A comparative study on cognitive, emotional, and social functioning in adolescents with and without smartphone addiction

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Abstract

Background: It has been well established that any form of addiction does not only have physiological impact but also long term cognitive, emotional and social impact. What is noticeable is however that, addiction has now become associated with many behaviours which are actually part of everyday life and is often termed as Behavioural Addiction. One of them being Smartphone Addiction. Although smartphones have become a necessity with many technological advantages, the rampant increase in use also has effects on our functioning and capacities. The young population being the prominent consumers, such effects are likely to be even more pronounced.

Aims: The present study thus aims to assess the cognitive, emotional and social functioning of adolescents having smartphone addiction.

Methods: The study compares adolescents having smartphone addiction with those who form the comparative group. A sample of 100 adolescents have been taken into account, belonging to the age range of 12-17 years. The Smartphone Addiction Scale- Short version (SAS-SV) has been used as a screening tool to form the two groups, with 50 participants in each group. The t-test has been chosen as the statistic and statistical analysis has been conducted using SPSS-20.

Results: Significant differences has been found between the two groups with regards to working memory, Impulsivity and Social desirability.

Conclusion: Overall, Smartphone Addiction produces differences in Adolescent's functioning. Smartphones comes in the way of enriched psychological experience and adjusting to a world outside their screens becomes difficult.

Key words: Adolescents, Smartphone Addiction, Cognitive, Emotional, Social Functioning

Introduction

The focal point of this study is to understand adolescents within their environmental context. While emphasising upon their relationships with parents, peers, school etc. is important and forms a major part of their context, what also needs to be considered is the influence of technology. The most common mode being smartphones. While use of smartphones is in fact a necessity in present times, its usage now goes beyond that. To the point where it acts as a distraction, to the point where it is an addiction.

Based on studies of Griffiths and colleagues [1] it was found that earlier, the use of mobile phones was for communication and the risk of problematic use was minimal. However, now the risk of addiction is potentially higher for mobile phones as they include applications that facilitates in the alteration of user identity (e.g., gaming, social networking, etc.). In young population particularly adolescents this influence is felt even more.

On the basis of a meta-analysis conducted on 6 Indian studies which enrolled 1304 participants, it was found that the smartphone addiction magnitude ranged from 39% to 44%. As reported most families do not use landlines, considering that both the parents have smartphone, the young population get ready access to it [2]. Similarly, a number of other studies have focused upon increased usage in children and adolescents.

A smartphone provides a combination of mobile phone and internet. Young people are able to watch videos, express themselves, communicate and also search for information. On one hand while they are dependent on parents with regards to their life on the other hand they are also trying to create their independent space for themselves. Smartphone thus becomes indispensable for them, as it provides a new medium of expression and a means to establish that independent space [3].

Researches indicate that friendships are an important determinant for involvement in Smartphone. Social media and online game play are the most common digital venue for making friends and smartphone is a source for that [4].

Studies have also indicated the association of personality patterns with addiction in adolescents. Greater drives towards novelty seeking along with immature inhibitory systems, predisposes them towards impulsive actions and risky behaviours, including experimentation [5].

Relationship between parental variables and smartphone addiction in adolescents have been summarized in a review of literature, which indicated that family income has positive correlation with intensive phone use; parental punishment and restricted mediation can increase the risk for problematic use of smartphone on the other hand; parental addiction to substance abuse and gambling and parental neglect also serve as causal factors [6]. Overall family environment has also been found as a predicative factor to smartphone addiction

Thus, there are many risk factors and possible causal factors that links adolescents to smartphones and which ends with smartphone addiction. While it is important to consider the possible aetiology behind smartphone addiction, the consequences it has on adolescents, also needs to be explored.

Smartphone Addiction and Cognitive Functioning

During adolescents we tend to witness cognitive maturation. There is increased connectivity between brain regions. There is improvement in reasoning, information processing and

expertise. They become capable of multidimensional, abstract, planned and hypothetical thinking. While so many changes occur, it is also important to consider that this period is marked by heightened vulnerability and adjustments [7]. Recognising how sensitive cognitive functioning is at this stage of life, the continuous engagement to a smartphone and nature of its experience is bound to have strong impacts on it.

Literature suggests that the mere presence of cell phone acts a distractor and has negative effect on performance in multi-tasking. The same is particularly true for tasks which demand greater attention and cognitive activity. The effects are wide-ranging starting from school performance to work productivity [8].

There has been evidence that media-multitasking has significant impact on working memory, increase in impulsivity, changes in neural structures and negative impact on academic outcomes during learning [9].

Mobile phones that generate notifications, auditory and tactile in order to alert for incoming messages also has a negative impact on attention. Even though these notifications are short in duration they can lead the individual to engage in task irrelevant thoughts or lead to wandering of mind thus causing damage to task performance [10].

A study conducted by Abramson and colleagues [11] took into account different instruments that tested signal detection, working memory (one back and two back) simple (one card) learning that assessed visual recognition memory and attention, associative learning and movement monitoring and inhibitory function (Stroop test) in case of young adolescents. The results indicated that mobile phone is associated with faster however less accurate responses on higher cognitive tasks. In case of Stroop test, the completion time was longer in relation to greater number of mobile phone voice calls and also short messages.

In a particular study on college students, relationship was found between smartphone addiction and executive functioning and psychological health. Overall, executive functioning was studied

in terms of 9 domains namely inhibition, shifting, emotional control, self-monitoring, initiation, working memory, planning, monitoring of tasks and material organization. Participants who scored high on problematic mobile phone use, scored lower on all the 9 domains of executive functioning and scored higher on depression and an overall mental health. The research was conducted on a sample of 233 students [12].

Smartphone Addiction and Emotional & Social Functioning

Negative relationship has been found between smartphone addiction and overall psychological health in adolescents. As discussed before the desire to be liked by peers, to update one's life events into social media, often adolescents are drawn towards smartphone addiction, but negative impacts on the quality of interpersonal and social interactions has been found to exist. In a particular study, a comparison was drawn between the quality of conversation in the presence and absence of mobile phones. Findings indicated that in the absence of mobile phones there was higher level of empathic concern. On the other hand, in the presence of mobile phones, empathy was less and the dyads appeared less friendly with each other [13].

In another study it was found that mobile phones inhibited the formation of trust and closeness. It was also reported that under neutral condition, a distinction occurs between casual conversations and meaningful conversation and the latter leads to increase in intimacy. However, this distinction was absent in the presence of mobile phones [14].

The factors associated with smartphone addiction i.e. tolerance and daily life performance was found to have a significantly negative effect on academic performance of students. The researcher [15] suggests that through minimization of Smartphone usage, good academic performance can be expected .

Comparatively greater number of studies focus on social and emotional factors that predict smartphone, however effects on emotional and social experience needs to further investigated. Research upon cognitive functions largely focus on attention, memory and media multi-

tasking, however other domains have been less explored. Lastly, while there are studies in Asian countries, the investigation of smartphone addiction in adolescents of India is limited

In order to cater to the above limitations, the present study aims to assess the cognitive, emotional and social functioning in adolescents with smartphone addiction.

Method

Study Design

The study is a cross-sectional comparative study, the sampling technique selected was the purposive sampling method. In order to select the sample, different coaching centres and residential units were approached. The study was approved by the departmental research committee of the Amity Institute of Behavioural Health and Allied Sciences, Amity University Kolkata. Informed consent was taken from all participants and confidentiality was maintained.

Participants

After obtaining Ethics approval from the Institute, 100 participants were selected, out of them 50 participants formed the Smartphone Addiction group (Group 1) and 50 participants formed the control group (Group 2). The participants in both the group were within the age range of 12- 17 years and belonged to both the genders. The participants were school going students can you just give outline of your chapter in 2-3 lines (Classes 6 through 12) had average intellectual functioning. The former group met the criteria for Smartphone Addiction, the control group used Smartphones but did not meet the criteria for Addiction. Those adolescents who had intellectual, neurological, behavioural and emotional disorders, as well as those who had any other form of addiction were excluded from the study. The study was conducted over a period of 6 months (August 2019- January 2020).

The interest of the study is to understand the cognitive, emotional and social processes associated with addiction to smartphone in adolescents. The participants in the study group

was selected taking into account the following inclusion criterion: participants within the age group of 12-18 years, of both genders, with average intellectual functioning were included. For study group 1, participants met the criteria for smartphone addiction, and in study group 2, participants used smart phone but not meeting the criteria for addiction. Those with presence of any intellectual, neurological, behavioural and emotional disorders as well as who experienced any other form of addiction were excluded. Non-cooperative subjects weren't made part of the study.

Tools

Socio-demographic Questionnaire: The socio-demographic details of the subjects included name, age, gender, religion, education qualification, residence, family type and number of family members, grade, medium of education, board of education, presence of childhood problems and history of mental illness in family. The questionnaire was prepared by the researcher.

Standard Progressive Matrices (SPM): SPM developed by Raven et al [16], is administered to assess the intellectual functioning of the client. As per the norms, scores obtained above the 25th percentile indicates average and above average intellectual functioning. In the present study it has been used as a screening tool. Those individuals who scored below or fell under the category of intellectually impaired, were therefore excluded from the study.

Smartphone Addiction scale- short version (SAS-SV): Developed by Kwon, Jin, Cho and Yang [17], the Smartphone addiction scale- short version is administered to assess the presence or absence of smartphone addiction. The SAS-SV consisting of 10 items is based on a 6-point Likert scale. For males, when the score is at or above the cut-off score of 31 and for females, when the score is at or above the cut-off score of 33 it implies presence of smartphone addiction. On the basis of this screening tool, the two groups in the present study was formed.

Cognitive Functioning

Symbol Search Test: Developed by Wechsler [18], Symbol Search Test was administered to assess the processing speed of the subjects. Symbol Search is a subtest of the Wechsler Adult Intelligence Scale (WAIS), the Wechsler Intelligence Scale for Children (WISC), and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). The total score was determined by subtracting total number of wrong responses from right responses achieved within 2 minutes.

Trail Making Test (TMT): Developed by Lezak [19], TMT was administered to assess the visual attention in the subjects. Trail Making test (TMT) is the neuropsychological test of visual attention. Scores obtained consist of time taken to complete the trail (Trail A and Trail B).

Digit Vigilance Test: Developed by Lezak [19], Digit Vigilance test was administered to assess the sustained attention of the subjects. The scores obtained was determined in terms of number of errors which is found by addition of number of omissions and commissions. The time taken to complete the test was also taken into consideration.

Triads Test: The triads test was developed at NIMHANS by Rao, Subbakrishna & Gopukumar [20]. It is used to assess divided attention. It combines a verbal triads task with a tactual number identification task. The two tasks differ in terms of sensory modality and number of stimulus processing. The scores thus consist of number of word errors and number of number errors.

N Back Task, (Verbal) For Verbal Working Memory: The 1 back and 2 back versions of Verbal Memory N back test is used to assess verbal working memory. The verbal 1 N back test requires verbal storage and rehearsal., whereas the 2 N back version requires manipulation of information. The test takes about 12 minutes [20]. Scores obtained consist of number of hits and misses. N Back Test was administered to assess the working memory of the subjects.

STROOP Neuropsychological Screening Test (STROOP Test): STROOP Test [21], was administered to assess the response inhibition of the subjects. It measures the ease with which

a perceptual set can be shifted both to conjoin demands and suppressing a habitual response in favor of an unusual one. Total score consists of number of incorrect responses subtracted from the total responses. The time taken to complete the test was also determined.

Modified- Wisconsin Card Sorting Test (M-WCST): M-WCST developed by Nelson [22], was administered to assess the cognitive flexibility of the subjects. The scores obtained consist of number of correct categories, total number of errors and total number of perseverative errors.

Emotional Functioning

Emotional Regulation Questionnaire (ERQ): ERQ developed by Gross & John [23], was administered to assess the emotional regulation of the subjects. The scale has been designed to measure respondents' tendency to regulate their emotions in two ways: cognitive reappraisal and expressive suppression. Each item has 7-point Likert-type scale and based on responses, two scores were determined. Higher score represents higher presence of the tendency.

Short version of the UPPS-P Impulsive Behaviour Scale (SUPSS-P): The Short UPPS-P Impulsive Behaviour Scale (SUPPS-P) by Cyders et al [24], was used to measure impulsivity facets of the subjects. Items are rated on a 4-point scale. Scores were obtained for each of the subscale namely, negative urgency, positive urgency, lack of perseverance, lack of premeditation and sensation seeking. Total scores on each of the subscale and mean score was also determined. Higher values indicate more impulsive behaviour.

Social Functioning

Children's Social Desirability Scale (CSD): The Children's Social Desirability Scale developed by Crandall, Crandall & Katkovsky [25], is administered to assess the extent of social desirability in individuals. The score of 0 or 1 was given for each of the item depending on whether it was true keyed or false keyed. The raw score was obtained by adding up the score on the 48 statements. Higher score represents higher presence of social desirability.

Weinberger Adjustment Inventory- Short Form (WAI-SF): WAI-SF developed by Weinberger & Schwartz [26], was administered to assess the adjustment of the subjects. The WAI-SF consists of 37 items that are scored on a scale from 1-5. The subscales include Distress, Restraint and Defensiveness. Score for each of the four-subscales was determined by considering reverse items as well. In total there are 22 reverse items.

Procedure

Based on review of literature, on-going researches and experiences the problem, variables of interest and age group was selected, and the hypotheses was formed. In the present study, adolescents belonging in the age group of 12-17 years were selected. The participants belonged to classes 6 through 12. For the purpose of the study, 15 coaching centres as well as various residential units in Kolkata were approached. Informed consent was obtained from the authorities of the various establishments as well as individual participants.

Socio-Demographic details of the sample was taken. Intelligence test were conducted as screening tool. Followed by which the Smartphone Addiction Scale- Short version (SAS-SV) was administered. As per the norms, those participants who had scored above the cut-off point formed the Smartphone Addiction Group and those who scored below formed the Control Group. Thus, based on the inclusion and exclusion criteria, the two groups were formed. All the other tools representing different domains were administered on the participants. The entire study was conducted in a face to face mode, over the duration of 6 months. Administration of tools required 45 minutes on an average for each. Once the data collection was completed, data was scored and tabulated.

Statistical Analysis

The student's t-test was conducted to make the comparative analysis between Smartphone Addiction Group (n=50) and Control Group (n=50) in terms of the cognitive, emotion and

social variables. The statistical operations namely Mean, SD and t-test was performed using the Statistical Package for the Social Sciences version 20 (SPSS-20).

Results

Table 1 describes the Socio demographic variables of age Group I: Smartphone Addiction Group (SA) and Group II: Control Group. The mean age for adolescents with smartphone addiction has been found to be 14.74 and for adolescents in the control group, the mean age has been found to be 14.36. The average years of education has been found to be 8.86 and 8.26 for adolescents with and without smartphone addiction respectively.

Table-1: Socio-Demographic details of Smartphone Addiction Group and Control Group

Variables	Smartphone Addiction group	Control group
	Mean (SD)	
Age	14.74 (1.664)	14.36 (1.735)
Years of Education	8.86 (1.917)	8.26 (1.904)
	Number (%)	
Gender Male Female	28 (56%) 22 (44%)	23 (46%) 27 (54%)
Family Type Joint Nuclear	15 (30%) 35 (70%)	21 (42%) 29 (58%)
Board of Education CBSE ICSE WB	19 (38%) 31 (62%) 0	19 (38%) 29 (58%) 2 (4%)

Table 2 describes the screening details of the sample. The two variables based on which the Sample has been screened include Intelligence and Smartphone Addiction. Intelligence has been found to be average with no significant difference with respect to it between the groups. Significant difference has been found with respect to Smartphone Addiction between both the groups.

Table- 2: Screening Details of the Smartphone Addiction Group and the Control Group

Variables	Tools	Smartphone Addiction Group	Control Group	t-value
		Mean (SD)		
Intelligence	SPM	45 (6.73)	43.34 (6.84)	-1.222
Smartphone Addiction	SAS-SV	38.94 (5.25)	23.86 (4.66)	-15.164**

**Significant at 0.01 level

As depicted in Table-3 significant difference has been found in Working Memory whereby, the number of errors made is higher in Control group. Processing speed has been found to be more in adolescents with Smartphone Addiction. Total time taken in the task of Visual Attention has been found to be higher in Adolescents without Smartphone Addiction. Sustained attention has been found to higher in the Control Group, while the time for which adolescents could sustain in the task is lower in Group I, the total number of omissions made is also higher. Response Inhibition was found to be greater in Adolescents with Smartphone Addiction. Cognitive flexibility has been found to be greater in Adolescents with Smartphone Addiction. Table-4 describes the comparison between Smartphone Addiction and Control Group on the basis of emotion variables. Greater use of emotional regulation strategies has been found in case of Control group. Significant difference has been found between the two groups with respect to impulsivity. Lack of perseverance and lack of premeditation has been found to be significantly higher in Adolescents with Smartphone Addiction

Table-3: Comparison on Cognitive variables

Variables	Assessments	Indices	Smartphone Addiction Group		Control Group		t-value
			Mean	SD	Mean	SD	
Processing Speed	Symbol Search Test	Total Number of Responses	36.92	8.27	34.92	7.39	-1.274
		Total Number of Correct Responses	35.10	7.68	33.14	6.96	-1.336
Visual Attention	Trail Making Test -Part I	Total Time taken	41.32	16.39	44.86	14.16	1.156
	Trail Making Test- Part II	Total Time taken	78.38	32.14	81.67	35.23	0.488
Sustained Attention	Digit Vigilance	Total Time taken	486.94	127.18	503.54	152.8	0.590
		Omissions	25.88	34.48	25.28	24.35	-0.100
Divided Attention	Triads Test	Number of word errors	0.22	0.545	0.42	0.906	1.338
		Number of number errors	2.68	2.004	2.52	1.95	-0.404
Working Memory	N-Back (1)	Number of Hits	8.60	0.782	8.74	0.487	1.074
		Number of Errors	0.56	1.013	0.34	0.658	-1.287
	N-Back (2)	Number of Hits	12.16	2.50	11.36	2.47	-1.608
		Number of Errors	4.48	3.019	5.66	3.075	1.936*
Response Inhibition	Stroop test	Total Time taken (Colour)	56.03	9.77	54.15	9.69	-0.966
		Total Time taken (Colour-Word)	132.86	29.95	136.80	34.107	0.614
		Stroop Effect	11.18	13.89	13.36	14.98	0.754
Cognitive Flexibility	M-WCST	Number of Correct Responses	5.64	0.851	5.40	1.05	-1.256
		Number of Perseverative Errors	1.74	1.915	1.76	2.07	0.050
		Total Number of Errors	6.46	6.332	7.40	6.518	0.731

*Significant at 0.05 level

Table-4: Comparison on Emotion Variables

Variables	Assessments	Subscales (Raw Score)	Smartphone Addiction Group		Control Group		t-value
			Mean	SD	Mean	SD	
Emotional Regulation	Emotional Regulation Questionnaire (ERQ)	Cognitive Reappraisal	28.16	5.419	28.64	6.67	0.395
		Expressive Suppression	17.08	5.771	17.52	4.917	0.410
Impulsivity	Short version – UPPS-P Impulsive Behaviour Scale (SUPPS-P)	Negative Urgency	10.32	2.254	10.70	2.443	0.808
		Lack of Perseverance	8.16	2.444	7.00	2.347	-2.42**
		Lack of Premeditation	9.30	2.375	8.26	2.302	-2.23*
		Sensation Seeking	12.26	2.80	11.72	2.45	-1.025
		Positive Urgency	11.22	2.82	10.24	2.52	-1.831

*Significant at 0.05 level, **Significant at 0.01 level

Table 5 describes the comparison between Smartphone Addiction and Control Group on the basis of social variables. Social desirability was found to be significantly higher in Group-I. On grounds of adjustment, distress has been found to be higher in Adolescents with Smartphone Addiction. Restraint and Repressive defensiveness are higher in the Control group.

Table-5: Comparison on Social Variables

Variables	Assessments	Subscales (Raw Score)	Smartphone Addiction Group		Control Group		t-value
			Mean	SD	Mean	SD	
Social Desirability	Children's Social Desirability Scale (CSD)	Social Desirability	17.68	5.95	21.76	6.33	3.316**
Adjustment	Weinberger's Adjustment Inventory- Short Form (WAI-SF)	Distress	35.28	7.79	34.42	9.101	-0.508
		Restraint	38.36	8.19	41.14	7.68	1.756
		Repressive-Defensiveness	24.64	5.53	26.66	6.10	1.734
		Response Set	9.64	0.802	9.68	0.68	0.268

**Significant at 0.01 level

Discussion

Taking into account all of the findings of the present study, an impression can be formed that the effects of smartphone addiction is not restricted to any one specific domain. There are certain clearly visible and certain implicit declines, which might become more explicit in the long run.

Cognitive Functioning in Adolescents with Smartphone Addiction

While using smartphones, there is continuous engagement of cognitive processes. With greater periods of time that an adolescent engages into the use of smartphones, simultaneously a number of functions are taking place. Previous literature [27] has often associated Smartphone addiction to cognitive deterioration as well as advantages in some domains.

In the present study, Significant difference has been found in case of number of errors on Verbal Working Memory, whereby number of errors has been found to be greater in Adolescents without Smartphone Addiction. Working Memory involves holding information temporarily and processing it.

Probable reasons for lesser error in case of Adolescents without Smartphone Addiction is that with continuous use of Smartphone similar functions are carried out, the individual has the task of continuously responding to a stimulus. A number of applications that are carried out for example in gaming, requires the use of such mental operations repeatedly. It brings the individual into practice and thereby reduces the number of errors. This would, however, not necessarily translate when having to retrieve information stored for long time in the memory or has not been used recently. Hence, it would not provide a permanent advantage over healthy controls.

An important factor to be noted is that, Adolescents with Smartphone Addiction seems to have relative advantage in domain such as Processing Speed, Response Inhibition, Cognitive Flexibility and Visual Attention. All these domains form part of the smartphone experience as

well. An experience which is stimulating in nature, involves fast responses, demands multi-tasking and adaptation to new features.

Studies indicates that we tend to attend to stimulus in an involuntary manner when either the stimulus is intense, sudden, and voluminous or when the nature of stimulus is such that it automatically appeals to ones impulses [28].

However they also experience relative disadvantage in tasks which are monotonous in nature and those not involving continuous bombarding of stimulation. This relative disadvantage can be particularly seen in their performance in the domain of Sustained Attention. The results obtained with regards to reduced sustained attention is consistent with previous literature. In a study it was found that 3 months of use produced a trend of inattentiveness and was positively associated with frequency of smartphone use [29]. As indicated by Hayward, the young population can multi-task and switch between multiple media at a very fast rate however they compromise on attention spans [30].

Also, while performance might be better for the Addicted group in such a task-based assessment, negative implications might be associated when taking into account everyday functioning and tasks besides those part of Smartphones. For example, retaining academic material. Similar indications were made in a study which stated that the presence of one's smartphone may exhaust the available limited cognitive resources, thus leaving only limited resources for other cognitive performance [31].

Emotional Functioning in Adolescents with Smartphone Addiction

In the present study both the strategies of emotional regulation i.e., Cognitive reappraisal and Expressive suppression was in greater use in Adolescents without Smartphone Addiction.

In adolescents with increased use of smartphone, it may firstly lead to loss of connection with emotional and social experiences that happen outside the screens. It may also turn out to be source of avoidance, when finding it difficult to regulate emotions, thus appropriate strategy

may not be used. Previous literature indicates that those who experience emotional dysregulation are more likely to turn to addictive behaviours in-order to escape from negative feelings and experience relief. It has been further indicated that those who have stronger emotional regulation strategies are able to inhibit their own addictive behaviours as well [32]. Similar results have been obtained in the present study. Impulsivity was found to be higher in adolescents with smartphone addiction.

From neurobiological perspective, a link has been indicated between impulsivity and addiction. Dysregulation of dopaminergic transmission in the mesolimbic pathways has been implicated. It may lead to tendencies to seek immediate reward as opposed to incentive motivation which requires longer duration of effort and working for higher value outcomes. In other words, it leads to impulsive actions, thus risking the individual towards addiction and increasing relapse. Similar mechanism works in case of behavioural addiction, with Smartphone Addiction falling within the purview [33].

Significant difference has been found in the domains of Lack of perseverance and Lack of premeditation, which was found to be higher in adolescents with Smartphone Addiction. Low perseverance implies not being able to resist interferences. Often an adolescent, would engage in phone use to get rid of irrelevant thoughts such as speaking to a friend on phone, this rather has a negative impact as it may lead to new subjects of discussion and generation of new thoughts and memories which are obviously irrelevant to the present task [34]. With such repeated exposures, the overall capacity to sit down with task for long periods reduces.

Lack of premeditation involves reduced capacity to consider possible consequences and outcomes of an action, ie, acting without prior thinking. When engaging into excessive smartphone use, often there is lack of consideration of consequences. It may lead to, for example, academic failures, and poor relationship with family, and reduced time for any other kind of recreation.

Social Functioning in Adolescents with Smartphone Addiction

Significant difference has been found in case of Social desirability between the two groups. Higher social desirability was found in case of Control group. Probable reason associated with it is that such adolescents would likely to show behaviours that have less negative attitude attached to it.

Moreover, those who are not addicted to phones are more likely to be better connected with social world outside. Being better at handling such situations improves their own attitude about social experiences. This would lead to more socially desirable behaviours, thus maintaining the cycle.

In terms of Adjustment, distress was found to be higher in Adolescents with Smartphone Addiction. Distress could be seen both the predictor and consequence of increased smartphone use. When facing anxiety provoking situations or situations which may lead to experience of low mood, they are more likely to see their smartphone as a mode of distraction. It serves to provide a temporary solution. Furthermore, while using smartphone a number of factors gets associated with it such as social status, pressure to build impressions on others, defining one's own worth based on what people with whom they are connected to on smartphones thinks about them. When failing to receive the validation there might be experience of low self-esteem.

In a review of literature, it has been indicated that in case of children and young people, problematic smartphone use is associated with increased odds of depression, anxiety, perceived stress and poorer sleep quality [35].

To concluded, significant differences exists between Adolescents with and without Smartphone Addiction on grounds of cognitive, emotional and social functioning. While Adolescents using their smartphones excessively may be gaining advantage on switching between tasks swiftly, adapting to newer changes, even with such advantages, the efficiency

with which they approach to different scenarios is being reduced. Poor emotional and social functioning has also been found.

The limitations of the study is that it does not taken into differences across genders, which could have further helped in understanding the difference in the nature of Cognitive, Emotional and Social functioning. Also, The nature of tasks given to assess cognitive functioning could have been made more distinct from operations that generally form part of smartphones.

Future studies can take longitudinal perspectives help in understanding how the effects produced by excessive usage of smartphones changes over time, how it correlates with years of usage and what are the long-term advantages and disadvantages of increased smartphone uses. Comparisons could also be made across genders and different age groups. Studies could also focus on understanding how the advantages that has been found can be translated into everyday life and other important domains for example, family, personal goals, academics etc. The study also points out towards making the young generation more equipped in terms of psychological resources, building on the capacity of emotional regulation, coping with difficulties, effective communication with those around. Thus, probably reducing the need to look for outlets like smartphones.

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