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ORIGINAL RESEARCH

The Longitudinal Relationship Between Sibling Smartphone Addiction and Child Smartphone Addiction

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Background: The global rise in smartphone addiction among children is linked to increasing mental, physical, familial, and financial problems. This study aimed to longitudinally explore the impact of sibling smartphone addiction on child smartphone addiction. While the influences of parental smartphone addiction and peer groups on smartphone addiction have been studied, more research is needed to examine the longitudinal effects of sibling smartphone addiction, a significant family member during childhood, on child smartphone addiction.

Methods: This study conducted a longitudinal analysis using four years of panel data (2019–2022) from the Korean Children and Youth Panel Survey (KCYPS). The final analysis included a total of 1,978 participants, comprising fourth-grade elementary school children (n=989) and their siblings (n=989). The changes in smartphone addiction over the four years were analyzed using latent growth analysis.

Results: First, while the rate of change in child smartphone addiction was higher, both sibling and child smartphone addiction increased over time. Lower initial smartphone addiction levels were linked to a greater increase in smartphone usage over time. These results indicate the need for interventions targeting groups with lower initial levels of smartphone addiction. Second, higher initial levels of sibling smartphone addiction were associated with greater child smartphone addiction, and the change rate of sibling smartphone addiction influenced that of child smartphone addiction. As sibling smartphone addiction sharply increased over time, child smartphone addiction similarly escalated dramatically. On the other hand, it was found that as sibling smartphone addiction increases gradually, child smartphone addiction also increases gradually.

Conclusion: This study identified the longitudinal impact of sibling smartphone addiction on the onset and progression of child smartphone addiction. The findings suggest that when preventing and intervening in the risk of child smartphone addiction, it is effective to consider the issue of sibling smartphone addiction in a long-term context.

Keywords: smartphone addiction, child smartphone addiction, sibling smartphone addiction, longitudinal study

Introduction

Smartphones have become essential communication tools in the information society, with approximately 5.22 billion people, accounting for 66% of the global population, reportedly using them as of 2020.[1] While smartphones facilitate networking with others and help maintain social identity, they offer quick access and immediate gratification, which sets them apart from computer-based internet use and contributes to a rapidly increasing trend of smartphone addiction.[2,3] Smartphone addiction is a form of behavioral addiction that heightens the risk of numerous mental, physical, and financial issues, such as depression, anxiety, stress, alcohol and drug abuse, aggression, academic performance decline, cyberbullying, emotional damage, sleep disorders, and spinal problems.[4–7]

A meta-analysis of 26 studies involving 15,108 participants found that smartphone addiction is positively correlated with procrastination tendencies, supporting the compensatory internet use theory.[8] Excessive smartphone use was shown

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to have a positive correlation with depression[5] and an increased level of anxiety.[9] A meta-analysis of 44 studies conducted on university students across 16 countries revealed that smartphone addiction negatively impacts students' learning and overall academic achievement, while also adversely affecting the cognitive abilities and skills required for academic success.[10] An analysis of smartphone addiction prevalence among 5,497 medical students across seven Asian countries found a high prevalence rate of 41.93%, with smartphone addiction positively correlated with poor sleep quality, stress, anxiety, depression, neuroticism, and general health issues.[11] A meta-analysis of changes in smartphone addiction among Chinese university students over the past decade (2013–2022) revealed that female students exhibited more severe smartphone addiction compared to male students. Factors such as anxiety, depression, loneliness, stress, well-being, social support, and resilience were identified as influencing the progression of smartphone addiction in university students.[12] A meta-analysis of 82 studies involving 48,880 participants found a significantly positive association between social anxiety and smartphone addiction. This relationship was stronger in adolescents than in adults, with age being a significant factor. The association was also stronger among Eastern participants compared to Western participants. However, gender differences did not appear to affect this relationship.[13]

Adolescents, in particular, perceive smartphones as an essential part of their lives, are relatively more vulnerable to the harmful effects of media, and are reported to be more susceptible to addiction than other age groups.[14] This trend is concerning as teenagers are not only the most frequent users of smartphones but also the most susceptible to developing addictive behaviors.[15] For instance, in Switzerland, smartphone addiction prevalence is reported to be higher among younger adolescents than young adults.[16] In China, about 80% of adolescents use smartphones, with 22.8% of them being addicted.[17] According to the 2023 National Information Society Agency (NIA)[18] survey on smartphone overdependence in South Korea, 97% of Koreans use smartphones, and among these users, 23.1% are considered addicted. Analyzing smartphone addiction risk by age group reveals that 40.1% of teenagers (ages 10–19) are at the highest risk, compared to 25.0% of young children (ages 3–9), 22.7% of adults (ages 20–59), and 13.5% of seniors (ages 60 and above).

Children and adolescents spend significant time using social networking sites (SNS) for games, messaging, music, photography, and online community involvement rather than engaging in face-to-face interactions. The tendency for increased smartphone use is linked to lower self-esteem, higher loneliness, and interpersonal anxiety, which exacerbate smartphone addiction.[19–21] Research on college students indicates that both minimal and extensive smartphone users primarily use their devices to maintain or strengthen social relationships.[22] A study examining differences in factors affecting smartphone addiction across different educational levels found notable differences. Elementary students with high addiction scores displayed higher levels of self-control compared to middle and high school students. These elementary students also showed greater sensation-seeking, greater loneliness, and lower perceived parent-adolescent relationship quality.[23] Additionally, smartphone addiction has been found to be a predictive factor for sleep quality in adolescents.[24] The variation in factors influencing smartphone addiction based on educational level highlights the importance of self-control development during adolescence, an essential component of addiction, and warrants attention.

As children engage more actively in external activities such as peer groups and school life, the influence of parents may not be absolute. However, if family members use smartphones addictively, children can easily access smartphones, and if parents themselves are addicted to smartphone use, it can negatively affect the quality of parent-child interactions.[25,26] Particularly, witnessing or frequently being exposed to addictive media use by family members may lead to imitative behaviors, increasing the risk of smartphone addiction.[27]

Recent studies have reported that parental and family factors directly and indirectly influence smartphone addiction in children and adolescents. For example, poor parent-child relationships, dysfunctional family dynamics, parental neglect, and communication problems between parents and children have been identified as risk factors.[28–31] Parental smartphone addiction has been identified as a predictor of smartphone addiction in adolescent children. It has been shown that adolescents are more likely to develop smartphone addiction when their parents excessively use smartphones,[26,32,33] and longitudinal studies have also indicated that parental smartphone addiction is a positive predictor of smartphone addiction in adolescent children.[34]

A study examining the role of virtues in the relationship between university students' smartphone addiction and parenting style[35] found that a negative parenting style not only directly exacerbated the degree of smartphone addiction but also indirectly predicted smartphone addiction through virtues. Furthermore, during the elementary school period,

parents' influence is significant, but the role of peer groups begins to grow substantially. Family and peer responses and behaviors, such as parenting style and satisfaction with friendships, are known to affect addictive smartphone use.[36,37] Thus, there is increasing interest in the importance of family factors influencing smartphone addiction in children and adolescents. Given that family functioning is reflected in the emotions and behaviors of all family members, it is necessary to explore the relationship between family factors and smartphone addiction.

Siblings play a crucial role in buffering against and providing support for the negative outcomes of stressful life events experienced by children and adolescents during their developmental process.[38] Sibling conflict has been identified as a risk factor for risky behavior in adolescents, while sibling intimacy has been positively associated with risky behavior only among brother-brother pairs.[39] Longitudinal studies on the impact of sibling relationship quality on adolescent problem behaviors[40] have found that sibling support is unrelated to the level of externalizing problems and does not affect the longitudinal changes in externalizing problems, anxiety, or depression. Conversely, sibling conflict has been identified as a risk factor for externalizing problems. A study by Lee et al[41] found that being an only child had a moderating effect on the relationship between smartphone addiction and depression among low-income male middle and high school students. In other words, male middle and high school students without siblings were found to be at a higher risk of experiencing depression if they were addicted to smartphones.[41]

In the field of addiction, particularly in alcohol and substance abuse research, sibling factors are reported to play a critical role as socialization agents. This is due to their interactive role in behavioral and normative similarity, influencing the initiation, maintenance, and abstinence of alcohol and substance use among adolescents.[42,43] According to research on alcohol use,[44] the parent-child relationship, parental monitoring, and older siblings' drinking behaviors have a significant impact on the frequency of high-risk drinking among younger siblings. A study involving middle school adolescents[45] found that sibling substance use and peer substance use had a stronger relationship with adolescent substance use than parental alcohol abuse. Furthermore, sibling substance use can serve as a motivation for adolescents to consume alcohol to cope with negative emotions, thereby influencing adolescent drinking problems.

Moreover, a study examining predictors of substance abuse during middle childhood[46] found that both sibling deviance and peer deviance directly predicted children's substance abuse. However, when analyzing the longitudinal effects of sibling deviance and peer deviance on childhood substance abuse, it was found that only sibling deviance had a significant influence over time. While there has been some research on the impact of siblings on adolescent alcohol and substance abuse within the field of addiction, research on the influence of siblings' smartphone addiction on children's smartphone addiction remains limited.

This study aims to explore the longitudinal relationship between siblings' smartphone addiction and children's smartphone addiction. By understanding the relatively under-researched influence of siblings' smartphone addiction, this study seeks to provide foundational data to prevent and intervene in children's smartphone addiction.

Methods

Research Model

To examine the longitudinal relationship between sibling smartphone addiction and child smartphone addiction, the following research model was established.

Participants

This study analyzed data from the Korean Children and Youth Panel Survey (KCYPS) conducted by the National Youth Policy Institute of Korea. The KCYPS is a representative survey of Korean children, adolescents, and their parents, aimed at comprehensively understanding changes in the growth and development of children and adolescents. The survey provides foundational data for policy formulation related to children and adolescents. The KCYPS sample was drawn using a stratified multi-stage cluster sampling method, targeting all 4th-grade elementary school students in South Korea as of 2018. The total number of panel participants who completed the survey was 2,607. Although data collection for the siblings of 4th-grade elementary school students did not occur in 2018, it began in 2019. From 2019 to 2022, a total of 1,380 siblings responded to the survey. This study utilized data from the second wave (2019) to the fifth wave (2022),

spanning four years, focusing on elementary school students and their siblings. The final sample consisted of 989 children and 989 siblings who provided data on key variables for at least three out of the four years, allowing for an estimation of changes in smartphone addiction.

Thus, the study targeted 989 households that provided responses for both the independent variable, sibling smartphone addiction, and the dependent variable, child smartphone addiction, for at least three years. The reason for analyzing only cases with responses spanning three or more years was to ensure the reliability of the latent growth model analysis. The latent growth model is a method for analyzing longitudinal data. In longitudinal studies, which analyze patterns of change based on multi-year data, including cases with responses from at least three years ensures stable and reliable estimation change patterns.[47] Furthermore, the latent growth model requires data from at least three time points to simultaneously estimate individual initial values (intercepts) and rates of change (slopes).[48] Therefore, the analysis included only cases with responses from three or more years. This report was exempted from approval by the Institutional Review Boards (IRB) of Jeonbuk National University (IRB number: JBNU 2024–09-004).

Variables

Dependent and Independent Variables: Smartphone Addiction

Smartphone addiction was measured using the Smartphone Addiction Proneness Scale (SAPS) developed by Kim, D. et al (2014). This self-report scale consists of 15 items rated on a 4-point Likert scale (1 = Not at all, 2 = Not quite, 3 = Somewhat, 4 = Very much). Among the 15 items, the following were reverse-coded: "Smartphone use does not interfere with what I am currently doing (eg, studying)", "I do not feel anxious without my smartphone", and "I do not spend a lot of time using my smartphone". The mean score of all 15 items was calculated, with higher scores indicating a higher level of smartphone addiction. The Cronbach's alpha coefficients for smartphone addiction were as follows: for children, 0.877 in 2019 (Time 1), 0.896 in 2020 (Time 2), 0.861 in 2021 (Time 3), and 0.861 in 2022 (Time 4); for siblings, 0.877 in 2019 (Time 1), 0.893 in 2020 (Time 2), 0.866 in 2021 (Time 3), and 0.876 in 2022 (Time 4).

Statistical Analysis

The following analytical methods and procedures were employed to examine the longitudinal relationship between smartphone addiction in siblings and children. Data handling and model analyses were conducted using SPSS 29.0 and Mplus 8.0. First, a frequency analysis was conducted to present the gender and residential area of the child, as well as the gender, grade level, and relationship to the child of their siblings. Second, descriptive statistics were used to present the means and standard deviations of sibling smartphone addiction and child smartphone addiction from 2019 (Time 1) to 2022 (Time 4). Third, Latent Growth Modeling (LGM) was used to estimate changes in smartphone addiction among siblings and children and to verify the relationship between smartphone addiction in siblings and children. In the unconditional model of the latent growth model, changes in sibling and child smartphone addiction over time were examined. Subsequently, in the conditional model of the latent growth model, the effects of the initial value and rate of change in sibling smartphone addiction on the initial value and rate of change in child smartphone addiction were analyzed. Model fit was evaluated using the Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA).

Results

Descriptive Statistics

The demographic characteristics of the study participants are as follows (Table 1): Among the children, 495 (49.0%) were male and 504 (51.0%) were female, showing a relatively equal gender distribution. Regarding the area of residence, 844 children (85.4%) lived in urban areas, while 145 children (14.6%) resided in rural areas, indicating a higher proportion of children living in urban settings. Among the siblings, 481 (48.6%) were male and 508 (51.4%) were female. The distribution of school grade among siblings was as follows: 525 (53.1%) were elementary school students, 329 (33.3%) were middle school students, and 135 (13.6%) were high school students. In terms of their relationship with the children, 236 (23.9%) were older brothers, 262 (26.5%) were older sisters, 240 (24.3%) were younger brothers, 248 (25.1%) were younger sisters, and 3 (0.3%) were twins.

Table 1 Demographic Characteristics of Study Participants (N=989)

Variable		Categories	N	%
Child	Gender	Male	495	49.0
		Female	504	51.0
	Area of Residence	Urban	844	85.4
		Rural	145	14.6
Sibling	Gender	Male	481	48.6
		Female	508	51.4
	Grade	Elementary School	525	53.1
		Middle School	329	33.3
		High School	135	13.6
	Relationship with Child	Older Brother	236	23.9
		Older Sister	262	26.5
		Younger Brother	240	24.3
		Younger Sister	248	25.1
		Twin	3	0.3

As shown in Table 2, the mean score for siblings' smartphone addiction increased steadily from 2.04 (SD = 0.49) in 2019 to 2.17 (SD = 0.49) in 2022. Similarly, the average score for children's smartphone addiction also showed a continuous increase, from 1.98 (SD = 0.50) in 2019 to 2.19 (SD = 0.45) in 2022.

Analysis of the Research Model

This study analyzed the latent growth model in two stages. In the first stage, an unconditional model analysis was conducted to estimate the initial values and rates of change in smartphone addiction among siblings and children. In the second stage, a conditional model analysis was performed to examine the relationship between changes in smartphone addiction among siblings and changes in smartphone addiction among children, based on the initial values and rates of change obtained in the first stage.

Table 2 Descriptive Statistics

Classification	Year	Min	Max	Mean	SD
Sibling's Smartphone Addiction	2019 (Time 1)	1.00	3.73	2.04	0.49
	2020 (Time 2)	1.00	3.93	2.08	0.53
	2021 (Time 3)	1.00	3.80	2.14	0.49
	2022 (Time 4)	1.00	3.67	2.17	0.49
Child's Smartphone Addiction	2019 (Time 1)	1.00	3.67	1.98	0.50
	2020 (Time 2)	1.00	3.80	2.14	0.55
	2021 (Time 3)	1.00	3.80	2.14	0.47
	2022 (Time 4)	1.00	3.73	2.19	0.45

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Table 3 Model Fit of Unconditional Model

Model		χ2	*df*	CFI	TLI	RMSEA
Sibling Smartphone Addiction	No Growth Model	84.141***	8	0.864	0.898	0.098
	Linear Growth Model	46.887***	5	0.925	0.910	0.082
Child Smartphone Addiction	No Growth Model	233.840***	8	0.717	0.788	0.169
	Linear Growth Model	64.526***	5	0.926	0.911	0.079

Note: ***p<0.001.
Abbreviations: TLI, Tucker-Lewis Index; CFI, Comparative Fit Index; RMSEA, Root Mean Square Error of Approximation.

Table 4 Mean and Variance of Initial Score and Rate of Change of Unconditional Model

Variables		Mean		Variance		Covariances
		Estimate	S.E.	Estimate	S.E.	
Sibling's Smartphone Addiction	Initial Score	2.063***	0.017	0.120***	0.014	−0.002*
	Rate of Change	0.037***	0.007	0.009**	0.003	
Child's Smartphone Addiction	Initial Score	2.009***	0.016	0.162***	0.013	
	Rate of Change	0.062***	0.006	0.019***	0.002	−0.017***

Notes: *p<0.05, **p<0.01, ***p<0.001.
Abbreviation: SE, Standard Error.

Analysis of the Unconditional Model

Before conducting the conditional model analysis, an unconditional model analysis was performed to understand the changes in smartphone addiction among siblings and children (Table 3). To identify the optimal change pattern, the no growth model and linear growth model were analyzed separately.

The results indicated that the linear growth model provided a better explanation of changes in smartphone addiction than the no growth model for both siblings ($\chi^2 = 46.887$, $p < 0.001$; CFI = 0.925; TLI = 0.910; RMSEA = 0.082) and children ($\chi^2 = 64.526$, $p < 0.001$; CFI = 0.926; TLI = 0.911; RMSEA = 0.079). Therefore, the linear growth model was adopted.

The analysis results of the final selected unconditional linear growth model revealed that the mean initial levels of smartphone addiction were 2.063 ($p < 0.001$) for siblings and 2.009 ($p < 0.001$) for children (Table 4). The rates of change were 0.037 ($p < 0.001$) for siblings and 0.062 ($p < 0.001$) for children, indicating that the rate of change in smartphone addiction was slightly higher for children (Figure 1). However, both the mean and the rate of change in smartphone addiction were statistically significant for siblings and children, confirming that smartphone addiction in both groups increased over time.

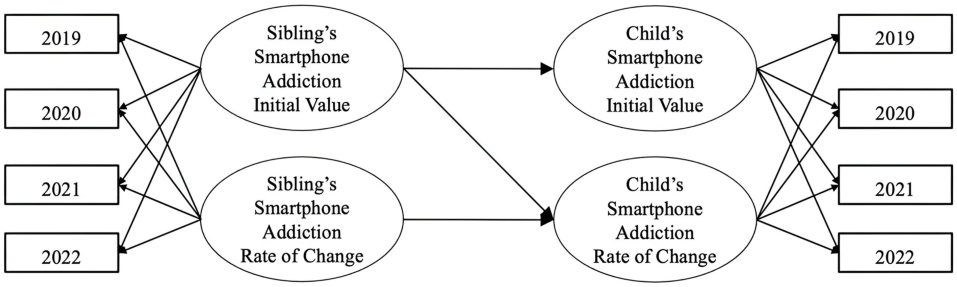

Figure 1 Research model.

Table 5 Path Coefficient of Study Model

Path Between Variables			Coef.	S.E.
Initial level of smartphone addiction in sibling	→	Initial level of smartphone addiction in child	0.845***	0.065
Initial level of smartphone addiction in siblings	→	Rate of change in smartphone addiction in child	0.105***	0.029
Rate of change in smartphone addiction in sibling	→	Rate of change in smartphone addiction in child	0.620***	0.103

Notes: ***p<0.001.

Furthermore, the variances in the initial levels and rates of change for smartphone addiction were significant for both siblings and children. This indicates considerable variability in the initial levels and rates of change in smartphone addiction among the study participants. The covariances between the initial levels and rates of change in smartphone addiction were also significantly negative for both siblings and children. This finding suggests that groups with higher initial levels of smartphone addiction exhibited smaller increases over time compared to groups with lower initial levels.

Analysis of the Conditional Model

The conditional model analysis examined how the initial levels and rates of change in siblings' smartphone addiction influenced the initial levels and rates of change in children's smartphone addiction. The model fit indices showed acceptable results, with $\chi^2 = 232.816$ ($p < 0.001$), CFI = 0.914, TLI = 0.909, and RMSEA = 0.090, indicating no issues with analyzing the model.

The initial level of smartphone addiction among siblings was found to have a significant effect on both the initial level (Coef. = 0.845, $p < 0.001$) and the rate of change (Coef. = 0.105, $p < 0.05$) of smartphone addiction among children (Table 5 and Figure 2). Specifically, higher initial levels of smartphone addiction in siblings were associated with higher initial levels of smartphone addiction in children and a more rapid increase in children's smartphone addiction over time. Conversely, lower initial levels of smartphone addiction in siblings were associated with lower initial levels of smartphone addiction in children and a more gradual increase over time.

The rate of change in siblings' smartphone addiction also significantly influenced the rate of change in children's smartphone addiction (Coef. = 0.620, $p < 0.01$) (Figure 3). This indicates that as the rate of smartphone addiction among siblings increased rapidly over time, the rate of smartphone addiction among children also increased rapidly. Similarly, when the rate of change in siblings' smartphone addiction was more gradual, the rate of change in children's smartphone addiction was also more gradual.

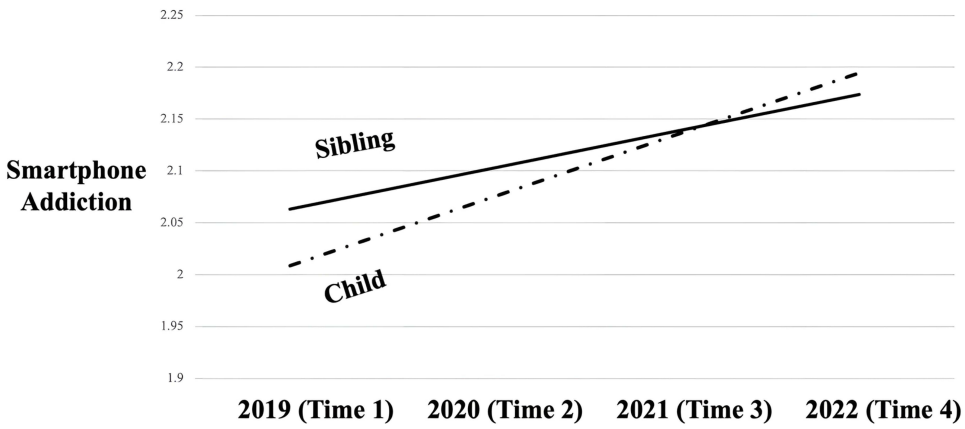

Figure 2 Linear Change Model Estimates of Sibling and Child Smartphone Addiction.

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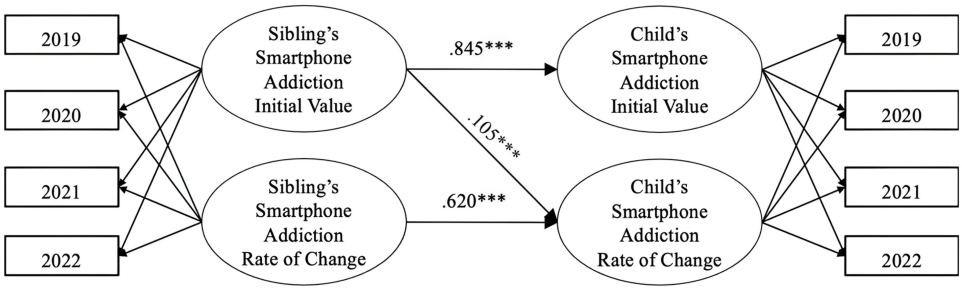

Figure 3 Analysis Results of the Research Model.
Note: ***p<0.001.

Discussion

In this study, we longitudinally explored the impact of sibling smartphone addiction on child smartphone addiction. The findings revealed that smartphone addiction increases over time in both children and their siblings, with a notably higher rate of increase observed in children. For both groups, the initial low levels of smartphone addiction were associated with a more rapid increase over time. This result aligns with prior research showing that smartphone addiction peaks during adolescence and tends to escalate from elementary school to high school.[15,16,23]

This finding supports prior research showing that the factors influencing smartphone addiction differ by educational level[23] and that smartphone addiction levels are higher in children and adolescents than in adults.[13] These results suggest that even individuals with initially low levels of smartphone addiction require close monitoring for effective prevention and early intervention efforts.

The reasons for the more rapid increase in smartphone addiction over time among groups with lower initial levels remain unclear; however, it could be hypothesized that individuals with initially lower addiction levels may experience less early intervention, leading to a steeper escalation as their usage increases unnoticed. Future research should investigate this phenomenon to identify potential underlying causes. Considering that groups with lower levels of smartphone addiction may receive less attention in prevention and treatment efforts, these findings highlight the importance of targeted interventions and increased accessibility for groups with lower initial levels of smartphone addiction. Furthermore, these results suggest that interventions targeting smartphone addiction should begin in early childhood, emphasizing the need for education, prevention, and intervention strategies tailored to this developmental stage.

These findings highlight the need to develop school-based educational programs to address child smartphone addiction, similar to previous studies that demonstrated the significant contribution of age-based educational training programs and school-based programs in reducing the severity of internet addiction among children.[49,50] At the same time, the observation that children, including siblings, with lower initial smartphone addiction levels experience a more rapid and significant increase suggests that intervention programs for preventing and treating smartphone addiction should focus on group-based approaches. Such programs can enhance peer support and are ideally implemented through school-based initiatives. An analysis of effective interventions for smartphone addiction among female adolescents identified involuntary restriction, self-awareness and self-control, school restrictions, peer support, and professional services as key components of successful intervention programs.[51]

Moreover, the rate of change in smartphone addiction among siblings was found to significantly impact the rate of change in smartphone addiction among children. Specifically, as smartphone addiction in siblings increased more rapidly, so did addiction levels in children. Conversely, when the increase in smartphone addiction among siblings was more gradual, the increase in children's smartphone addiction was also more gradual.

Previous studies have identified factors influencing child smartphone addiction, including parent-child relationships, parenting style, attachment, parent-child bonding, and parental smartphone addiction, as significant predictors.[25,28,29,33] Consistent with findings from previous cross-sectional studies, research examining the longitudinal effects of parental smartphone addiction on child smartphone addiction[34] and a study on Chinese adolescents showing that negative parent-child relationships longitudinally influence increases in child smartphone addiction[52] produced

results similar to the longitudinal findings of this study. However, there is a fundamental limitation in directly comparing the longitudinal influence of sibling smartphone addiction on child smartphone addiction with existing studies evaluating the impact of parental smartphone addiction or parent-child relationships on smartphone addiction.

These findings align with previous studies showing that sibling behavioral similarities and norms interact to influence alcohol and substance abuse.[41–44] These findings can be interpreted as being similar to studies predicting the risk of sibling addiction on overall addiction. For instance, research has shown that sibling substance abuse and peer substance abuse exert a stronger influence than parental substance abuse.[45] Additionally, studies have demonstrated that sibling deviance and peer deviance directly predict child substance abuse, with longitudinal effects indicating that only sibling deviance significantly influences child substance abuse over time.[46]

This is also similar to studies indicating that parental smartphone addiction affects children's smartphone addiction.[28–31,34] The longitudinal influence of sibling substance use observed in middle childhood studies[46] and its parallel in the context of smartphone addiction in this study highlight the importance of considering sibling influences in addiction research.

Despite the differences between alcohol, substance abuse, and smartphone addiction, this study contributes to expanding the scope of addiction research by demonstrating the impact of sibling addiction across different domains. Notably, this study contributes to the literature by examining the time-variant influence of sibling smartphone addiction, alongside parent-child relationships and parental smartphone addiction factors. While prior research in alcohol and substance abuse demonstrates the impact of sibling similarities on addiction, this study confirms a similar influence of siblings in the context of smartphone addiction. However, it is important to interpret these findings with caution due to several unexamined factors that could represent potential third variables influencing the relationship between sibling and child smartphone addiction, such as socio-economic status, parental control practices, or the presence of other siblings. Further research is needed to account for these variables to better understand their impact on the observed relationship.

Nevertheless, this study suggests that effectively addressing the growing issue of smartphone addiction among children requires an integrated, family-centered approach that considers siblings as essential targets for intervention alongside parents. Considering previous findings on parental addictive smartphone use[25,26] and family media use addiction,[27] as well as the influence of sibling smartphone addiction identified in this study, it is crucial to develop intervention strategies tailored to the characteristics of childhood.

Implications

The confirmation of the longitudinal influence of sibling smartphone addiction on the initiation and progression of smartphone addiction in this study has significant implications for smartphone addiction research. Specifically, it highlights the importance of considering not only parent-child relationships but also the behavioral and normative similarities and modeling roles that siblings play within families regarding smartphone addiction. This understanding could be utilized to develop effective prevention and intervention strategies for smartphone addiction. The findings suggest the need for a more thorough assessment of sibling smartphone addiction and usage when defining target groups for prevention and intervention efforts.

Limitations and Future Research

While it would have been valuable to further categorize the impact of siblings based on birth order and gender, the study faced limitations due to the small sample size in the panel's raw data, which prevented such detailed analysis. Future research should consider sibling relationship differences by gender, such as older brothers, older sisters, and younger siblings. Additionally, comparative studies involving smartphone addiction in only children versus those with siblings, as well as differential examinations of the influence of parental smartphone addiction, sibling smartphone addiction, and peer smartphone addiction, are needed in subsequent research.

The purpose of this study is to examine the relationship between sibling smartphone addiction and child smartphone addiction. While the research model may appear simple with only one independent variable and one dependent variable, other independent variables were considered. However, incorporating additional variables was not feasible due to limitations in the data. The variables corresponding to independent variables were limited to those provided by siblings,

as the Korean Children and Youth Panel Survey (KCYPS) primarily targets children and adolescents rather than their siblings, resulting in fewer surveyed variables related to siblings.

Furthermore, in the latent growth model, model fit is crucial. Including other independent variables significantly reduced the model fit, making it difficult to incorporate them. Therefore, future research should aim to conduct direct surveys rather than relying solely on secondary data, incorporating additional sibling-related variables that could influence the dependent variable.

Conclusion

This study aimed to longitudinally explore the impact of sibling smartphone addiction on children's smartphone addiction. We confirmed the longitudinal influence of sibling smartphone addiction on both the onset and progression of smartphone addiction, contributing to an expanded understanding of family-related risk factors. Future research should consider theoretical models that influence sibling-related behaviors, as well as sibling relationships and their interactions with parents and other family members. This study underscores the importance of targeting sibling relationships in the design of interventions to prevent smartphone addiction among children. By addressing both sibling and parental influences, public health policies and educational programs can be more effective in mitigating the rising trend of smartphone addiction in younger populations. These findings suggest that a holistic, family-centered approach is crucial for developing comprehensive strategies to combat smartphone addiction.

Disclosure

The authors report no conflicts of interest in this work.

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