Impact of smartphone usage on academic performance of the college students

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***ABSTRACT* :** There has been a transformation in the manner in which smartphones are being used by college students in relation to their mode of studying at colleges and universities. There have been numerous advantages that the e-learning through smartphones offers to the college students but also presents the risk of digital distraction. The present study was a quantitative one, cross-sectional in design, focusing on the impact of mobile devices' utilization on the academic performance and study habits of college students. We used 25-item digital questionnaire as a research tool for our convenience sampling. The questionnaire was aimed at collecting diverse information from the students about their daily screen time, patterns of smartphone usage, their concentration level perception, academic collaboration, and their late-night fatigue (n=206 with 206 original responses). Through this, we examined the joint effects of daily screen time & main usage modes on these variables.

The investigation revealed that the major portion of college students (65.5%) is using their smartphones for more than 3 hours a day and their main purpose is entertainment (76.7%) and social media activities, i.e., for non-academic purposes. Multiple analyses of correlation and regression revealed that the highest frequency of daily smartphone use, and the receipt of non-academic messages were significantly associated with lower concentration time and the increased perception that students' GPAs would be higher if they did not have unlimited access to smartphones.

The mediation analysis showed that the degree to which students used their smartphones for entertainment was mediated by their receiving non-academic messages thereby affecting their overall concentration capacity. On the other hand, those students who use their smartphones mainly for educational purposes usually demonstrate significantly higher levels of academic collaboration and organization, thereby showing a productive and completely different usage.

IndexTerms - Smartphone usage, academic performance, digital distraction, e-learning, study habits.

INTRODUCTION

The digital revolution came about in the twenty-first century and was mainly powered by mobile devices. At first, smartphones were only meant for communication, but now they have so many different functions that we really can't live without them. College students are perhaps the most heavily digitally native user group and for them, the smartphone can be seen as a "Swiss Army knife" giving them the means to carry out social interaction, entertainment, and autonomous learning.

However, continuous connectivity has made its effects on cognition and academic results a matter of debate. While mobile learning advocates highlight its ability to foster autonomy and collaboration, critics point to the risks of distraction, multitasking, and time displacement.

Nowadays, campuses are mobile-first environments, which means that besides learning platforms and instant communication, students are being required to engage with these systems on a continuous basis. Consequently, students are finding it rather difficult to resist the never-ending temptation of notifications and social media along with entertainment that could lead to the gradual loss of their attention spans which are a prerequisite for deep learning.
This is why educators and psychologists investigate the impact that different smartphone uses, both productive and unproductive, have on self-regulated learning and academic trajectories. Researchers usually treat smartphone usage as one big thing and analyse screen-time metrics without differentiating between academic and entertainment behaviours.

This paper proposes a dual pathway model: on one hand, educational apps enhance organizing and collaborating, but on the other hand, distractions and cognitive fatigue result from non-educational notifications and entertainment.

The study intends to use study habits, usage patterns, and perceived impacts to differentiate between the empowering and destructive aspects of smartphones for today's students.

LITERATURE REVIEW

Current studies on mobile phone and education have created an argument between the potential of mobile phones to positively impact education and the potential for negative impacts related to being "hyper-connected" due to the cognitive costs associated with this level of connectivity (greater cognitive effort required to manage the attention switching involved when switching between academic activities and social activities), as explained by **Junco (2012)** and **Rosen et al. (2013)**. Constantly switching between academics and social media creates "switching costs" and can lead to poor academic performance. Additionally, the anxiety created by constant notifications and the "fear of missing out" (**FoMO**) results in a lack of cognitive control and a decrease in the encoding of information (i.e., making information more difficult to understand) (Sana et al., 2013; Upshaw et al., 2022).

Mobile phone usage not only distracts students from academic work but also affects overall academic success by creating time displacement between study and social activity, which has been shown to correlate with lower GPAs and increased levels of perceived stress (Lepp et al., 2015; Samaha & Hawi, 2016). Furthermore, overusing a mobile phone may create psychophysiological fatigue; for example, the blue light from device screens and constant notifications may diminish students' working memory and disrupt circadian rhythms, creating additional barriers to academic success (Felisoni & Godoi, 2018; Joshi et al., 2023).

In contrast, **Kukulska-Hulme (2010)** explains that **M-learning** supports students learning in a way that is context-aware and autonomous. In addition, students can use their smartphones as academic extensions of themselves (given that they have high levels of self-regulation). However, students who do not have a strong level of digital literacy will likely find it easier to use smartphones in a way that has negative effects on academic success, rather than using smartphones in a way that has positive effects on academic success.

METHODOLOGY

The purpose of this study was to investigate the relationships between smartphone usage and study habits and their relationship to the perceived academic performance of college students. A sample of 206 real responses was collected using convenience sampling through social media/app (WhatsApp) and university email; to support statistical R modelling, yielding N=206 for further analysis. A 25-item questionnaire using Google Forms collected data on demographics; general smartphone usage (time spent and primary purpose of use); study habits (academic searches, number of notifications received, use of educational apps, doom-scrolling, and use of the internet during class); and perceived academic and psychological impact (focus/concentration, anxiety, collaboration, belief about GPA). All dependent variables were reported by participants and not verified using registrar's GPA. Descriptive statistics, Pearson correlations, multiple regression to identify predictors of distraction and GPA effect, and mediation testing using bootstrap confidence intervals to determine if non-academic notifications mediate the relationship between entertainment/socially centred smartphone usage and reduces concentration. This study provides a snapshot of an individual behaviour and its relationship to behaviours based upon the empirical support of 206 observed responses.

DATA ANALYSIS & INTERPRETATION

The study included a total of 206 participants, whose smartphone habits varied considerably. When it came to how long they spent on their phones each day, the largest group — just over two-fifths of participants (40.3%, n = 83) — reported using their smartphones for more than five hours. About 25 percent of the participants used their cell phones from three to five hours a day (25.2%, n = 52), while almost the same percentage used them from one to three hours daily (25.7%, n = 53). Less than 10 percent, specifically 8.7 percent (n = 18), spent less than an hour a day using their phones.

Daily Usage Duration	Percentage (%)	Count (n)
Under 1 hour	8.70%	18
1 to 3 hours	25.70%	53
3 to 5 hours	25.20%	52
More than 5 hours	40.30%	83

When looking at the primary reason for which the subjects used their mobile phones, entertainment emerged as the most popular activity among them, with a frequency rate of 39.3% (n = 81), while using social media came second in line with 37.4% (n = 77). More than 75% of the subjects used mobile phones either for entertainment or social media. In addition, 12.6% (n = 26) used their phones to study, while only 7.8% (n = 16) of the subjects used them for communication.

Purpose	Percentage (%)	Count (n)
Entertainment	39.30%	81
Social media	37.40%	77
Educational Purposes	12.60%	26
Communication	7.80%	16
Other	2.90%	6

The descriptive statistics of all the important variables involved in the study were derived. Smartphone usage per day was rated from 1 to 4, with an average of 2.97 (SD = 1.01) among respondents, indicating that most respondents had a level of usage ranging from moderate to heavy. Distraction and lack of focus on phones obtained a nearly identical average of 2.83 (SD = 1.00).

On the scale of 1 to 5, educational application use produced a mean score of 3.36 (SD = 1.03), signifying a moderate extent of involvement with educational applications. Similarly, academic collaboration and organisation achieved a mean score of 3.41 (SD = 0.88), indicating that smartphones were being utilised to some extent for organisational purposes related to studies.
However, worth mentioning is the fact that the variable measuring the frequency of aimless scrolling had a mean of 3.46 (SD = 1.13), which shows that participants were relatively frequently doing this. One of the highest ranked variables was tiredness at night caused by the use of a phone, which had a mean of 3.89 (SD = 1.18). Thus, it could be said that the disturbance of sleep because of phone usage was quite frequent in this sample.

The belief that GPA performance would have been better had the participants not used cell phones, however, was not so high. It registered a mean of only 1.92 (SD = 0.80), implying that although many participants admitted having poor mobile practices, very few believed that their grades were suffering because of it.

Variable	Scale	Mean (M)	Std. Dev (SD)
Daily Smartphone Use	1–4	2.97	1.01
Distraction & Reduced Focus	1–4	2.83	1
Educational App Use	1–5	3.36	1.03
Academic Collaboration	1–5	3.41	0.88
Doom-scrolling Frequency	1–5	3.46	1.13
Late-night Tiredness	1–5	3.89	1.18
Non-academic Notifications	1–5	3.36	0.92
Perceived GPA Harm	1–3	1.92	0.8

There were three main bivariate correlations that were investigated in order to examine the possible relationship between certain smartphone behaviour variables and their impacts. It is worth mentioning that all the three correlations were highly significant at the level of $p < .001$.
The strongest correlation was obtained between the daily use of smartphones and distractions, or inability to concentrate ($r = .65$), meaning that students who used their phones more often experienced greater difficulties concentrating on something. This may come as no surprise, yet the high correlation shows how strong the connection between phone usage and lack of focus really is.

There was an equally significant relationship between educational app usage and academic collaboration/organization ($r = .64$), which means that the more often the students used their phones for educational purposes, the more organized and collaborative they were in their academic endeavours. This means that when used appropriately, smartphones may have a positive effect on the students' academics.

Furthermore, a moderate correlation was found between the frequency of doom scrolling and fatigue due to tiredness at night ($r = .59$). This supports the notion that frequent passive smartphone use especially in the evenings is highly correlated with sleep-related tiredness. Overall, these results reveal the complex relationship between smartphones and academics.

Model 1 attempted to explain the composite dependent variable of distraction and lack of focus. This model had a good power in explaining the variation of scores on the composite dependent variable (distraction; $R^2 = .470$). The amount of daily usage of smartphones was found to be a significant contributor with high power ($B = 0.595$, $SE = 0.052$, $t = 11.41$, $p < .001$, 95% CI [0.492, 0.698]), which means that the high overall phone usage correlated positively with increased self-reported distraction levels. Whether the use of a person's phone was mainly for entertainment or social media also had a significant effect on the dependent variable ($B = 0.455$, $SE = 0.124$, $t = 3.67$, $p < .001$, 95% CI [0.211, 0.699]). Usage of educational apps was close to being statistically significant ($B = 0.097$, $p = .053$).

Predictor	B	SE	t	p	95% CI
Daily Smartphone Use	0.595	0.052	11.4	<.001	[0.492, 0.698]
Primary Use (Ent. /Social)	0.455	0.124	3.67	<.001	[0.211, 0.699]
Educational App Use	0.097	—	—	0.053	—
Model Summary: R2=.470.					

Model 2 considered an alternative dependent variable, namely whether students thought that their GPA would have been higher had they used their cell phone less often, but this model accounted for much less variance (R^2 = .101). This implies that the perception of the negative impact on GPA is based on a more multifaceted combination of predictors than simply being distracted by social media or other non-academic activity. Only one predictor was statistically significant in Model 2 – non-academic notifications (B = 0.209, SE = 0.074, t = 2.82, p = .005, 95% CI [0.063, 0.355]). Thus, the more distracting notifications that a student receives from his/her cell phone, the more likely he/she is to think that using the phone affected academic performance negatively. The distraction composite predictor was not significant (B = 0.101, p = .125) along with the educational apps predictor (B = -0.068, p = .213).

Predictor	B	SE	t	p	95% CI
Non-academic Notifications	0.209	0.074	2.82	0.005	[0.063, 0.355]
Distraction Score	0.101	—	—	0.125	—
Educational App Use	-0.068	—	—	0.213	—
Model Summary: R2=.101.					

The study further used a mediation analysis to explore if the notifications from the non-academic sources acted as a channel for the effects of entertainment and social media on reducing the concentration period. The findings revealed that the channel did act as such.

Path A (0.309) showed that the higher the level of students' entertainment or social media orientation on their cell phones, the higher the likelihood that they would be receiving, or responding to, non-academic messages. Path B (0.936), in its turn, showed that there was a very high correlation between non-academic messages and lack of concentration.

As far as the two pathways are concerned, the indirect path (ab = 0.289) had a strong impact, and hence a greater proportion of the relationship between entertainment orientation and decreased concentration could be explained via the pathway of notifications. This was further supported by the fact that the direct path (c' = -0.009) was negligible to the point of being almost zero.

Total effect (c = 0.280) represents the complete effect of entertainment orientation on concentration without accounting for the intermediary factor. The almost perfect correspondence between the total effect and the indirect effect indicates that non-academic messages do not only go hand-in-hand with distraction but that the former serves as an important pathway for passive and entertainment-related smartphone use influencing concentration.

CONCLUSION

In this research, it has been clearly illustrated that the smartphone could be a determining factor for a student's academic life. The excessive use of smartphones due to the compulsions of social media, notifications, and doomscrolling at midnight creates distractions and fatigue for most students who are hindered from achieving their academic potential. On the other hand, it is clear that there is a solution to this problem. Smartphones can play an important role in organization and collaboration when used purposefully. Instead of imposing an outright ban, universities should promote digital literacy among students.

STRATEGIES FOR SUCCESS

Universities:

Educate students on the cognitive disadvantages of multi-tasking and how blue light harms their physical body.

Mindful use: Students can take control by setting their phones on 'Do Not Disturb' mode, using app-blockers, and avoiding nighttime browsing.

In the end, the solution lies in changing from being passive consumers to active utilizers of the tools at our disposal.

LIMITATIONS

Despite the fact that the current research has provided many valuable findings, there are certain limitations. Even though the current study uses real responses from 206 respondents, this number of respondents, who have been recruited mainly through convenience

sampling, cannot claim to be truly representative of the entire population of college students.

Furthermore, since the current research relies on the data obtained through self-reporting measures, it is possible that such findings were distorted due to the possibility of an inaccurate memory. Additionally, people might tend to exaggerate their organization skills or try to rationalize the reasons for their low academic results, including blaming cell phones exclusively for those.

Considering that the current study measured the impact of cell phones on academic performance based on perception and not based on factual evidence (such as students' grades), the results cannot be seen as absolute proof of the impact; instead, it provides evidence of a significant correlation between the dependent and independent variables.

Future research could eliminate such limitations by replacing self-reports with objective measures of academic performance. For instance, the researcher can obtain real data regarding students' performance from the registrar's office and conduct longitudinal research to assess the effectiveness of digital wellness training programs in fostering better self-regulation among students throughout their college years.

Thus, the transition from subjective cross-sectional research to objective longitudinal research will provide factual evidence regarding how well students manage to control their digital device usage.

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