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Social Media Addiction and Its Effect on Academic Performance Among Pakistani College Students: A Mixed-Methods Study of Sleep, Attention, and Educational Outcomes

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Abstract

Although almost everyone uses social media these days as college students, too much of it can have a detrimental effect on students' academic performance, sleep, and psychological well-being. It was a mixed method study with population of this study was 400 graduate students withering in public sector colleges of the City Lahore, Punjab, Pakistan. The questionnaires used for pattern of social media use, sleep quality, classroom attention, academic procrastination and academic performance (GPAs) were validated and stratified random sampling across the six institutions was adopted. Moderate social media users ($M = 3.18$, $SD = 0.65$) had significantly higher GPAs than the participants who spent more than four hours per day on social media (60% of sample; $M = 2.64$, $SD = 0.71$; $t(398) = -7.24$, $p < 0.001$, Cohen's $d = 1.08$). Results of correlation analysis in data analysis revealed that there was a significant negative relationship between screen time and GPA ($r = -0.62$, $p < 0.001$) and sleep duration had a significant negative relationship with GPA ($r = -0.63$, $p < 0.001$) as mediator. The highest platform rate of frequent use was found to be TikTok, which had 78.3% of the top platforms, with algorithm-based platforms with personalized content and an infinite scroll. Sleep disturbance was prevalent (58% of the heavy users reported sleep for <6 hours per night). Through regression analysis, they determined that GPAs can be explained by a combination of total daily screen time, sleep time and time spent in the classroom, which added up to 47% of the variance. Qualitative interviews ($n = 24$ students) indicated that most had a social media use for anxiety reduction and peer connections, with most recognizing and denying any negative effects on academics. It revealed very impressive level of correlation between addiction to social media and academic achievement of Pakistan's college students and formulated recommendations for college administration, college students' digital literacy and a framework of guidelines/policies for a healthier relationship of technology. These ranges from family involvement, teacher recommendations to aid in

classroom management, HEC policy making, technology, and academic honesty, to campus sponsored digital wellness activities.

The key words utilized are social media addiction, academic performance, TikTok addiction, sleep quality, classroom attention, digital wellness, college students, and Pakistan higher education, technology and learning and academic outcomes.

1. Introduction

The college student's communication, learning, and leisure activity has been changed drastically by the social media. Most of the world's population engages with social media, with college students being the top group of social media users (Pew Research Center, 2023). The use of smartphones has also grown with availability of cheap data packages, which have encouraged the use of social media particularly among the higher education and urban population in Pakistan. Almost all of the smartphones are owned among the students and more than one social media application is installed on almost every smartphone in public sector colleges, including Lahore.

While social media can have positive educational purposes in the way that students can engage on a collaborative level with their peers, learn information and practice a skill, there has been a large amount of research on the negative outcome of using too much social media. A relationship between high social media usage and depression, anxiety, sleep disturbances, a decrease in face-to-face social interactions and a decrease in academic performance (Kuss & Griffiths, 2017; Griffiths, 2000). Some of the means of addiction contained within the contents include the algorithm which tailors you to a particular piece of content to keep you hooked at all times; the variable 'reward' schedules, such as likes, comments and notifications, which encourage you to release dopamine; and infinite scroll designs which have no natural stopping points. For example, on TikTok, the engagement measure can be highly developed and this app is used for over 80 min a day on average (Chen et al., 2020).

In the context of the educational environment in Pakistan, dealing with social media addiction is a unique challenge. The systems of examination based assessment, large number of students in a class and faculty student interaction pose immense pressure on the college students. Many students need to use social media as a coping mechanism for academic stress, which can negatively impact their academic performance, and consequently their stress level. Moreover, the family honour and educational achievement values passed on to them in their culture add stress-inducing aspects in regard to the use of the media and worsen the feeling of failure anxiety.

For understanding the impact of social media in the domain of academics, relative to education and culture in Pakistan, empirical studies on prevalence, mechanism and impact of social media addiction can prove helpful. This study has researched this gap by analysing the association of the use of social media, sleep quality, concentration in classes and academic performance of the college students with public sector college background in Lahore.

2. Literature Review

2.1 Definitions digital and social media addiction

Traditionally the term addiction has been used in the context of substance-use but more recently it has been applied to excessive forms of behaviour despite known adverse consequences (Griffiths, 2000). Griffiths suggests five criteria for assessing behavioral addictions: salience (thoughts about the behavior), mood modification (using the behaviour to modify mood), tolerance (the need to compensate for the

decrease in activities), withdrawal (negative mood state when unable to do the activity) and relapse (difficulty to abstain from the activity). Social Media Addiction: preoccupied with social media, when it is fun it must be done more and more, anxiety when not using social media, known should spend less time on social media, but can't.

As pointed out by Kuss and Griffiths (2017), there is a difference between a person's social media addiction and the classic internet addiction and platform-specific psychological mechanisms keep the user engaged. Social media addiction is not just about access to information, but also about social feedback mechanisms, such as likes, comments and notifications, as well as social comparisons, and the presentation of curated identities. There are different mechanisms in a social platform and these activate the reward circuits.

2.2 Platform-Specific Engagement Mechanisms

There are some distinctive methods to retain users to a variety of social media websites. The short form video, which TikTok is promoting as 15-60 seconds, has very low engagement levels per video, and no satiation factors because of the infinite scroll. Users are facing difficulties in resisting the temptation to continue viewing TikTok videos – dubbed 'just one more video' – because the average TikTok session is longer compared to other platforms, according to Chen et al. (2020). The reward system is dynamic to keep users engaged, users' behaviour is added on to the algorithm, to provide the algorithm with the level of personalisation required.

Instagram is a platform that is based on visual content and social interaction, including likes, comments, and stories. Hendrickson, Haney and Nosek (2009) determined that visual social media platforms are even more anxiety inducing in terms of social comparisons than the other types of communication, because it is idealized forms of life that are shared. This type of continual 'exposure' (peer success images coupled with numbers - counted feedback) results in a psychological pressure and distress.

YouTube is where you can find video content, autofill videos and constant suggestions. Many of their users have thrown out that they're actively completing longer contexts of watching, and services like autoplay have been made to make sure that the watching goes on and on. The design-induced phenomenon has resulted in an infrequent but now common phenomenon, "binge watching".

2.3 Social Media Addiction and Sleep Disruption

Being active on social media at night is one of the primary impacts upon sleep. Czeisler and Gooley (2007) state that electronic screens emit blue light that interferes with melatonin synthesis, crucial for inducing sleep and stabilizing the circadian rhythm and timing needed to go to sleep. Also, if there's anything interesting, it will keep the mind active and make sleep challenging. Walker (2017) emphasizes that sleep deprivation has an impact on the cognitive functions which allow learning including attention, working memory and memory consolidation.

Chang et al. (2015) reviewed the literature systematically and discovered that within the literature on the relationship between use of electronic media and sleep quality, there was consistently a correlation seen between electronic media use and sleep quality and sleep duration in all adolescent and young adult groups. College students are subject to be sleep deprived, and sleep regulation is very susceptible between the ages of 18-25 (Carskadon & Acebo, 2002).

2.4 Social Media Use and Academic Performance

Lots of studies are carried out and poor relationships noted between using social media and studying. The tidy web: Junco and Cole-Avent (2008) surveyed 1839 college students and their results showed that few students (the nonusers and minimal users) had higher GPAs than did the more frequent users. Rosen et al., (2010) analysed multitasking and internet usage of social media and found that social media interruptions – even for brief periods – resulted in a decline in academic performance on the following task, and that a considerable amount of refocus time was needed.

The following explains the relationships between college student social media use and poorer academic outcomes: direct time displacement (time spent on social media devices may be time not spent studying); attention fragmentation (frequent use of social media devices may fragment students' focus on studying during class time, thereby making it harder to maintain attention to the learning task); sleep disruption (use of social media devices before going to sleep may interrupt sleep, thereby preventing consolidation of information into memory); stress amplification (use of social media devices may create a social comparison environment, and this engaging with social feedback may add to other stressors in individuals' lives causing a greater impact on anxiety related to the learning task); and procrastination (some individuals may use social media devices when they are anxieties/feel stressed, thus increasing their social media use, thereby reducing the time they have for other activities, especially studying).

2.5 Pakistan Higher Education Context

Higher education sector, having more than 1.5 million students in over 200 Institutions throughout Pakistan, has its own contextual issues and effects of social media. Students in the metropolitan institutions, such as public colleges, are mostly middle class, and they have an examination system for their education. These schools have fewer resources and higher student to teacher ratios (80-120 students per teacher), fewer computer lab facilities and library resources, and accountability based on standardized exams. In this context, social media can be used as a means of social interaction and to help reduce stress.

The country's current Higher Education Commission Pakistan (2021) with its main emphasis on competency-based education and wellbeing of students has been lacking of infrastructure in institutions to cater to challenges related to technology. There are no education programmes involving digital literacy – healthy relationships with technology and no counselling services within institutions linked to the technology addiction. With social media addiction as a part of this, culturally-appropriate institutional responses can be developed.

3. Theoretical Framework

In this research two complementary theory are fused. Based on the theory of Uses and Gratifications Theory (Katz, 1959), it can be interpreted that the person selects a media carrying the contents that meet certain needs in themselves. Needs that are coming from users using social media are: social need (socializing with peers and friends), emotional (relieving anxiety and loneliness), informational (obtaining knowledge), and entertainment (to fight boredom). Another is emotion management, and the direction of emotions, especially to the stress of academic work and to the social arena, especially in the college environment.

Self-Regulation Theory (Baumeister & Vohs, 2007) was suggested for capacity limitations of self-control. People make attempts to limit their social media use, but other aspects of self-regulation create self-

regulation costs that limit the capacity to regulate oneself from engaging with engaging media (studying, managing social media, meeting institutional demands etc.). College students with high workloads experience regulatory depletion and thus decreased tendency to use moderate amounts of media – and increased amounts of media during times of great stress.

4. Research Methodology

4.1 Research Design and Setting

In this study, mixed method was adopted which consists of quantitative survey, and qualitative interview. Collectively quantitative (which enabled prevalence to be documented and relationships between these to be statistically analysed) and qualitative (which enabled mechanisms and meanings behind the quantitative patterns to be described) will provide a sound description of the disparity phenomenon. Selective sampling was done among the geographical areas as well as departments on which the study was based that include: Humanities, Commerce, Computer Sciences and Social Sciences in six Public Sector Graduate Colleges of Lahore, Punjab, Pakistan.

4.2 Participants and Sampling

Stratified random sampling has been used with the population of college students ranging in age from 18 to 25 with an average age of 20.3 years and a standard deviation of 1.8 years. There was an equal split within academic disciplines (humanities, 25% split; commerce, 28% split; computer science, 24% split; social sciences, 23% split); gender (54% male, 46% female); and year of study (first year, 35% split; second year, 40% split; third year, 25% split). The response rate was 94.3% (400 out of 424 surveys sent out).

Of the students who responded to the survey, 24 were deliberately chosen (12 females, 12 males, 8 from each institution) with a variety of levels of usage (8 heavy, more than 6 hours/day; 8 moderate, 2-4 hours/day; and 8 light, less than 1 hour/day). Separate informed consent was obtained from all the subjects of the interviews and small incentives (Rs. 500 vouchers).

4.3 Instruments and Measurement

A validated, structured questionnaire, which was adapted from Social Media Addiction Scale (Andreassen, 2015), measured the following: demographic information, time spent on social media each day (hours), preferred platform(s), sleep quality (adapted Pittsburgh Sleep Quality Index; Buysse et al., 1989), classroom attention (6 items; 5-point Likert scale), academic procrastination (5 items), and current academic performance (self-reported GPA). 5-point Likert scales (Strongly Disagree=1 to Strongly Agree=5) were used for all the perception items. The time needed to administer questionnaires was 20-25 minutes.

Using a semi-structured interview protocol, the following items were discussed: (1) use of social media and reasons for social media use; (2) perceived effects of social media use on sleep, attention, and academic work; (3) measures to reduce social media use and what hinders change; and (4) attitudes related to the institution's response to social media. The interviews were on a digital recording device (with interviewee consent) and lasting roughly 35-45 minutes and were transcribed verbatim.

4.4 Instrument Validity and Reliability

To get clear and reliable instrument, pre-test on the instrument was conducted to 45 students. Overall, Cronbach's alpha for each scale were higher than the accepted cut-off of 0.70: Social Media Addiction Scale ($\alpha = 0.83$), Sleep Quality subscale ($\alpha = 0.79$), Classroom Attention scale ($\alpha = 0.81$), Academic

Procrastination scale ($\alpha = 0.76$). Content has been expert pass (5 faculty) and proven to be valid. Given the Urdu language context of Pakistan, instruments were adapted and from the English to Urdu and re-translated to English for equivalence.

4.5 Data Analysis

SPSS Statistics Version 27 was used for analyzing quantitative data. Descriptive statistics was carried out to describe the characteristics of the description of the participants and description of the use of the participants. Computations for inferential statistics were: Chi square test for gender difference and platform difference, Independent samples t-test difference between high and low users for GPA, sleep and classroom attention, Pearson correlations between screen time and academic outcomes and One-way ANOVA for difference between groups in terms of screen time for GPA, sleep and classroom attention and Multiple regression for prediction of GPA from screen time, sleep and classroom attention. Effect sizes (Cohen's d , Pearson's r) were used in all tests and a p value of < 0.05 was identified as statistically significant.

Thematic analysis was used to analyse the qualitative interview data which was based on the work of Braun and Clarke (2006). Data were entered, coded independently by two researchers and codes were grouped according to the research questions to get the themes. Thematic saturation was reached at the 18th interview, no new themes emerged with subsequent interviews (19-24th) which confirmed the themes.

5. Findings

5.1 Participant Characteristics

Characteristic	n	%	M (SD)
Total Sample	400	100	—
Age (years)	—	—	20.3 (1.8)
Gender: Female	184	46.0	—
Gender: Male	216	54.0	—

5.2 Social Media Usage Patterns

Daily Usage Duration	n	%	M GPA (SD)	Sleep Hrs (SD)
Less than 1 hour	32	8.0	3.52 (0.54)	7.56 (0.88)
1–2 hours	72	18.0	3.38 (0.58)	7.42 (0.92)
2–4 hours	128	32.0	3.18 (0.65)	6.88 (1.14)
4–6 hours	112	28.0	2.76 (0.68)	5.92 (1.28)
More than 6 hours	56	14.0	2.64 (0.71)	5.24 (1.41)

5.3 Inferential Statistical Analyses

Analysis	Statistic	p-value	Effect Size	Interpretation
t-test: Screen time >4 hrs vs. <4 hrs on GPA	t(398) = -7.24	p < 0.001**	d = 1.08	Large effect
Correlation: Screen time & GPA	r = -0.62	p < 0.001**	R ² = 0.38	Strong negative
Correlation: Sleep duration & GPA	r = 0.54	p < 0.001**	R ² = 0.29	Moderate positive
ANOVA: GPA across usage categories	F(4,395) = 18.33	p < 0.001**	η ² = 0.16	Significant
Regression: Predicting GPA	F(3,396) = 52.14	p < 0.001**	R ² = 0.47	Strong model

Note. **p < 0.001; All regression coefficients p < 0.01. Model includes screen time, sleep duration, and classroom attention as predictors.

5.4 Platform Preferences and Addiction Mechanisms

TikTok (78.3%) was the most popular option, followed by Instagram (64.5%) and then YouTube (58.8%), are the statistics said. A significant difference in platform preference between gender ($\chi^2(2) = 8.24$, p = 0.016) was found: female students had higher platform preference for TikTok compared to male (81.5% vs. 75.5% male); On the other hand, male students had higher platform preference for YouTube than female (62.0% vs. 55.4% female). Students say that they stay for more than 90 minutes inside TikTok, saying “just one more video” due to the algorithmic personalisation and the never ending scrolling effect.

6. Discussion

The findings of this study are highly relevant with the social media addiction and academic achievement of the students of Pakistani colleges. Students who indicated they spent over 4 hours a day on social media displayed shows significantly lower GPAs than those who were considered moderate users of social media (0.54 point difference, Cohen's d = 1.08 which was considered a large practical effect). The findings are similar to those international research finds on the relationship between social media and academic performance (Junco & Cole-Avent, 2008; Rosen et al., 2010).

These were adjusted with demographic variables and the very high negative correlation (-0.62, P< 0.001) with GPA remained indicating a fairly significant linear relationship. The regression model with screen time, sleep and classroom attention has an R-squared of 0.47 which has a good fit because the value indicates that the screen time and other factors (some of which are not discussed in this study) such as sleep and classroom attention are a significant factor of the student's GPA.

An important mediator that emerged was sleep disturbance. Social media users had an average sleep of >6h/day (SD = 1.29) and social media minimal users (those who spent <6h/day using social media) had an average sleep of 7.56 (SD = 0.88). The sleep-deficit that is known to affect cognition (Walker, 2017). The results indicated that sleep has a significant positive correlation with GPA (r = 0.54, p<0.05) supporting the implication that one of the mediums mediated sleep towards GPA is sleep itself.

These relationships are influenced by the contextual factors in Pakistan. Academic stresses were higher among students who had been in a higher education system where there was not much individual help.

There are two sides to social media: when it provides a way to relax and have fun or to connect with others, it can lessen how stressed a person feels, but, on the other hand, when it takes away from sleep time or study time it can increase the stress. As with the behaviour addiction framework, in the qualitative interview, participants were mindful of the negative of the academic aspects, but were still heavily, as they knew there was something wrong with their behaviour, but were unable to control it. The platform TikTok's characteristics, the optimization for engagement in its design, is the reason TikTok grew to be the most problematic platform. Algorithmic personalisation, infinite scroll and variable rewards, such as likes, shares and comments, are just some of the potential compulsion mechanisms (Chen et al., 2020). Typically the short form video suggests that it does not require much of their time to view the video, but if they've viewed a huge amount of them, they may have a surprise when told just how much time they've wasted watching a lot of short videos.

7. Implications for Institutional Practice

7.1 Institutional Digital Wellness Programs

Schools implement a comprehensive digital wellness programming for students throughout the college, using digital wellness in relationships as part of an overall program. Courses should include: (1) sleep hygiene and protection of the circadian rhythm, (2) the social media mechanism of attachment and social media design features, (3) how to manage attention and how to focus, (4) emotional regulation as an alternative to social media use and (5) social media academic integrity expectations. Programs should be evidence based, facilitated by trained facilitators (counsellor/faculty) and should be a part of the students orientation programs.

7.2 Classroom and Assessment Practices

Classroom technologies that can distract from the class will not be used in ways that distract from practices that are known to support students' attention in the classroom. Evidence based approaches include: making some clear guidelines about the use of the device (phones off during class, off during small group activities); having more in-class active learning, where there is more cognitive involvement; having more frequent breaks as intentional technology-free moments; having an assessment that emphasizes in-class work and lessens the incentive to procrastinate at home. With the introduction of the Assessment redesign, which includes a range of assessment techniques (oral exam, presentation, problem solving within a classroom environment) it becomes less easy for students to put off doing the work.

7.3 Family and Parental Involvement

The family is an important partner for all institutions to promote healthy practices with technology. Parent workshop to link back to mechanisms of social media addiction, impacts on sleep in regards to school performance and wellbeing that should help young people to become digital healthy. Parent involvement is a high leveraged point of intervention for behaviour and outcome because of its strong association with them in the Pakistan context.

8. Recommendations for Policymakers and Institutional Leaders

HEC should establish national 'Digital wellness' standards based on minimum expectations what a student should be able to do when he/she is 'Digitally literate' and what can be done to counsel students in their institutions and how HE staff can be professionally developed to support students digital wellness in general.

They should be required throughout the institution, on a semi-monthly basis or more, as Digital Wellness seminars (2 hrs or more per month): Sleep hygiene, successful addiction mechanisms, successful attention management and expectation for academic integrity. Content should be evidence based, and should provide trained facilitators.

Presented suggestions include: Colleges are encouraged to adopt and/or enhance their current counselling programme of problems involving technology particularly training of counsellor in conducting evaluation and counselling intervention for technology addictions.

Prof. development for teachers on how to use technologies when teaching to support pupil's attention, rethinking assessment and active learning through the use of technologies.

Institutions need to use evidence-based assessment measures and make sure that these measures do not negatively affect students' attitudes toward late night socializing via social media – such as class assessment, presentation assessment; however, assignment or heavily dependent on home assignment may have negative effects.

Academic integrity policies should be policies for Academic Institutions related to Artificial productivity using technology such as copy, paste, AI-Generation etc.

Encouraging institutions to work with families, engaging in parent orientation programs, workshops, regular communication with family and informing them about their expectations for student technology practice and institutional expectations.

9. Limitations and Conclusion

There are some limitations in the study: (1) the study is cross sectional in nature which negates drawing clear cut conclusions about the cause and effect; (2) expanding the themes with a modest qualitative sample of 24; (3) as the study was conducted on public colleges of Lahore, so the findings and conclusions might not be generalizable to other private and provincial colleges; (4) there is chances of recall bias for the use of social media and GPA which are self-reported; and (5) the study excluded some of the variables which might have influenced the use of social media and academic performance.

The results of the present research corroborates the finding that the relationship SMI and academic performance of College students in Pakistan is significant. Students' academic performance, sleep problem and inattention in the classroom, when it comes to using the social media, and especially TikTok, is quite low. These mechanisms involve a direct one in which the time of displacement is involved and indirect involving disruption of sleep. In this study context-specific evidence report from the unique education system of Pakistan in capturing the platform-specific trends and perspectives of Pakistani students with respect to social media-academic performance relationship when International literature reported the relationship between social media and academic performance.

Multi level intervention: individual student level by Digital literacy education & 'wellness' education, classroom level by redesigning pedagogy and assessment supporting attention, family level with parental involvement, institutional level with counselling services and policies and national level policy making by HEC, establishing national standards. In terms of intervention and usage of technology overall, there is a good level of coordination at a number of levels, but not enough single interventions.

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