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Research Article

# A Conceptual Framework of Online-Offline Integrated Intervention Program for Adolescents' Healthy Smartphone Use\*

Young Yim Doh<sup>1</sup>  
Graduate School of Culture Technology  
KAIST

Jimin Rhim<sup>2</sup>  
Graduate School of Culture Technology  
KAIST

Seul Lee<sup>3</sup>  
Graduate School of Culture Technology  
KAIST

## Abstract

Smartphones have become an integral part of our lives, significantly affecting adolescents' media consumption behaviors, and social issues such as smartphone addiction or problematic usage have been raised. Concerned parents have applied various mediation strategies; however, most were ineffective and created further conflicts between parents and adolescents. Contrary to the perceived seriousness of smartphone addiction, less than 10% of the users are actually diagnosed as high-risk groups. Rather than treating those identified as addicts, preventive intervention strategies should be made available to broader populations to reduce overall problematic uses. This paper suggests a framework of preventive intervention programs to promote adolescents' healthy smartphone use through a series of case studies. In the first study, three smartphone user groups with different usage motivations and behavior patterns were identified. In the second study, the difficulties in smartphone mediation process were compared from perspectives of both parents and children. The results indicated that each household with diverse family cultures need customized intervention programs. In the third study, parent-child dyads participated in mutual rule-shaping workshops to support adolescents' healthy smartphone use and reduce conflicts. As a result, they were able to reflect their daily smartphone usage patterns and realized the necessity of a continuous negotiation process for rule-shaping according to usage contexts. Based on implications from these studies, we suggest activity design of online and offline integrated services system to facilitate adolescents' healthy smartphone usage habits.

## Keywords

Adolescents • Healthy smartphone use • Preventive intervention • Parental mediation • Child-parent mutual rule-shaping

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1 **Correspondence to:** Young Yim Doh (PhD), Graduate School of Culture Technology, Korea Advanced Institute of Science and Technology, Republic of Korea. Email: yydoh@kaist.ac.kr

2 Graduate School of Culture Technology, Korea Advanced Institute of Science and Technology, Republic of Korea. Email: kingjimin@kaist.ac.kr

3 Graduate School of Culture Technology, Korea Advanced Institute of Science and Technology, Republic of Korea. Email: ardet@kaist.ac.kr

Smartphone usage has spread globally at an unprecedented rate and penetrated every aspect of daily life. In 47 top media consuming countries in 2015, over half of the population were smartphone users, and this is forecast to rise to nearly two-thirds by 2018, up from about 26.3% in 2012 (Austin, Barnard, & Hutcheon, 2015). According to a report by Deloitte in 2015, mobile obsession and mobile distraction have increased in the United States. People in the United States check their phones 46 times per day on average (in the age group 18–24 years, 74 times), about 43% of smartphone owners check their phones within five minutes of waking up, and half the users check their phones for 15 minutes before going to sleep. Also, 87% of owners use their mobile devices while talking with family or friends, 81% while eating at a restaurant, and more than 15% of users use their devices while crossing the road (Deloitte Touche Tohmatsu International, 2015). British teens pick mobile devices as their ‘miss-most’ media over TV sets, PCs and game consoles (Berkeley, 2015). A smartphone is no longer just a special device for convenience, it is an essential part of life, and people feel uncomfortable without their phones.

South Korea is a country at the cutting edge of smartphone penetration and societal change. A Pew Research report in 2015 showed that the smartphone ownership rate among adults in South Korea was the highest at 88%, followed by Australia (77%), Israel (74%), and the United States (72%) (Poushter, 2016). According to a national survey in South Korea, the smartphone ownership rate at ages 6–59 years was 82.5% in 2015 (Korea Internet & Security Agency, 2015a). As with large number of users, problems around smartphones occur more frequently; the national awareness of the severity of problematic smartphone use and the need for intervention strategies is rising. There have been concerns about the negative impacts of internet and game addiction in South Korea. Research into problematic behavior measurements and addiction treatment services for smartphones is conducted based on prior research into digital media such as the internet and online games. Furthermore, addiction coping services are constructed at diverse levels, from government to academia and industry.

In particular, adolescents’ smartphone usage is becoming a huge social concern. The teen smartphone ownership rate in South Korea has increased from 16% in 2011 to 88% in 2014 (Korean Media Panel Survey, 2015). With this rapid penetration, smartphone addiction in adolescents is increasing (National Information Society Agency, 2015). Adolescents are at a key developmental stages and desire identity construction, to achieve experiences and sociality formation. Smartphones let them accomplish such desires through providing channels for various activities. In addition, the unique properties such as an intuitive interface and multimedia functions attract the adolescents into frequent use. However, improper use of smartphones could disrupt adolescents’ physical and mental development. Furthermore, habits formed in adolescence will affect one’s whole lifetime. Thus, it is important to support

adolescents in growing healthy smartphone usage habits for preparing a future society fully integrated with smartphones.

To date, Korean society has treated the adolescents' smartphone use within the addiction frame and pathological perspectives. However, the rate of users in the high-risk groups who are actually experienced serious problems was around 4% of the total users (National Information Society Agency, 2016). Compared to the initial phase of smartphone diffusion, the penetration rate is now reaching 90% and the device is integrated in our lives. Also, we can make good use of smartphones to expand social relationships, develop visual-spatial intelligence (Greenfield, 2009), and to provide learning content to individuals at convenient times (White & Mills, 2012). Previous digital media like PC, TV, and video games have been used at specific locations and times; smartphones are used everywhere at any time.

In present, it is not enough to handle smartphone use problems with a current addiction perspective of treating users who already have problems. Rather, we need to have a broader perspective and understand the smartphone culture. In the age of the smartphone, preventive intervention is required for the majority of users that helps them deal with their problems and guide better use.

Although smartphones have become ubiquitous in society and a clear majority of people use the device in daily life, interventions for adolescents' smartphone use in Korean society remains in the addiction frame and focuses on surface symptoms like controlling usage time. Education programs to prevent smartphone addiction are offered to groups of students for only short periods of time, cannot consider individual contexts, and are not enough to induce behavioral changes.

In home settings, many parents use restrictive parenting for their children's smartphone use. Such methods are not effective but rather cause conflicts between parents and children (Ko, Choi, Yang, Lee, & Lee, 2015). Existing intervention methods have limitations, as they just take individual approaches to smartphone users and do not reflect the roles of related stakeholders including parents and peer groups. Further, they focus on the negative effects of smartphones and reducing usage time.

In addition, smartphone users have diverse usage motivations and behavior patterns even if they look similar on the outside, because smartphones provide multiple functions. People interact with friends, relieve their stress, and express themselves, and each places different values on the device. Attempts to reduce the surface symptoms without considering individual usage contexts could result in rebellious reactions and conflicts.

It is necessary to develop autonomy and self-regulation of adolescents to build and keep healthy habits. The majority of time that youths spend using smartphones

takes place in house and family setting, and parental mediation and monitoring in the developmental period prompts children's self-control (Olson, Bates, & Bayles, 1990). Therefore, effective ways of parental mediation at home is required for adolescents' healthy smartphone use.

## Background

### Adolescents' Smartphone Use Landscapes

Adolescents in today's digital society are born and raised with digital media (Courtois, Mechant, De Marez, & Verleye, 2009). Their digital media habits show three distinguishing features: using media wherever and whenever, multitasking with multiple screens, and being provided with targeted and customized media content (Warren, 2016). In recent years the smartphone use has diffused explosively and brought big differences to our daily lives, which is also true for adolescents in Korean society. In 2015, 94.2% of teen smartphone owners used their device at least several times a day, and the average usage time was over 2 hours. 99.7% reported using mobile internet for communication (instant messenger, SNS, email, etc.), 99.1% for information searching (e.g., web surfing, news, learning), and 98.2% for leisure activities (e.g., photo and video taking, game, TV and video watching) (Korea Internet & Security Agency, 2015b). In a 2016 report, 67.9% of teens selected the smartphone as the most necessary media for daily life rather than TVs (19.4%) or PCs (10.4%) (Jung, 2016). Smartphone is an important communication channel, a convenient content-providing platform for leisure time, and an essential media in everyday lives of adolescents.

As the rate of smartphone penetration increases, so do social concerns about adolescents' problematic smartphone usage. In addition, diverse risks around smartphone use have been reported. An incorrect posture and usage environment can cause eye and joint injuries. Disruptions in daily life such as loss of academic performance, tiredness and mental health problems including depression and social anxiety (Becker, Alzahabi, & Hopwood, 2013) could be the result of smartphone overuse. Media multitasking can damage teens' cognitive skills related to decision-making and learning (Baumgartner, Weeda, Van Der Heijden, & Huizinga, 2014). In addition to personal problems, real world social problems are significant. Since smartphones provide increased higher access to SNS (Social Networking Service) and instant messaging, young users become more and more involved in online social interaction and withdraw from face-to-face communication (Casey, 2012; Sarwar & Soomro, 2013).

On the other hand, smartphones can provide opportunities, depending on how they are used. Communication and SNS applications are effective for increasing social

capital that can decrease an individual's social isolation (Cho, 2015). Furthermore, SNS and mobile communication promote offline social interaction, not replace it, by providing channels for meeting new people and talking with friends (Jacobsen & Forste, 2011). Also, informal learning through the screen media environment is helpful for the development of visuospatial intelligence while it has some weaknesses in higher-order cognitive processes (Greenfield, 2009). Also, smartphones can offer diverse leisure activities that can be good ways to relieve stress (Iwasaki, Mactavish, & MacKay, 2005) for adolescents with limited time and monetary resources.

As discussed, smartphone can also be used in positive ways and is the essential media for communication and daily life nowadays. For the young generations living with smartphone, it is necessary to form healthy usage habits by facilitating positive uses and reducing problematic uses. However, adolescents are at a developmental stage and have limited capabilities in self-regulation, value judgment, and time management; they have difficulties in changing behaviors and constructing healthy habits on their own.

Therefore, an approach with preventive educational perspectives is necessary to support teens' developing abilities to make positive usage habits of smartphone. The primary purpose of preventive intervention for adolescents' healthy smartphone use is to encourage individual users in their conscious choice of behavior and being responsible for it. Parental concern and support will play a crucial role.

### **Parental Mediation for Adolescent's Smartphone Use at Home**

Parents' behavior and mediation influences their teens' habit formation. Children's screen time is strongly associated with parents' screen time and parental attitudes (Lauricella, Wartella, & Rideout, 2015). Also, parental mediation and monitoring can improve children's self-control and self-regulation on media usage (Olson et al., 1990). Conversely, improper mediation can cause parent-child conflict. Smartphones contain private information and are perceived as personal devices, so the parent-child conflicts are more likely to happen in smartphone mediation as compared with traditional media. Appropriate parental mediation based on trustful relationships is necessary to support adolescents in developing healthy smartphone usage habits.

There has been research about parental media mediation at home. In a study on internet and cell phone usage mediation (Vaterlaus, Beckert, Tulane, & Bird, 2014), four major themes were found: monitoring usage and content (e.g., check statements, internet history, pictures, and text messages), active mediation (parent participation in technology use and open parent-adolescent communication about technology), restriction (e.g., internet filters, blocking texting, timers on internet modems, password protecting devices), and rules (e.g., limiting time, asking permission). The parental

authority was evident when parents were active in mediation, were physically present during their usage, and enforced consequences when the children misbehaved. The authors suggested that parents should show trust, communicate about technology with children and set mediation methods through discussion.

In Yardi and Bruckman's research, 16 parents in Atlanta reported their rules and difficulties in parenting their children's technology usage. They mainly set the usage rules based on time of day, frequency of use, and location of use. In addition, they used tools for monitoring and managing children's technology use. They reported challenges including undermined parental authority due to gaps in technical expertise and difficulties in keeping up with their children's activities on digital platforms (Yardi & Bruckman, 2011).

Restrictive and oppressive mediation can lead to conflicts in the parent-child relationship. In the case of South Korea, restrictive methods based on total usage time, types of content, and locations of use were widely used at home. However, about 80% of parents perceived their parenting methods as less effective because of difficulties in compelling their child to follow the restrictive rules (e.g., the teenagers' rebellious behavior). In contrast, 20.4% of parents reported their methods were effective, characterized by setting rules collaboratively. Their children made an effort to follow the rules (Ko et al., 2015).

Also, parents' participation is required to make children adhere to the rules. In a study of Chinese adolescents, children followed their parents' behaviors when there was a dissonance between that behavior and domestic rules, and they followed the rules when the parents' behaviors were in line with the rules (Liu, Fang, Deng, & Zhang, 2012). The more parents stick to the rules, the more children follow them. Smartphones are daily media for parents too, so they need to be aware of their usage habits and participate in regulation efforts when parenting their children.

For effective mediation, parents need to understand children's smartphone use and guide them with trustful and receptive attitudes. Also, parental strategies are required that are responsive to children's particular usage contexts (Warren, 2016). There are some ways of mediation that can be used without deep consideration, including software for automatic restrictions. Such methods seem easier than other mediation strategies; however, we cannot achieve the primary purpose of smartphone parenting with only these tools. To achieve the first aim of mediation with growing children as autonomous and responsible smartphone users, parents should acquire knowledge about adolescents' media use, set and adjust the rules reflecting children's need through mutual negotiation.

## Public Preventive Intervention Programs for Smartphone Overuse in South Korea

South Korea, one of the leading countries of new media culture, has diverse strategies for adolescents' digital media overuse that began with the internet and online game addiction. A cooperative system between government ministries and institutes has been built to cope with smartphone usage problems. Preventive intervention programs such as parental education, group-education, and practical activities were started. Some are listed below (Seo, 2016).

- **Preventive education for smartphone and internet over-dependency** (National Information Society Agency–Internet Addiction Prevention Center): send professionals to schools and institutes to educate adolescents about over-dependency and precautionary methods. This includes the ‘Internet and Smartphone Lemon Class (a 1-hour group-lecture)’ and ‘WOW Healthy Internet Mentoring (a 2-hour session with group-lecture and discussion)’.
- **Smartphone over-dependency prevention content propagation** (National Information Society Agency–Internet Addiction Prevention Center): develop and propagate online educational content about the positive use of smartphones for all age-group users.
- **Family camp for healthy game culture** (Korea Creative Content Agency): provide a place for family communication about games through activities such as preventive education for games addiction and career exploration. Held each summer and winter vacation, for 200 participants.
- **Parent education for preventing adolescents' Internet and smartphone addiction** (Korea Youth Counseling & Welfare Institute): inform parents about adolescents' media addiction and mediation methods for children's healthy smartphone and internet use.
- **Are You Smart? (Smart media usage self-practice note)** (Ministry of Science, ICT and Future Planning/National Information Society Agency): a diary-style individual activity note for healthy smart media use on vacation (Internet Addiction Prevention Center, 2015). This includes setting behavioral goals, checking individual usage patterns, and practicing proper usage activity guidelines. This can grow adolescents' autonomy, but at the same time, has limitations because most students do the activities without any help.

Although there have been several attempts at preventive intervention, some limitations exist and these programs were much fewer than treatment programs. First, most preventive programs are in the form of group-education, conducted in one-shot session and delivering general facts about smartphone addiction. Thus, they are not enough to raise awareness, and students easily lose their attention. Also, such uniform



education has difficulties in considering different contexts of individual students, and there is a lack of support process for autonomous activities to make healthy habits.

Second, there is lack of programs that guide collaborative mediation between parents and children at home. For successful parental mediation, shared activities are important for constructing trustful and smooth parent–child relationship. Existing programs were aimed at adolescents and parents separately. Even if they learned important ways to set healthy usage habits, they were faced with difficulties in applying them in interactive contexts without adequate practice. It is important to provide places for practicing collaborative mediation activities for parents and children.

Last, there is insufficient support for alternative activities and cultural resources. Although there were some programs dealing with board games or outdoor activities for families, those are one-time events and do not provide connected channels for further activities. Adolescents tend to pursue personal enjoyment and happiness more than older generations. If alternative activities that fit with teens' interests are provided, smartphone immersion will be reduced as they move to such activities. Diverse stakeholders around adolescents, including family, school and communities, need to cooperate to help adolescents experiencing many activities and find their interests.

In the case of South Korea, institutional and governmental reactions have been imposed since internet and gaming disorders became serious social concerns. The public tends to depend on such strategies to treat digital media usage problems. The situation is similar in smartphone usage; governmental institutes came forward to resolve and prevent smartphone addiction using existing internet addiction counseling networks.

If the system participates first, then individuals will shift all the responsibility onto it. However, the system cannot cope with every risk and problem because smartphones have become an essential part of daily life. It will be more effective to develop individual users' abilities to use smartphones in healthy ways and increase awareness of parental mediation. Individuals and families should be able to judge the core values of their usage behaviors and select proper values from various institutional supports. From discussion about limitations of existing preventive programs and importance of parental mediation for adolescents' smartphone usage at home, we conducted the following research to find effective intervention strategies.

### **Investigations of Preventive Intervention Program**

The objective of this paper is to develop a conceptual framework of preventive intervention programs to promote adolescents' healthy smartphone use through a



series of case studies. The goals of the research are to understand smartphone usage behaviors based on specific motivations, to understand conventional smartphone intervention methods to find appropriate intervention points, to practice and test the effectiveness of intervention programs, and to find insights for designing services to help adolescents form healthy smartphone use habits.

The first phase was conducted to understand the youth's smartphone usage behaviors and motivations. The second phase was conducted to explore effective behavior modifications for smartphone usage. The purpose of these two phase is to explore intervention points that consider realistic difficulties both parents and adolescents face while applying smartphone mediation. In order to find such intervention points, it is essential to understand two aspects: how the youth are using smartphones and the motivations for their usage patterns; how smartphone mediation strategies are currently applied at home and the reasons for failures of certain methods.

Our aim was to develop specific preventive intervention strategies based on the findings to guide effective behavior modifications for smartphone usage. We have conducted two phenomenological case studies in the form of focus group interviews (FGIs) to understand subjective experiences, find insights into both adolescents; and parents' motivations and actions (Lester, 1999). The third phase implemented an intervention program in the form of parent-child dyad participatory workshops to facilitate adolescents' healthy smartphone usage habits.

### **Youth's Smartphone Usage Behavior Patterns and Motivations**

**Purpose.** There have been attempts to mitigate smartphone overuse. However these trials mainly focused on curtailing usage time, disregarding users' various usage contexts. The purpose of this research is to profile smartphone users by understanding their needs and goals in order to suggest personalized guidelines to help develop healthy smartphone usage habits (Rhim, Lee, & Doh, 2016).

**Research design.** FGIs were conducted on twenty (13 male, 7 female,  $M = 28.4$ ,  $SD = 2.7$ ) young adults. Five smartphone usage behavior indexes conveying users' needs and motivations (communication, entertainment, functional tool, information search, and life logging) were used as criteria for profiling user groups.

**Analysis.** Three researchers' analyzed self-reported answers from participants to gain further insight of how participants use such functions using an affinity diagram method.

**Results.** Three smartphone user groups (Social fun seeking, Leisure activity seeking, and Information seeking) based on defining motivational characteristics are classified. Defining characteristics of users in the Social fun seeking group is

that they use the communication function the most and enjoy social activities using smartphones. Users in the Leisure activity seeking group use the entertainment function the most, mainly to reduce stress. Users in the Information seeking group highly rate the importance of the internet search function.

**Discussion and conclusion.** The finding of this study shows that users have different intentions for smartphone usage with distinctive usage patterns. This supports the fact that when applying intervention strategies to prevent excessive smartphone use, a unilateral intervention method cannot satisfy users with different motivations. Therefore, appropriate intervention strategies should be applied to different smartphone user groups by considering specific usage motivations and behavioral contexts.

### **Parental Mediation Strategies Used at Home**

**Purpose.** Smartphones have become an integral part of technology savvy adolescents' lives rapidly altering their media culture, which has created concerns for abusive smartphone usage. Worried parents apply various mediation strategies, yet most rules eventually fail because they do not include adolescents' perspectives or specific family contexts. The purpose of this study was to find effective intervention points for parental mediation in digital media contexts to form adolescents' healthy smartphone usage habits that can be applied at home (Rhim, Lee, Lee, Na, & Doh, 2016).

**Research design.** Two sessions of FGI were conducted. A purposive sampling was adopted to identify vivid experiences of both adolescents and their parents regarding smartphone and media usage rules. In the first FGI (n = 21; parent: 21), we explored experiences of parents regarding their children's media usage. In the second FGI (n = 24; parent: 13, child: 11), digital media usage rules applied at home were examined from both adolescents' and parents' perspectives.

**Analysis.** Five independent coders repeatedly read the transcripts from the session to identify regularities and commonalities among the participants' experiences. Labeled themes that identified common experiences of the participants were manifested through the interpretive process.

**Results.** This phenomenological qualitative research revealed parents' concerns (health, safety, social relationship, and developmental issues of their children) and difficulties (lack of understanding youth media culture, confusion in regulation selection, lack of adolescents' responsibility) they faced while applying media usage rules. On the other hand, adolescents sought mediation that allowed their autonomy with the least involvement from parents.

**Discussion and conclusion.** Overall, mediation strategies that the adolescents perceived ineffective were those applied without adolescents' consensus. In most cases the rules were set by parents, which did not consider the individual youths' characteristics and family contexts. Through the sessions, adolescents realized the necessity of their responsible media use. We suggest parent-child mutual rule-shaping for digital media usage guidelines to reach common ground and increase the autonomy of adolescents.

### **Participatory Workshop to Support Parent-Child Mutual Rule-Shaping for Smartphone Use**

Through previous two exploratory studies, it can be concluded that unilateral intervention methods based on time limitation do not work, because all users have different motivations and show differing usage behaviors. Furthermore, since applying intervention methods is a process of interactions between parents and children, finding common ground based on communication is necessary to form mutually agreed adaptive methods. Forming mutually agreed mediation methods helped both teens and parents to select realistic goals that were more attainable for the teens. Furthermore, the rules should be adaptive and specific to individual child and family contexts. Based on the findings, a participatory parent-child workshop session was designed to help adolescents form intervention strategies for healthy smartphone use.

**Workshop design.** Three sessions of activities were designed based on the stages of change: pre-contemplation stage (sampling), contemplation and preparation stages (first workshop session), action stage (second workshop session), and maintenance stage (third workshop session) (Prochaska et al., 1994). Three sessions of the participatory workshop were conducted for three weeks in three cities in South Korea (Seoul, Daejeon, and Mokpo) with 18 parent-child dyads ( $n = 37$ ; parent: 18, child: 19). We focused on (a) helping both adolescents and parents to realize adolescents' media consumption patterns and its value or meaning to them, (b) setting mutually consented media usage goals for individual households, (c) reflecting on previous trial and error or applying individual media regulations to find a starting point for implementing individual adaptive regulations to form healthy media usage habits.

**Sampling method.** Purposive sampling method was used in this case study to recruit participants. The notice for recruiting for the workshop was posted online (internet bulletin, notice from education office (Wee Center, <http://wee.go.kr/home/main.php>), and introduction from acquaintances) with thorough explanations of purpose, objective, procedures, and contact information of the workshop. Parent-child couples that wanted appropriate regulations for their household to modify adolescents' smartphone use behaviors made their own decisions to participate in the workshop and requested to participate. It can be assumed that those couples who

made such decisions had undergone the pre-contemplation level of the transtheoretical model. Participants in this level had gone through stages where they did not intend to take immediate action, perhaps because they were uninformed or unaware of their current situations (Velicer, Prochaska, Fava, Norman, & Redding, 1998).

**Participatory workshop session 1: Reflection on smartphone usage behaviors.**

The purpose of the first participatory workshop session was to reflect adolescents and parents' digital media usage patterns to find differences in perceptions and form common grounds to understand each other's smartphone usage behaviors. First, individual participants were asked to list all the digital media content they have used in the past week. Second, participants were asked to list each activity in the order of their perceived importance. Third, for each digital media activity, participants were asked to write positive feelings or thoughts, negative feelings or thoughts for using that particular media. Also, they were asked to write the amount of time spent for each media activity and how long they should use it. Lastly, after finishing the activities the pairs shared their digital media usage experiences.

**Participatory workshop session 2: Setting family rules for smartphone usage.**

The purpose of this session was to set more realistic media usage goals specified for each household by regarding family members' media usage patterns and contexts. The goal was to form mutually agreed rules by having open discussions and compromise as parent-child dyads. The activity was in a semi-game format to facilitate open discussion and reduce possible tension. First, each pair received a paperboard and a stack of 'digital media usage promise cards' consisting of 13 cards with different media related regulations written on them. Second, the child and parent individually read each card and chose three with digital media usage regulations to adopt for the family, but did not show each other what they have chosen. Third, they wrote their reasons for selecting each rule on the back of the selected cards. Fourth, on the count of three, both teens and parents showed the regulation cards they have chosen to see how many they have chosen in common. Fifth, they discussed the cards they have chosen and the reasons for selecting such regulations. After the discussion, the child and parent chose the three media regulations to try in the future. Last, they glued three of the selected rules on the paperboard and wrote resolutions for keeping the rules.

**Participatory workshop session 3: Evaluation of rule keeping.** The purpose of this session was to reflect an individual family's effectiveness of the past week's trial of co-settled smartphone use rules. In this session, parent-child dyads discussed the past week's experiences of how each mediation method was performed and evaluated the effectiveness of the rules. Four of our researchers participated in each dyad's discussion to moderate their discussions and give appropriate advices.

**Finding and implication.** The findings of the study can be summarized as below. First, in order to trust each other and communicate, parents need to understand and acknowledge teens' digital culture and what it means to them. Before the workshop, most parents were not aware of the kind of digital content their children were consuming and reasons for their behaviors. Therefore, most parents had negative or distorted view of teens' digital media consumption. This ambiguous perspective on digital media consumption made parents worry about their teens, leading some of them to apply forceful mediation rules, which led to conflicts. Second, when parents solely chose mediation strategies, these rules tended to convey parents' expectations rather than adolescents' interests, which made it difficult for teens to keep up with rules. Third, teens should also be proactive media consumers. They should reflect and know what they are trying to achieve from consuming particular digital content and set standards for using them. When teens and parents mutually select rules that are created based on usage purposes, teens are more likely to understand the purposes of the rules and become more responsible in keeping such rules. Fourth, digital media rules are not fixed. Both parents and teens should be aware that mediation rules regarding digital media should be periodically modified on behalf of different child and differing situational contexts.

**Limitations.** The program activities had some limitations. Since the program was conducted in weekly face-to-face sessions with the help of moderators, limited number of dyads were able to participate per session. Furthermore, giving appropriate and immediate feedback and objective monitoring was difficult. This could result in difficulties in self-reflection, thereby reducing overall self-motivation, which could eventually end as a one-time trial session. Also, methods to keep user diaries on smartphone use should be modified. Self-reflection is important for the behavior modification process, yet not many participants filled in user diaries. Participants reported that keeping diaries every day without feedback for a long period was difficult. Some of these limitations can be overcome by integrating online software systems to the current offline workshop activities.

**Discussion.** While many previous attempts at applying mediation was forced by parents, our research attempted to help adolescents become active and autonomous participants by co-shaping media usage guidance settings. It can be concluded that such mutually shaped rules should be specific, conveying the family contexts. Also, when teens become better at keeping the rules they have made, the rules can be reinforced. Parents should be fully aware of their children's state, interests, and life cycles by having active communication in daily life and modifying digital media rules to help the child form healthy digital media habits.

Summary of useful intervention strategies, core activities, and their advantages and limitations are described in Table 1. This value-oriented step-by-step guidance is the beginning for behavior modification.

Table 1

*Summary of Participatory Workshop Activities of Parent-Child Mutual Rule-Shaping for Smartphone Use*

Useful Intervention Strategies	Activities	Advantages	Limitations
Professional help from facilitators	Digital literacy education	Deliver accurate information to reduce confusion and form common understanding	Limited number of dyads that can participate per session
	Provision of structured activities (e.g., mutual rule-shaping activities)	Allows an opportunity to conduct various activities based on value-weighted goals	Activities conducted outside of the sessions cannot be clearly monitored
Provision of safe negotiation settings	Provision of opportunities for open conversation	Have objective and honest conversations about adolescents' smartphone use	Giving appropriate feedback can be difficult Difficult to make objective self-reflection
	Exchange expectations among family members Allow formation of sympathy with other families with similar experiences	Facilitate communication and help form family context reflected goals Share experiences and provide moral support for other families with similar concerns	Long sessions can reduce overall self-motivation Could end as a one-time trial session
Provision of opportunities for self-reflection	Activity reflection (self-monitoring, activity tracking)	Allows setting further goals and directions based on self-reflection	

### Ideation for Activity Design of Integrated Intervention Program

#### **Evolving Process Model of Parent-Child Conflict Around Adolescents' Smartphone Use**

Overall, three phases of research were conducted to form the framework of a preventive intervention program to guide adolescents' healthy smartphone use that can start at home. Five independent researchers repeatedly read the transcripts from the session to identify regularities and commonalities among the participants' experiences. Based on observations and discourse from all the case studies, researchers formed an evolving process model of parent-child conflict around adolescents' smartphone use (Figure 1).

This model describes interaction between parent and child around adolescent's smartphone use in the sequence of precondition, process, and consequences. Adolescents use smartphones for various reasons, showing complex usage patterns: external factors, peer pressure, and individual motivations. However, since the device is personal and teens use it for long hours, parents eventually become worried about their children's smartphone consumption.

The overflowing side effects of smartphone overuse from the media, and their lack of understanding make parents more anxious, so they try to apply various mediation

strategies to curtail adolescents' smartphone use. Many regulation methods were restrictive or burdensome for the adolescents to follow. When parents are too strict or nag too much, adolescents become stealthier or more immersive in smartphone use. During this phase, many conflicts occurred. Nervous or confused parents would apply inconsistent mediation rules because many of the previous regulations seemed to have failed. This would result in unsatisfactory communication with their children, and conflicts in varying degrees are likely to occur in most households.

But with clear understanding, predictable conflicts and arguments can be avoided. Parents should be less apprehensive of adolescents' media use by having a clear understanding of smartphone literacy. Adolescents on the other hand should be more aware of their media consumption and make efforts to effectively communicate with their parents.

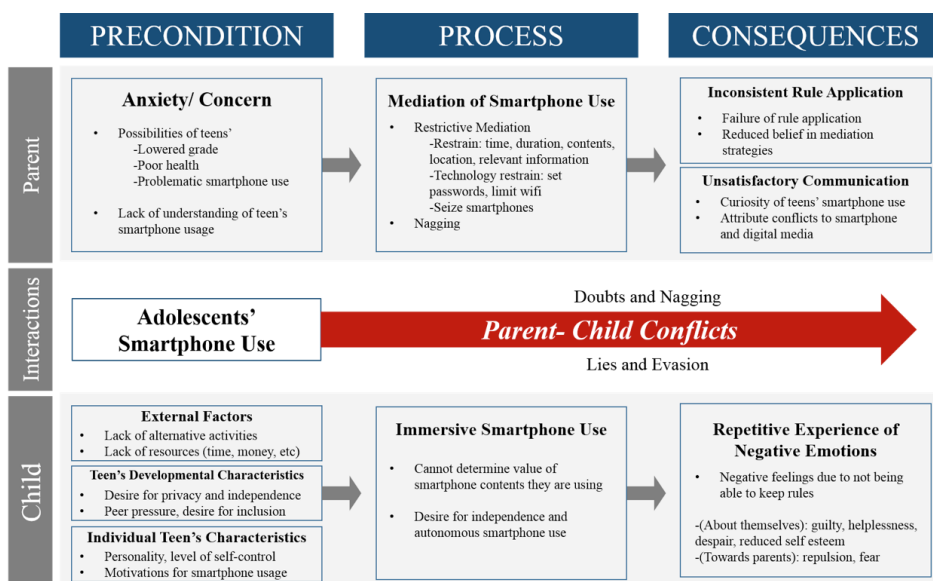


Figure 1. Evolving process model of parent-child conflict around adolescents' smartphone use.

### Activity Design of Online and Offline Integrated Service System for Healthy Smartphone Use

The framework was an initial guide for adolescents' healthy smartphone use. It is assumed that certain behaviors become more automatic as they go through a number of repetitions (Lally, Van Jaarsveld, Potts, & Wardle, 2010). Therefore, repetitive actions from the participants are necessary to form healthy smartphone use habits.

Being portable and pervasively used, smartphones are widely used for habit formation (Oulasvirta, Rattenbury, Ma, & Raita, 2012). Using smartphones for habit



formation has two aspects: (1) it automatically tracks specific designated behaviors and (2) it can deliver cues that trigger such behaviors. Furthermore, users' habit formation can be measured from quantitative data logged with smartphones, such as time and frequency of certain application usage (Partridge & Golle, 2008).

It can be suggested that by integrating online software systems to currently designed participatory workshops can help adolescents to form sustainable healthy smartphone use habits. Table 2 lists core activities for a preventive participatory workshop and online software in terms of the four steps of a preventive intervention framework for supporting teens' healthy smartphone use (knowledge support, relational support, social support, and cultural support).

Table 2  
*Activities Design of Online and Offline Service*

Service	Offline participatory workshop activities	Online software service activities
<b>Core values</b>	<b>Value-oriented activity guidance:</b> <i>Provides the opportunity to increase awareness of the current state</i>	<b>Sustainable habit formation guidance:</b> <i>Increases self-motivation, provide cues for repetitive actions, provide feedback</i>
Phase 1. Knowledge support	<ul style="list-style-type: none"> <li>• Provide lectures on digital literacy</li> <li>• Increase self-awareness of individual's core values</li> </ul>	<ul style="list-style-type: none"> <li>• Provide various video lectures with specific topics (e.g., adolescents' privacy in media use, history of media communication, youth digital culture and developmental tasks)</li> <li>• Provide cues to facilitate self-reflection</li> <li>• Provide various online tests: smartphone addiction test, parent-child conflict type test, parental mediation type test</li> </ul>
Phase 2. Relational support	<ul style="list-style-type: none"> <li>• Provide opportunities to communicate in an open and supportive environment</li> <li>• Conduct mutual rule-shaping activities</li> </ul>	<ul style="list-style-type: none"> <li>• Provide mutual rule-shaping service online for modification and reminder</li> <li>• Provide user diaries to keep track of how the rules are kept for self-reflection</li> <li>• Facilitate communication between parents and children</li> <li>• Provide emotional supports (using online reward items)</li> </ul>
Phase 3. Social support	<ul style="list-style-type: none"> <li>• Communicate with other families with similar concerns</li> <li>• Share past experiences and give support</li> </ul>	<ul style="list-style-type: none"> <li>• Provide internet bulletin board to share experiences or concerns</li> <li>• Become mentors and mentees for other families</li> </ul>
Phase 4. Cultural support	<ul style="list-style-type: none"> <li>• Provide information about services and programs for alternative activities</li> <li>• Provide lecture on methods to creatively use digital media</li> </ul>	<ul style="list-style-type: none"> <li>• Open up various channeling gateways to regional resources for adolescents to provide alternative activities</li> </ul>

### Limitation and Future Work

There are several limitations to the research framework because it is in an exploratory phase. First, the results should not be overgeneralized due to characteristics of the sample. Although purposive sampling is appropriate for phenomenology study in the attempt to understand actual digital media mediations applied at home, it cannot

be concluded that they represent larger or varied population. Furthermore, using qualitative research methods may result in a limitation in the number of participants per session. Also, the samples were all Koreans, which convey specific cultural backgrounds. Second, the workshop sessions did not have comparative studies to prove their effectiveness. In the future, based on the implementation service trials, the long-term and comparative experiments with more dyads should be conducted to find the effectiveness of the research.

### **Conclusion**

We have suggested a service framework of preventive intervention programs to help form adolescents' healthy smartphone use through several case studies and findings. Three principal conclusions may be drawn concerning the significance and implications.

First, adaptive intervention strategies that specifically consider individual adolescent's smartphone usage motivations and contexts should be applied. Application of a single preventive intervention method is not sufficient to help adolescents modify their smartphone usage patterns.

Second, parent-child dyads should mutually shape adaptive smartphone use rules. The rule-shaping procedure is not the final step for applying preventive intervention strategies, because the rules are not fixed. Adolescent's rule keeping procedures should be periodically reflected to check whether the rules are positively affecting their smartphone use patterns. Therefore, mutual rule-shaping procedures should be reiterated and rules should be reinforced that better suit the adolescent's developmental process and situation. Furthermore, when there is more than one child in the family, parents should adapt different rules for each sibling in line with the individual child's characteristics.

Third, the offline rule-shaping participatory workshop program should be integrated with an online software system to help adolescents form healthy smartphone use habits. With the aid of a software system, adolescent's smartphone use can be monitored and precise feedback could be provided to motivate teens to positively reinforce their smartphone use habits.

These trials are not only an attempt to reduce confusions regarding smartphone use and mitigate conflicts between parents and adolescents, but also as an initial step to form an overall healthy smartphone use culture. Smartphone use is not an individual's media consumption behavior. Content consumed via smartphones connects people and affect others in various aspects. Therefore, ways to consciously use smartphones should be learned and practiced. Such habits should be developed as early as in youth because it is the best time to form value-oriented behaviors. Smartphones are

one of the emerging technologies. Whenever digital technology and novel devices are developed, the public and media are fearful about the harmful effects of these emerging technologies. However, with adequate digital media literacy and practicing conscious digital content consumption, users can be creative participants in new technology culture and use it in ways that represent their life values.

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