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The Relationship between Mother's Smartphone Addiction and Children's Smartphone Usage

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Objective As smartphone use is becoming more common, the age of initial exposure to devices is becoming younger. Young children's screen use is influenced by various factors; it is more directly dependent on family environment than school-aged children. Our study aimed to examine the effect of mother's smartphone addition on their child's smartphone use.

Methods Participants were from the Kids Cohort for Understanding of internet addiction Risk factors in early childhood (K-CURE) study. Adult smartphone addiction self-diagnosis scale was used to evaluate smartphone addiction degree of mother. Child's smartphone use was assessed by parental questionnaire. Using logistic regression analysis, we examine the association between mother's smartphone addiction and child's smartphone use.

Results After adjusting for other factors, mother's smartphone addiction is related with early smartphone exposure of children. High-risk group's children was exposed to smartphone earlier than low risk group (adjusted OR, 0.418; p=0.021). Contrary to expectation, there is no correlation between mother's smartphone addiction and child's smartphone use time.

Conclusion Our study explain that mother's smartphone addiction can affect early smartphone exposure on children. Based on our findings, further study might explore the effect of early smartphone exposure on children. **Psychiatry Investig 2021;18(2):126-131**

Key Words Smartphone overuse, Preschool children, Mother's smartphone addition.

INTRODUCTION

Smartphone ownership and usage have rapidly increased worldwide. The percentage of American adults who own smartphones rapidly increased from 35% in May 2011 to 45% in May 2013 and 77% in 2017.[1,2]

In Korea, smartphone usage was about 53.4% in 2012, 68.4% in 2013, 76.1% in 2014, and 88.7% in 2016.[3] In 2019, a national survey of Koreans, the prevalence of Problematic smartphone use (PSU) for all ages was 20.2%. Especially in children and adolescents, the prevalence of PSU is 22.9% and 30.2%, respectively.[4] Exposing infants and toddlers to smartphones also is increasing rapidly, and the age of initial exposure to mobile devices is getting younger.[5] In the United States, most children start using mobile media devices before they are one year old, and they use the devices daily by age two.[6] In Korea, about 31.3% of toddlers start using smartphones before they are 24 months old,[5] interactive and mobile media devices such as smartphones and tablets have been on the rise during recent years.[7] Some studies have reported negative influences of children's usage of mobile devices. Adolescents who excessively used smartphones had poor cognitive emotional regulation strategies,[8] and they experienced depression, anxiety, and daily dysfunctions related to excessive smartphone usage.[9] Particularly among children, excessive screen time might cause socio-emotional developmental delays and/or behavioral problems at age two.[10] Moreover, excessive screen time during early childhood has been associated with cognitive development, such as language delays.[11] Consequently, as awareness that excessive smartphone usage has increased, many countries have developed guidelines on the appropriate smartphone usage for children and adolescents.[12,13] Some previous

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studies found that the age at first internet usage powerfully predicted adolescent internet addiction.[14,15] Smartphones are a main tool for accessing the internet, and, therefore, the younger the smartphone exposure, the higher the risk of internet addiction. Consequently, children's age at first internet usage is an important factor to their risk of smartphone addiction and related mental health problems. Children's screen time is influenced by many factors. It tends to directly relate to family environment, such as parental factors (addictions, depression, parenting style).[15,16] We investigated whether a mother's smartphone addiction was associated with the smartphone usage of her young children.

METHODS

Participants

This study analyzed data derived from the Kids Cohort for Understanding Internet Addiction Risk factors in Early Childhood (K-CURE) study. This prospective cohort study was conducted in Korea to investigate the effects of internet usage on children and adolescents. Our study used the first wave data of the K-CURE study.[17] The data were collected between December 1, 2015, and June 30, 2016, on the mothers of 400 children aged two through five years old recruited from three cities (Suwon, Goyang, and Seongnam). To find out how mothers affect their younger children, this study was conducted using first wave data. Subsequently, the parents of 352 children (88% of those consents) provided sufficient data to be included in our study. The purpose and methods of the study were full explained to all of the parents and they all provided informed written consent before they participated.

Variables

Mother's smartphone usage

The Adult Smartphone Addiction Self-assessment Scale (S-scale) is the Self-assessment Scale developed by National Information Society Agency.[18] The S-Scale consists of 15 items with a four-point Likert scale ranging from 1 (not at all) to 4 (always). It is composed of the following four categories: daily life disturbance (5 items), virtual world orientation (2 items), withdrawal (4 items), and tolerance (4 items). The mothers were sorted into two groups (high risk and low risk) using their S-Scale scores. In this study, we assumed that mothers whose S-Scale scores over 39 (about upper 10% of the entire data) as a high risk group.

Child's media usage

The parents reported the types of smart devices their children used, including smartphones. They reported usage regarding the following six types devices: smartphone, television, desktop or laptop computer, tablet computer, video game console (e.g., Microsoft Xbox), and portable gaming devices (e.g., Nintendo DS). The parents reported their children's frequency and average amount of time spent using smart devices during the past month. The responses were identified as weekday or weekend and categorized by type of device. To analyze the children's age at first smartphone usage, the parents' estimated age when they first used a smartphone was used.

Parental behaviors

The parents reported the methods used to and extent to which they controlled their children's smartphone usage. Mother's psychological characteristics were measured using the Parenting Stress Index Short Form (PSI-SF),[19] Beck Depression Inventory II (BDI), and Beck Anxiety Inventory (BAI). Beck Depression Inventory II (BDI) is composed of 21 items.[20] Each question inquires the participant's psychological and physical symptoms and changes in mood in the past two weeks, each questions are scored on a 4-point scale (from 0 to 3). The validity and reliability of BDI in Korean population was established.[21] Beck Anxiety Inventory (BAI) is composed of 21 items with a four-point Likert scale ranging from 1 (Not at all) to 4 (always).[22] Parenting Stress Index Short Form (PSI-SF) is composed of 36 items with a Likert-type answer format of five options. It is developed for evaluate the level of stress and negative feelings a person experiences regarding his or her role as a parent.[23] Mothers with high PSI-SF scores (>80) were classified as seriously stressed, those with high BDI scores (>22) were classified as depressed based on a previous study on the Korean population,[24] and those with high BAI scores (>22) were classified as anxious based on a previous study's findings.[25]

Covariates

Some variables were included in the analysis as covariates: child's gender, gender of main caregiver, family structure, family socioeconomic status, monthly household income, and parental educational level.

Statistical analysis

First, we assessed socio-demographic differences by comparing the high-risk group to the low-risk group of mothers using chi-squared for contingency tests. Second, we used Fisher's Exact Test to test the relationships between smartphone addiction (high risk vs. low risk) and the psychological variables. Third, a binomial logistic regression analysis was performed with the dichotomous indicator of mothers' smartphone addition and other mental health issues as predictors and the children's total smartphone usage and age at the first smartphone usage as binary dependent variables. Odds ratios

(ORs) and 95% confidence intervals (CIs) were computed on the covariates. All of the statistical analyses were performed in SPSS version 21.0 (IBM Corp., Armonk, NY, USA).

Ethics statement

This study was approved by the Institutional Review Board at the Ajou University School of Medicine (AJIRB-SBR-SUR-14-378). Informed consents were obtained from all participants when they were enrolled.

RESULTS

Demographic and smartphone usage characteristics

Table 1 describes the demographic characteristics of the sample of mothers. There were no significant differences between the high-risk group and low-risk group regarding age, gender of main caregiver, parental educational level, or monthly household income. The main caregivers were the parents in both groups (95.7% and 93.7% for the high-risk and low-risk groups, respectively). Most of the fathers were employed (100% in the high-risk group and 98.3% in the low-risk group),

Table 1. Demographics and smartphone use characteristics (N=353)

	Total	Low-risk group	High-risk group	p
		N (%)	N (%)	
Sex				0.470
Male	207	185 (52.4)	22 (46.8)	
Female	193	168 (47.6)	25 (53.2)	
Age				0.368
2	51	48 (13.6)	3 (6.4)	
3	172	147 (41.6)	25 (53.2)	
4	139	124 (35.1)	15 (31.9)	
5	38	34 (9.6)	4 (8.5)	
Main caregiver				0.754
Parents	373	328 (93.7)	45 (95.7)	
Grandparents or else	24	22 (6.3)	2 (4.3)	
Paternal education				0.490
High school or below	46	42 (11.9)	4 (8.5)	
College or above	353	310 (88.1)	43 (91.5)	
Maternal education				0.379
High school or below	50	46 (13)	4 (8.5)	
College or above	350	307 (87)	43 (91.5)	
Paternal employment status				1.000
Unemployed	6	6 (1.7)	0 (0)	
Employed	390	343 (98.3)	47 (100)	
Maternal employment status				0.008
Unemployed	253	215 (61.1)	38 (80.9)	
Employed	146	137 (38.9)	9 (19.1)	
Monthly household income				0.311
<₩4,000,000	202	175 (49.6)	27 (57.4)	
₩4,000,000−	198	178 (50.4)	20 (42.6)	
Parental opinion of their children's smartphone use				0.300
Needs to control	227	203 (59)	24 (51.1)	
Not needs to control	164	141 (41)	23 (48.9)	
Parental control on children's smartphone use				1.000
Helpful	5	5 (1.4)	0 (0)	
Harmful	394	347 (98.6)	47 (100)	

and most of mothers were homemakers. However, there was a significant difference regarding mother's employment ($p< 0.05$). In the high-risk group, the percentage of unemployed mother was higher than in the low-risk group (80.9% vs. 61.1%, respectively).

Similarly, parental opinion and the extent to which they controlled the children's smartphone usage were not significantly different between the two groups of mothers. Most of the mothers (98.6% and 100% in the low-risk and high-risk groups, respectively) responded that using smartphones is not helpful to their children. About one-half of the parents controlled their children's smartphone usage (51.5% of the high-risk group and 59.0% of the low-risk group).

Psychological differences between the high-risk and the low-risk groups

Table 2 presents the differences between the high-risk group and the low-risk group in BDI, BAI, and PSI-SF scores, which were statistically significant ($p<0.05$). In the high-risk group, the percentage of depressed mother was higher than in the low-risk group (34.0% vs. 12.5%, respectively). In the high-risk group, the percentage of mothers with highs PSI-SF scores was higher than in the low-risk group (68.1% vs. 38.2%, respectively).

Relationship between mother's smartphone addiction and child's smartphone usage

Table 3 shows the results of logistic regression on predicting factors for children's smartphone use. As predictors, the mother's smartphone addiction, the mother's employment status, which showed a significant difference by group, and mental health related indicators were included in the logistic regression analysis. The mother's smartphone addiction was found to have a significant impact in predicting the child's first exposure age to smartphones (adj. OR=0.418, p=0.021), however, other predictors did not affect both the child's smart use time and the first exposure age.

DISCUSSION

Results of the Fisher's Exact Test indicated statistically significant differences between the groups on the BDI, BAI, and PSI-SF which is consistent with previous studies' findings

Table 2. Comparison between smartphone addiction high-risk group and low-risk group

	Low-risk group	High-risk group	p
	N (%)	N (%)	
Beck Depression Inventory			<0.001†
Non-clinical group	309 (87.5)	31 (66.0)	
Clinical group	44 (12.5)	16 (34.0)	
Beck Anxiety Inventory			0.038*
Non-clinical group	341 (96.6)	42 (89.4)	
Clinical group	12 (3.4)	5 (10.6)	
Parenting Stress Index Short Form			<0.001†
Non-clinical group	218 (61.8)	15 (31.9)	
Clinical group	135 (38.2)	32 (68.1)	

*p<0.05, †p<0.001

Table 3. Predictors of children's smartphone use by logistic regression analysis (N=3[illegible])

	Total smartphone use time					First smartphone exposure age				
	β	OR	95% CI		p	β	OR	95% CI		p
Adult Smartphone Addiction Self-Assessment Scale										
Low-risk group	Ref					Ref				
High-risk group	0.067	1.069	0.386	2.966	0.897	-0.873	0.418	0.199	0.877	0.021
Maternal employment status										
Unemployed	Ref					Ref				
Employed	-0.225	0.798	0.338	1.887	0.608	-0.274	0.761	0.454	1.274	0.299
Parenting Stress Index Short Form										
Non-clinical group	Ref					Ref				
Clinical group	0.443	1.558	0.711	3.415	0.268	0.361	1.435	0.876	2.352	0.152
Beck Depression Inventory										
Non-clinical group	Ref					Ref				
Clinical group	0.271	1.312	0.487	3.532	0.591	-0.597	0.551	0.259	1.173	0.122
Beck Anxiety Inventory										
Non-clinical group	Ref					Ref				
Clinical group	0.504	1.655	0.335	8.179	0.537	0.343	1.409	0.391	5.081	0.601

OR: odds ratio, CI: confidence interval, Ref: reference

about psychological factors and internet addiction.[26] Previous studies have reported that problematic internet usage was comorbid with other psychiatric disorders; for example, one study found that about 7.0% of adults with excessive internet usage had a comorbid dysthymic disorder.[27] Social anxiety disorder has been associated with problematic internet usage,[28] and excessive internet usage was found to degrade interpersonal relationships.[29] Therefore, smartphone usage also might be comorbid with psychiatric disorders, such as depression and anxiety. A further complication is that high levels of depression, anxiety, and stress might increase smartphone usage among mothers because depressed mothers might try to escape their psychological problems by distracting themselves with their smartphones.

This study investigated the association between a mother's smartphone addiction and her children's smartphone usage. According to the logistic regression analysis, children whose mothers were in our high-risk group began using smartphones younger than those whose mothers were in our low-risk group. Previous studies suggested that early exposure to the internet might increase the risk of internet addiction.[14,30,31] There are several possible explanations for these findings. First, children of high-risk mothers would likely have more opportunities than other children to be exposed to smartphones. As found in previous studies, the environment at home has a great impact, especially for preschool children.[32] These children might start using smartphones at younger ages than they otherwise would be inclined to do so. Second, high-risk mothers might be relatively lax about regulating their children's usage. A previous study found that parents who spent two hours or less per day watching television and using a computer were less likely than parents who used those devices more often to allow their children more than two hours per day of screen time.[33] Further, parents' smartphone addiction was directly related to the extent of their control of their children's smartphone usage.[34] Third, maternal depression might be associated with early smartphone usage. A previous study reported that depression and anxiety were related to smartphone addiction.[35] Because maternal depression might negatively influence parenting quality, depressed mothers might have problems forming the stable relationships with their children that are needed for successful control of their children's behaviors, including their smartphone usage. Depressed, low-energy mothers also might use smartphones as a parenting tool to soothe their children. Thus, maternal depression and smartphone addiction might function together to influence children's early smartphone usage.

We expected the children's total smartphone usage time would be higher in the high-risk than in the low-risk group. However, the relationship was not significant. Several previous studies found that parents' smartphone addiction was related to their adolescents' smartphone overuse.[36] Our finding might have diverged from this result because the children in our study were two to five years old, did not own personal smartphones, and needed their parents' or another older person's cooperation to use a smartphone. Our results might reflect the differences between toddlers and adolescents regarding freedom and autonomy. We suspect that a study that followed children throughout their childhoods would find significant changes in smartphone usage time as they grow from toddlers into adolescents.

This study has some limitations to consider when interpreting its findings. First, children's smartphone usage was measured by parental reports. Therefore, it might not be accurate for two reasons: many mothers cannot constantly check their children's daily logs, which could result in inaccurate reporting of smartphone usage, and the mothers almost universally believed that smartphones are not helpful to their children (98−100%) and underreporting might be the result of social desirability bias. Second, the ISDS3 was intended as a brief screening tool rather than a diagnostic tool, and it might not accurately measure problematic smartphone usage. Finally, this study was cross-sectional, so we were unable to interpret the results from the perspective of causality.

Smartphone addiction negatively influences children's emotional, cognitive, and social development. Because children are deeply and widely influenced by their families, parenting styles, and caregivers, it is important to understand the relationship between a mother's smartphone addiction and her children's smartphone usage. Educating parents and evidence-based policy interventions are needed to regulate children's smartphone usage within a safe and healthy range. This study revealed that a mother's smartphone addiction was related to her children's early smartphone usage. Further study might explore the diverse effects of early smartphone usage on children's health, wellbeing, and behaviors.

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Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

Author Contributions

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REFERENCES

1. Smith A. Smartphone Ownership-2013 Update. Pew Research Center: Washington DC; 2013;12:2013.
2. Poushter J, Bishop C Chwe H. Social media use continues to rise in developing countries but plateaus across developed ones. Pew Res Center 2018;22:2-19.
3. ICT KMoSa. The Survey Internet/Smartphone Overdependence in 2018. Seoul: Korean National Information Society Agency; 2019.
4. ICT MoSa. The Survey on Smartphone Overdependence in 2019. Seoul: Korean National Information Society Agency; 2020.
5. Chang HY, Park EJ, Yoo HJ, Lee JW, Shin Y. Electronic media exposure and use among toddlers. Psychiatry Investig 2018;15:568-573.
6. Kabali HK, Irigoyen MM, Nunez-Davis R, Budacki JG, Mohanty SH, Leister KP, et al. Exposure and use of mobile media devices by young children. Pediatrics 2015;136:1044-1050.
7. Kostyrka Allchorne K, Cooper NR, Simpson A. Touchscreen generation: children's current media use, parental supervision methods and attitudes towards contemporary media. Acta Paediatr 2017;106:654-662.
8. Extremera N, Quintana-Orts C, Sánchez-Álvarez N, Rey L. The role of cognitive emotion regulation strategies on problematic smartphone use: comparison between problematic and non-problematic adolescent users. Int J Environ Res Public Health 2019;16:3142.
9. Demirci K, Akgönül M, Akpinar A. Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. J Behav Addict 2015;4:85-92.
10. McDonald SW, Kehler HL, Tough SC. Risk factors for delayed social emotional development and behavior problems at age two: Results from the All Our Babies/Families (AOB/F) cohort. Health Sci Rep 2018;1:e82.
11. Lin LY, Cherng RJ, Chen YJ, Chen YJ, Yang HM. Effects of television exposure on developmental skills among young children. Infant Behva Develop 2015;38:20-26.
12. Canadian Paediatric Society DHTFOO. Screen time and young children: promoting health and development in a digital world. Paediatr Child Health 2017;22:461-477.
13. Reid Chassiakos YL, Radesky J, Christakis D, Moreno MA, Cross C. Children and adolescents and digital media. Pediatrics 2016;138:e20162593.
14. Lee JY, Shin KM, Cho SM, Shin YM. Psychosocial risk factors associated with internet addiction in Korea. Psychiatry Investig 2014;11:380-386.
15. Lam LT. Parental mental health and Internet Addiction in adolescents. Addict Behav2015;42:20-23.
16. Zhang H, Spinrad TL, Eisenberg N, Luo Y, Wang Z. Young adults' internet addiction: prediction by the interaction of parental marital conflict and respiratory sinus arrhythmia. Int J Psychophysiol 2017;120:148-156.
17. Lee DY, Roh HW, Kim SJ, Park EJ, Yoo H, Suh S, et al. Trends in Digital Media Use in Korean Preschool Children. J Korean Med Sci 2019;34.
18. Shin K, Kim D, Jung Y. Development of Korean Smart Phone Addiction Proneness Scale for Youth and Adults. Seoul: Korean National Information Society Agency; 2011.
19. Perez-Padilla J, Menéndez S, Lozano O. Validity of the Parenting Stress Index Short Form in a sample of at-risk mothers. Eval Rev 2015;39:428-446.
20. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry 1961;4:561-571.
21. Sung HM KJ, Park YN, Bai DS, Lee SH, Ahn HN. A study on the reliability and the validity of Korean version of the Beck Depression Inventory-II (BDI-II). J Korean Soc Biol Ther Psychiatry 2008;14:201-212.
22. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. J Consult Clin Psychol 1988;56:893-897.
23. Perez-Padilla J, Menendez S, Lozano O. Validity of the Parenting Stress Index Short Form in a aample of at-risk mothers. Eval Rev 2015;39:428-446.
24. Lee EH, Lee SJ, Hwang ST, Hong SH, Kim JH. Reliability and validity of the Beck Depression Inventory-II among Korean adolescents. Psychiatry Investig 2017;14:30-36.
25. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. J Consult Clin Psychol 1988;56:893-897.
26. Younes F, Halawi G, Jabbour H, El Osta N, Karam L, Hajj A, et al. Internet addiction and relationships with insomnia, anxiety, depression, stress and self-esteem in university students: A cross-sectional designed study. PLoS one 2016;11:e0161126.
27. Bernardi S, Pallanti S. Internet addiction: a descriptive clinical study focusing on comorbidities and dissociative symptoms. Compr Psychiatry 2009;50:510-516.
28. Ko CH, Yen JY, Yen CF, Lin HC, Yang MJ. Factors predictive for incidence and remission of internet addiction in young adolescents: a prospective study. CyberPsychol Behav 2007;10:545-551.
29. Milani L, Osualdella D, Di Blasio P. Quality of interpersonal relationships and problematic Internet use in adolescence. CyberPsychol Behav 2009;12:681-684.
30. Beard CL, Haas AL, Wickham RE, Stavropoulos V. Age of initiation and internet gaming disorder: the role of self-esteem. Cyberpsychol Behav Soc Netw 2017;20:397-401.
31. Lee JY, Shin KM, Cho SM, Shin YM. Psychosocial risk factors associated with internet addiction in Korea. Psychiatry Investig 2014;11:380-386.
32. Carson V, Janssen I. Associations between factors within the home setting and screen time among children aged 0-5 years: a cross-sectional study. BMC Public Health 2012;12:539.
33. Schoeppe S, Rebar AL, Short CE, Alley S, Van Lippevelde W, Vandelanotte C. How is adults' screen time behaviour influencing their views on screen time restrictions for children? A cross-sectional study. BMC Public Health 2016;16:201.
34. Hwang Y, Jeong SH. Predictors of parental mediation regarding children's smartphone use. Cyberpsychol Behav Soc Netw 2015;18:737-743.
35. Boumosleh JM, Jaalouk D. Depression, anxiety, and smartphone addiction in university students-A cross sectional study. PLoS one 2017;12:e0182239.
36. Kim HJ, Min JY, Min KB, Lee TJ, Yoo S. Relationship among family environment, self-control, friendship quality, and adolescents' smartphone addiction in South Korea: findings from nationwide data. PLoS one 2018;13:e0190896.