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Impact of mobile phone dependence on behavior and academic performance of adolescents in selected schools of Uttarakhand, India

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Abstract:

BACKGROUND: Mobile phones are one of the excellent gifts of technology in the 21st century, which is most popular among adolescents. Today, mobile phones have infinite resources that have multiple benefits and applications. Its excessive use may impact adolescents in the form of behavioral changes and diminish the academic performance. This study explores the relationship between mobile phone usage with behavioral modifications and educational achievement among adolescents.

MATERIALS AND METHODS: A descriptive correlational study was conducted among adolescents ($n = 285$ –male-210, female-75) at selected schools of Rishikesh, Uttarakhand, India. The test of mobile dependence was used to assess the mobile phone dependence, and a behavioral Likert scale to evaluate the behavioral changes through the self-report method. The academic performance was observed by school records; percentage of the last two examination results was considered. Collected data were analyzed using descriptive and inferential statistics.

RESULTS: The study shows that 156 (54.70%) participants had a low mobile dependency, 191 (67%) participants had negative behavioral changes, and 125 (43.90%) participants had shown reduced academic performance due to overuse of the mobile phone. A significant relationship was seen between mobile phone dependency with behavioral changes ($P < 0.001$) and academic achievement ($P < 0.035$) seen among adolescents. Regression analysis predicted 49% of the differences among adolescents with selected variables due to the overuse of mobile phones.

CONCLUSION: The study concluded that mobile dependency changes adolescent's behavior as well as reduces their academic performance due to the overuse of the mobile phone.

Keywords:

Academic performance, adolescents, behavioral changes, dependency, mobile phone

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Introduction

Adolescence is a concrete age group (12–18 years), and its a phase of the switch to maturity. It is a time for rapid physical, cognitive, social changes, as the boys ready for adulthood, and the girls are prepared for maturity.^[1,2] 1.2 billion adolescents cover up about 20% of the world population, where as in India, it has 600 million adolescents.^[3] In 2017, worldwide, mobile phone users

were 4.77 billion.^[3,4] There is an increase in mobile phone users in India from 2013 to 2019 that is accounted for 730.7 million users in 2017, which includes 340 million Smartphone users.^[5] Smartphones have been used for many purposes such as to teach, to communicate, to store essential files and data, to acquire knowledge and skills, anything anywhere and anytime with in a comfort zone that makes the young mind get dependent easily.^[6]

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According to the PEW Research Center, 67% of smart phone users have admitted to check their phone for calls or messages when their phone did not vibrate or ring. Smart phones are used in advanced teaching, contacting between students and teachers, storing important files and data, and boosting their learning knowledge and skills; each one is competent to learn anything, anywhere, and anytime, provides comfort, and improves communication.^[6] In contemporary years, the mobile has become the most important technical and entertainment tool for teenagers around the world.^[7]

Today's adolescents are highly receptive to new forms of media such as smart phones as they are the first generation to have grown up surrounded by various forms of high-tech media. Studies show that cellphone use peaks during the teen years and gradually decline thereafter. Excessive cell phone use among teens is so common; 43% of 13-year-olds never turn off their phones, day or night, may develop because phones become the important tool of social interaction. In 2014, a study reported that most of the adolescents belong to lower socioeconomic status in India that did not know about positive as well as negative outcome of the smart phones and addictive use of the device.^[6]

However, it has drawbacks primarily on excessive usage, particularly among adolescents. Therefore, adolescents are prone to get an addict quickly to watching movies, gaming, and chatting on social media apps such as Face book, WhatsApp, and TikTok.^[8] It affects the way teenagers react and may lead to the use of mobile phones excessively.^[9] The teenagers agree that the excessive use of smartphones affects their educational performance, adversely, mainly classroom interruption, decreases cognitive skill, promotes pornography, reduces script ability, exciting, nervous tension, and spoils relationships.^[9] Adolescents who overuse cell phones may experience the behavior loss of control, feelings of irritability and anxiety, sleep deficits, eating patterns, and relationship conflicts.^[9]

Research suggests that mobile phone use has become such a considerable part of a teenager's life that it is almost "invisible" and they do not necessarily realize their level of dependence addiction to their cell phones. It is, therefore, incumbent to identify the threshold point where mobile phone use crosses the line from being a helpful tool to being one that enslaves both users and society alike.^[10]

If the mobile dependency perseveres, then there will be possible long-term health risks, including behavioral change and diminished in the academic performance of adolescents.^[8] Most of the population will run toward technology and gradually become dependent

on it. Especially adolescents, youth, and children are highly prone to misuse the device; therefore, this study will provide awareness among parents, teachers, and students. Thus, there is a requisite to assess the level of mobile dependency, behavioral changes, and academic performance of adolescent students in the region of Uttarakhand.

Aim of the study

The present study aimed to determine the relationship between mobile phone dependency on behavioral change and academic performance among adolescents.

Materials and Methods

Research method

The study was a descriptive co-relational design.

Population and sampling

Adolescents aged 12–19 years who were studying in 9th–12th classes at schools of Rishikesh, Uttarakhand, were included. Nonprobability convenience sampling technique was used to select adolescents.

Sample size calculation

Before enrollment, the participants' sample size was calculated based on the results of previous study done by Kuhdasht *et al.*^[11] considering a confidence interval 15% (0.05) and a standard deviation 95%.

$$n = (1 - n/N) \times t^2(p \times q) \div d^2$$

$$n = (1.96)^2 (0.24 \times 0.76) \div (0.05)^2$$

$$= 3.84 \times 0.18 \div 0.0025$$

$$= 0.6912 \div 0.0025$$

$$N = 276.$$

After considering 10% of non-responsive rate, a total of 285 samples were considered for this study. Nonprobability convenience sampling technique was adopted to select the participants who were studying in 9–12 standards in various schools of Rishikesh.

Inclusion and exclusion criteria

Inclusion criteria

Adolescents who are:

- Under the age group between 12 and 19 years
- Willing to participate in the study.

Exclusion criteria

Adolescents who are:

- Absent during data collection period
- Not physically and mentally healthy.

Tools

The present study is a descriptive correlation study. The instrument used in the study had four parts.

Part-1: Sociodemographic profile of the study participants

Consists of 20 items related to their details,^[12]such as age, gender, and class standard, and it had one sub part consisting of their mobile phone usage details^[8] about the age they got the smartphone, daily usage on school days/on weekends, the purpose of using mobile, etc.

Part-2: Test of mobile dependence

Standardized tool consists of 22 items developed by Marino Cholz in 2012

Part-3: Self-structured Likert scale

It has 14itemson behavioral change related to overuse of mobile phone.

Part-4: Assessment of academic performance of adolescents

It consists of a percentage of two-term examination results of the students.

Validity and reliability of the tool

The validity of tools has prevailed with the help of experts in the field of nursing, child health, and mental health. Appliances were also tested for reliability using the test-retest method with Pearson’s correlation coefficient for Part 2and 3, and these were found reliable = 0.70 and = 0.80, respectively.

Data collection and analysis

The study was conducted from December 2019 to April 2020, among 285 participants. Both descriptive (frequency, percentage, mean, mean percentage, and standard deviation) and inferential statistics (*t*-test, linear regression analysis, independent sample-test, and one-way ANOVA) were used to analyze and interpret the data by SPSS version 23 (IBM Corporation, Foster City, CA, USA).

Ethical approval and informed consent

Permission was obtained from the Institutional Ethical Committee (IEC) of All India Institute of Medical Sciences (AIIMS), Rishikesh, to carry out this study. The IEC approved the study protocol of AIIMS, Rishikesh (ECR/736/Inst/UK/2015/RR-2018).Written consent from the parents and assent was obtained from all the participants.

Results

Sociodemographic characteristics of participants

The mean age of the participants was 16.15 years. Among 285 participants, 210 (73.70%) were male,

and 75 (26.30) were female. Most of the 158 (55.40%) participants were studying in the 11th–12th class, and 263 (92.30%) participants have at least 1–3 siblings. Almost 264 (92.60%) participants were the 1st, the 2nd, or the 3rd child. 218 (76.50%) adolescents belonged to the nuclear family, while 60 (21.10%) have belonged to a joint family. Moreover, 174 (61.10%) were living with <6 family members, while 99 (34.70%) living with 6–10 family members. Majority of the participants, 275 (96.50%), belonged to Hindu religion, and 217 (76.10%) were living urban area, whereas 68 (23.90%) of them living in a rural area [Table 1].

Mobile phone usage by participants

The study findings revealed that slightly more than half of the participants 166 (58.10%) received mobile during 14–16 years of age, where as the mean age of receiving first mobile phone was 15.04 years. The usage of the mobile phone was 1–2 hrs on school days by 201 (70.50%) participants and was 1–4 hrs on weekends by 205 (71.90%). The majority of participants, 261 (91.60%), were used to frequently look at their phone about 1–50 times in a day [Table 2]. Further, it was

Table 1: Frequency and percentage distribution of participant characteristics (n=285)

Variables	Frequency (%)
Age (years)	
12-13	1 (00.40)
14-15	100 (35.10)
16-17	139 (48.80)
18-19	45 (15.70)
Mean±SD	16.15±01.269
Gender	
Male	210 (73.70)
Female	75 (26.30)
Class	
9-10	127 (44.60)
11-12	158 (55.40)
Number of siblings	
0-3	263 (92.30)
4-6	22 (07.70)
Birth order	
1-3	264 (92.60)
4-6	21 (07.40)
Type of family	
Joint	60 (21.10)
Nuclear	218 (76.40)
Extended	7 (02.50)
Religion	
Hindu	275 (96.50)
Muslim	1 (00.40)
Sikh	9 (03.10)
Habitat	
Rural	68 (23.90)
Urban	217 (76.10)

SD=Standard deviation

analyzed that majority of the participants used a mobile phone for communication/call/messages, photographs, entertainment, social media, education, games/sports, and reading newspapers/novels [Figure 1].

Levels of mobile dependence of participants

As per the results, more than half of the participants, 54.70%, reported having low dependency, whereas 30.5% and 30.5% of the participants reported no dependence and a moderate level of dependence, respectively. In comparison, high dependence on the mobile phone was reported by only 1.1% of the participants [Table 3]. In item analysis, the majority of participants admitted when they are bored (2.32 ± 1.437) and when they feel lonely (2.36 ± 1.261) uses mobile phones. At the same time, least of the participants responded that they did not argue with parents or family members about the cost of my mobile phone (0.46 ± 0.940). Do not spend more money on my mobile phone [Table 4].

Levels of behavioral changes of participants

Among 285 participants, 67% of the participants had mild behavioral changes, and 29.80% had a moderate level of behavioral changes. 3.20% of the participants reported a severe level of behavioral changes [Table 5]. In item analysis, the majority of participants said that they get up set when mobile phone battery discharge (01.77 ± 0.757) and acquired temper outbursts on being asked to reduce mobile phone use (01.76 ± 0.791), which had shown a higher level of behavioral changes. Very few participants reported less variation in their eating habits, due to the overuse of mobile phones (01.40 ± 0.617), which represented a lower level of behavioral change.

Levels of academic performance of participants

In a total of 285 participants, 43.90% had fair academic performance, 29.10% were good academic performers, where as 26.30% were showed a very good performance

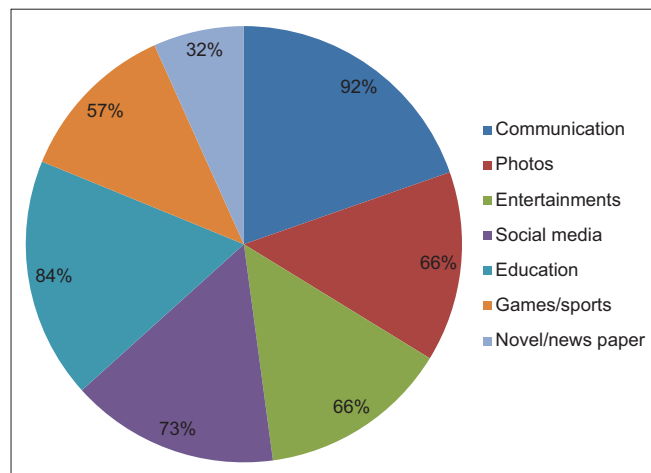


Figure 1: Purpose of mobile phone usages among adolescents

and 0.70% confirmed to have excellent performance in their academics [Figure 2].

Correlation between mobile phone dependency with behavioral changes and academic performance

A significant positive relationship was seen between mobile phone dependency on behavior changes,

Table 2: Frequency and percentage distribution of mobile phone usage (n=285)

Variables	Frequency (%)
Age of receiving first smartphone (years)	
10-13	54 (18.90)
14-16	166 (58.10)
17-19	65 (22.80)
Mean±SD	15.04±01.869
Duration of mobile phone usage school days (h)	
1-2	201 (70.50)
3-4	70 (24.60)
5-6	14 (04.90)
Weekends	
1-4	205 (71.90)
5-8	69 (24.20)
9-12	11 (03.90)
Frequency of mobile phone checking per day (times)	
1-50	261 (91.60)
51-100	20 (07.00)
101-150	3 (01.10)
151-200	1 (00.40)

SD=Standard deviation

Table 3: Level of mobile dependence among adolescents (n=285)

Level of mobile dependency	Score	Frequency (%)
No dependency	0-22	87 (30.50)
Low dependency	23-44	156 (54.70)
Moderate dependency	45-66	39 (13.70)
High dependency	67-88	3 (01.10)
Mean±SD		30.27±13.434

Range: 0-75, Minimum score: 0, Maximum score: 88. SD=Standard deviation

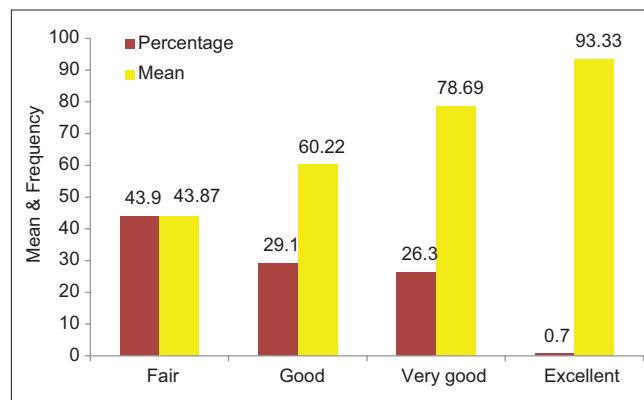


Figure 2: Levels of academic performance

Table 4: Item wise ranking of mobile dependency among adolescents (n=285)

Items	Mean±SD
When I am bored, I use my mobile phone	2.36±1.261
When I feel lonely, I use the mobile phone (calls, SMS, WhatsApp...)	2.32±1.437
I have sent more than five messages in 1 day	2.19±1.430
If my mobile phone were broken for an extended period and took a long time to fix, I would feel terrible	1.99±1.527
I have been called on the carpet or warned about using my mobile phone too much	1.68±1.237
When I haven't used my mobile phone for a while, I feel the need to call someone, send an SMS, or use WhatsApp	1.55±1.427
I have put a limit on my mobile phone use, and I couldn't stick to it	1.53±1.249
If I don't have my mobile phone, I feel bad	1.52±1.467
Since I got my mobile phone, I have increased the number of SMSs I send	1.48±1.533
I don't think I could stand spending a week without a mobile phone	1.42±1.477
As soon as I get up in the morning, the first thing I do is see who has called me on my mobile phone or if someone has sent me an SMS	1.42±1.538
When I have my mobile with me, I can't stop using it	1.35±1.425
I spend more time than I would like to talk on the mobile phone, sending SMS, or using WhatsApp	1.33±1.161
Since I got my mobile phone, I have increased the number of calls I make	1.29±1.390
I need to use my mobile phone more and more often	1.20±1.289
I would grab my mobile phone and send a message or make a call right now	1.08±1.312
I use my mobile phone (calls, SMS....) in situations where, even though not dangerous, it is not appropriate to do so (eating, while other people talk to me, etc.)	1.01±1.097
I have gone to bed later or slept less because I was using my mobile phone	0.93±1.122
I spend more money on my mobile phone now than when I first got it	0.86±1.243
I have been criticized because of the cost of my mobile phone	0.67±1.119
I spend more money on my mobile phone (calls, SMS) than I had expected	0.61±0.985
I have argued with my parents or family members about the cost of my mobile phone	0.46±0.940

SD=Standard deviation

Table 5: Level of behavioral changes among adolescents (n=285)

Level of behavioral change	Score	Frequency (%)	Mean±SD
Mild	14-23	191 (67.00)	19.38±2.539
Moderate	24-32	85 (29.80)	27.20±2.374
Severe	33-42	9 (03.20)	35.33±2.646
Mean±SD		22.21±04.925	

Range: 14-42, Minimum score: 14, Maximum score: 42. SD=Standard deviation

$P < 0.001$, which states that those participants spent more time on the mobile phone had developed negative behavior and also showed a significant negative relationship between mobile phone usage and academic performance, $P < 0.035$, which states that those participants were spent more time on the mobile phone they have to decrease academic performance. Hence, hypothesis $1H_0$ was rejected [Figure 3].

Linear regression analysis between mobile phone dependency with selected variables

Linear regression analysis showed the dependent variable and different demographics and variables related to the mobile phone as the independent variables. R^2 is 0.496, which indicates that 49.60% of the variation in results can be expressed by the independent variables considered in this study [Table 6].

Discussion

This study was conducted among 285 adolescents who were studying in various schools of (Rishikesh)

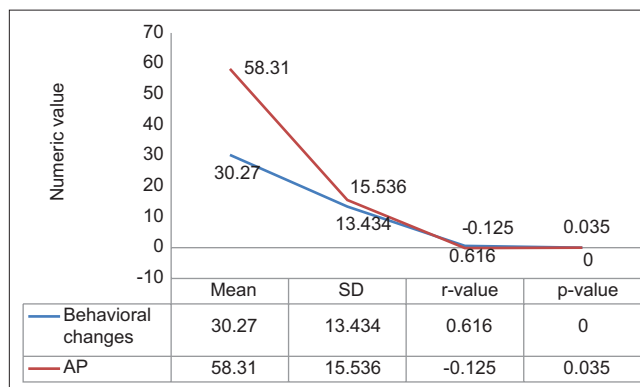


Figure 3: Correlation between mobile phone dependency with behavioral changes and academic performance $n = 285$. AP: Academic performance, Significance at $p < 0.01$ and $p < 0.05$

Uttarakhand to determine the relationship of mobile dependency with behavior change and academic performance among participants. Almost 50% of the participants were from between 16 and 17 years of age group and 73.70% were male candidates. Maximum candidates belonged to the Hindu religion and were living in an urban area. These findings were similar to other results of a study conducted by Davey and Davey.⁴¹

58.10% of the participants received first mobile phones at an age between 14 and 16 years, and all participants spent more time with a mobile phone on weekends than school days with multiple purposes such as communication, study, read a novel, gaming, and for accessing social

Table 6: Linear regression analysis between mobile phone dependency with selected variables (n=285)

Variables	Mobile phone dependency				
	B	SE	T	P	R ² , adjusted R ² , Durbin-Watson test
Constant	-26.871	10.454	-2.570	0.011	
Age	0.084	0.894	0.094	0.925	
Gender	3.341	1.463	2.285	0.023	
Class	0.165	0.946	0.174	0.862	
Received first mobile phone	0.326	0.468	0.697	0.486	
Usage of phone in school days	2.073	0.706	2.938	0.004	0.496, 0.473, 1.788
Usage of phone on weekends	0.851	0.440	1.933	0.054	
Frequency checking per day	0.002	0.028	0.066	0.947	
Photos/selfie	-0.024	1.346	-0.018	0.986	
Social media	4.572	1.479	3.092	0.002	
Check phone between sleep	1.002	2.225	0.450	0.653	
Behavioral changes	1.426	0.127	11.234	0.000	
Academic performance	0.418	0.849	0.492	0.623	

SE=Standard deviation

media the same finding revealed the study done by Vasantha Kumaran.^[13]

54.70% of the adolescents have a low dependency on mobile phones due to more time spent on networking sites, social media, etc., Cha said that students spent more time on networking sites were prone to depended and addicted to mobile phones.^[12]

The present study showed that 67% of the participants have mild behavioral changes such as irritability, temper, and restlessness due to excessive time spent on the mobile phone. Walsh *et al.*^[14] found that those participants who spent more time with mobile phones lead to more behavioral changes. Basu *et al.* Did another survey^[15] and stated that participants had cell phone addiction-like behavior due to overtime with the mobile phone.

In the present study, academic performance decline when students spent more time with the mobile phone. Ibrahim NK^[16] in their study reported that participants had a decrease in academic performance due to more time spent on the mobile phone. And also, Hossain^[17] stated that participant's usage of mobile phone for calls, messages, and internet sites during study time, which leads to a decrease in academic score.

The present study shows a positive correlation between mobile dependency with negative behavioral changes with significant $P < 0.000$ and shows a negative relationship with academic performance < 0.022 . Hossain^[14] in this study found a considerable correlation between selected variables and academic performance. Another study did by Kuhdasht stated academic burnout due to excessive use of mobile phones.^[11]

This study limited to selected high schools in Rishikesh, Uttarakhand, India, which limits and its generalizability of findings. There was a lack of cooperation from some

school officials due to higher classes and data were collected at once by the self-reported method. Prevalence of mobile phone dependence and mobile phone usage patterns could have been assessed due to lack of time; it was not assessed by researchers.

Conclusion

Mobile phone dependence has become an emerging public health problem among teenagers. In this study too, over half of the adolescents were dependent on mobile phones; it affects their academic performance and changes their behavior. Hence, it is necessary to take further steps in developing recreational programs and the active involvement of teens to maintain their mental health. Therefore, higher education institutions and parents must develop awareness for adolescents. Indian government should establish policies to raise awareness on this issue for a better future of youth as a priority action.

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Conflicts of interest

There are no conflicts of interest.

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