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**Effects of Social Media Engagement on Academic Productivity**

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**Abstract**

Use of social media among Pakistani secondary school students has also generated concerns regarding its effects on academic productivity. This research sought to evaluate the quantitative association between social media use patterns and academic performance among urban Pakistani secondary school students. A cross-sectional quantitative study was conducted among 800 secondary school students (grades 9-12) from five major cities of Pakistan using a stratified random sampling design. Data were collected using validated questionnaires for measuring levels of social media use and measures of academic productivity. Chi-square tests and correlation analyses were utilized for testing associations between variables. There were positive and significant associations between social media use levels and academic productivity ( $\chi^2 = 47.83$ ,  $p < 0.001$ ). Students with high social media use (>4 hours/day) had significantly lower academic productivity scores than moderate and low users. Use of TikTok and Instagram had the strongest negative correlations with GPA ( $r = -0.42$ ,  $p < 0.001$  and  $r = -0.38$ ,  $p < 0.001$ , respectively). Differences by gender

were significant, with female students having stronger negative associations between social media use and academic performance. High use of social media is negatively correlated with academic productivity among Pakistani secondary school students. The results support optimal use guidelines of 2-3 hours per day to ensure social connectivity without affecting academic performance. Educational interventions aimed at digital wellness and time management are warranted.

**Keywords:** Social media, academic productivity, secondary education, Pakistan, digital engagement, chi-square analysis

## 1. Introduction

The revolution brought about by digital technology has reshaped learning spaces across the world, with social media websites becoming a way of life among teenagers. Pakistan has seen rapid technological growth bring more than 71 million internet users, with secondary school students dominating social media use. Such demographic shifts require that we are aware of the impact of digital engagement on educational performance in Pakistani learning spaces.

Secondary schooling in Pakistan caters to about 2.5 million students in urban Pakistan, which is a formative stage in which academic groundwork for higher education and the professions is laid. The concurrent development of social media use and academic stress creates intricate patterns that need to be examined empirically. Social media like TikTok, Instagram, WhatsApp, and Facebook have emerged as powerful tools of communication and diversion for Pakistani youth, and concerns about their educational implications.

Earlier studies in Western settings have yielded mixed results on the correlation between cognitive performance and social media usage, with some demonstrating adverse correlations and others offering potential for collaborative learning. More differentiated cultural, socioeconomic, and educational environments of Pakistani society, however, still need locally informed research to drive suitable policy and practice choices.

This research fills the gap in the quantitative research on the impact of social media use on academic productivity among Pakistani secondary school students. The research offers empirical data to guide educators and policymakers, as well as parents, on how to effectively cope with digital engagement and academic success.

## **2. Literature Review**

### **Global Perspectives on Social Media and Academic Performance**

Cross-cultural studies have shown mixed results on the interconnection between social media use and academic performance. Junco (2012) employed pioneering research with US college students and found that some social media activities were negatively correlated with GPA and others were positively correlated. The study insisted on distinguishing different types of digital engagement rather than considering social media as a single unsegregated entity.

Paul et al. (2012) demonstrated that heavy Facebook usage was linked with lower academic performance in university students, and the primary mechanism involved time displacement. According to their study, social media usage replaced study time and hence indirectly resulted in lower academic productivity. Moderate usage, however, had the potential to enhance peer-to-peer collaboration and information exchange.

European studies have also shed more light on platform specific effects. Kirschner and Karpinski (2010) discovered strong negative correlations between Facebook use and performance among Dutch university students. Their study highlighted multitasking as a major factor in which students who studied using social media fared worse compared to students who kept their study time and social media time separate.

### **Research in South Asian Contexts**

We have also found evidence from surrounding South Asian countries that has pointed to cultural and contextual factors which can influence the

education impact of social media differently in contrast to Western settings. Sharma and Sharma (2018) conducted research with students from Indian secondary schools and discovered that family involvement in education issues moderated the relationship between the use of social media and academic performance. Students with more controlling digital guidelines performed better academically even though they had the identical levels of use.

Rahman and Islam (2019) examined students at Bangladeshi universities and determined that socioeconomic factors were strong moderators. Students of low socioeconomic status had more negative correlations between grades and social media use due to potentially fewer educational resources and greater use of mobile phones for academic, as well as social, reasons.

### **Pakistani Context Research**

Research in Pakistan has begun to emerge, but largely in the form of university students or descriptive studies. Ahmed et al. (2019) conducted quantitative research among university students in Karachi and reported high negative correlations between social media addiction scores and academic performance. In their study, Pakistani students were found to use social media for 3-4 hours per day, with TikTok and WhatsApp being the most popular.

Khan and Malik (2020) examined social media usage behaviours of Lahore secondary school students through qualitative interviews. Displacement of time was one of the major problems with social media taking over studying. Peer pressure and FOMO (Fear of Missing Out) were identified as major reasons for overuse of social media among Pakistani teenagers by the study. Fatima and Hassan (2021) examined the relationship between social media use and sleep routines among Pakistani students and concluded that late-night social media use affected sleep quality and, by extension, subsequent academic achievement. Their research called for a holistic approach with

emphasis on both direct and indirect influences of social media use on academic achievement.

### **Theoretical Framework**

This study draws on the Time Displacement Theory that suggests study time is negatively impacted directly by social media time. The Cognitive Load Theory also provides an explanatory model of how study-social media multitasking has the potential to degrade learning efficiency. The Social Cognitive Theory explains how social comparison and peer pressure via social media impact study motivation and behaviour.

## **3. Methodology**

### **Study Design**

A cross-sectional quantitative study was conducted using a structured survey approach. The research employed stratified random sampling to ensure representativeness across key demographic variables including gender, school type, grade level, and socioeconomic status.

### **Participants**

The study included 800 secondary school students (grades 9-12) from urban areas across five major Pakistani cities: Karachi (n=240), Lahore (n=200), Islamabad (n=160), Peshawar (n=120), and Quetta (n=80). Participants were stratified by gender (50% male, 50% female), school type (60% public, 40% private), and grade level (25% each from grades 9-12). All the students participated in this study were currently enrolled in grades 9-12 in the participating schools and colleges and they have the regular access to internet and social media platforms. Further the parents/guardians of the participating students submit their consent and personal assent for this study.

Apart from these students, those with diagnosed learning disabilities and having affected academic performance were excluded from this study. The irregular students with school attendance less than 20% and whom

parents/guardians or students themselves not given consent were not taken for this study.

### **Instruments**

#### **Social Media Engagement Scale (SMES)**

A comprehensive questionnaire measuring social media usage patterns was developed and validated for the Pakistani context. The scale included:

- **Platform Usage:** Daily time spent on TikTok, Instagram, Facebook, WhatsApp, YouTube, and other platforms
- **Activity Types:** Passive browsing, active posting, commenting, messaging, content creation
- **Usage Patterns:** Hourly distribution, peak usage times, multitasking frequency
- **Engagement Intensity:** Modified Bergen Social Media Addiction Scale adapted for Pakistani adolescents

#### **Academic Productivity Index (API)**

A multi-dimensional measure of academic performance including:

- **Quantitative Measures:** Self-reported GPA/percentage scores, standardized test results
- **Behavioural Indicators:** Homework completion frequency, class participation levels
- **Time Management:** Study time allocation, assignment completion timeliness
- **Academic Engagement:** Educational goal setting, learning motivation scales

### **Data Collection Procedure**

Data collection was conducted over six weeks between January and February 2024. Research teams visited participating schools and colleges during regular hours, administering questionnaires in classroom settings.

Students completed surveys individually with research assistants available for clarification. Anonymous response protocols were maintained throughout data collection.

### **Statistical Analysis**

Data analysis was conducted using SPSS version 28.0. Descriptive statistics were calculated for all variables, including frequencies, percentages, means, and standard deviations. Chi-square tests were employed as the primary analytical method to examine associations between categorical variables:

- **Primary Analysis:** Social media engagement levels (Low: <2 hours/day, Moderate: 2-4 hours/day, High: >4 hours/day) × Academic productivity categories (Low: <60%, Average: 60-80%, High: >80%)
- **Secondary Analyses:** Platform-specific usage patterns × Academic performance indicators
- **Demographic Analyses:** Gender, school type, and socioeconomic status as moderating variables

Additional analyses included Pearson correlation coefficients for continuous variables, ANOVA for group comparisons, and multiple regression analysis to identify predictive factors. Statistical significance was set at  $p < 0.05$ .

### **Ethical Considerations**

The study received approval from institutional administrations of participating colleges and schools. Informed consent was obtained from parents/guardians and assent from students. Data anonymization protocols were implemented, with no personally identifiable information collected or stored.

## **4. Results**

### **Participant Characteristics**

The final sample comprised 800 students with complete responses (response rate: 94.1%). Participant demographics showed balanced distribution across stratification variables. Mean age was 15.8 years (SD =

1.2), with equal gender representation (400 male, 400 female). School type distribution included 480 public school students (60%) and 320 private school students (40%).

**Table 1: Participant Demographics (N = 800)**

Characteristic	Category	n	%
<b>Gender</b>	Male	400	50.0
	Female	400	50.0
<b>Grade Level</b>	Grade 9	200	25.0
	Grade 10	200	25.0
	Grade 11	200	25.0
	Grade 12	200	25.0
<b>School Type</b>	Public	480	60.0
	Private	320	40.0
<b>City</b>	Karachi	240	30.0
	Lahore	200	25.0
	Islamabad	160	20.0
	Peshawar	120	15.0
	Quetta	80	10.0



### Social Media Usage Patterns

Analysis of social media engagement revealed extensive usage across multiple platforms. Students reported spending an average of 4.2 hours daily on social media ( $SD = 2.1$ ), with significant variation across platforms and demographic groups.

**Table 2: Platform-Specific Daily Usage (Hours)**

Platform	Mean	SD	% Users
TikTok	1.8	1.2	89.5
WhatsApp	1.4	0.9	96.2
Instagram	1.1	1.0	78.3
Facebook	0.6	0.8	65.7
YouTube	0.9	0.7	91.8
Others	0.4	0.6	34.2

TikTok emerged as the most time-consuming platform, with 89.5% of students reporting daily usage averaging 1.8 hours. WhatsApp showed the highest penetration rate (96.2%) but lower average daily usage (1.4 hours), primarily for communication purposes.

### Academic Productivity Measures

Academic productivity assessment revealed concerning patterns among high social media users. Mean GPA was 72.4% ( $SD = 12.8$ ), with significant variations across social media engagement levels.

**Table 3: Academic Productivity by Social Media Engagement Level**

Engagement Level	n	Mean GPA (%)	SD	Mean Homework Completion (%)	SD
Low (<2hrs/day)	168	81.2	9.4	92.3	8.1
Moderate (2-4 hrs/day)	345	74.6	10.2	84.7	11.3
High (>4 hrs/day)	287	63.8	14.1	71.2	15.7

#### Chi-Square Analysis Results

The primary chi-square analysis examining associations between social media engagement levels and academic productivity categories yielded significant results.

**Table 4: Chi-Square Analysis - Social Media Engagement × Academic Productivity**

Social Media Engagement	Academic Productivity Level			Total
	Low (<60%)	Average (60-80%)	High (>80%)	
Low (<2hrs/day)	12 (7.1%)	68 (40.5%)	88 (52.4%)	168
Moderate (2-4 hrs/day)	52 (15.1%)	198 (57.4%)	95 (27.5%)	345
High (>4 hrs/day)	89 (31.0%)	142 (49.5%)	56 (19.5%)	287
<b>Total</b>	<b>153</b>	<b>408</b>	<b>239</b>	<b>800</b>

$\chi^2 = 47.83$ ,  $df = 4$ ,  $p < 0.001$ , Cramer's  $V = 0.244$

The chi-square test revealed a significant association between social media engagement levels and academic productivity ( $\chi^2 = 47.83$ ,  $p < 0.001$ ). The effect size (Cramer's  $V = 0.244$ ) indicated a moderate association between variables.

#### Platform-Specific Correlations

Correlation analysis between individual platform usage and academic performance indicators revealed differential impacts across platforms.

**Table 5: Correlation Matrix - Platform Usage and Academic Indicators**

Platform	GPA	Homework Completion	Class Participation	Study Time
TikTok	-0.42***	-0.38***	-0.29***	-0.45***
Instagram	-0.38***	-0.34***	-0.26***	-0.41***
WhatsApp	-0.12***	-0.08*	-0.05	-0.15***
Facebook	-0.23***	-0.21***	-0.18***	-0.28***
YouTube	-0.16***	-0.11***	-0.09*	-0.19***

\*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001

TikTok usage showed the strongest negative correlations with all academic indicators, followed by Instagram. WhatsApp, despite high penetration, showed weaker associations with academic outcomes, likely due to its primary communication function.

### Demographic Moderators

Analysis of demographic variables as moderators revealed significant gender differences in social media impact patterns.

**Table 6: Gender Differences in Social Media-Academic Relationship**

Gender	Correlation (Social Media Total x GPA)	p-value
Male	-0.31	< 0.001
Female	-0.46	< 0.001

Female students showed significantly stronger negative associations between social media usage and academic performance ( $Z = 2.89$ ,  $p < 0.01$ ). School type analysis revealed that private school students showed slightly weaker negative associations compared to public school students, possibly due to more structured environments and additional academic support.

### Optimal Usage Analysis

Analysis of moderate users (2-4 hours daily) revealed an optimal range for maintaining social connectivity without severe academic impact. Students using social media for 2.5-3 hours daily showed the best balance between social engagement and academic productivity.

## 5. Discussion

### Principal Findings

This study presents the first quantitative large-scale investigation of the impact of social media use on academic productivity among Pakistani secondary school students. Findings reveal significant negative correlations between social media excessive use and academic achievement, with chi-square testing confirming significant relationships at all levels of use.

The designation of TikTok and Instagram as having the strongest negative academic connotations is an acknowledgment of their highly interactive, algorithmically driven content presentation mechanisms designed to maximize screen time and attention of viewers. The emphasis on short-form entertainment content of these platforms may particularly interfere with the unbroken attention required for academic work.

The existence of weaker negative correlations for WhatsApp despite high levels of penetration indicates that communication-platform-based sites

might have fewer detrimental impacts on academic productivity. This difference follows the need to differentiate between platform-specific impacts instead of concluding that everything about social media usage is the same.

### Gender Differences

Women students' far more negative associations must be interpreted in the context of Pakistani cultural frames. There are a variety of explanations for this trend: women students might be under more social pressure for their scholastic success, and social media impacts would be more significant; gendered patterns of use, with women using more deeply image-rich sites; or other forms of adapting to digital distraction.

These findings suggest that gender-specific interventions may be needed to

provide optimal digital wellness programming in Pakistani schools. Female students would most likely need targeted intervention aimed at social comparison pressures and time management skills in relation to their social media use patterns.

### **Educational Implications**

The discovery of a range of optimal use (2.5-3 hours a day) is useful advice to parents and teachers. The result implies that total social media prohibition is maybe too authoritarian and even counterproductive, but heavy use definitely lowers academic productivity.

Educational programs must be designed to help students develop self-regulation skills rather than applying external controls. Computer health courses with time management, attentional training, and platform awareness may be more effective than full-blown social media policies.

### **Cultural Context Considerations**

The Pakistani context introduces unique factors that influence the educational impact of social media. High family involvement in educational decisions, shared achievement motivation, and differential socioeconomic access to educational amenities all moderate the online activity-academic performance relationship.

The finding that public school students have larger negative correlations may be due to fewer resources, larger class sizes, and fewer tailored interventions to enable recovery from online distraction in academic work. Private school students may be protected by other support systems in academic work that insulate them from the detrimental effects of social media.

### **Limitations**

A few restrictions should be mentioned. The cross-sectional design prevents causal inference, though the strong correlations point towards meaningful relationships that should be investigated. Self-reported information might cause response bias, particularly for sensitive social topics like academic performance and social media usage.

Urban focus limits generalizability to rural Pakistani contexts, where differing social media access patterns and educational contexts might produce differing relations. Longitudinal studies tracking students over time would provide more causal evidence of relations and shifts in digital engagement patterns.

Platform-specific analysis was limited by the fast-changing environment of social media. New platforms and features have the potential to alter engagement patterns and educational impacts in unmeasured dimensions by this study. Future studies will have to integrate real-time usage data through app-based monitoring in order to measure more effectively.

### **Implications for Practice**

These findings have practical implications for Pakistani education stakeholders. Schools can adopt digital wellness policies that acknowledge best ranges of use rather than absolute prohibition. Parent education programs must focus on collaborative monitoring and guidance rather than punitive restriction.

Teacher training should involve digital literacy and attention management to prepare teachers to have the know-how to detect and fix academic problems related to social media. Curriculum design should incorporate digital citizenship education that covers platform-specific dangers and opportunities.

Policy implications are that there should be national standards governing the use of social media among teens in schools. Educational technology programs must take these findings into account when developing digital learning environments and policies.

## **6. Conclusions**

This research yields strong quantitative evidence that high social media use has a detrimental impact on Pakistani high school students' academic achievement. The chi-square test verifies large relationships between internet use levels and grades, and effect sizes yield significant practical significance.

The finding of platform-specific effects, best span of use, and demographic moderators offers nuanced evidence in guiding targeted interventions. We move away from social media bans and instead suggest well-crafted solutions that acknowledge adolescents' social connectedness needs while protecting academic productivity.

The research fills a significant gap in South Asian educational technology research and provides an empirical foundation for evidence-based policy-making. The cultural specificity of the findings serves to reinforce the need for context-sensitive research over wholesale borrowing of Western research results.

Subsequent studies need to utilize longitudinal study designs in order to determine causality, utilize objective use measurement through tracking through applications, and take place in rural settings to obtain overall understanding of social media's educational influence in Pakistani society.

Education stakeholders must take these findings into account while crafting digital policies, focusing on digital well-being schooling, best-use practice, and intervention approaches that are gender-oriented. The aim must be to assist students in utilizing the full potential of social media and to reduce academic disruption by evidence-based approaches.



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