39±12.65

Classification of smartphone addiction of participants is presented in Table 3. General group, potential risk group, and high risk group were 85.1% (n = 222), 9.2% (n = 24), and 5.7% (n = 15); respectively. 14.9% of students had risk of smartphone addiction.

**Table 3: Classification of smartphone addiction of participants (N = 261)**

Score	Group	n(%)
≤ 39	General group	222(85.1)
40-43	Potential risk group	24(9.2)
≥ 44	High risk group	15(5.7)

Table 4 presents the correlations among the variables studied. As shown in Table 4, stress was significantly and positively correlated with smartphone addiction ( $r = .378, p < .001$ ) and negatively correlated with interpersonal relationship ( $r = -.521, p < .001$ ). Smartphone addiction was significantly and negatively correlated with interpersonal relationship ( $r = -.298, p < .001$ ).

**Table 4: Correlations among the variables (N = 261)**

	Stress	Smartphone addiction	Interpersonal relationship
	r(p)	r(p)	r(p)
Stress	1		
Smartphone addiction	.378(<.001)	1	
Interpersonal relationship	-.521(<.001)	-.298(<.001)	1

The three-step procedure designed by Baron and Kenny was carried out to determine the mediating effect of interpersonal relationship on stress and smartphone addiction. Table 5 presents the results of mediating analysis. In the first step, independent variable stress significantly explained the mediating variable interpersonal relationship ( $\beta = -.521, p < .001$ ). In the second step, stress significantly explained the dependent variable smartphone addiction ( $\beta = .378, p < .001$ ). In the third step, the mediating variable interpersonal relationship was found to have a significant influence ( $\beta = -.139, p < .05$ ) on smartphone addiction. In addition, the partial mediating effect of interpersonal relationship was identified because the influence ( $\beta = .305, p < .001$ ) of stress on smartphone addiction was significantly decreased compared to the influence ( $\beta = .378, p < .001$ ) in the second step

**Table 5: Factors affecting interpersonal relationship of nursing students (N = 261)**

Steps	Variables	B	SE	$\beta$	t(p)	R <sup>2</sup>	F(p)
1	Stress → Interpersonal relationship	-.221	.023	-.521	-.9.822(<.001)	.271	96.481(<.001)
2	Stress → Smartphone addiction	.078	.012	.378	6.563(<.001)	.143	43.072(<.001)
3	Stress → Smartphone addiction	.063	.014	.305	4.553(<.001)	.157	23.980(<.001)
	Interpersonal relationship → Smartphone addiction	-.068	.033	-.139	-2.082(<.05)		

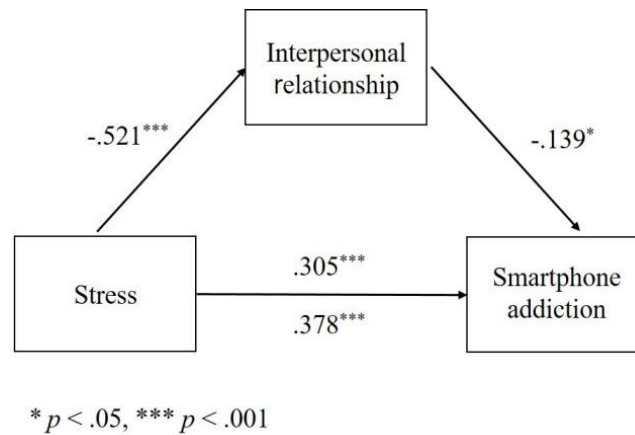
Sobel's z test was executed to certify the signification of the mediating effect of interpersonal relationship. As shown in Table 6, the consequences assured a partial mediating effect of interpersonal relationship on the connection between stress and smartphone addiction ( $Z = 2.015, p < .05$ ).

**Table 6: Sobel test (N = 261)**

	Process	a(SEa)	b(SEb)	Zab(p)
Stress	→ Interpersonal relationship	-.221(.023)	-.068(.033)	2.015(<.05)
	→ Smartphone addiction			

The modified model is giveded in Figure 2. The direct passage from stress to smartphone

addiction was statistically significant ( $\beta = .378, p < .001$ ). Bootstrapping outcomes further demonstrated that the indirect effect of stress on smartphone addiction ( $\beta = .305, p < .001$ ), via interpersonal relationship, was statistically significant.



**Figure 2. Mediating effect of interpersonal relationship between stress and smartphone addiction**

The object of this research was to check up the mediating effect of interpersonal relationship between stress and smartphone addiction in nursing students. Prior to full-scale analysis, the subject's smartphone addiction level was first examined. The mean score of smartphone addiction of subjects was 33.87 in this study, which was similar to the results (32.51) of them (Kwon and Paek, 2016). When categorized by applying the criteria of NIA in this study, 14.9% of participants appeared to have a risk of smartphone addiction. This result was similar to the smartphone addiction rate of 14.7% in one study (Kwon and Paek, 2016) measured by 293 university students using the same tool. However, in studies of nursing college students conducted by other researchers (Kim, 2020; Seo and Bang, 2017), smartphone addiction rate was 30%~43%, which differed largely from the findings of this study. One possible explanation for this difference is that the proportion of female students in this study was much lower than that of the other two studies. In this study, there was a statistically substantial difference in gender in smartphone addiction according to general characteristics, which was consistent with the findings of researcher (Cho and Kim, 2014; Kim, 2020). They interpreted the reason for higher female student smartphone addiction (compared to male students) as that females have a stronger relationship orientation and thus would use the smartphone as a means of communicating with others via chat and social networks. Nevertheless, some studies (Long *et al.*, 2016; Sashin *et al.*, 2013) have reported no differences based on gender. In a study (Longet *et al.*, 2016), male students accounted for 46.1%, with no difference in gender composition. As females are immersed in social networking, males may spend the time playing games; thus, there might be no difference in smartphone addiction according to gender. In regard to age, younger groups show higher

likelihood of smartphone addiction (Hauget *al.*, 2015); however, in this study, there was little difference in age among the similar peer groups, and no difference was found in levels of smartphone addiction according to age or grade. Variables such as income of family (Longet *al.*, 2016) and alcohol use (Cho and Jeon, 2016), which appeared as factors of smartphone addiction among university students in other studies, were not included in our analysis. Therefore, more research is needed to consider the effect of other personal characteristics and cultural differences on smartphone addiction.

Two researchers (Gligor and Mozoş, 2018) analyzed the correlation between stress score (International Stress Management Association Questionnaire) and indicator of smartphone addiction (Mobile Phone Dependence Questionnaire) in 148 Romanian university students including medical and nursing students. They found that the correlation between stress score and smartphone addiction was weak but significant ( $r = .305, p < .01$ ). It was evaluated perceived stress level and degree of smartphone addiction for 195 medical students in India (Dharmadhikari *et al.*, 2019) using the Perceived Stress Scale (PSS-10) and the Smartphone Addiction Scale-Short Version, respectively. Although smartphone addiction and stress measurement tools used in the present study were different, there was a significant correlation ( $r = .40, p < .001$ ) between the two variables in both studies. The authors also demonstrated that students had high awareness about smartphone addiction but left room for further research as to whether this would lead to action for treatment. In a qualitative study (Kang *et al.*, 2020) that analyzed the experience of smartphone addiction of nursing students through focus group and in-depth interviews, categories such as 'Recognized as a Problem' and 'Trying to stay Away but no control' were identified. The government currently operates a variety of programs through affiliated institutions to prevent and eliminate overdependence on smartphones; however, customized programs for college students are still scarce. Students busy with the rigors of academic life would be more likely to participate if provided with comfortable and easily accessible counseling. Therefore, it is recommended that students at risk of smartphone addiction be screened and counseled with addiction prevention/stress relief education via counseling centers within the university.

The smartphone is an effective communication vehicle, especially for young people. It helps to expand interpersonal relationships (Aljoma *et al.*, 2016); however, excessive smartphone usage may also facilitate avoidance of face-to-face communication and lead to a decline in communication skills. Some researchers (Kanget *al.*, 2017) argued that in order to increase interpersonal relationship capability, it is necessary not only to communicate using the smartphone, but also to establish a wide range of interpersonal relationships through active in-person communication. Therefore, the efficient use of smartphones in nursing education is



suggested while providing students with instructions on self-control. A study (Park *et al.*, 2014) notified that there was no significant difference in interpersonal competence between at-risk and normal user groups among 502 college students using SNS on the smartphone. However, students who had higher scores for virtual life demonstrated lower interpersonal competence, and those with higher smartphone addiction scores scored lower in managing interpersonal conflict in subdomains of interpersonal competence. It is believed that students with good interpersonal relationship skills can better express emotional distress caused by stress and receive support from those around them. Increase in smartphone usage time decreases time available for in-person communication which may have negative effects on interpersonal relationships. Thus, addictive use of the smartphone is likely to have a negative impact on social development by reducing face-to-face interaction (Kim, 2015). Therefore, an offering of various non-curricular programs or/and club activities may provide an opportunity to promote and improve interpersonal relationships.

The ultimate goal of this study was to proof our recommended mediation model. We found that the influence of stress on smartphone addiction was mediated by interpersonal relationships among nursing students. The accomplishments of this research were consistent with the findings of previous study (Baek *et al.*, 2016), who examined the mediating effect of interpersonal relationship in relation to college students' stress and smartphone addiction. The consequences of their research strongly corroborate the findings of this study. Given the paucity of similar studies, further investigation of the parameters mediating smartphone addiction would be beneficial and informative for future studies.

## **Conclusion**

The present study crystallized the mediating effect of interpersonal relationship on the effect of stress on smartphone addiction of nursing students. Therefore, the development and implementation of an integrated program to reduce stress and promote interpersonal relationship is suggested for students at peril of smartphone addiction.

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## **References**

1. Aljomaa, S.S., Al Qudah, M.F., Albursan, I.S. and Bakhiet, S.F., 2016. Smartphone addiction among university students in the light of some variables. *Computers in Human Behavior*, 61,

- pp. 155-164. DOI:10.1016j.chb.2016.03.041
2. Baek, H.Y., Yoo, S.H. and Jo, S.S., 2016. The effect of college students' stress on smartphone addiction forced on mediating effect of interpersonal relationship. *Journal of The Korean Data Analysis Society*, 18(3), pp. 1621-1635.
  3. Cho, G.Y. and Kim Y.H., 2014. Factors affecting smartphone addiction among university students. *Journal of the Korea Academia-Industrial cooperation Society*, 15(3), pp. 1632-1640. DOI: 10.5762/KAIS.2014.15.3.1632
  4. Cho, S. and Jeon, G.S., 2016. Correlates of problematic mobile phone use among Korean college students. *The Korean Journal of Stress Research*, 24(1),pp. 13-22. DOI:10.17547/kjsr.2016.24.1.13
  5. Dharmadhikari,S.P., Harshe, S.D. andBhide, P.P., 2019. Prevalence and correlates of excessive smartphone use among medical students: a cross-sectional study. *Indian Journal of Psychological Medicine*, 41(6), pp. 549-555. DOI:10.4103/IJPSYM.IJPSYM\_75\_19
  6. Gligor, Ş. andMozoş, I., 2018. Indicators of smartphone addiction and stress score in university students. *WienerKlinischeWochenschrift*, 131(5-6),pp. 120-125. DOI:10.1007/s00508-018-1373-5
  7. Haug, S., Castro, R.P., Kwon, M., Filler, A., Kowatsch, T. and Schaub, M.P., 2015. Smartphone use and smartphone addiction among younger people in Switzerland. *Journal of Behavioral Addictions*, 4(4), pp. 299-307. DOI:10.1556/2006.4.2015.037
  8. Jeon, H.S. and Jang, S.O., 2014. A study on the influence of depression and stress on smartphone addiction among university students: focused on moderating effect of gender. *Korean Journal of Youth Studies*, 21(8), pp. 103-129.<http://kiss.kstudy.com/thesis/thesis-view.asp?key=3264471>
  9. Ju, H.J., Jun, H.S. and Park, M.K., 2019. The stress, self-efficacy, and self-control of university students impact on smartphone addiction. *Journal of Digital Convergence*, 17(11), pp. 395-407. DOI:10.14400/JDC.2019.17.11.395
  10. Kang, H.L., Cha, J.G. and Oh H., 2020. Smartphone addiction through nursing student experience. *Korean Association of Addiction Crime Review*, 10(1), pp. 1-19. <https://www.earticle.net/Article/A371438>
  11. Kang, H.L., Lee, Y.R. and Hwang, J.H., 2017. The influences of the interpersonal relationship capabilities and the self-control of the university students on smartphone addiction. *Korean Association of Addiction Crime Review*, 7(2),pp. 1-23.
  12. <https://www.kci.go.kr/kciportal/ci/sereArticleSearch/ciSereArtiView.kci?sereArticleSearchBe>
- <http://annalsofrscb.ro>

an.artiId=ART002238899

13. kang, M.S., Kim, Y.S. and Kim, Y.H., 2016. The influence of stress on game addiction in university students: Moderating effect of human relation skills. *Journal of Service Research and Studies*, 6(2),pp. 65-82. DOI:10.18807/jsrs.2016.6.2.065
14. Kim, J.I., 2020. The effects of sociality, life stress, and depression on the smartphone addiction of nursing students. *Journal of the Korea Academia-Industrial cooperation Society*, 21(4), pp. 100-108. DOI:10.5762/KAIS.2020.21.4.100
15. Kim, K.H., 2015. A study on correlation between undergraduates' smart phone addiction and sociality in an IT environment. *Journal of the Korea Institute of Information and Communication Engineering*, 19(7),pp. 1671-1679. DOI:10.6109/jkiice.2015.19.7.1671
16. Kim, S.O. and Kim, S.M., 2016. Influence of interpersonal relations and depression on smartphone usage level of nursing students. *Journal of The Korean Data Analysis Society*, 18(1 B),p p. 563-574.<https://www.dbpia.co.kr/Journal/articleDetail?nodeId=NODE08964326>
17. Koh, K.B., Park, J.K. and Kim, C.H., 2000. Development of the stress response inventory. *Journal of Korean Neuropsychiatric Association*, 39(4),pp. 707-719.<http://journal.kisep.com/pdf/002/2000/0022000064.pdf>
18. Kwon, Y.S. and Paek, K.S., 2016. The influence of smartphone addiction on depression and communication competence among college students. *Indian Journal of Science and Technology*, 9(41),pp. 1-8. DOI:10.17485/ijst/2016/v9i41/103844
19. Lee, E.J., 2019. Comparison of factors related to smartphone dependency among middle school, high school, and college students based on the Seventh Korean Children and Youth Panel Survey. *Child Health Nursing Research*, 25(2),pp. 165-174. DOI:10.4094/chnr.2019.25.2.165
20. Lee, E.J. and Eo, J.K., 2015. The effects of perceived stress and impulsivity of high school students as well as the parents' parenting attitude on smartphone addiction. *Family and Family Therapy*, 23(1), pp. 1-22. DOI:10.21479/KAFT.2015.23.1.1
21. Lee, S., Kim, H.J., Choi, H.G. and Yoo, Y.S., 2018. Smartphone addiction and interpersonal competence of nursing students. *Iranian Journal of Public Health*, 47(3), pp. 342-349.
22. Lee, S., Lee, S., Lee, M. And Jun, S., 2014. Relationship between self-esteem, stress and interpersonal relationship of nursing college students. *Keimyung Journal of Nursing Science*, 18(1), pp. 61-70.<http://scholar.dkyobobook.co.kr/searchDetail.laf?barcode=4010023840594>
23. Lee, S.H. and Cha, E.J., 2014. Effects of depression, self-esteem, and interpersonal relationship on smartphone overuse in college students: based on health science students.

- Journal of The Korean Data Analysis Society*, 16(5), pp. 2781-2193.  
<https://www.kci.go.kr/kciportal/ci/sereArticleSearch/ciSereArtiView.kci?sereArticleSearchBe an.artiId=ART001923655>
24. Long, J., Liu, T., Liao, Y., Qi, C., he, H., Chen, S. et al., (2016). Prevalence and correlates of problematic smartphone use in a large random sample of Chinese undergraduates. *BMC Psychiatry*, 16(408),pp. 1-12. DOI:10.1186/s12888-016-1083-3
25. Ministry of Science and ICT and National Information Society Agency, 2019. The survey on smartphone overdependence. viewed 20 June 2020, [https://www.iapc.or.kr/mediaView.do?idx=28&article\\_id=IC CART\\_0000000113015&type=A1#this](https://www.iapc.or.kr/mediaView.do?idx=28&article_id=IC CART_0000000113015&type=A1#this)
26. Moon, S.M., 1980. A study on the effect of human relations training of university students. *Journal of Gyeongsang National University*, 19(2), pp. 195-204. [http://www.riss.kr/search/download/FullTextDownload.do?control\\_no=7a9c7b74eae6b76&p\\_mat\\_type=1a0202e37d52c72d&url\\_type=&orgcode=863532d4ecea7d8](http://www.riss.kr/search/download/FullTextDownload.do?control_no=7a9c7b74eae6b76&p_mat_type=1a0202e37d52c72d&url_type=&orgcode=863532d4ecea7d8)
27. National Information Society Agency, 2011. S-scale (Smartphone addiction proneness scale) for youth and adults. viewed 20 June 2020, [https://www.iapc.or.kr/mediaView.do?idx=28&article\\_id=IC CART\\_0000000003540&type=A1#this](https://www.iapc.or.kr/mediaView.do?idx=28&article_id=IC CART_0000000003540&type=A1#this)
28. Park, J.H. and Park, J.H., 2017. The relationship among interpersonal relationship anxiety, college adjustment, self-control, and smartphone addiction in nursing students. *Journal of the Korean Data & Information Science Society*, 28(1),pp. 185-194.DOI:10.7465/jkdi.2017.28.1.185
29. Park,S., Kwon, M.A., Baek, M.J. and Han N.R., 2014. Relation between smartphone addiction and interpersonal competence of college students using social network service. *Journal of the Korea Contents Association*, 14(5), pp. 289-298.DOI:10.5392/JKCA.2014.14.05.289
30. Sashin, S., Ozdemir, K., Unsal, A. and Temiz, N., 2013. Evaluation of mobile phone addiction level and sleep quality in university students. *Pakistan Journal of Medical Sciences*, 29(4),pp. 913-918. DOI:10.12669/pjms.294.3686
31. Schlein, A. and Guerny, B.G., 1971. *Relationship enhancement: Skill-training programs for therapy, problem prevention, and enrichment*, Sanfrancisco (CA): Jossey-Bass.
32. Seo, G.S. and Bang, S.Y., 2017. The relationship among smartphone addiction, life stress, and family communication in nursing students. *Journal of the Korea Academia-Industrial cooperation Society*, 18(4), pp. 398-407. DOI: 10.5762/KAIS.2017.18.4.398