Use Of Smartphone And Cognitive Distortion: A Correlational Study

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Abstract

Introduction: Smartphone is an essential part of our daily life. However excessive use of smartphones leads to so many psychological issues and many times physical damage in the form of accidents. This addictive device grips an individual into an unresponsive world, which is filled with virtual lives not only this it also includes changes in cognitive ability, problems with social or emotional skills, sleeping problems, and mental laziness. Aim: To assess the relationship between excessive use of smartphones and cognition distortion.
Sample: A total of 1000 (500 from India & 500 from Algeria) young adults aged 18 to 35 years were selected. For the study of socio-demographic data, the Cognitive Distortions Scale and Problematic Smartphone Use Questionnaire were used.
Results & Discussion: The data was analysed with the SPSS 20. On the demographic data frequency and percentage analysis was applied. Descriptive Statistical techniques and inferential analysis were done on all the study variables. In the results, it was found that excessive use of smartphones positively correlated with cognitive distortions.
Conclusion: In today's scenario the use of smartphones and other electronic gadgets increased at an extreme level which is significantly related to high cognitive distortions and other psychological issues.

Keywords: Cognitive Distortion, smartphone, cognitive thinking, psychological issues

Introduction

In our daily lives the use of Smartphone is increasingly ubiquitous; if we talking about the number of users in worldwide i.e. a record-breaking 3.6 billion in 2020 and it is expected to reach around 4.5 billion by 2024 (Gu, 2021). This is not surprising because it happened due to high level of growing functional adaptability and portability of smartphones which makes the mobile phone as a highly desirable and immersive technological tool that affords social, informational, and leisure conveniences free from locational restrictions. Accompanying people's habitual and frequent involvement with smartphones, however, is continuing debate regarding possible negative consequences of smartphone use (Harris et al., 2020). One and most negative impact or consequence of use of smartphone which has received much attention is its relation to cognition. Smartphones have been reasoned to a constant source of distraction that interferes with one's task performance (Throuvala et al., 2021; Wajcman & Rose, 2011).

Cognitive distortion

Cognitive distortions are simply ways that our mind convinces us of something that isn't really true. These inaccurate thoughts are usually used to reinforce negative thinking or emotions — telling ourselves things that sound rational and accurate, but really only serve to keep us feeling bad about ourselves. Aaron Beck first proposed the theory behind cognitive distortions and David Burns was responsible for popularizing it with common names and examples for the distortions are:1. Filtering, 2. Polarized Thinking (or "Black and White" Thinking), 3. Overgeneralization, 4. Jumping to Conclusions, 5. Catastrophizing, 6. Personalization, 7. Control Fallacies, 8. Fallacy of Fairness, 9. Blaming, 10. Shoulds, 11. Emotional Reasoning, 12. Fallacy of Change, 13. Global Labeling, 14. Always Being Right, and 15. Heaven's Reward Fallacy.

There is pliantly of research evidence which showed that smartphones are used to as a supplant thinking and it induce cognitive miserliness (Barr et al., 2015). From phone books and calendars to gaming devices and internet portals, the integration of a diverse array of applications within a single smartphone supplements a limitless range of cognitive activities. For instance, rather than having to memorize a string of phone numbers or recall upcoming appointments, with a smartphone, people no longer have to dedicate mental effort to carry out these activities. This may encourage people to use smartphones more often to engage in cognitive tasks (Wilmer et al., 2017). Another research has found that use of excessive smartphone is associated with deficits in inhibitory control (Chen et al., 2016; Hartanto & Yang, 2016), poor sustained attention and reasoning (Pluck et al., 2020), shortened attention span and lower numerical processing capacity (Hadar et al., 2017), and weak in impulse control (Wilmer & Chein, 2016). While these studies showed that excessive smartphone use is negatively correlated with cognitive functioning, there are some other researches which were failed to correlate that how smartphone use have momentary effects on people's everyday cognitive functioning. Moreover, there are also a few studies that failed to find strong evidence supporting the effect of smartphone use on cognitive performance, (Frost et al., 2019; Hartmann et al., 2020). On the basis of review of literature where we found much more discrepancies in the results on the basis of that present study is planned with the aim to found the relationship between use of smartphone and cognitive distortions.

Objective

To assess the relationship between demographic variables, problematic smartphone uses and cognitive distortions.

Methods

Description of the Sample
A total of 1000 young adults aged 18 to 35 years from Algeria, and India were selected. Among them n = 500 (173 men & 327 women with Mean age=32.86, SD=6.96) from Algeria, n = 500 (286 men & 214 women with Mean age=25.14, SD=5.51) from India. To control potential extraneous variables, certain inclusion/exclusion criteria were developed for participation in the study. Those respondents who participated in the study were (a) university students, (b) Nationals and residents of the home country, (c) with minimum education till intermediate, and (d) could read and write their native language. Those respondents were excluded from the study who were (a) diagnosed with any serious medical illness or psychiatric disorder and (b) with any physical disability. The demographic information taken from the participants included their age, gender, qualification, religion, marital status, residential area, and family system. The respondents were also asked if they were suffering from any medical illness, psychiatric disorder, or physical disability.

Tools

Socio-demographic and clinical data sheet: A socio-demographic record sheet was prepared for collecting the information about various areas of social, demographic and clinical variables. Information relating to age, sex, residence, marital status, education, types of family.

Cognitive Distortions Scale
The instrument is developed for age 18 and above to measure distorted thinking patterns of the adult population; it is developed on the student population and is a 5-point rating scale ranging from 1 "Not at all applicable on me" to 5 "Totally applicable to me." The measure has four subscales, namely: (a) Stress Creating Thinking (4-items); (b) Rigid Thinking (4-items); (c) Predictive thinking (5-items); and (d) Self Blame/Self Criticism (3-items). The scale has 16 items with good internal consistency (a = .87), moderately high temporal stability (r=.86), moderately high split-half reliability (a = .86) and moderately high concurrent validity of the scale ranging from r =.44 to .89 (Shakil, & Ali, 2015).

Problematic mobile phone use questionnaire short version (PMPUQ)
To assess the use of smartphone, the 15-item PMPUQ-SV developed by Lopez-Fernandez, Kuss, Romo, et al., (2017), was used. It has three major sub-scales i.e. dangerous use, prohibited use and depended use. Each subscale comprised five items, which were scored from 1 ('I strongly agree') to 4 ('I strongly disagree'), except for the items that were reverse scored these are following item; 2, 4, 8, 9, 10, 11, 13, & 14. Overall scores ranged from 15 to 60, with higher scores indicating more potential problems due to mobile phone use. The Cronbach's alphas of the PMPUQ-SV ranged from 0.56 to 0.90.

Procedure

The present study conducted on across the culture. After taking the inform consent in written the socio-demographic details of the participants were recorded including their age, education, sex, occupation, marital status, religion etc. After that, the responses of the participants on the main scales i.e. problematic smartphone use questionnaire and cognitive distortions scale was recorded and data was scoring done with carefully.

Stastical Analysis

The Statistical Package for Social Sciences (SPSS), version 20, was used for data analysis. The categorical demographic variables were analysed with frequency and percentages. The Descriptive analysis, including Mean and Standard Deviation, was used to analyze continuous demographic and clinical variables.

Results & Discussion

As smartphone use has become increasingly prevalent in our daily lives, there also has been continuing debate regarding its negative consequences on our daily cognitive functions. On the basis of the lack of consistency in the results of different researches, the present study planned with the aim to assess the relationship between use of smartphone and cognitive distortion.

Table 1 showing the results of frequency and percentage of demographic data (N=1000)

Variables		Algeria (n=500)	India (n=500)
Age		32.86±6.96	25.14±5.51
		Frequency (%)	Frequency (%)
Education	Up to 12	19 (3.80)	483 (32.20)
	Graduation	481(96.20)	809 (53.90)
	Post-Graduation	0	182 (12.10)
	Ph. D	0	26 (1.70)
Gender	Male	173(34.60)	286 (57.20)
	Female	327 (65.40)	214 (42.80)
Marital Status	Married	315 (63)	132 (26.40)
	Unmarried	118 (23.60)	365 (73)
	Separated/Divorce/Widow	67 (13.40)	3 (0.60)
Residence	Rural	0	137 (27.40)
	Urban	500 (100)	244 (48.80)
	Sub-urban	0	119 (23.80)
Religion	Hindu	0	475 (95)
	Sikh	0	13 (2.60)
	Muslim	500 (100)	6 (1.20)
	Others	0	6 (1.20)
Family System	Joint	319 (63.80)	282 (56.40)
	Nuclear	50 (10)	207 (41.40)
	Extended	131 (26.20)	11 (2.20)

In the results it has been found that the sample in the education variable is under graduation was 96% from Algeria population and 56% from Indian. 65% participants were females in the Algerian sample and 35% were males, similarly 43% were females in Indian sample and 57% males. In Algerian sample 63% were married, 24% unmarried and 13% were separated/divorce/widow, whereas 27% married, 73% unmarried and 0.60% were separated/divorce/widow were found in the Indian sample. In the residence variable 100% sample belongs to the urban background in Algeria sample but in Indian sample 27% participants were from rural background, 49% were urban and 24% were sub-urban. In the sample 100% were Muslim in Algerian sample and in Indian sample 95% were Hindu and 3% were Sikh, 1.2% Muslim and 1.2% were others. In the family system 64% Algerian participants were belongs to joint family system, 10% and 26% from nuclear and extended respectively. Similarly, 56% were from joint family, 42% from nuclear and 2.20% from extended family were found in the Indian sample.

Table 2 showing the results of correlation (N=1000)

	PMPUQ Sub-areas				Cognitive Distortion Sub-areas (CDS)				
	Dangerous Use	Prohibited Use	Dependent Use	PMPUQ Total	Stress creating thinking	Self-Criticism/ self-blame	Predictive Thinking	Rigid thinking	CDS Total
Education	**.136****	0.042	0.033	**.096****	**-.105****	**-.083****	-0.037	-0.029	**.072***
Age	**-.218****	-0.037	**-.112****	**-.176****	**.330****	0.03	**.098****	**.108****	**-.304****
Gender	**.088****	0.033	-0.061	-0.047	**.143****	-0.023	-0.009	0.03	**-.082****
Marital status	0.057	0.021	0.036	**.064***	**-.100****	0.018	-0.043	-0.009	**.119****
Residence	-0.023	-0.031	-0.028	-0.034	**.123****	0.004	0.038	0.014	**.164****
Religion	**-.412****	-0.06	**-.113****	**-.297****	**.522****	0.058	**.113****	**.187****	**-.481****
Family system	-0.044	0.001	-0.023	-0.016	**.094****	0.002	0.007	0.029	**-.079***
Dangerous	1	.241**	.334**	.744**	**-.369****	**-.125****	**-.109****	**-.157****	**.225****
Prohibited		1	.328**	.638**	**-.257****	**-.104****	**-.125****	**-.159****	**-0.616****
Dependent			1	.693**	**-.209****	**-.091****	**-.092****	**-.121****	**.063***
PMPUQ Total				1	**-.391****	**-.135****	**-.149****	**-.213****	**.143****
					1	1	1	1	1
**. Correlation is significant at the 0.01 level (2-tailed).									
*. Correlation is significant at the 0.05 level (2-tailed).									

Table 2 showing the results of Pearson correlation in the sample between problematic use of smartphone and cognitive distortion along with demographic variables. Firstly, we found significant relationship between socioeconomic variables such as education, age, gender, religion, and marital status and use of smartphone as well as with cognitive distortion. In the results it is found that in demographic variables education, is strongly positive relation with dangerous use of mobile phone (r=**136****) whereas age is negatively related with use of smartphone in both areas i.e. dangerous use (r=-**.218****) and dependent use (r=-**.112****), it indicates that as age increase use of smartphone in both aspects decreased. Gender also showed the strong correlation with dangerous use (r=**.088****). In religion also negative correlation (r=**-.412****) is found. In the results it is found that Muslim participants were use more smartphone in dangerous as compare to other religion. In the total score of PMPUQ it is found that education (r=**.096****), age (r=**-.176****), marital status(r=**.064***), and religion (r=**-.297****), demographic variables had strong relationship with problematic use of smartphone. On the second variable i.e. cognitive distortion the demographic variables showed significant results. It is found that all the demographic variables significantly correlated with cognitive distortion, these are education (r=**.072***), age **(r=-.304**)**, gender **(r=-.082**)**, religion (r=**.119****), residence (r=**.164****), marital status (r=**-.481****), and family system (r=**-.079***). These all variables not only related with overall CDS score also with stress creating thinking sub-domain of CDS (r=**-.105**, r=.330**, r=.143**, r=-.100**, r=.123**, r=.522**, & r=094**)** respectively. Education variable also negatively related with self-criticism/ self-blame domain of CDS (r=**-.083****). Negative relationship indicates that with age if the education increase, then cognitive distortion also decreases. In the favour of present study another study also showed that the smartphone addiction and internet addiction was related to cognitive distortion for both urban and rural students (Zaman, et. al., 2020). In the results it is also found that sub domain of problematic smartphone uses i.e., dangerous use, prohibited use, and dependent use significantly related with all sub domain of cognitive distortions, i.e. stress creating thinking (r=**-.391****), self-criticism/self-blame(r=**-.135****), predictive thinking (r=**-.149****) and rigid thinking (r=**-.213****). Overall smartphone use is significantly positive correlated with cognitive distortion (r=**.143****). In the review few studies have found positive connection between use of smartphone and cognitive failures (Hong et al., 2020; Marty-Dugas et al., 2018), another study also showed the similar evidence, that (Hadar et al., 2015; Xavier et al., 2014) smartphone addiction and internet addiction correlated with cognitive distortion among students. Another researcher found in their study that there were negative within-person associations between smartphone screen time for social and tools related applications and daily cognitive failures, suggesting that some types of smartphone use may temporarily benefit one's cognitive functioning (Hartanto, Lee, & Quek, et. al., 2023).

Limitations of the study: The current study is not without limitations. Although the daily diary method increases the ecological validity of the current study, the correlational nature of the current study limits inferences that can be drawn about the causal relationship between smartphone use and cognitive failures. Future research could investigate the effect of smartphone use on daily cognitive failures using experimental design. Furthermore, as the current sample included only young adults, more studies should be conducted to examine the generalizability of the current findings to other age groups and cultures.

Future direction: It should attempt to replicate the findings with a more diverse 24 range of smartphone users such as those that are using Android operating system. The rigorous methodology allows the current study to address confounds related to stable individual differences, increase ecological validity, reduce memory bias, increase the validity and reliability of smartphone use measures, and provide a comprehensive investigation of the relationship between the different categories of screen time and daily cognitive failures.

Conclusion

In the present study there are few limitations, but on the basis of objective measures of smartphone use and cognitive distortion there are notable strengths of the current study. The results of the study helped to look for further research. More importantly, the negative association between smartphone use and demographic variables and cognitive distortions disputes existing studies and highlights the complex and interconnected relations between smartphone use and cognition.

Declarations

Ethics approval and consent to participate:
The study was approved by all local ethical committees (No 7/2021 for the Ethical Committee of the RCLCMS of University of Mohamed Boudiaf M'sila, Algeria as the main ethical committee) and is in accordance with the Declaration of Helsinki. Participants were asked to give written informed consent to participate in this study.

Consent for publication: Not applicable.

Availability of data and materials: The datasets generated and/or analyzed during the current study are not publicly available due the fact that participants were not asked at that time to provide consent on open data but are available from the corresponding author on reasonable request.

Competing interests: The authors declare that there is no conflict of interest.

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Author contributions:

M. R the research idea was invented, translating the scale into Arabic, applying it to an Algerian sample, and the research methodology. S.R working on developing the scale on the Indian sample, formulating the introduction. S.R Statistical aspect, discussion of results and comparison between samples. P.R. working on data collection. All authors reviewed the manuscript.

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