RESEARCH PAPER

School-Based Educational Intervention on Mobile Phone–Related Health Risks among Upper Primary Students in Cuttack

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ABSTRACT

Background of the Study: Mobile phones have become indispensable in modern life, with approximately 6.4 billion users worldwide (Jean CJ Liu, David A Ellis et al., 2021). Their widespread accessibility across all demographics has led to excessive usage, often resulting in dependency syndrome. This overuse is associated with disrupted sleep, impaired attention, and cognitive decline, posing significant health risks for children and adolescents.

Aim of the Study: The study examined upper primary school students' understanding of mobile phone health concerns before and after an educational intervention. It also examined pre-test knowledge levels and demographic characteristics to determine the intervention's efficacy.

Methodology: A quantitative quasi-experimental design was adopted, involving 60 upper primary school students from a selected school in Cuttack, Odisha. The independent variable was a structured teaching programme on mobile phone health risks, while the dependent variable was students' knowledge levels. A validated 30-item structured questionnaire was used to measure knowledge. A pilot study confirmed feasibility, and ethical approval with informed consent was obtained. Students completed a pre-test, followed by an educational intervention, and a post-test was conducted one week later. Data were analyzed using descriptive and inferential statistics.

Results: Pre-test findings showed that 65% of students had inadequate knowledge, 35% had moderate knowledge, and none demonstrated adequate understanding. Post-test results revealed significant improvement, with 26.7% achieving adequate knowledge and 73.3% moderate knowledge, while none remained inadequate. The average score before the test was 9.63 (SD = 4.247), while the average after the test increased to 19.90 (SD = 4.144), resulting in a difference of 10.267. The paired t value of 39.127 (df = 59, $p < 0.00001$) confirmed the intervention's effectiveness. No significant association was found between pre-test knowledge scores and demographic variables.

Conclusion: The structured educational intervention significantly enhanced students' awareness of mobile phone-related health risks. These findings emphasize the necessity of integrating such programs into school curricula to encourage healthier digital habits. To confirm these results, it is advisable to conduct studies on a larger scale.

Keywords: Effectiveness, Educational Intervention, Knowledge, Health Risk, Mobile Phone Usage, Upper Primary School Students.

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INTRODUCTION

Along with the rapid development of modern technology, smartphones have become an indispensable tool in daily [(1)] Teenagers using smartphones too much is becoming a big health problem. It can cause anxiety, depression, trouble sleeping, and addiction-like behavior. As technology grows fast, smartphones are now a key part of daily [(2)] India is experiencing one of the most rapid expansions in smartphone usage worldwide, with teenagers making up a significant portion of its user base. This swift growth in smartphone adoption, particularly among the younger demographic, has led to an increased dependency on these devices, which is increasingly associated with a range of psychological and behavioral challenges.[(3)] The usage of mobile phones has increased dramatically over the last decade, particularly among children and teens. According

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to US data, between 2015 and 2021, the percentage of 8-year-old children who own a smartphone climbed from 11% to 31%. In 2021, over 90% of 14–18-year-olds have their own smartphones. [4,5]

With the rise in smartphone ownership and usage among children and youth, classrooms are increasingly seeing the presence of these devices. This trend presents distinct challenges for educators, school administrators, and policymakers. Although there is some advocacy for utilizing mobile phones as educational tools, the potential negative impacts might surpass any advantages.[6–8] In the bustling realms of workplaces and classrooms, mobile phones often masquerade as tiny tricksters, weaving webs of distraction with their siren calls of texts, games, social media, and the vast expanse of the Internet. These pocket-sized portals have the uncanny ability to whisk students away from the shores of focus, casting them adrift in seas of diversion, and thus, they can become formidable foes to the pursuit of knowledge. [6]

Smartphone addiction is characterized by an excessive reliance on mobile devices, particularly evident among younger users who frequently access their devices and spend significant amounts of time online. Compulsive smartphone use is one of three types of technology-related disorders. However, various technologies prone to overuse, such as social media and gaming, are often accessed through mobile devices. Smartphones offer users the convenience of accessing information and services without the need for a desktop or laptop, as they can be easily carried wherever the user goes. Consequently, these devices have increasingly become the user's primary computing tool, facilitated by their adaptability and near-ubiquity. [9]

The health implications of electromagnetic fields (EMF) emitted by mobile phones and their base stations are a matter of concern. [10] Children and adolescents are believed to be more vulnerable to the effects of electromagnetic fields. This increased susceptibility is attributed to the ongoing plasticity of their brains, the thinner bones of their skulls, and the dielectric properties of their brains, which are more similar to soft tissues. Additionally, since they begin using these devices earlier in life compared to their parents, who encountered this technology as adults, their cumulative exposure to this agent—classified by the IARC as possibly carcinogenic to humans (Group 2B)—is likely to be significantly higher. [11,12]

Recent research increasingly links prolonged electronic device use to musculoskeletal problems, such as neck, shoulder, lower back, and arm pain. Adolescents with these symptoms are less physically active, use more medication, and miss school more often. Technological devices are also associated with vision problems. Regular use of visual display devices can cause Computer Vision Syndrome (CVS), which includes burning sensations, eye dryness, tearing, asthenopia, blurred vision, eye strain, and delayed focusing. The psychosocial effects of excessive device use are under study as well. Research in Western societies has found associations with sleep disturbances, strained parental relationships, academic difficulties, mental health concerns, and daytime fatigue. [13]

Mobile phone use among young people, especially those aged 12 to 18, has raised concerns about physical, social, and psychological health risks. This study examines upper primary students' knowledge of these risks, the effect of a teaching program on awareness, and the correlation with socio-demographic factors. Conducted at Sevasadan U.P. School in Bangalore with 30 students, the survey showed initial low awareness of mobile phone health risks. Post-education, students' knowledge significantly improved. The study found correlations between knowledge and daily phone use, parents' occupations, and play type. [14]

Students’ mobile phone addiction (MPA) results in substantial psychological repercussions and calls for treatments to change mobile phone usage (MPU) behaviours. Behavioural change theories, particularly the transtheoretical model (TTM), have been useful in targeting addictive behaviours. However, few studies have examined MPA-focused TTM-based therapies among female primary school children. The present study addresses this gap by examining the effect of a TTM-based educational intervention on decreasing MPA among this demographic in an attempt to offer evidence for successful behavioural modification strategies in early adolescent girls. [15]

Upper elementary pupils in Cuttack are especially significant as they are at an intermediate stage where autonomous usage of mobile phones tends to increase but school health services and curricula may not systematically cover digital health issues. In many contexts, parents and teachers tolerate or even promote the use of mobile phones for communication and learning, but there is often no organised guidance on healthy limits, posture, screen cleanliness and psychosocial hazards. School-based educational interventions provide a practical and scalable technique for reaching large numbers of kids in a controlled environment where consistent messages can be delivered, questions can be asked, and reinforcing by instructors may occur. Evidence generated from this context can assist integration of digital health content into normal school health instruction and inform local policy and practice.

The present study is justified for the studied phenomenon is supported by the link of excessive mobile phone use and health concerns, lack of awareness among the upper primary students and inadequate intervention focused research at this level. The study aims at filling the observed gap in prevention orientated school health practice by evaluating the impact of a planned educational intervention on knowledge on mobile phone associated health hazards among upper primary students of a selected school of Cuttack. The findings are likely to give empirical support for adding mobile phone related health risk education in school health programmes and thus contribute to the promotion of healthy digital behaviours and the

protection of physical, mental and social well-being among young students.

OBJECTIVES OF THE STUDY

1. To assess the pre – test and post-test level of knowledge regarding health risks associated with mobile phone usage among upper primary school students in selected school.
2. To evaluate the effectiveness of educational intervention on knowledge regarding health risks associated with mobile phone usage among upper primary school students in selected schools.
3. To determine the association between the pre-test knowledge scores about the health risks linked to mobile phone use and certain demographic factors.

METHODOLOGY

This quantitative study consisted of a one-group pretest-posttest quasi-experimental design that was used in an attempt to brighten the minds on cell phone use and dark side aspects with adolescents. The venue was Kalinga Public (Govt) High School Choudwar, Cuttack, Odisha with bright students from Grade 8 to grade X. This enlightening adventure began with sixty students, selected from fifty schools across the country, using systematic random sampling of even roll numbers — like selecting pearls at sea. Only those new to the world of previous educational efforts on this topic or who were content to join us in journeying forth, would be allowed aboard; prior exposure and/or reluctance meant being left on shore. The treasure map to gather the data was a standardized survey of 30 items testing knowledge regarding health risks, with some demographics. This questionnaire was blessed with the content validity by five experts in this field at a time, meanwhile its reliability established through test retest method showing correlation coefficient of 0.84. They launched a pilot test, stepping into the winds of trial with six students from a nearby school, and it breezed through. The guiding star of any research is clearance from an ethics committee, which was obtained from the Institutional Ethics Committee of School Of Nursing DRIEMS University Cuttack. Upon realizing the study as a whole, participants signed their consent with informed grace. Pretest — this can be compared to a compass before the intervention was made. A week later the students started in an organized educational session, a rich mosaic of teaching methods exposing risks to health on cell phones. There was a post-test of winds-of-change in knowledge thereafter. The data which resembled a melodious symphony, was analyzed using descriptive statistics such as frequency percentage mean & standard deviation set to music with inferential statistics like paired t test and chi squared tests. A p-value of 0.05 was deemed significant which is a systematic and ethical method for estimating the effect on student's understanding about cell phone health risks after exposure to an educational intervention grounded in principles of risk perception modelling

RESULTS

Table – I: Frequency and percentage distribution of upper primary school students according to their Socio-Demographic Variables n = 60

Sl. no	Variables	Frequency	Percentage
Age (Years)			
1.	13-14 Years	33	55.00
2.	15-16 Years	27	45.00
Gender			
1.	Male	30	50.00
2.	Female	30	50.00
Standard			
1.	8^{th} class	20	33.3
2.	9^{th} class	20	33.3
3.	10^{th} class	20	33.3
Type of family			
1.	Nuclear	29	48.3
2.	Joint	29	48.3
3.	Extended	2	3.3
Religion			
1.	Hindu	50	83.3
2.	Muslim	6	10.0
3.	Christian	2	3.3
4.	Others	2	3.3
Place of Current Stay			
1.	With parents	58	96.7
2.	hostel	2	3.3
Area of Residence			
1.	Rural	12	20.0
2.	Urban	48	80.0

Father's Education			
1.	No formal education	6	10.0
2.	Primary education	18	30.0
3.	High school education	17	28.3
4.	Higher secondary education and above	19	31.7
Mother's Education			
1.	No formal education	14	23.3
2.	Primary education	18	30.0
3.	High school education	14	23.3
4.	Higher secondary education and above	14	23.3
Number of Siblings			
1.	No sibling	6	10.0
2.	One sibling	36	60.0
3.	Two siblings	16	26.7
4.	More than two siblings	2	3.3
Do you own personal mobile			
1.	Yes	22	36.7
2.	No	38	63.3
Daily phone usage duration			
1.	Less than 2 hours	36	60.0
2.	2 – 4 hours	20	33.3
3.	More than 4 hours	4	6.7

Table 1 illustrates the distribution of samples according to demographic characteristics among the 60 upper primary school students. A majority of the participants (55%) were aged between 13 and 14 years, while the remaining 45% were in the 15–16 years age bracket. The sample was evenly split by gender, with 50% male and 50% female. In terms of class standard, students were equally distributed across the 8th, 9th, and 10th grades, each comprising 33.3%. Most students came from either nuclear or joint families, each accounting for 48.3%, and 83.3% identified as Hindu. Nearly all participants (96.7%) lived with their parents, and 80% resided in urban areas. Regarding parental education, 31.7% of both fathers and mothers had attained higher secondary education or above. A majority of students (60%) had one sibling. Only 36.7% owned a personal mobile phone, while the majority (63.3%) did not. Concerning daily mobile phone usage, 60% of students used their phones for less than 2 hours per day, 33.3% for 2–4 hours, and a mere 6.7% for more than 4 hours.

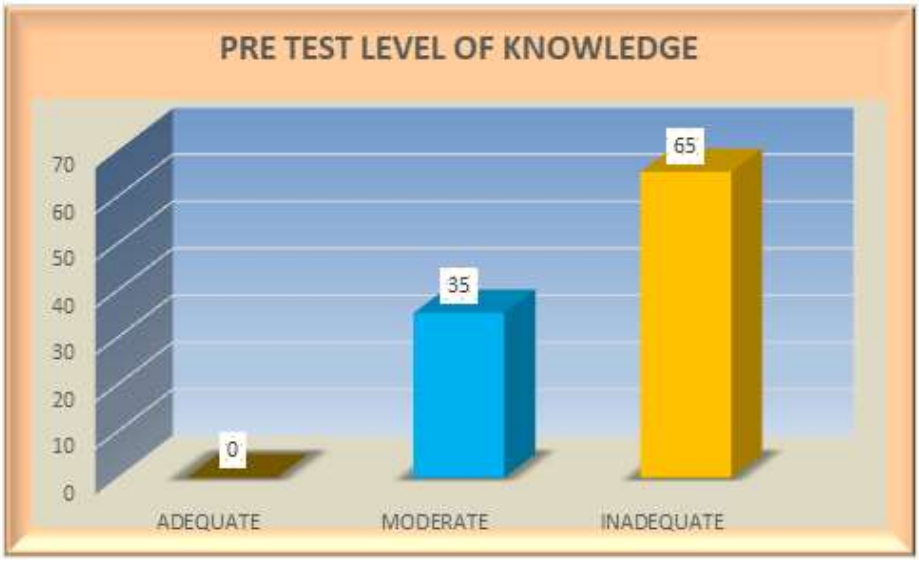

Figure - 1: 3-D clustered column shows the percentage distribution of samples according to pre-test level of knowledge regarding health risk associated with mobile phone usage

Figure 1 shows that in the pre-test evaluation, none of the upper elementary pupils displayed an appropriate level of awareness of the health concerns connected with cell phone use. The proportion of students who attained a moderate level of knowledge was 21 (35%). indicating only partial awareness of the relevant health consequences. A substantial majority, accounting for 39 (65%) of the participants, exhibited an inadequate level of knowledge, reflecting a pronounced deficit in baseline understanding prior to the implementation of the educational intervention.

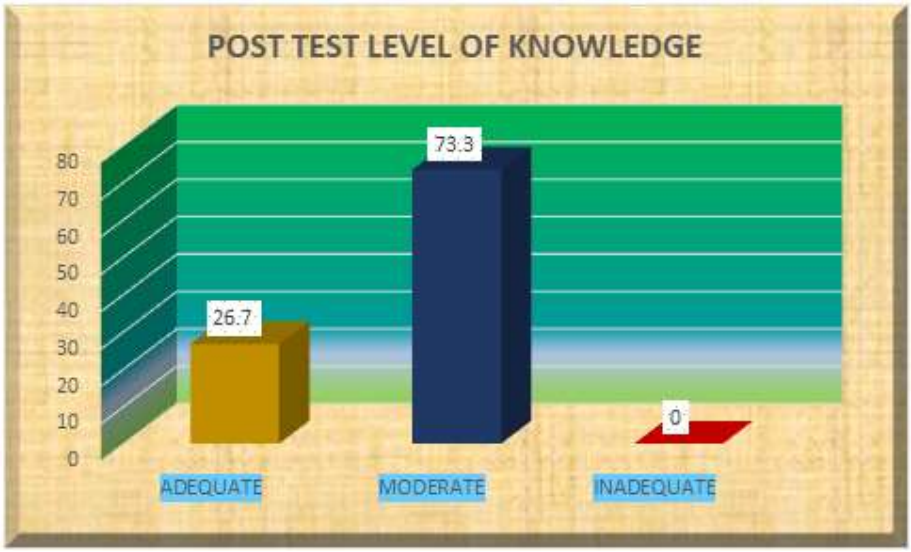

Figure - 2: 3-D clustered column shows the percentage distribution of samples according to post-test level of knowledge score regarding health risk associated with mobile phone usage.

Figure 2 shows that students' understanding of mobile phone health risks improved after the test. Just over 25% of participants (26.7%) had adequate knowledge, while the majority (73.3%) had moderate understanding, a significant improvement over pre-test results. Zero students remained in the inadequate knowledge category (0%), suggesting that the educational intervention improved all participants' knowledge to a reasonable level.

Table – II: Effectiveness of Educational Intervention on Knowledge Scores Regarding Health Risks of Mobile Phone Usage among Upper Primary School Students: Pre-test and Post-test Comparison n=60

Knowledge Scores	Mean	Mean Difference	Standard Deviation	Paired 'T' test value	Degree of Freedom	P Value at 0.05
Pre-Test	9.63	10.26	4.24	39.127	59	0.001*
Post-Test	19.90		4.14			

Table II shows how well the educational intervention affected upper primary school pupils' knowledge of mobile phone health risks (N=60). The pretest knowledge score averaged 9.63 (±4.24) and climbed to 19.90 (±4.14) in the post-test. Differences between pre- and post-test scores averaged 10.26. To establish the difference's significance, a paired t-test yielded a 39.127 t-value and 0.001 p-value, which was statistically highly significant at 0.05.

It was determined that the knowledge scores before and after the test were significantly different, rejecting the null hypothesis. Research shows that elementary school pupils' understanding of the dangers of mobile phone use has much improved after participating in the educational intervention.

Chi-square analysis showed no statistically significant association between the pre-test knowledge scores regarding health risks of mobile phone usage and the selected socio-demographic variables such as age, gender, class standard, type of family, religion, area of residence, parental education, number of siblings, personal mobile phone ownership, and daily duration of mobile phone use ($p > 0.05$).

DISCUSSION

The findings of the study were discussed in relation to previous supportive research. Numerous similar studies have been conducted at various times and in different geographical areas both nationally and internationally, which are summarised below alongside the current study's results. In this study, the sample was distributed according to socio-demographic variables as follows: 60 upper primary school children participated, 55% of whom were aged between 13 and 14, while 45% were aged between 15 and 16. The sample comprised 30 boys and 30 girls, with each academic standard (eighth, ninth, and tenth classes) evenly represented at 33.3%. Only 3.3% of the students came from extended families, whereas nearly half were from nuclear (48.3%) and joint (48.3%) households. The majority of the students identified as Hindus (83.3%),

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followed by Muslims (10%), Christians (3.3%), and others (3.3%). Most pupils resided in urban areas (80%) and lived with their parents (96.7%). The educational background of mothers was more evenly distributed, with 23.3% having no formal education, high school education, and higher secondary education each, and 30% having completed primary education. In contrast, fathers' educational levels varied, with 31.7% achieving higher secondary education or above and 30% having completed only primary education.

Regarding siblings, 60% of respondents had one, 26.7% had two, 10% had none, and 3.3% had more than two. In terms of mobile device ownership, 36.7% of respondents reported having a personal mobile device, while 63.3% did not. Daily mobile usage was predominantly less than two hours (60%), followed by two to four hours (33.3%) and more than four hours (6.7%). A study conducted by Khoshgoftar M, Amidi Mazaheri M, and Tarahi MJ (2019) aimed to assess the effect of an educational intervention based on the Health Belief Model (HBM) to reduce and prevent mobile phone addiction among female high school students in Isfahan, Iran. The analysis revealed that the study participants consisted of 112 female high school students, with 56 in the intervention group and 56 in the control group. The mean age of the students was 14.62 ± 0.52 years in the intervention group and 14.66 ± 0.83 years in the control group. Most students in both groups had parents with diploma-level education or higher. In terms of mobile phone use, the majority reported using their phones for less than three to four hours daily and possessed varying levels of mobile use skills, from primary to advanced. [16]

In this study, the sample's understanding of the health concerns linked with mobile phone use was tested. The pre-test and post-test results for total knowledge scores on this issue are as follows: In the pre-test, 65% of participants had insufficient information, 35% had intermediate knowledge, and 0% had a thorough comprehension of the health concerns connected with mobile phone use. In the post-test, 26.7% of individuals had adequate knowledge, 73.3% had intermediate knowledge, and 0% had a poor comprehension of these health hazards. These findings are consistent with the findings of Ajur S, Guled S, Patil R, and Metri R (2025), who discovered that the majority of schoolchildren lacked awareness about the health impacts of cell phone use. Out of 100 participants, 32% had weak knowledge (scoring 0-10), 54% had intermediate knowledge (score 11-20), and only 14% had high knowledge (score 21-30). The mean pre-test knowledge score was 12.4 ± 3.2. After administering the instructional pamphlet, there was a significant improvement in knowledge levels. In the post-test, 82% of the participants received good knowledge ratings, 18% had moderate knowledge, and none had low knowledge. [17]

The primary objective of the study was to assess the efficacy of an educational intervention on the knowledge of upper primary school pupils in specific schools regarding the health risks associated with mobile phone usage. The pre-test mean score was 9.63, with a standard deviation of 4.247, and the post-test mean score was 19.90, with a standard deviation of 4.144, in the current study. The average scores differed by 10.267. The tabulated value was surpassed at the $P < 0.001$ level by the computed paired 't' value of 39.127, which had 59 degrees of freedom. Consequently, there was a substantial disparity in the knowledge levels of upper primary school pupils regarding the health risks associated with mobile phone usage between the pre-test and post-test data. This discrepancy was ascribed to the educational intervention's efficacy in increasing awareness of the health risks associated with mobile phone usage. As a result, the hypothesis (H1) was adopted. These conclusions are corroborated by the subsequent investigation. **Sharma D, Pathania P, Thakur S (2022)** conducted a study to evaluate the efficacy of a structured teaching program in informing school pupils about the health risks associated with mobile phone addiction. The structured teaching program's efficacy was evident in the comparison of pre-test and post-test knowledge scores. The mean knowledge score in the experimental group increased significantly from 16.58 (SD = 3.50) in the pre-test to 23.44 (SD = 3.15) in the post-test, as evidenced by a paired t-value of 35.39 ($p < 0.01$), indicating a substantial improvement. Conversely, the control group did not exhibit any significant change, as evidenced by pre-test and post-test means of 15.64 and 15.74, respectively, resulting in a non-significant t-value of 0.58. Additionally, the unpaired t-test verified a substantial disparity between the post-test scores of the experimental and control groups ($t = 11.35$, $p < 0.00001$), indicating that the structured teaching program was successful in improving students' understanding of the health risks associated with mobile phone addiction.[18]

Champion KE, Parmenter B, McGowan C, Spring B, Wafford QE, Gardner LA, et al. (2019) found in a systematic review on Effectiveness of school-based eHealth interventions to prevent multiple lifestyle risk behaviours among adolescents that school-based eHealth interventions targeting multiple lifestyle risk behaviours among adolescents produced modest but significant short-term improvements. Specifically, intervention participants consumed more fruit and vegetables, and reported more physical activity and screen time (measured by both self-report and accelerometer) immediately postintervention. But these effects were not sustained at follow-up and there was no substantial effect on alcohol usage, smoking or intake of high-fat and sugary meals. Of note, none of the included trials targeted sleep behaviours or mobile health interventions. The quality of evidence was low to very low overall. There is a need for more rigorous studies, informed by adolescents, to develop sustainable eHealth solutions to change numerous risk behaviours. [19]

The present research study compellingly demonstrates that there is no statistically significant link between the pre-test knowledge levels concerning the health risks of mobile phone usage and the socio-demographic variables of primary school children. This finding underscores the critical need to reassess assumptions about the influence of

socio-demographic factors on children's awareness of mobile phone-related health risks. It is imperative to recognize that these variables do not inherently dictate knowledge levels, urging educators and policymakers to explore alternative strategies for enhancing awareness and education in this vital area. this findings was supported to the study by **Varma and Thakur (2022)**, the analysis of associations revealed that post-test knowledge scores regarding health hazards of mobile phone use among school-going children showed no statistically significant relationship with selected socio-demographic variables such as age, gender, father's education, mother's education, parental occupation, type of family, monthly income, area of residence, number of siblings, prior knowledge, or mobile phone ownership. This indicates that the effectiveness of the video-assisted teaching programme was consistent across diverse demographic groups, suggesting its broad applicability and universal impact in improving awareness among children irrespective of background factors. [20]

CONCLUSION

The current research illustrates the significant efficacy of a structured educational intervention conducted within schools in enhancing upper primary students' understanding of the health risks associated with mobile phone usage. This is evidenced by a notable increase in mean knowledge scores from pre-test to post-test, alongside a statistically significant paired t-value. These results underscore the potential for systematic health education on digital device usage to be effectively integrated into school environments and nursing practices, thereby fostering early awareness, informed decision-making, and healthier behavioral patterns among adolescents. The study highlights the pivotal role of nurses as educators and collaborators with schools in the design, implementation, and evaluation of mobile phone health-risk education. It further advocates for the inclusion of digital health and screen-time counseling content within nursing curricula and school health policies. Based on these findings, it is recommended that similar educational interventions be expanded across schools, that school health programs establish clear guidelines for safe mobile phone use, and that future research adopt longitudinal and comparative designs, involve parents and teachers, and explore technological and culturally sensitive strategies to sustain knowledge and translate it into enduring behavioral change.

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