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Research Paper

Smartphone Use among Pre-School Children - An Exploratory Study

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ABSTRACT

Aim: Present study aimed to see the extent of smartphone use among children of Pre-school age with associated factors and impact of such usage. **Settings and Design**: This cross-sectional study was conducted at two nursery level English medium schools at the urban locality of Gwalior city at Madhya Pradesh, India. **Materials and Methods**: Purposive sampling method was used to enroll Participants (N=55), aged 2-6 years, who were Pre-schoolers and using smartphone for at least one hour per day. IQ of all participants was assessed using GDT. Then Parents (either one) of such participants, who has average level of developmental milestones/IQ, were screened on GHQ-5 and interviewed regarding their child's smartphone use behaviour on Smartphone Use Questionnaire for Early Childhood. **Statistical Analysis**: Data was analysed on SPSS 20.0 in the form of Frequencies and Percentages. Contingency Coefficient and Pearson 'r' was used to see relationship between different socio-demographic and other intervening variables. **Results:** Family-type, duration of smartphone use by parents, child's age, and educational reasons were some of the factors influencing Smartphone use by children. Significant association was found between the duration of Smartphone use and the negative impact on the child in the form of increased anger, reduced interest in studies, and weak eye sight. **Conclusion**: Socio-demographic characteristics of parents and children play a significant role in increased usage of smartphones in this age group.

Keywords: *Smartphone, Pre-school children, GDT, Touch screen, Smartphone Use*

Smartphone is a term that is used for differentiating between mobile phones having advanced features from basic phones (Baek, Lee, Kim, 2013). Smartphone addiction has been defined as "a psychological state, in which mental and emotional

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states are altered often leading to impairment in scholastic, occupational, and social interactions" (Lee, Ogbolu, 2018). With the highly increasing use of smartphones nowadays its addictive qualities have emerged as a major concern, especially for the paediatric population as children have started using smartphones at very younger ages (Holloway, Green, Stevenson, 2015). They provide adult and children with easy access to number of communication interactive apps, many of these are known to provide learning opportunities for them (Zencirci, et al., 2018).

On the positive side, studies do indicate that 4- and 5-year-old can be helped to read and count by using a well-designed educational programs, and children of that age also benefit from pro-social messages on media that teaches them about kindness and sharing. However, it's been reported that exposure to television violence can increase the risk of children behaving aggressively and that media use can lead to attention problems in children later in life (Rideout & Hamel, 2006).

Benefits and Opportunities of Media Use-

There is no doubt that the new media use has its own benefits, but these benefits depend to a large extent on a child's age and his developmental stage. Also, on manner in which, media is being used, its content and design. According to the developmental perspective up till 2 years of age, children usually are in developing stage of cognitive, language, sensori-motor, and Social-emotional skills, which need hands-on exploration and social interaction with trustworthy caregivers for successful maturation (Chassiakos, et al., 2016). Early age of media use with greater number of hours and not so good quality content, all significantly act as the predictors of poor executive functioning and "Theory of Mind" (TOM) deficits in Pre-school children (Chassiakos, et al., 2016). Existing evidence suggests that media use, has a negative impact on sleep (Chassiakos, et al., 2016). Analysis of the learning pattern of a 2–3-year-old, from interactive versus non-interactive videos, it is established that by using interactive apps on smartphones and other touch screen devices we can achieve more learning in comparison to passive videos or television viewing for children in this age range (Holloway, Green, Stevenson, 2015).

Need for the study

Smartphones are commonly found in the hands of almost every individual across ages. Though it has helped us in getting advanced and being in touch with the rest of the world but it appears to have its own impact on the safety of individuals. There are a number of concerns related with smartphone use by toddlers or Pre-schoolers, like decrease in child's interaction with others making them house bound which often affects their development of social and physical skills. It has been noticed that now-a-days more children tend to suffer from low vision because of constant use of such devices. Though it helps in learning new things but it is not used as frequently for educational purposes as it is used for enjoyment purposes. Previous studies conducted at different socio-cultural background like at Korea, Turkey, UK, USA have shown that smartphones are used by young children for varied purposes like for stories/songs (66%), non-educational videos (30%), educational purposes (66%), and games (14%). However, more recently parents have raised concern for the negative medical consequences like vision and sleep impairments, undermining cognitive, physical, social and brain development of the child (Li, Mendoza & Milanaik, 2017; Cheung, et al., 2017). Most of the children are found to be using mobile phone for 1-2 hours in a day and it is advised as the maximum amount in some studies (Genc, 2014; Coenen, et al., 2015). Multiple factors were reported to be involved in increased smartphone use by toddlers and child like the desire of the child, easy availability, lack of parental control, etc.

However, there is a scarcity of published literature in Indian context and on this age group (pre-schoolers). Therefore, the present study was planned to explore the smartphone use among children of pre-school age and to look for the related psycho-social factors for such use.

MATERIALS AND METHODS

Study Settings and participants

The study was carried out at two primary level school settings, ECS Bagless and Mother's Pride, located in the urban area at Gwalior, Madhya Pradesh, India. To maximize the participants' number, sample were also enrolled by performing purposive home visit on referral basis. The sample, collected through purposive sampling, involved primary level educated parents (any one), of 55 such children of pre-school age 2-6 years, who were using smartphone for at least one hour per day. Those children who had a history of neurological illness and a Developmental Quotient (DQ) below average were screened out as well as those parents who had any psychiatric or neurological illness were also excluded from the study.

Instruments

A self-made consent form especially designed for this study was given to all participants and their consent was sought. Information regarding various socio-demographic variables of all participants were collected by using Socio-Demographic data sheet. Information towards assessing smartphone use behaviour, the associated variables and impact was collected on a Smartphone use Questionnaire for Early Childhood. It is self-made semi-structured questionnaire consisting of 25 items specially designed for the purpose. The questionnaire had questions ranging from the number of hours of smartphone use by the child to the impact it has had on the child. The questionnaire was content validated by giving it to 5 experts on the subject for evaluation which showed 90% consistency. General Health Questionnaire (GHQ-5) was administered to screen out any psychiatric morbidity in parents. GHQ was developed by Sir David Goldberg (1972) for the detection of non-psychotic psychiatric illness in primary care, general medical practice, community survey and research. It is valuable effective first stage screening tool for easy and quick identification of probable psychiatric cases (Shamsunder, et al., 1986). It has many versions but for the present study, the shortest version was used, which contains 5 items. Scores range from 0 to 5 and 1/2 is the cut-off score. GHQ-5 has been found to have sensitivity of 86% and specificity of 89% (Shamsunder, et al., 1986). Gessel's Drawing Test **(**GDT) was used to assess the intellectual functioning of the child. It is frequently used as an easy, expeditious and effective screening measure of intelligence for clinical populations. It was validated by Dr. S. Venkatesan (2002). The applicable age range is from 18 to 144 months. For the overall GDT-R, the KR-20 measured to be 0.72. Concurrent validity of GDT-R, against developmental schedules/intelligence tests and social adaptive behaviour scales was found to be high (Venkatesan, 2009).

Procedure

The present study basically aimed to assess the extent of Smartphone Use and the related aspects. For this, the study was divided into two phases. In Initial phase pilot study was carried out to develop a self-made tool. A semi structured interview was conducted with parents of 15 children using smartphone (2-8 years) to list out the use of smartphones, factors involved and the resulting behavioural/emotional problems. A questionnaire having 27 questions based on the results of the pilot study was developed and given to five subject experts for evaluation towards content validity. A final questionnaire consisting of 25 items

was developed based on the evaluation by experts. In the second phase, the principals of ECS Bagless School and Mother's Pride School were contacted and briefed about the present study. Their permission was sought to collect the data from the parents of children studying in these schools respectively. A total 50 parents were interviewed from the schools. Apart from the schools, 30 of the parents were contacted through home visits. Initially, children who use smartphone for at least one hour per day were identified and screened on GDT for any developmental delay. Parents, of only those children's who obtained above average DQ on GDT were assessed on GHQ to rule out the presence of any psychiatric/neurological problem and only those who scored below the cut-off were administered self-made questionnaire. A total number of 80 participants were interviewed out of which finally 55 participants were included in the study in accordance with inclusion/exclusion criteria and they were administered the Smartphone use Questionnaire for Early Childhood for collection of data after obtaining written consent.

Statistical analysis

The obtained data was analysed by using Statistical Package for Social Sciences version 20.0 for windows (SPSS Inc., Chicago, IL, USA). Analysis was done in the form of frequency and percentages of different studied variables. The relationship between different variables was seen by calculating the Contingency coefficient and Pearson 'r'.

RESULTS

Socio-Demographic analysis of participants (Parents)

Analysis of various socio-demographic variables related with the participants (Parents) is depicted in Table 1. Analysis revealed that the family type and the number of hours of smartphone use by the child are found to have significant relationship (0.31) with high percentage of children spending increased amount of time on smartphone in nuclear families. The mean age of parents was 33.32 ± 4.69. There is negative but insignificant association (-0.023) between parental age and duration of smartphone use by child. Analysis further depicts a significant positive relationship (0.44) between hours of smartphone use by parent and number of hours of smartphone use by children.

Table 1: Socio-Demographic Details of the Participants (Parents) of Children Using Smartphone

Variable	**Mean/SD**	**Correlation with duration of smartphone use by the child**			
Age	33.32/±4.69	-0.023(NS)			
Variable	**Frequency/ percentage**	**Correlation with duration of smartphone use by the child**			
Total no of children One More than one	 26/47.3 29/52.8	 0.142(NS)			
Variable	**Frequency/ Percentage**	**Duration of smartphone use by the child (Frequency/Percentage)**			**Contingency coefficient**
		1-2 hrs	**2-3 hrs**	**>3 hrs**	
Education Up to primary High school Graduation and above	 2/3.6 9/16.4 44/80	 1(50) 6(66.66) 36(75)	 1(50) 2(22.22) 3(6.81)	 0 1(11.11) 5(11.36)	 0.365(NS)
Occupation Home maker Business Private Govt	 24/43.6 11/20 15/27. 5/9.1	 21(87.5) 6(54.5) 12(80) 4(80)	 1(4.2) 3(27.3) 3(13.3) 0	 2(8.3) 2(18.2) 1(6.7) 1(20)	 0.329(NS)

Socio-Economic-Status					
Low SES	1/1.8	1(100)	0	0	
Middle SES	51/92.7	39(76.5)	6(11.8)	6(11.8)	0.14(NS)
High SES	3/5.5	3(100)	0	0	
Income					
10000	4/7.3	4(100)	0	0	
10001-25000	19/34.5	14(73.7)	2(10.5)	3(15.8)	0.282(NS)
25001-50000	24/43.6	17(70.8)	4(16.7)	3(12.5)	
>50000	8/14.5	8(100)	0	0	
Family type					
Joint	33/60	25(75.8)	6(18.2)	2(6.1)	0.310*
Nuclear	22/40	18(81.8)	0	4(18.2)	
Residence/ background					
Urban	50/90.9	39(78)	6(12)	5(10)	0.135(NS)
Rural	0/0	0	0	0	
Sub-urban	5/9.1	4(80)	0	1(20)	
Duration of smartphone use by parent					
0-2 hrs	37/67.3	28(75.7)	6(16.2)	3(8.1)	0.441*
2-4 hrs	14/25.5	13(92.9)	0	1(7.1)	
4-6 hrs	3/5.5	2(66.7)	0	1(33.3)	
>6 hrs	1/1.8	0	0	1(100)	

*NS- not significant; *p<0.05*

Socio demographic variables associated with participants (children) using smartphone

The various socio demographical variables associated with children using smartphone were depicted in table no 2. The mean age of children using smartphone was 4.49 ± 1.26. Result also revealed that the age of the child has significant positive association with smartphone use. However, analysis indicates no significant association between the sex of the child and the duration of smartphone use along with nil association between ordinal position and the duration of smartphone use.

Table 2: Socio-demographic details of children using smartphone

Variable	**Mean/ SD**	**Correlation with duration of smartphone use by the child**			
Age	4.49/±1.26	0.268*			
Variable	**Frequency/ percentage**	**Correlation with duration of smartphone use by the child**			
Age of onset					
0-1 year	6(10.9)				
1-2 year	23(41.8)	-0.050(NS)			
2-4 year	20(36.4)				
4-6 year	6(10.9)				
Variable	**Frequency/ Percentage**	**Duration of smartphone use by the child (Frequency/Percentage)**			**Contingency coefficient**
		1-2 hrs	**2-3 hrs**	**>3 hrs**	
Sex					
Male	26(47.3)	21(80.8)	3(11.5)	2(7.7)	0.097(NS)
Female	29(52.7)	22(75.9)	3(10.3)	4(13.8)	
Ordinal position					
First born	41 (74.5)	33(0.5)	4(9.8)	4(9.8)	
Second born	11 (20)	7(63.6)	2(18.2)	2(18.2)	0.202(NS)
Third born	3 (5.5)	3(100)	0	0	

*NS- Not Significant; *p<0.05*

Viewpoints of parents regarding smartphone use by their children

Table 3 shows the different viewpoints of the parents regarding the smartphone use by their child.

Table 3: Parental viewpoint regarding smartphone use of their child

Variable	Frequency	Percentage
Duration of use by the child 1-2 hrs/day 2-3 hrs/day >3 hrs/day	 43 6 6	 78.2 10.9 10.9
Do you think your child uses smartphone more than he/she needs to	20	36.4
Do you think your child cannot stay without using smartphone at all	7	12.7
Do you think they need to use smartphone as much as they are using presently	5	9.1
Do you think you need to control the use of smartphone in your child	40	72.7

Parental reasons for smartphone use by their children

Analysis of the data related with reasons given by parents for their child smartphone use is been presented in Table No 4. The data suggest that the main reason reported by parents for giving smartphone to their child was for learning educational tasks (56.4%).

Table 4: Reasons for providing smartphone to the child as per parents

Reasons given	Frequency	Percentage
The child asks for it, and starts crying, fighting, and shouting if not given	24	43.6
Child does not eat properly without smartphone	22	40
To keep the child busy so that parents can do other work	25	45.5
To motivate the child in the form of reward	15	27.3
To make him learn educational material	31	56.4
The child does not have any company at home to play with	9	16.4
Parents do not have enough time for children	3	5.5
Television is not easily available every time	6	10.9
The child picks it by himself	24	43.6
To enhance creativity	17	30.9
Other reasons	4	7.3

Impact of smartphone use on children

Analysis of the data related with the impact of smartphone use is presented in Table No 5. The data suggest that there is significant positive association between the duration of use and the negative impact of behavioural, emotional, and physical nature.

Table 5: Behavioural consequences associated with smartphone use in children

Table 5 indicates positive relationship between duration of smartphone use and the negative impact associated with it.

Variable	Frequency/ Percentage	Correlation coefficient with duration of smartphone use
Behavioural problems when smartphone is taken back Crying Shouting Hitting others Complaining Others	 29/50.9 20/36.4 4/7.3 7/12.7 19/34.5	 0.448*

Variable	Frequency/ Percentage	Correlation coefficient with duration of smartphone use
Negative consequences		
Increase in anger	19/34.5	
Social withdrawal	15/27.3	0.305*
Change in posture	4/7.3	
Weak eyesight	17/30.9	
Reduced touch with nature	11/20	
Sleep problem	9/16.4	
Problems in eating	13/23.6	
Reduced interest in studies	19/34.5	
Getting dependent on smart phone	24/43.6	

*NS- not significant; *p<0.05*

DISCUSSION

The present study was a cross sectional study conducted at Gwalior city, Central India, on pre-school children with the aim of exploring the extent of smartphone use by this age group along with identifying the socio-demographic variables associated with such use. A review of published literature suggested a scarcity of original research in this area focussing on pre-school children in Indian context.

Discussion related to socio-demographic factors of parents:

The analysis related with socio-demographic variables of parents of Pre-schoolers for parental age and duration of smartphone use by the child suggested negative but insignificant relationship between them, which is in contrast to the findings of Park & Park (2014) which showed that the children of younger parents tend to use smartphones and other media devices much more frequently than that of older ones.

However, Paudel et al. (2017) in their review reported about three studies showing no association between parental age and smartphone use by children, but Wu et al. (2014) found a negative relationship and suggested that children born of younger parents used screen devices more frequently. To an extent, these findings does support to our findings as well, where the direction is negative but the relationship is not significant to claim it as a responsible parental factor involved. The results could be such because parents themselves spend more time on smartphone; hence children also develop this habit as a learned behaviour from them. Education, occupation, socio-economic status, income, total number of children, and background were not found to have any significant relationship with the use of smartphone in children. High percentage of children spending increased amount of time on smartphone in nuclear families. A possible explanation could be the fact that children have lesser number of people to talk to and spend time with in nuclear families, which might result in increased use of such devices. Parental use of smartphone is found to be related with child use of smartphone in this study, which is supported by Paudel et al. (2016) review study, in which the authors reported that two studies showed no statistically significant relationship between parental use of smartphone and their children' use, but in other studies positive associations have been reported for parental screen time and children' use of tablets, touch screen devices or any media. Baek et al. (2013) found that parents spending more time on media are less inclined to apply active and restrictive methods of control on their child's use of smart devices which could be a possible factor for the positive relation in the current study.

Discussion related to factors associated with smartphone use in children

In accordance with the previous studies of Paudel et al. (2016) & Duch et al. (2013), significant positive relationship was noticed in the present study, between child's age and smartphone use (Table 2). Support has also come from Baek et al. (2013) where the investigators propounded that the frequency of smartphone is correlated with infants and young children age. However, Nikken & Schols in a study (2015) found out that the TV sets are most frequently used by children. The youngest children (0–1 years) use TV and touch screen devices significantly less than older children. So, it is observed that earlier it was the television but now-a-days smartphones and other such device usage has increased with the increasing age of the child. This study has not found any significant association between the sex of the child and the duration of smartphone use (Table 2). This could be attributable to the fact that, as smartphones have many attractive features like colour, brightness, sound & applications so it makes it difficult for children to resist it, irrespective of gender. Analysis of data revealed that majority of the children using smartphone was reported to be first born (74.5%). Significant association between the ordinal position of the child and the use of smartphone (Table 2) was not found in the present study, which is supported by research of Duch et al. (2013) where authors reported no association between screen time and children' first-born status. Possible explanation could be the understanding that as children develop according to the time in which they are born, so if other children of that time are using it, then it can be expected from the children of the same time to use it as well, irrespective of their ordinal position. When it comes to possible reason of the parents (Table 4), that prompts them to give smartphones to their children, 'learning educational material' (56.4%) tops the list followed by 'keeping children busy' (45.5%), 'behaviour of crying, shouting and fighting if not given' (43.6%), 'the child picking himself' (43.6%), 'child refusing eating without smartphone' (40%), 'enhancing creativity' (30.9%), 'to motivate the child' (27.3%), 'the child not having companion at home' (16.4%), 'television not available' (10.9%), 'parents not having time' (5.5%) &, 'others' (7.3%). According to Li et al. (2017), around 60% of parents selected educational benefits of smartphones and other touch screen devices as the major reason. This is similar to the findings of the current study in which majority reported the similar reasons. However, in 2015, Coenen et al. reported the parents' purpose in giving smartphone to child was not only to keep them calm and happy (44%), but also for educational purpose (37%).

Discussion related to the extent of smartphone use in children:

With regard to the age of onset (Table 2) of smartphone use, majority of children started using it at the age of 1-2 years (41.8%), followed by 2-4 years (36.4%), with children starting to use at 0-1 year and 4-6 years were lesser compared to the other two options (10.9%). Our findings differ from previous findings by Kabali et al. (2015), where authors found that almost all children (96.6%) used smartphone, and most started using it before the age of 1year. This is because of the easy availability of smartphones at home and parents might have been ignorant about it's ill effects. According to the findings of the study, maximum number of children spent around 1-2 hours in a day on smartphone (Table 3). The number of children spending 2-3 hours and more is very less (10.9%). This finding is supported by many studies done in the past which have also found similar amount of time being spent by children on smartphones. Coenen et al. (2015) reported that children used smartphones for more than 30 minutes a day which is also shared by Baek et al. (2013) to an extent. Baek et al (2013) found that when parents were asked about the need of smartphone by infants and young children, 53.3% replied in affirmation. While in the current study very few, 9.1%, parents are in favour of the current amount of usage (Table 3). This is because of the cultural differences between these studies, where people in western countries have more

frequent use of electronic media devices like smartphone compared to the countries like India where the scenario is still changing though rapidly.

Discussion related to the impact of smartphone use on children

With regard to the impact of such devices (Table 3), 36.4% of parents reported that their children use smartphones more than they need to use it, 12.7% reported that the child cannot stay at all without using smartphone. 72.7% reported that they need to control the use of smartphone in their child. The commonly reported behavioural problems (Table 5) that take place in children when the smartphone is taken away from them are: crying (50%); shouting (36.4%); complaining (12.7%); hitting others (7.3%); others (34.5%) which included becoming quiet/ trying to approach others. There was found to be a significant association between duration of smartphone use and frequency of such behavioural problems (Table 5). This shows the dependency children are gradually developing on such devices. The frequently found negative impact of smartphone use (Table 5) in the current study are: increase in anger (34.5%); reduced interest in studies (34.5%); weak eye sight (30.9%); social withdrawal (27.3%); problems in eating (23.6%); reduced touch with nature (20%); sleep problems (16.4%); change in posture (7.3%). A significant association was found between the duration of smartphone use and the negative impact (Table 5) taking place in children. It has been supported by the study done by Divan et al. (2008) which says that children with exposure to cell phones either at prenatal, postnatal stage or both, usually presents higher percentages of borderline or abnormal scores for emotional, conduct, hyperactivity and peer problems. Park & Park (2014) reported that children with higher smartphone addiction are likely to come up with certain issues like irritability, depression, ADHD, anger, lack of attention, etc. Apart from this, high smartphone use predicts developmental problems like impairment in visual/hearing senses, obesity or other bodily disturbance. Cheung et al. (2016) found significant relationship between touch screen use and duration of sleep with increased use of smartphone was related to reduce overall of sleep.

CONCLUSION

There is a significant use of smartphone by children of Pre-school age. Child's age, family type and parental extent of smartphone use are some of the major factors playing a role in the child's smartphone usage.

Limitations of the present study

The study was conducted on a small sample and without a matching control group. Data was collected by interviewing only one of the parents, so the observation may be subjective and may lack the accuracy.

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Conflict of Interest
The author(s) declared no conflict of interest.

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