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Exploring the Differences between Adolescents' and Parents' Ratings on Adolescents' Smartphone Addiction

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ABSTRACT

Background: Smartphone addiction has recently been highlighted as a major health issue among adolescents. In this study, we assessed the degree of agreement between adolescents' and parents' ratings of adolescents' smartphone addiction. Additionally, we evaluated the psychosocial factors associated with adolescents' and parents' ratings of adolescents' smartphone addiction.

Methods: In total, 158 adolescents aged 12–19 years and their parents participated in this study. The adolescents completed the Smartphone Addiction Scale (SAS) and the Isolated Peer Relationship Inventory (IPRI). Their parents also completed the SAS (about their adolescents), SAS-Short Version (SAS-SV; about themselves), Generalized Anxiety Disorder-7 (GAD-7), and Patient Health Questionnaire-9 (PHQ-9). We used the paired t-test, McNemar test, and Pearson's correlation analyses.

Results: Percentage of risk users was higher in parents' ratings of adolescents' smartphone addiction than ratings of adolescents themselves. There was disagreement between the SAS and SAS-parent report total scores and subscale scores on positive anticipation, withdrawal, and cyberspace-oriented relationship. SAS scores were positively associated with average minutes of weekday/holiday smartphone use and scores on the IPRI and father's GAD-7 and PHQ-9 scores. Additionally, SAS-parent report scores showed positive associations with average minutes of weekday/holiday smartphone use and each parent's SAS-SV, GAD-7, and PHQ-9 scores.

Conclusion: The results suggest that clinicians need to consider both adolescents' and parents' reports when assessing adolescents' smartphone addiction, and be aware of the possibility of under- or overestimation. Our results cannot only be a reference in assessing adolescents' smartphone addiction, but also provide inspiration for future studies.


Keywords: Addictive Behavior; Adolescent; Depression; Parents; Smartphone

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Disclosure

The authors have no potential conflicts of interest to disclose.

Author Contributions

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INTRODUCTION

Given their convenience, social networking advantages, and variety of functions, smartphones are pervasively popular.¹ However, their use can lead to many side effects, such as lightheadedness, blurred vision, and sleep disturbances.²⁻⁴ A recent systematic review showed that depression, anxiety, and chronic stress were related to problematic smartphone use or smartphone addiction.⁵ Smartphone use can also reduce the amount of in-person social interaction and academic achievement, as well as generate relationship problems.⁶⁻⁸ Furthermore, Cazzulino et al.⁹ mentioned health hazards such as texting while driving.

The boom in smartphone use and the potential problems caused by smartphones has brought more attention to the issue of smartphone addiction. Although evidence-based research was not sufficient for smartphone addiction to be included in the most recent version of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5),¹⁰ recent studies have demonstrated that it may be a behavioral addiction, as it demonstrates all the usual features of addiction such as tolerance, withdrawal symptoms, dependence, and social problems.^{1-3,11,12}

In Korea, smartphone addiction in adolescents has been regarded as a major health issue. Approximately 85% of Korean adolescents have their own smartphone, and adolescents use their smartphones (for everything except calling) for around 170 minutes per day, on average.^{13,14} The Korea Internet and Security Agency reported that the percentage of smartphone users exhibiting symptoms of addiction was highest in adolescents.¹⁵ To understand the smartphone addiction phenomena in adolescents, the first and essential step is to identify those with addiction problems. There is a strong consensus that the assessment of adolescents' psychopathology requires data from multiple informants.^{16,17} Indeed, numerous researchers have reported significant discrepancies between adolescent-reported and parent-reported psychopathology.^{18,19} Although smartphones are widely used and many adolescents have problems related to smartphone use, there is a relative lack of acknowledgement that they can be smartphone addicted.^{2,20} This can result in the neglect of adolescents' smartphone addiction, especially in the case where assessment only depends on the view of adolescents themselves.²⁰ However, despite the necessity of reports of multiple informants on adolescents' smartphone addiction, few studies have focused on the discrepancy issue of adolescents' behavioral addiction, much less on smartphone addiction in particular. Therefore, we investigated differences in adolescents' and parents' ratings in order to properly assess adolescents' smartphone addiction.

We assessed the degree of agreement between adolescents' and parents' ratings of adolescents' smartphone addiction, hypothesizing that there would be significant discrepancies based on previous studies of several psychopathologies. Additionally, we also assessed the psychosocial factors associated with adolescents' and parents' ratings of adolescents' smartphone addiction. Previous studies have shown that isolated adolescents—namely, those without close peers—are at a higher risk for problems such as anxiety, depression, gaming addiction, and low physical activity.^{21,22} Furthermore, it is widely believed that parental psychopathology, such as anxiety and depression, can influence offspring in numerous ways.^{23,24} Thus, we intended to investigate the possibility of peer relationship isolation in adolescents, and parental smartphone addiction, anxiety, and depression as potential psychosocial factors associated with adolescents' smartphone addiction.

As far as we know, this is the first study to assess the differences between adolescents' and parents' ratings on adolescents' smartphone addiction and the associations between parental psychopathology and adolescents' smartphone addiction. We expect that our analysis can be a reference in assessing adolescents' smartphone addiction.

METHODS

Participants and procedure

Adolescents aged 12–19 years and their parents were included in this study. Participants were recruited among audience of the annual lectures held by the Korean Academy of Child and Adolescent Psychiatry for general population. The subject of the lectures were about parenting in the digital age. Detailed research and instruction packages were sent to the home address of all participants. The questionnaire comprised two parts — one for adolescents and one for parents. Participants had to complete all questions anonymously, and then return the packages by mail. Of the 300 initial participants, 167 returned the answers by mail. Nine additional subjects were excluded because the adolescents' age was unsuitable or the adolescents' part of the questionnaire was missing. The final total sample size was 158.

Measures

The questionnaire contained items assessing sociodemographic and clinical characteristics. All questionnaires were in self-reported format. **Table 1** describes the composition of the questionnaire.

The Smartphone Addiction Scale (SAS)² was used to assess smartphone addiction. The SAS contains 33 items rated on a six-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). Based on their total scores, individuals can be described as no problem (total score ≤ 100), caution needed (total score = 101–126), and clinically significant (total score ≥ 127).²⁵ We regarded the caution needed and clinically significant groups as risk users in this study. The SAS comprises six subscales: 1) daily-life disturbance, 2) positive anticipation, 3) withdrawal, 4) cyberspace-oriented relationships, 5) overuse, and 6) tolerance. The cutoff scores for each subscale used to discriminate between no problem and risk users were 18, 23, 18, 19, 16, and 8, respectively. We included the SAS in both the adolescent and parent questionnaires. It was emphasized to parents to rate the adolescents' smartphone addiction.

Table 1. The composition of the questionnaire

Adolescents' part	Parents' part
Age, yr	Academic performance of the offspring
Gender	Whether there are dual income earners in the household
Average minutes of weekday smartphone use	Father's level of education
Average minutes of holiday smartphone use	Mother's level of education
SAS	Economic status
IPRI	SAS-parent report
	Father's SAS-SV
	Mother's SAS-SV
	Father's GAD-7
	Mother's GAD-7
	Father's PHQ-9
	Mother's PHQ-9

SAS = Smartphone Addiction Scale, IPRI = Isolated Peer Relationship Inventory, SAS-SV = Smartphone Addiction Scale-Short Version, GAD = Generalized Anxiety Disorder, PHQ = Patient Health Questionnaire.

We refer to the response of parents on their offspring's smartphone usage as the SAS-parent report. In this study, Cronbach's alphas of the SAS and SAS-parent report were 0.967 and 0.975, respectively.

The Isolated Peer Relationship Inventory (IPRI)²¹ was used to assess the degree of peer relationship isolation. The IPRI contains 16 items rated on a four-point scale ranging from 1 (never) to 4 (almost always), and includes subscales on isolation/loneliness, social competence, and mutual interaction with peers. Items 4, 9, 12, 13, 15, and 16 are reverse scored. We included the IPRI in only the adolescent questionnaire. Cronbach's alpha was 0.876 for IPRI in this study.

Parental smartphone addiction was assessed using the SAS-Short Version (SAS-SV).² The SAS-SV is a short version of the SAS containing only 10 items rated on a six-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). We included two copies of the SAS-SV in the parent questionnaire, one each for the father and mother. Cronbach's alphas for father's and mother's SAS-SV in this study were 0.942 and 0.934, respectively.

The Patient Health Questionnaire (PHQ)²⁶ is a commonly used, well-validated self-report tool for screening of mental health disorders. We used the Generalized Anxiety Disorder-7 (GAD-7) and PHQ-9, both of which were adapted from the PHQ, for assessing anxiety and depression, respectively. A higher score on the GAD-7 or PHQ-9 indicates a higher possibility of having anxiety or depressive disorder, respectively. These scales have been translated into Korean and their reliability and validity have been confirmed.^{27,28} We included two copies of the GAD-7 and PHQ-9 in the parent questionnaire, one each for the father and mother. In this study, Cronbach's alphas were 0.886, 0.877, 0.824, and 0.816 for father's GAD, mother's GAD, father's PHQ-9, and mother's PHQ-9, respectively.

Statistical analysis

Descriptive statistics were calculated for all variables (i.e., means and standard deviations [SDs] for continuous variables and percentages for categorical variables). We compared the SAS and SAS-parent report scores using a paired t-test. To compare number (and percentage) of smartphone risk users as rated by SAS and SAS-parent report, the McNemar test was used. Associations between the SAS/SAS-parent report and other variables were evaluated using Pearson's correlation analyses. A *P* value of less than 0.05 was considered indicative of statistical significance. All statistical analyses were performed using PASW Statistics 18.0 (i.e., SPSS/IBM Corporation, Somers, NY, USA) for Windows.

Ethics statement

Ethical approval was received from the Institutional Review Board at Soonchunhyang University Bucheon Hospital (2014-07-032-001) before the initiation of the study. All participants were informed of the study protocol, and all adolescents and their parents gave their written informed consent.

RESULTS

Table 2 shows the sociodemographic and clinical characteristics of all study participants. A total of 158 adolescents aged 12–19 years were included (53.2% men, *n* = 84; 46.8% women, *n* = 74). The mean (*M*) age of participants was 15.32 (*SD* = 1.80) years.

Table 2. Sociodemographic and clinical characteristics of study participants

Variables	Categories	No. (%) or M ± SD
Age, yr		15.32 ± 1.80
Gender	Men	84 (53.2)
	Women	74 (46.8)
Academic performance of the offspring	Top 20%	33 (21.0)
	Second 20%	54 (34.4)
	Third 20%	43 (27.4)
	Fourth 20%	17 (10.8)
	Bottom 20%	10 (6.4)
From a dual income household	Yes	83 (52.5)
	No	75 (47.5)
Father's level of education	Middle school graduate or less	2 (1.5)
	High school graduate	31 (23.5)
	College graduate or more	99 (75.0)
Mother's level of education	Middle school graduate or less	0 (0)
	High school graduate	48 (33.6)
	College graduate or more	95 (66.4)
Economic status	High	8 (5.1)
	Upper middle	27 (17.1)
	Middle	86 (54.4)
	Lower middle	31 (19.6)
	Low	6 (3.8)
Average minutes of weekday smartphone use		185.95 ± 154.18
Average minutes of holiday smartphone use		273.37 ± 211.22
IPRI		7.63 ± 7.23
Father's SAS-SV		18.28 ± 8.55
Mother's SAS-SV		18.74 ± 8.28
Father's GAD-7		1.60 ± 2.53
Mother's GAD-7		1.56 ± 2.55
Father's PHQ-9		2.20 ± 2.91
Mother's PHQ-9		1.88 ± 2.67

M = mean, SD = standard deviation, IPRI = Isolated Peer Relationship Inventory, SAS-SV = Smartphone Addiction Scale-Short Version, GAD = Generalized Anxiety Disorder, PHQ = Patient Health Questionnaire.

The mean SAS-parent report score (M, 91.26; SD, 33.42) was significantly higher than the mean SAS score (M, 80.03; SD, 32.21). The risk users according to SAS and SAS-parent report scores were 32 (21.0%) and 60 (39.4%) adolescents, respectively. Twenty-five participants (16.4%) were classified as risk users by both adolescents and parents. The McNemar test showed a statistically significant disagreement between the SAS and SAS-parent report total scores and scores on the positive anticipation, withdrawal, and cyberspace-oriented relationship subscales (Table 3).

Table 4 shows the Pearson correlation coefficients for the SAS and SAS-parent report with other variables. SAS scores were positively associated with average minutes of weekday/

Table 3. Smartphone risk users as rated by adolescents and parents

SAS/SAS-parent report	Risk users as rated by SAS, No. (%)	Risk users as rated by SAS-parent report, No. (%)	P value
Total score	32 (21.1)	60 (39.5)	< 0.001 ^a
Daily-life disturbance	34 (21.7)	39 (24.8)	0.500
Positive anticipation	44 (28.2)	86 (55.1)	< 0.001 ^a
Withdrawal	40 (25.6)	60 (38.5)	0.008 ^a
Cyberspace-oriented relationship	36 (22.9)	54 (34.4)	0.013 ^b
Overuse	42 (26.9)	48 (30.8)	0.441
Tolerance	79 (50.0)	89 (56.3)	0.245

SAS = Smartphone Addiction Scale.

^aP < 0.01; ^bP < 0.05.

Table 4. Correlation coefficients of scores on adolescents' and parents' ratings of adolescents' smartphone addiction with other variables

Variables	SAS	SAS-parent report
SAS	1	
SAS-parent report	0.474 ^a	1
Age, yr	-0.028	-0.086
Average minutes of weekday smartphone use	0.503 ^a	0.408 ^a
Average minutes of holiday smartphone use	0.538 ^a	0.415 ^a
IPRI	0.224 ^a	0.104
Father's SAS-SV	0.054	0.257 ^a
Mother's SAS-SV	0.023	0.357 ^a
Father's GAD-7	0.231 ^a	0.256 ^a
Mother's GAD-7	0.125	0.305 ^a
Father's PHQ-9	0.212 ^b	0.251 ^a
Mother's PHQ-9	0.166	0.355 ^a

SAS = Smartphone Addiction Scale, IPRI = Isolated Peer Relationship Inventory, SAS-SV = Smartphone Addiction Scale-Short Version, GAD = Generalized Anxiety Disorder, PHQ = Patient Health Questionnaire.

^aP < 0.01; ^bP < 0.05.

holiday smartphone use and scores for the IPRI and father's GAD-7 and PHQ-9 scores. Additionally, SAS-parent report scores showed positive associations with average minutes of weekday/holiday smartphone use and each parent's SAS-SV, GAD-7, and PHQ-9 scores.

DISCUSSION

This study compared adolescents' and parents' ratings on adolescents' smartphone addiction. The mean score of parents' ratings was higher than that of adolescents' ratings. Additionally, percentage of risk users was higher in parents' ratings of adolescents' smartphone addiction than ratings of adolescents themselves. The McNemar test also indicated significant differences in parents' and adolescents' ratings of smartphone addiction as well as in the areas of positive anticipation, withdrawal, and cyberspace-oriented relationship, whereas there were no significant differences with regard to daily-life disturbance, overuse, and tolerance.

Overall, the findings showed significant differences between adolescents' and parents' ratings on the adolescents' smartphone use at risk. The results were consistent with our expectations. We found that parents tended to estimate their adolescents' smartphone addiction as more risky than did adolescents toward themselves. Previous studies on psychopathology in youth have revealed that youth ratings of severity tend to be lower than the parent ratings in clinical samples.^{18,29} Salbach-Andrae et al.¹⁸ explained that these differences are due to parental distress and adolescents' lack of insight. Although the adolescents in our study were not from a clinical population, we believe that our results are nevertheless in part due to parental distress and adolescents' lack of insight. Excessive smartphone use can cause numerous problems such as depression, anxiety, and physical difficulties, and is increasingly considered a serious public health problem.^{1,2,5} In addition, it can be associated with reduced social interaction and poor academic achievement,⁶ which is the main concern of Korean parents.³⁰ We believe that these might stimulate parental distress. As mentioned above, most adolescents in Korea have their own smartphone and spend considerable time using it. We believe that the popularity of smartphones possibly prevents adolescents' insight into the fact that their smartphone use can be problematic. Furthermore, one study on perceived smartphone addiction among Korean adolescents showed that around 30% of a high-risk group perceived their statuses as non-problematic.²⁰

These factors may account for why parents estimated their adolescents' smartphone addiction more risky than did adolescents themselves.

As for the subscales of the SAS, some showed significant disagreement, while others did not. In general, previous studies have found greater parent–adolescent agreement for externalizing problems compared to internalizing problems.^{18,31,32} This may be because externalizing problems are more openly observable and directed at others, whereas internalizing problems are more subtle and difficult to perceive.¹⁸ Aggression, hyperactivity/inattention, and oppositional behavior are examples of externalizing problems, whereas depression, anxiety, and obsessive thoughts are examples of internalizing problems.^{18,31} Positive anticipation refers to the feelings of excitement about and stress relief through using a smartphone, as well as feelings of emptiness without a smartphone.² We believe that positive anticipation has similar qualities to internalizing problems because it concerns subjective feelings. Likewise, withdrawal and cyberspace-oriented relationship also represent subjective feelings and internalizing problems.² By contrast, daily-life disturbance, overuse, and tolerance refer to behaviors that can be observed by others.² Therefore, our results are consistent with the results of previous studies showing differences in parent–adolescent agreement between internalizing and externalizing problems.

Additionally, we assessed the association between the SAS/SAS-parent report and other variables. Adolescent reported smartphone addiction was associated with adolescents' and father's factors — average minutes of weekday/holiday smartphone use, peer relationship isolation, and father's anxiety/depression. There have been few studies on the association between smartphone addiction and peer relationships. However, Enez Darcin et al.³³ reported that feelings of loneliness was positively correlated with smartphone addiction, especially cyberspace-oriented relationship. In addition, peer relationship isolation has been associated with anxiety, depression, and low self-esteem.³⁴ Previous studies reported that anxiety and depression were risk factors for smartphone addiction.^{1,3,5,35} Hong et al.³⁶ reported that low self-esteem was associated with mobile phone addiction. Pantic et al.³⁷ also showed a negative correlation between Internet addiction and self-esteem. We speculate that these previous studies can account for our results.

It is widely recognized that parental psychological problems can negatively affect their offspring.^{38,39} Beardslee et al.⁴⁰ reported that a child has a 40% chance of developing depression at the age of 18 when one parent is depressed. Other studies also showed the association between parental depression and anxiety in offspring.^{41,42} In addition, children with a parent with anxiety disorder have an increased risk for anxiety disorder.⁴³ Anxiety and depression are risk factors for smartphone addiction.^{1,3,35} Therefore, these findings may relate to our results about the association between adolescent reported smartphone addiction and father's anxiety/depression. However, in our study, only father's anxiety/depression was the risk factor for adolescent reported smartphone addiction as opposed to mother's anxiety/depression. There have been few studies on father's psychopathology and adolescents' mental health.³⁹ Verona and Kilmer revealed that women under high stress and negative affect responded with less aggression, and that men under high stress and negative affect responded with continued increases in aggression.⁴⁴ We reason that father's externalized affect might influence their offspring, but more studies and discussions are needed.

Parents' reports of adolescents' smartphone addiction was mainly associated with parental factors; that is, the parent's smartphone addiction, anxiety, and depression were related to the

parent's report of the adolescent's smartphone addiction. These findings suggest that parents reported adolescent's smartphone addiction may represent parents' psychopathology as well as their view of the adolescent's smartphone addiction. Parents reported adolescent's smartphone addiction also related to average minutes of weekday/holiday smartphone use. The time of smartphone use can be observed by others. We believe that this can account for our results.

This study has several limitations. First, the generalizability of the findings is limited because this study focused only on adolescents and their parents, and the sample size was small. Considering that excessive smartphone use is prevalent in other age groups, such as those in childhood or their twenties,¹⁵ further studies including various other age groups are needed. Second, participants were recruited as volunteers from among the attendees of annual national public lectures. Although these lectures were held for the general population, our participants might be more concerned about smartphone addiction. This may be associated with selection bias. Third, our participants were not from a clinical population and did not exhibit significant functional impairment, although we cannot completely exclude the possibility of such impairments, given that they were not specifically addressed in this study. Therefore, further studies with clinical samples are needed to generalize these results to the clinical setting. Finally, our study mainly focused on parental psychopathology as the psychosocial factors, rather than adolescent psychopathology. It is likely that there are other psychosocial factors associated with adolescents' smartphone addiction beyond those measured in this study.

As mentioned in the introduction, data from multiple informants are essential for assessing adolescents' psychopathology. Our study suggests that this can also be applied in the evaluation of adolescents' smartphone addiction. Clinicians need to consider both adolescents' and parents' reports when assessing adolescents' smartphone addiction, and be aware of the possibility of under- or overestimation. Our results also represent that parents' reports of externalizing problems are more close to the reports of adolescents themselves than are their reports of internalizing problems. We believe that this result can be utilized in further research, such as for developing a new "parent-report SAS" (to assess their offspring's smartphone addiction). In addition, our results suggest that more attention to smartphone addiction in adolescents may be needed, especially with regard to poor peer relationships. Clinicians also need to be aware that when parents assess their offspring's smartphone addiction, the psychopathology of the parents may affect the ratings.

Smartphone addiction is a relatively new area of behavioral addiction, although studies have recently begun to increasingly focus on understanding it. As far as we know, this research study was the first to examine differences between adolescents' and parents' ratings on adolescents' smartphone addiction. We believe that our results can not only be a reference in assessing adolescents' smartphone addiction, but also provide inspiration for future studies.

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