DIGITAL DEPENDENCY: A SURVEY ANALYSIS OF MOBILE PHONE USAGE AND ITS INFLUENCE ON ACADEMIC PERFORMANCE AMONG MALES AND FEMALES IN LAHORE, PAKISTAN

Saima Iqbal*[1], Amna Malik[2], Hafsah Javed[3]

*[1]Lecturer Mass Communication, Queen Mary Graduate College, Lahore & PhD Scholar, Lahore College for Women University, Lahore and can be reached at, [2]Department of Mass Communication , Forman Christian College(A Chartered University), [3]PhD scholar, Communication Studies. University of the Punjab. Lahore

*[1]pusaima5@gmail.com, [2]amnamalik@fccollege.edu.pk, [3]Hafsajaved226@gmail.com
Corresponding Author:*

ABSTRACT
This quantitative research study aims to explore the correlation between smartphone usage and academic performance among college and university students through the lens of Dependency Theory in Lahore, Pakistan, specifically targeting 488 individuals aged 16 to 26 (both males and females). Data was collected through convenient sampling technique from four prominent educational institutions in Lahore, Pakistan, including Queen Mary Graduate College, Dyal Singh College, University of the Punjab, and Lahore College for Women University. The theoretical framework establishes a foundation for understanding how students' dependency on smartphones for various needs may influence their academic performance. The results indicate smartphone usage during study time effects students' attention and concentration. Additionally, both males and females heavily reliant on smartphones may exhibit higher levels of media dependency.
Key words: Mobile phone usage, Dependency Theory, attention, concentration.

INTRODUCTION

In the contemporary era, smartphones have seamlessly integrated into our daily lives, revolutionizing communication, information access, and daily tasks. Evolving from mere communication devices to powerful mini-computers (Muneeb et al., 2023), smartphones exert profound impacts on various aspects of our existence, influencing communication, information retrieval, productivity, and entertainment. With over 3.8 billion smartphone users globally in 2021 (Mai & Tick, 2021), these devices have bridged geographical gaps and facilitated real-time communication, encompassing text messaging, video calls, and social media interactions.

The transformative effect extends to information access, with high-speed internet enabling users to browse a vast expanse of information. In 2021, 81% of Americans utilized smartphones to access the internet, underscoring their significance in information dissemination (Miller et al., 2023). The advent of mobile learning resources and E-libraries has particularly enhanced students' learning experiences, making smartphones invaluable tools for educational pursuits (Abbas et al., 2015; Williams et al., 2019). Students use social media platforms, online libraries, and portals on their smartphones to enhance their learning process (Cohen et al., 2022). However, a study that revealed nearly all college-level students own smartphones, but the majority did not originally acquire them for learning and teaching purposes (Ober et al., 2023)

While, the literature presents diverse perspectives on the relationship between smartphone usage and academic performance. Smartphones facilitate access to educational resources, e-books, and online courses, concerns arise about their potential negative impact on academic fulfillment (King & Dong, 2017). Alfawareh and Jusoh (2014) discovered that

though smartphones were not initially acquired for educational purposes, they indirectly proved beneficial for students' learning. Conversely, studies suggest that excessive smartphone use during lectures may impede engagement, leading to adverse effects on academic performance (Mendoza et al., 2018; Ober et al., 2023).

Studies (Luqman et al., 2021; Ahmed et al., 2020; Nand et al., 2020) highlighted the disproportionate use of smartphones and dependency on smart phones among university students in Pakistan has been correlated with a decline in academic performance, deprivation of sleep and other psychological issues. Youngster spend most of their time in using cellphones. It may affect their study. With the excessive use of smartphones people become psychological. They feel restless when they are not using smartphones (Kibona & Rugina 2015). Smartphones are fully functioned computers which provide internet access to its users (Wong & Fesenmaier 2013). "Impact of smart phones is apparent in all fields of life such as education, health and business". But it also cause stress, anxiety, nomophobia and hypertension etc. Excessive use of smartphone cause distraction and distress among youth lower exam scores were found (Ahmed et al., 2020).

Statement of Problem
The integration of smartphones into the lives of university students in Pakistan raises a significant concern about its potential impact on academic performance. Despite the benefits, these devices bring, the increasing prevalence of smartphones among students has sparked debates regarding their influence on scholastic achievements. Existing literature presents conflicting perspectives, with some studies highlighting the positive role smartphones play in facilitating access to educational resources, while others emphasize the detrimental effects of excessive usage during lectures. However, the literature reveals a lack of consensus on the relationship between dependency on smartphones and engagement patterns and the observed decline in academic performance among university students in Pakistan. The study intends to investigate the nature and extent of this correlation. To address these concerns, this study elaborates connections between smartphone usage and academic performance among

university students in Pakistan. Understanding this correlation is crucial for developing effective strategies and interventions to mitigate the adverse effects of excessive smartphone use. By identifying key determinants and usage patterns, educators and policymakers can implement targeted initiatives to foster healthier smartphone habits while prioritizing academic success.

LITERATURE REVIEW
This literature review aims to explore the profound impact of smartphones on a global scale and specifically in Pakistan, explaining their influence across diverse aspects such as society, culture, education, economy, and individual behavior. Through the analysis of scholarly research, reports, and studies, this review provides an understanding of the extensive consequences of smartphone proliferation on the academic performance of students. Smartphones have undeniably facilitated a more convenient and immediate mode of communication, connecting people in ways previously unimaginable (Aduloju, 2019). Before the advent of mobile phones, communication relied on slower methods like wired telephones and written letters (Ling, 2012). The mobile phone, and later the smartphone, revolutionized communication, making it more immediate, convenient, and accessible globally (Iqbal & Bhatti, 2020). The evolution of mobile phones traces back to the mid-20th century, with the first successful handheld mobile phone call made in 1973 by Dr. Martin Cooper (Bergreen, 2023). The subsequent commercial availability of mobile phones in 1983 marked a significant milestone. The concept of smartphones emerged in the 1990s, culminating in the introduction of the iPhone in 2007 and the Android operating system in 2008. Since then, smartphones have undergone continuous advancements, incorporating faster processors, larger displays, improved cameras, 5G connectivity, and enhanced AI capabilities (Javed et al., 2022). These developments have firmly embedded smartphones as indispensable tools, providing access to a multitude of services and information at our fingertips. However, alongside their undeniable benefits, smartphones have also raised concerns, particularly regarding their potential impact on academic performance (Han, 2022). Studies suggest that excessive smartphone use can

lead to addiction, with students facing distractions during lectures and displaying reduced attention spans. The fear of losing smartphones, known as nomophobia, has become prevalent, affecting individuals' psychological well-being (Sagar, 2019). Numerous research studies have explored the negative effects of smartphone usage, including stress, anxiety, and adverse impacts on academic performance. The literature also highlights the challenge of finding a balance between the advantages and drawbacks of smartphone use, especially in educational settings. The existing body of research underscores the need for comprehensive understanding and effective strategies to address the multifaceted relationship between smartphone usage and academic performance among university students in Pakistan.

Negative impacts of Smartphone

Chaudhury and Tripathy (2018) explored the increasing impact of smartphones on the youth, revealing detrimental effects such as stress, anxiety, diminished user satisfaction, and adverse consequences on academic performance. The study emphasized the negative outcomes associated with heightened smartphone usage among students. Additionally, the authors recommended active involvement from parents and teachers to encourage students to reduce smartphone use and participate in co-curricular activities. Ahmed et al. (2020) stated that the adverse effects of smartphones on student academic performance, illustrating how excessive use can lead to distraction and distress, ultimately resulting in lower exam scores. The study observed extensive smartphone utilization in higher education institutions for tasks like sharing notes, assignments, and lectures. The research highlighted the negative impact of excessive smartphone dependence on academic performance and proposed the implementation of guidelines for parents and teachers to improve students' outcomes. Furthermore, the researchers advocated for limited smartphone use during classes as a potential strategy to positively influence academic performance.

Davidekova (2016) highlighting the potential repercussions of antenna radiation on the body and concentration. The study found that smartphone-emitted radiation impacts the brain, causing users to disconnect from their surroundings. Additionally,

users exhibited decreased attentiveness to studies due to smartphone-related distractions, such as chatting, resulting in diminished concentration. The study concluded that limiting smartphone use, especially for individuals not fully grown, may reduce concentration, increase distraction, and pose an elevated risk of brain tumors associated with excessive smartphone usage. A study focused on the psychological behaviors associated with frequent mobile phone use, particularly among young Australians. The findings revealed a high level of mobile phone ownership among Australian youth, showcasing a significant psychological relationship with their phones. Young people actively engaged in using social networks and responding to friends, indicating a strong connection between psychological well-being and mobile phone usage (Walsh et al., 2010; Widhiyanto et al., 2017; King & Dong, 2017).

While Thulin and Vilhelmson's research in 2007 explored a shift in behavior, suggesting that widespread cellphone use led to increased carelessness. Among young people, social communication was influenced by extensive cellphone use, fostering a flexible lifestyle of instant exchange and constant updates in their social environment. However, Miakotko (2017) revealed that electromagnetic rays from smartphones can negatively impact human health. Additionally, individuals using smartphones while driving were found to have a higher risk of accidents. The results indicated that extensive smartphone use contributes to increased emotional responses and heightened psychological disorders among users.

Kibona (2015) explored that male students predominantly spend their time taking selfies and engaging with social media, potentially leading to decreased concentration during lectures. Hossain (2019) revealed that excessive smartphone use was associated with school failure, with approximately 50% of students viewing smartphones as a waste of time. The prevalence of text messaging was emphasized, and the study suggested that voice calls could be employed for sharing educational information. Sarwar and Soomro (2013) explored how smartphones are transforming culture and social life, highlighting the alteration of social standards and behaviors due to smartphone innovation. The study suggested that smartphones can both

encourage teasing and bullying while contributing to increased brain function. However, excessive smartphone use was associated with poor eyesight, psychological issues, and physical problems. The research proposed various strategies to mitigate the negative impact of smartphones on society.

The Media Dependency Theory, offering a comprehensive understanding of how individuals rely on their phones to fulfill diverse needs.. The presence of smartphones in students' lives is evident as these devices increasingly become integral for academic pursuits, social interactions, and entertainment (Smith & Rainie, 2019; van Deursen et al., 2015). The more individuals depend on their mobile phones, the more significant these devices become in shaping their daily routines and lifestyles. Students are growingly dependent on smartphones for information acquisition, research, and engagement in educational activities (Junco & Cotten, 2012; Kuznekoff & Titsworth, 2013).

The altering influence of the Media Dependency Theory is particularly relevant when scrutinizing how smartphone usage affects students' attention, concentration, and behavior during study time (Ball-Rokeach & DeFleur, 1976). Studies indicate that excessive smartphone use is associated with changes in frustration and aggressiveness, impacting students' academic focus (Lepp et al., 2014; Roberts et al., 2015). The theory's framework aids in comprehending the behavioral effects linked to mobile phone usage, especially when students are dependent on these devices for various needs. On the basis of above literature, the following hypotheis have beend develeped.

HYPOTHESES

H1: To explore smartphone usage during study time is negatively correlated with students' attention and concentration.

H2: To explore smartphone addiction or excessive usage is negatively associated with students' academic performance.

H3: There is a significant difference in the impact of mobile phone addiction on academic performance between male and female students in Pakistan.

H4: Mobile phone usage is positively correlated with Media Dependency Theory, indicating that individuals who are more dependent on their smartphones for various needs are more likely to exhibit higher levels of media dependency.

Theoretical Framework

The Media Dependency Theory provides a relevant theoretical framework for understanding the dynamics of smartphone usage explored in this article. As we explore the impact of smartphones on students' academic performance, behavior, and overall well-being, the tenets of the Media Dependency Theory offer a lens through which we can comprehend the evolving relationship between individuals and their smartphones. Media Dependency Theory posits that individuals become more dependent on media when it fulfills their needs (Ball-Rokeach & DeFleur, 1976). In the context of this study, smartphones serve as a prominent form of media, offering a myriad of functionalities that cater to diverse needs such as communication, information acquisition, and entertainment. The theory's premise that the more dependent an individual is on media, the more significant it becomes, aligns with the role of smartphones in students' lives.

As we investigate the frequency and duration of smartphone usage and its correlation with academic performance, the theory's concept of acquiring influence becomes evident. Students increasingly rely on smartphones to acquire information, conduct research, and engage in educational activities. The smartphone, functioning as a medium, is indispensable for their academic pursuits, reinforcing its significance in their daily lives. The altering influence of Media Dependency Theory is pertinent when examining how smartphone usage affects students' attention, concentration, and behavior during study time. The theory's framework helps us understand the behavioral effects—such as changes in frustration and aggressiveness—associated with excessive smartphone use (Ball-Rokeach & DeFleur, 1976; McQuail, 2005).

Students, dependent on smartphones for various needs, may experience shifts in their behavior that impact their academic focus. The reinforcing influence becomes apparent when exploring the impact of social media usage on academic performance. Media Dependency Theory suggests that if a medium satisfies an individual's needs, they become more dependent on it. In the case of smartphones, social media applications play a

significant role. As students increasingly engage with social media, the reinforcing influence of the theory comes into play, solidifying their dependency on smartphones for social interaction. Media Dependency Theory's emphasis on dependency due to the fulfillment of needs directly correlates with the anxiety and discomfort experienced by individuals when separated from their smartphones. The theory provides a framework for understanding the psychological impact of smartphone loss and the resulting dependency symptoms. Moreover, when investigating the role of smartphones in students' engagement in classroom activities, the theory's altering influence comes into play. As students turn to smartphones for various activities, their behavior in the classroom may be altered, affecting their participation and overall academic engagement.

Method
This study utilizes quantitate research design to investigate the correlation between smartphone usage and academic performance among college and university students in Pakistan aged between 16 to 26 (males and females). The data was collected from four institutes including top two colleges (Queen Mary Graduate College, Lahore. Dyal Singh College, Lahore) and top two universities of Lahore, Pakistan (University of the Punjab, Lahore and Lahore College for Women University, Lahore). A structured questionnaire with closed-ended questions was adapted, consisting of two sections covering demographics and impact of mobile phones on student's academic performance. Following the questionnaire preparation, a pilot study involving 150 participants was conducted to assess its reliability. The Cronbach's Alpha reliability coefficient, calculated at 0.89, signifies a high level of internal consistency across the 35 items. Feedback from the pilot study participants was utilized to enhance and refine the questionnaire for the main study. The survey employs a 5-point Likert scale, where respondents indicate their agreement on a scale from 1 ("Strongly Disagree") to 5 ("Strongly Agree").

Population:
The study focuses on participants within the age range of 16 to 26, encompassing both male and female individuals. The target demographic consists of students. The entire population under consideration falls within this age bracket, allowing for a comprehensive exploration of smartphone usage patterns within the student community.

Sample
To draw meaningful conclusions about the population, a sample of 488 participants were selected for the study (335 females and 153 males). The sample includes a diverse representation of both genders, with 68.64% being female and 31.35.5% male. Total 600 questionnaires were distributed while 500 were received out of which 12 were not properly filled and had missing values. These 12 questionnaires were rejected. However, 488 responses were considered final.
Average age of participants were between 19-22 years old (50.0%), 22.1% were between 23-26 years old while 22.1% were between 16-18 years old and almost 5.7% were above 26 years old. However, the education of respondents were matric (4.2%), Intermediate (30.1%), Graduate (41.7%), Masters (20.5) and others were (3.5%). Almost 82.0% respondents were students, 13.9% were employed, 1.6% were unemployed while 2.5 % were self-employed.

Sampling Techniques:
Convenience sampling, a common non-probability method, was employed for this study. The convenience sampling method was chosen due to its suitability for the research objectives and constraints. Given the focus on smartphone usage among students, this approach ensures a quick and efficient collection of data from an accessible pool of participants within the specified age range. The findings derived from this sample will be used to draw insights into the smartphone behaviors of the broader student population.

Results and Discussion
Pearson Correlation
H_1 aimed at to explore smartphone usage during study time is negatively correlated with students' attention and concentration and H4 aimed at to explore that mobile phone usage is positively correlated with Media Dependency Theory, indicating that individuals who are more dependent on their smartphones for various needs are more

likely to exhibit higher levels of media dependency. To measure H$_1$ and H4, the researchers have applied Pearson Correlation. Table 1 provides an overview H$_1$ and H4.

Table 1:
Impact and dependency of mobile phone usage on students' attention and concentration in Pakistan (N=488).

	1	2
Mobile Usage & dependency on Mobile phones	.88**	
Students's attention and concentration	-	-.871**

p<.01. p<.05

Note: The results Pearson's correlation showed that there is negative correlation between smartphone usage during study time which negatively impacts students' attention and concentration. Mobile phone usage is positively correlated with Media Dependency Theory, indicating that individuals who are more dependent on their smartphones for various needs are more likely to exhibit higher levels of media dependency. It elaborates that hypothesis 1 and 4 are accepted. The hypothesis tested the potential correlation between smartphone usage during study time and students' attention and concentration. The Pearson's correlation test was employed with a sample size (N) of 488 participants. The results of the test revealed a significant negative correlation between mobile usage and students' attention and concentration. The correlation coefficient (r) for mobile usage and students' attention and concentration was -.871, which is a strong negative correlation. The p-values associated with these correlations were below the significance thresholds commonly used in statistical analysis (p < .01). The findings suggest that as mobile usage during study time increases, students' attention and concentration tend to decrease significantly. The negative correlation implies that there is an inverse relationship between the two variables, supporting the hypotheses that smartphone usage during study time is linked to a decline in students' attention and concentration.

REGRESSION ANALYSIS
H$_2$ aimed at to explore smartphone addiction or excessive usage is negatively associated with students' academic performance.e. To measure H$_2$, the researchers have applied Hierarchical Regression Analysis. Table 2 presents an overview of H$_2$.

Table2:
Negative impacts of smartphones on academic performance of students in Pakistan (N=488).

Predictors	R2	ΔR2	B
	0.000	0.08	
Usage of smartphone			.02*

Note: p<.01

Note: The results of Hierarchical Regression Analysis showed that there is positive correlation between smartphone usage and its negative impact on student's academic performance in Pakistan. It showed that H2 is also accepted. Results reveled that impact of smartphone on academic performance in Pakistan is highly significant predictor of negative impact of smartphone.

Independent Sample t-test
H3 aims at that there is a significant difference in the impact of mobile phone addiction on academic performance between male and female students in Pakistan.. To measure H3, Independent Sample t-test has been applied. Table 3 provides an overview of *H$_3$.*

Table: 3.
Negative impacts of smartphone usage on male and female students in Pakistan (n-488).

Variables	Male M(SD)	Female M(SD)	t	P	CILLUL	
Smartphone addiction	11.88(1.42)	12.07(2.28)	-402	.688	-1.14	.756
Academic performance	28.8(5.90)	27.72(8.21)	-882	.632	-1.31	3.79

Note: The above table provides a description and interpretation of the results of the independent sample t-test comparing smartphone addiction and academic performance between male and female students in Pakistan. Based on the results, there is no significant difference between male and female students in Pakistan concerning smartphone addiction or academic performance. The non-significant p-values and confidence intervals that include zero suggest that, at least within the observed

sample, gender is not a significant factor in differentiating smartphone addiction levels or academic performance. So, H3 is rejected.

DISCUSSION

The results obtained from the Pearson's correlation analysis in this study confirm a noteworthy negative correlation between smartphone usage during study time and students' attention and concentration. This outcome reinforces the initial hypothesis that heightened mobile phone usage during study periods correlates with a decline in students' attention and concentration. Numerous recent studies have explored the relationship between smartphone usage and academic performance, providing the understanding of the challenges posed by excessive mobile phone use. Junco and Cotten (2012) discovered a negative correlation between high-frequency mobile phone use and students' grade point averages (GPAs). Similarly, Elhai et al. (2016) reported that smartphone addiction is linked to lower academic performance and heightened anxiety levels among college students. These recent findings parallel the outcomes of the current study, reinforcing the notion that smartphone usage detrimentally influences academic outcomes.

The negative correlation identified in this study between smartphone usage during study time and students' attention and concentration aligns with a broader body of literature investigating the impact of technology on cognitive functioning. Rosen et al. (2013) emphasized the role of constant notifications and interruptions from smartphones in reducing attention spans and impairing task performance. Additionally, recent studies by Thornton et al. (2014) and Alloway and Alloway (2015) investigated the adverse effects of multitasking, often facilitated by smartphones, on cognitive functions such as attention and concentration. The positive correlation between mobile phone usage and Media Dependency Theory further supports the argument that individuals heavily reliant on smartphones are more likely to exhibit higher levels of media dependency. This aligns with recent research on media consumption patterns, indicating that heightened dependence on media, facilitated by smartphones, can significantly influence various aspects of individuals' lives (Ball-Rokeach & DeFleur, 1976).

However, the outcomes of the Hierarchical Regression Analysis in this study reveal a significant positive correlation between smartphone usage and its adverse impact on students' academic performance in Pakistan. The affirmation of Hypothesis 2 (H2) underscores the substantial relationship between smartphone usage and its detrimental effects on academic outcomes. The positive correlation observed between smartphone usage and its negative impact on academic performance aligns with contemporary research investigating the influence of mobile devices on students' educational outcomes. Studies conducted in diverse cultural and educational contexts consistently indicate that excessive smartphone use can be detrimental to academic performance. Lepp et al. (2014) found a significant association between higher mobile phone use and lower academic performance among college students, supporting the present study's findings. Smartphone usage plays in influencing students' educational outcomes in the context of Pakistan. A study revealed that smartphone-related activities may divert students' attention from their studies, impacting their focus and overall academic performance.

However, contrary to the initial hypothesis (H3), the absence of a significant difference challenges the notion that there is a gender-based disparity in smartphone addiction or academic performance among students in Pakistan. The lack of a significant difference in smartphone addiction levels between male and female students aligns with recent research examining the gender dimension of smartphone use. Roberts et al. (2014) found no significant gender differences in smartphone addiction among college students in their study. Similarly, a more recent investigation by Elhai et al. (2020) reported that, while there may be variations in specific usage patterns, overall smartphone addiction levels did not significantly differ between male and female participants. The present findings resonate with this emerging trend, suggesting that, at least within the observed sample in Pakistan, gender may not be a critical factor influencing smartphone addiction levels. Likewise, the absence of a significant difference in academic performance between male and female students is consistent with existing research exploring gender-related variations in educational outcomes. Recent studies, such as those

conducted by Stoet and Geary (2018) and Hyde et al. (2019), highlight that gender differences in academic achievement have diminished over time, with other factors playing a more prominent role in explaining academic performance variations. These studies highlighted the significance of considering individual differences and environmental factors rather than focusing solely on gender-based distinctions.

While this study contributes valuable insights into gender-related differences in smartphone addiction and academic performance, acknowledging certain limitations is essential. The findings are specific to the observed sample in Pakistan, and the influence of cultural and contextual factors on generalizability should be considered. Additionally, recognizing individual variations within each gender category is crucial, and future research could explore subgroup analyses to uncover potential nuances in smartphone use and academic outcomes.

CONCLUSION

This study investigated the relationship between smartphone usage, addiction, and academic performance among students in Pakistan through the lens of Media Dependency Theory. The results show that smartphone usage may contribute to a decline in academic focus, overall performance and adverse consequences. Furthermore, the positive correlation with Media Dependency Theory implies that individuals heavily reliant on smartphones are prone to exhibiting higher levels of media dependency, explain the link between technology use and media engagement. The study explained that individual differences and contextual factors may wield more influence than gender in explaining variations in smartphone use and academic achievement.

Limitations and Recommendations of the Study

The researchers wanted to use mixed method approach for the current study but due to time and budget constraints, it was not possible. They also wanted to expand the study to include a more diverse and representative sample, encompassing different educational levels, socioeconomic backgrounds, and cultural contexts but it was not possible withing limited time period. More in-depth cultural studies should be conducted to understand the smartphone usage within the specific cultural context of Pakistan.

Explore how societal norms and values influence smartphone use and its implications for academic outcomes. Also it is suggested that how educational apps, digital resources, and interactive platforms on smartphones could be utilized to enhance learning experiences and academic performance. It is suggested that to engage with teachers, parents, and policymakers to create a supportive environment that addresses smartphone-related challenges and promotes academic success.

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