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Examining the Nexus between Smartphone Addiction, Academic Performance, and the Mediating Influence of Mental and Physical Health among Upper and Upper Middle Adolescents

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ABSTRACT

This study investigates the impact of smartphone addiction on academic performance among adolescents from upper and upper-middle-class backgrounds in Pakistan's major metropolitan areas. Previous research has measured the effect of mobile phone addiction on academic performance, but the specific impact on upper and middle-class adolescents has not been thoroughly explored. By examining the challenges linked to excessive smartphone use, the research highlights its detrimental effects on mental and physical health, which in turn impair academic success. Data was collected in Lahore and Faisalabad, with the cooperation of local schools and colleges, and necessary permissions were secured from school administrations. Using purposive sampling, 300 students were selected, yielding an 87% response rate. Both students and teachers provided data via a closed-ended questionnaire using a five-point Likert scale. The results reveal a negative correlation between smartphone addiction and academic performance. Additionally, smartphone addiction was found to deteriorate mental and physical health, further undermining academic outcomes. The study concludes with policy recommendations aimed at health and education policymakers, government officials, and school counseling committees, advocating measures to reduce excessive smartphone use among adolescents.

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INTRODUCTION

The rapid spread of smartphones has caused increasing concerns, with a growing body of evidence depicting that overwhelming use may contribute to sedentary behaviors (Nambirajan et al., 2025). The scientific literature widely acknowledges the existence of a reverse relationship between mental health (MH) issues and academic performance (AP), as indicated Agnafors et al. (2021). Concurrently, the escalation of MH concerns, particularly those associated with digital lifestyles like smartphone addiction (SPA) addiction, has emerged as a significant public health issue (Hu et al., 2021) and several studies have explored the strong associations between addictions to different smartphone applications and their co-occurrence (Lin et al., 2025). The ramifications of these challenges are projected to intensify, with MH issues, including depression, anticipated to rank among the primary causes of morbidity and mortality in adolescents (Zou et al., 2019).

The COVID-19 pandemic led to an increase in children's screen time (Descarpentry et al., 2024). Researchers attribute the surge in internalizing problems among adolescents to increased screen time, primarily spent in front of digital screens (Bäuerle et al., 2020; Mazza et al., 2020). Smartphones, considered indispensable worldwide, are particularly favored by students, as emphasized by Mahapatra (2019) and Lin et al. (2025). Despite the undeniable convenience and exclusive learning experiences facilitated by SPA, an alarming trend has emerged – students are dedicating unprecedented amounts of time to SPA due to the proliferation of features (Abbasi et al., 2021). This excessive reliance on SPA raises concerns about potential addiction, a sentiment echoed by various scholars; thus, Chen and Lyu (2024) highlight the adverse effects of students' extensive SPA on AP and learning activities. Smartphone overdependence is a maladaptive behavior marked by excessive and uncontrollable use of smartphones, even in the face of negative consequences (Cho & Kim, 2025). Thus, excessive reliance on SPA can lead to the development of addiction, wherein individuals lose control over their behavior despite facing detrimental consequences such as seeking pleasure, pain relief, and stress alleviation through SPA (Mahapatra, 2019). The rising pervasiveness of SPA has been related to adverse impacts on physical health (PH), i.e., sleep patterns and increased fatigue, as highlighted

by Holbein et al. (2019). Consequently, it becomes crucial to underscore the adverse effects of excessive SPA on the health of students, potentially influencing their AP, as indicated by Chen and Lyu (2024).

An exemplification of this phenomenon is demonstrated by Lee et al. (2018), who observed that an overreliance on SPA can divert students' attention in the classroom, diminishing their overall effort in educational pursuits. These findings underscore the intricate relationship between addicted SPA, attention distraction, and consequential effects on students' academic engagement and performance. Empirical studies further substantiate these claims, revealing that the adverse effects of phubbing contribute to feelings of negligence, suffering, and grief among parents and children. This, in turn, leads to inferior interactions, increased frequency of conflicts, and reduced relationship satisfaction, as evident in research by Kildare and Middlemiss (2017), McDaniel and Radesky (2018), and Liu et al. (2017).

According to Taylor (2023) the possession and availability of mobile devices on a global scale have become increasingly prevalent, and advancements in mobile technology have profoundly influenced digital communication, boasting a user base of 7 billion worldwide. By mid-2024, it was estimated that more than 96% of the global digital population accessed the internet via mobile devices. Notably, 80% of newly acquired mobile phones are attributed to developing countries. While in Pakistan mobile telecommunications sector has experienced significant annual growth; the figures escalated from approximately 0.31 million in 2000 to nearly 100 million by 2010. Subsequently, the trend persisted, culminating in a peak of around 188.7 million mobile subscriptions in 2021 (Kazi et al., 2021). In Pakistan, there is a rapid assimilation of new technologies, particularly the widespread adoption of mobile devices and engagement with social media (Tariq et al., 2018). The most vulnerable segment of addicted SPA is adolescents (Mohamed & Mostafa, 2020). Hence, it needs the immediate attention of researchers to examine the relationship between addicted SPA and AP in adolescents in Pakistan. Despite extensive research on mobile phone addiction and academic performance, there is a notable gap in studies addressing the impact of economic status on this relationship. Socioeconomic status significantly influences internet usage patterns, reflecting diverse needs and preferences among different social groups. Manufacturers also tailor devices for distinct market segments, ranging from affordable to high-end models (Rahmati et al., 2012). However, no research has specifically examined smartphone addiction among adolescents in the upper and upper middle class in Pakistan. This study aims to fill this gap by focusing on the underexplored segment of upper and upper middle-class adolescents, analyzing how their smartphone addiction impacts academic performance.

Health and educational policymakers should assess the scenario and contemplate implementing age-appropriate and necessity-driven interventions to encourage responsible SPA. Recognizing adolescents constitute the future citizens of any nation, health and school authorities must address this contemporary disorder in the new millennium (Sahu et al., 2019). Public awareness movements and social policy actions are essential to advocate for the creation of supportive school and home environments that encourage resilience among youth as they circumnavigate the experiments of adolescence in the contemporary world. Collaborative efforts between clinicians, youth, and their families are crucial. Clinicians should employ open-mindedness and proper methods to lessen possible harm related to SPA. This may involve educating the masses and practical strategies (Khalaf et al., 2023).

Research Questions

Based on the theoretical gap, the following research questions have been developed.

- RQ1: Is there a relationship between smartphone addiction and academic performance?
- RQ2: Does mental health serve as a mediator in the relationship between smartphone addiction and academic performance?
- RQ3: Does physical health act as a mediator in the relationship between smartphone addiction and academic performance?

Research Objectives

Based upon the research questions following hypothesis have been derived.

1. Examine the relationship between smartphone addiction and the academic performance of adolescents.
2. Investigate the mediating role of mental health between smartphone addiction and academic performance.
3. Explore the mediating role of physical health in the relationship between smartphone addiction and academic performance.

LITERATURE REVIEW

Social Cognitive Theory as Theoretical Background

This study focuses on investigating factors that predict Smart Phone Addiction (SPA) addiction in relation to Mental Health (MH), Physical Health (PH) and Academic Performance (AP) among adolescents, employing the social cognitive theory as the conceptual support for the study. Social cognitive theory (SCT), utilized as a theoretical model for analyzing media consumption behaviors (Bandura, 2001; LaRose and Eastin, 2004), was chosen as the basis for this study.

The theory suggests that learning happens within a social framework, involving an ongoing exchange between the individual, their surroundings, and their actions. SCT examines how individuals learn and sustain behavior in a distinct manner, considering the social context in which these behaviors occur, i.e., SPA behavior is related to social engagement. The study intends to contribute to the expansion of social cognitive theory within the context of SPA addiction and behavior consequences.

Smartphone Addiction and Academic Performance

Historically, scholars have traditionally examined the impacts of family settings and parents' nurturing style on AP in isolation. However, it is noteworthy that family environment and parenting style are closely intertwined. Furthermore, most studies have been limited to the analysis of a single city or school (Yang & Zhao, 2020), employing small sample sizes that may not offer representative conclusions. In addition to the conventional focus in literature, recent economic studies have explored parenting style differences between countries at a macro level (Doepke et al., 2019. These studies indicate a propensity for parents in countries with sophisticated economic inequality settings to assume strict parenting styles, while those in countries with poorer economic inequality lean towards permissive styles. An exploratory study addressed the correlation between the use of cell phones and AP, controlling for established predictors of academic success. Consequently, an increased use of cell phones was found to be associated with diminished AP (Lepp et al., 2014). Another study highlighted the adverse effects of unrestricted SPA, linking it to social problems, deficient social skill development, and the absence of guidelines to mitigate potential threats from excessive use, leading to mobile phone compulsion and following adverse impacts on AP (Abd Rashid et al., 2020).

In a Korean study on adolescents, a significant relationship was established between SPA for a long time and the occurrence of suicide attempts; notably, high SPA for process-related activities exhibited a robust connotation with adverse outcomes, while a reasonable SPA for social commitments demonstrated some protective effects against suicide attempts (Shinetsetseg et al., 2022). Additionally, a study investigating the interplay between cognitive health and academic achievement through several growth phases of children revealed an inverse association between cognitive health difficulties and AP (Agnafors et al., 2021). Additionally, a study conducted in China identified a significant association between mobile phone compulsion and school progress among youths from mediocre families. This relationship was found to be mediated by depression, with family functioning playing a moderating role in the association between mobile phone addiction and school performance (Bai et al., 2020). In summary, these diverse studies collectively contribute to a comprehensive understanding of AP across different domains, encompassing SPA family environment, parenting styles, deficient social skill development, and the absence of guidelines to mitigate potential threats from excessive use. Based on the evidence presented above, we formulate the hypothesis that:

H1: There is a negative relationship between smartphone addiction and academic performance.

H2: There is a negative relationship between smartphone addiction and mental health.

H3: There is a negative relationship between smartphone addiction and physical health.

H4: There is a positive relationship between mental health and academic performance.

H5: There is a positive relationship between physical health and academic performance.

The Mediating roles of Mental Health and Physical Health

The research revealed that problematic SPA by teenage students could detrimentally impact their cognitive health and related behavior, consequently influencing academic achievement and social relationships while diminishing the time allocated to physical activity and found that the combination of physical inactivity and problematic SPA appears to contribute to reduced stamina and rise symptoms of misery in teenage students (Pereira et al., 2020). Another study indicates that the widespread prevalence of problematic SPA holds public health significance, given its evident connections with alcohol consumption, specific MH conditions, i.e., anxiety and depression, and low AP. (Pereira et al., 2020).

Another study measuring problematic SPA, somatic symptoms, depression, worry, anxiety, and sleep quality identified that problematic SPA showed lengthier daily usage, more frequent interruptions to activities for smartphone checks, and higher scores across depression, tension, nervousness, sleep disorders, and somatic

symptoms compared to their unproblematic counterparts (Winkler et al., 2013). An additional study denotes a significant portion of the youth population is involved in widespread smartphone usage and multitasking on smartphones, leading to persistent sleep deficiency, which has hostile influences on cognitive control, AP, and socioemotional functioning. Thus, the findings from diverse cross-sectional, longitudinal, and empirical studies consistently link the use of smartphones and social media to an escalation in mental suffering, self-damaging behavior, and suicidal thoughts among the youth (Khalaf et al., 2023). Based on the given literature we hypothesize that:

H6: Mental health mediates the relationship between smartphone addiction and academic performance.

H7: Physical health mediates the relationship between smartphone addiction and academic performance.

Theoretical Framework

The relationship between the variables is presented in the form of a theoretical framework in Figure 1.

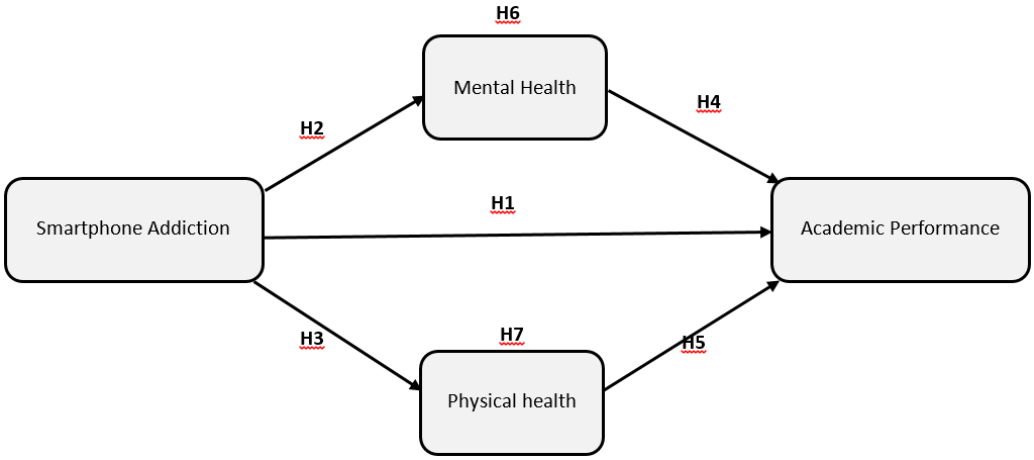

Figure 1: Theoretical Framework

RESEARCH METHODOLOGY

Utilizing existing literature and established theories, this research formulates theoretical connections among the variables under investigation. These proposed connections are then substantiated through the collection of data from participants. Hence, quantitative research methodology is considered suitable for this study (Saunders & Bezzina, 2015). Besides, since the objective of this study is to generalize its findings, deduction is favored as the primary approach (Saunders & Bezzina, 2015). An additional rationale for opting for the quantitative approach is the significant risk of non-returned survey questionnaires from certain participants. Conversely, qualitative investigations may face challenges in deriving meaningful insights from available data (Cooper & Schindler, 2014).

Statistical Method

The study employs structural equation modeling (SEM) employing the partial least squares (PLS) technique via SmartPLS 4.0, following the guiding principles presented by Ringle et al. (2015). The initial step involves assessing the reliability and validity of constructs, followed by examining the structural relationships among latent constructs. However, conducting significant tests within SmartPLS may present challenges when encountering significant deviations from normality (Hair et al., 2017). To address this issue, an evaluation of data normality is performed by analyzing skewness and kurtosis using the WebPower tool. The results indicate that skewness and kurtosis values fall within acceptable thresholds (+2) recommended by George (2011), suggesting adherence to acceptable distributional characteristics for all variables. Additionally, Mardia's skewness and kurtosis values, along with their significance levels below the predetermined threshold, confirm that the data do not adhere to multivariate normality assumptions. Based on these findings, SmartPLS is deemed suitable for data analysis.

Measures

The survey employed a questionnaire as a research tool for data collection; the reason for selecting a questionnaire for this study is an easy understanding of the respondents; closed-ended questions were adopted to investigate the respondents' answers. The questionnaire instrument is designed on a five-point Likert scale. The academic performance of adolescents was assessed using a 19-item Academic Performance Rating Scale (APRS) used by DuPaul et al. (1991) that was established to replicate teachers' observations of the academic performance of children. The smartphone addiction scale, which comprises 10 items, was adopted by Kwon et al., (2013). Mental Health was

assessed using a 7-item Generalized Anxiety Disorders Scale (Spitzer et al., 2006). Physical health was measured by adopting a 14-item scale developed by Schat et al. (2005).

Data Collection Procedure and Sampling Technique

The population for the study is smartphone users across the metro cities of Pakistan, including Lahore and Faisalabad. Smartphone users, adolescents between the ages of 13 and 18 years old (Allen et al., 2014), were approached. Upper-class and upper-middle-class smartphone-addicted adolescents residing in two metropolitan cities, namely Lahore and Faisalabad, were recruited through school visits, and data were gathered employing a five-point Likert scale. Additionally, teachers of these students were contacted to provide feedback on their academic performance using a similar five-point Likert scale. The selection criteria for adolescents with smartphone addiction focused on individuals spending more than 5 hours per day on their smartphones, employing a purposive sampling technique. Purposive sampling, endorsed by Palinkas et al., (2015), is recognized for its efficacy in identifying respondents likely to offer relevant insights, thus optimizing limited research resources. Prior to data collection, permission was sought from the school administration departments. Subsequently, the questionnaire was disseminated among the selected groups. Continuous communication was maintained with participants, encouraging them to raise any queries in the comments section to ensure clarity and comprehension. The follow-up strategy was refined iteratively to sustain participants' engagement and enhance response rates throughout the data collection process. For this research, the sample size, using the G-Power Calculator, is set at n=300, which aligns with Tabachnick (2007) recommendation that a sample size of 300 is adequate. This confirms the appropriateness of the chosen sample size for the study. However, the final number of responses received was 262 respondents, with an 87% response rate.

Missing Value Analysis

The Expectation-Maximization (E-M) technique was employed to tackle missing data. This approach involves two primary steps: the Maximization step (M-step) and the Expectation step (E-step), both aimed at estimating the missing values. During the E-step, the conditional expectation of the complete data log-likelihood is computed based on the observed data and the current parameter approximations. Subsequently, the M-step concentrates on maximizing the likelihood identified in the E-step to refine parameter estimates for the structural model. The process iterates repeatedly until convergence is attained.

Before proceeding with the analysis, the dataset underwent preparation in IBM SPSS 23.0, and standard procedures were executed to identify missing values. Following Cohen's (1992) recommendations, four surveys with missing values exceeding 10% were excluded from the final analysis to mitigate significant interpretational challenges. Since the remaining dataset contained less than 5% incomplete values, the E-M method was employed to impute and compute them. The remaining usable questionnaires were 258.

Common Method Variance

To alleviate CMV, a combination of procedural and statistical measures is employed. Procedural measures entail implementing safeguards within the questionnaire prior to data collection, while statistical methods such as Harman's single-factor analysis, as outlined by Podsakoff et al., (2003), are utilized to address this issue.

RESULTS

Technological resources are crucial in increasing vocabulary learning for English as a Foreign Language (EFL) at the elementary level. The combination of multimedia factors such as pictures, slides, audio clips, videos, and other activities provides an immersive learning experience aligned with the strategies adopted by students. Firstly, the Corpus significantly influences vocabulary learning by creating an engaging and technological environment for students to learn new lexical items. At the elementary level, learners develop their vocabulary skills by associating words with situations, leading to clearer comprehension. The Corpus was presented using multimedia resources in the form of slides. Students were exposed to the Corpus slides, and their vocabulary knowledge was assessed after exposure.

Measurement Model Evaluation

The assessment of the measurement model involved reporting descriptive statistics, including standard deviation (SD) and mean, along with correlations presented in Table 3. It is important to exercise caution when interpreting fit indices in Partial Least Squares Structural Equation Modeling (PLS-SEM) due to the ongoing exploration of critical threshold values for model fit (Hair et al., 2017). Consequently, the absence of model fit indices in some PLS-SEM studies has been noted (Henseler & Sarstedt, 2013). The factor loadings are between the threshold level which is shown in the Figure 2. Discriminant validity (DV), convergent validity (CV), and internal reliability were evaluated as part of the measurement model assessment. Composite reliability (CR) scores were computed to assess internal

reliability, as recommended to set a minimum threshold of 0.7 (Sarstedt et al., 2021). The obtained CR values for AP (0.915), MH (0.844), and PH (0.926) surpassed the threshold value, indicating satisfactory internal consistency for the constructs (Refer to Table 1).

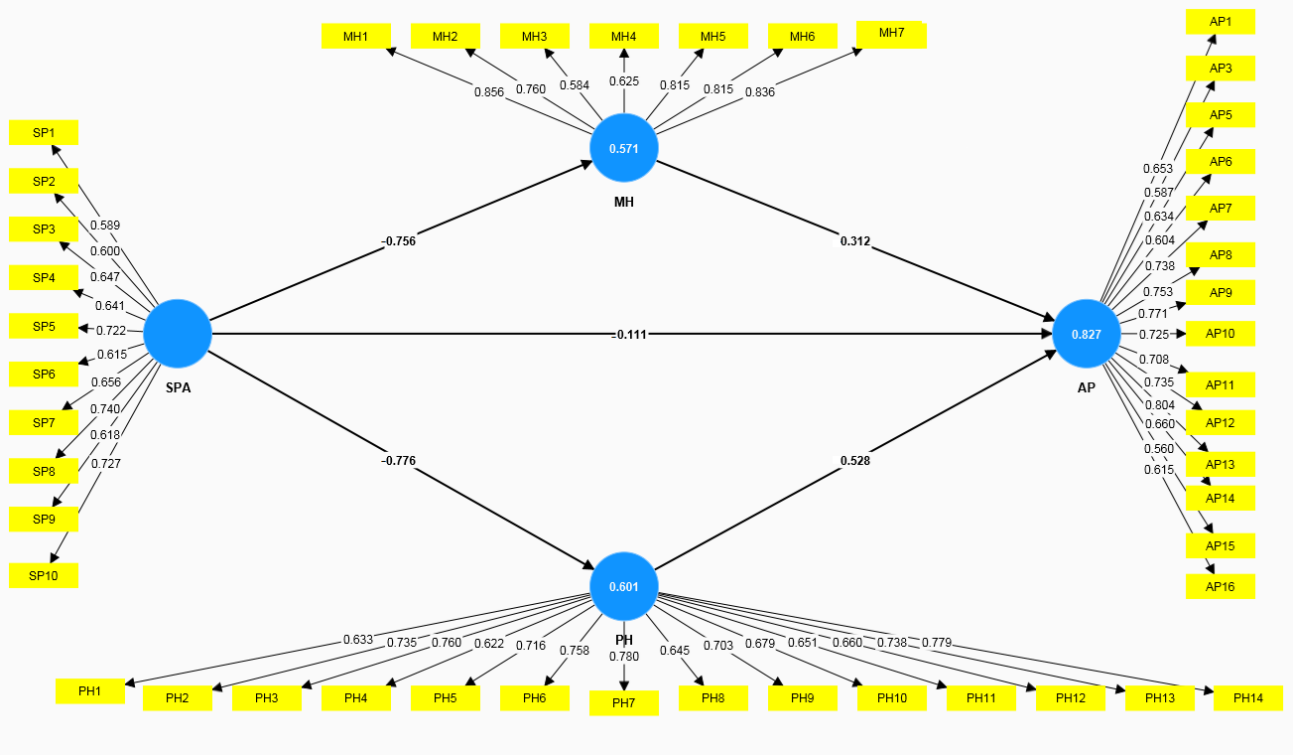

Figure 2: Measurement Model

Furthermore, conventional fit measures, which depend on residual covariance assumptions, are not suitable for application in PLS-SEM due to their estimation process. Nevertheless, this study presented a Standardized Root Mean Square Residual (SRMR) value of 0.10 as an indicator of model fit, also referred to by Henseler and Sarstedt (2013). Typically, an SRMR value up to 0.10, ideally lower, is thought to be indicative of a good fit, as described by Hu and Bentler (1999). Therefore, as it meets the threshold value, the model is deemed to exhibit a good fit.

Table 1: Indicator Reliability, Convergent Validity, Internal Consistency

Constructs	Loading	VIF	Cronbach's alpha	CRa	AVE
Academic Performance (AP)			0.912	0.915	0.471
AP1	0.653	2.237			
AP3	0.587	1.643			
AP5	0.634	2.238			
AP6	0.604	1.782			
AP7	0.738	3.367			
AP8	0.753	4.59			
AP9	0.771	4.826			
AP10	0.725	2.825			
AP11	0.708	2.471			
AP12	0.735	2.439			
AP13	0.804	3.39			
AP14	0.66	1.745			
AP15	0.56	1.893			
AP16	0.615	1.654			
Mental Health (MH)			0.875	0.844	0.581
MH1	0.856	3.576			
MH2	0.76	1.929			
MH3	0.584	1.466			
MH4	0.625	1.407			
MH5	0.815	4.8			
MH6	0.836	3.608			
MH7	0.815	4.594			
Physical Health (PH)			0.922	0.926	0.499
PH1	0.633	1.902			

PH2	0.735	2.4
PH3	0.76	4.764
PH4	0.622	4.135
PH5	0.716	3.047
PH6	0.758	2.961
PH7	0.78	4.885
PH8	0.645	4.788
PH9	0.703	2.748
PH10	0.679	2.712
PH11	0.651	2.245
PH12	0.66	1.85
PH13	0.738	2.787
PH14	0.779	3.627

Convergent Validity

Convergent validity was calculated by inspecting the outer loadings of the indicators representing constructs and the average variance extracted (AVE). Avkiran (2018) presented that outer loading values of 0.7 or higher are deemed acceptable, with an AVE of 0.5 indicating satisfactory convergent validity. Yet, values up to 0.6 are also acceptable (Marcoulides, 1998). According to Hair et al. (2017), loadings exceeding 0.50 are of practical significance and are deemed acceptable. Although items with outer loadings below 0.5 were considered for subsequent deletion, PH1, AP2, AP4, AP17, AP18, and AP19 were removed.

Variance Inflation Factor (VIF) values exceeding 10 typically indicate multicollinearity. However, all constructs within our model exhibited VIF values below 5.0, ranging from 1 to 3, signifying the absence of collinearity concerns. As all the values are below 5, there is no concern about collinearity.

The AVE resulting from composite reliability ideally exceeds 0.5. Yet, if the composite reliability (CR) exceeds 0.6, an AVE greater than 0.4 is deemed sufficient (Hair et al., 2017; Lam, 2012; Fornell & Larcker, 1981). Thus, all constructs met the recognized minimum threshold value of 0.4 for AVE (Avkiran, 2018) – namely AP (0.471), MH (0.581), PH (0.499), and SPA (0.432) – thereby endorsing the convergent validity of the variables (see Table 1).

Table 2: HTMT-Discriminant Validity

	AP	MH	PH	SPA
AP				
MH	0.89			
PH	0.86	0.888		
SPA	0.786	0.792	0.821	

After the Average Variance Extracted (AVE), discriminant validity is estimated via Heterotrait-Monotrait (HTMT) statistics. Recent scholarship indicates that Fornell and Larcker's (1981) approach may not adequately evaluate the dependent variable (DV) across diverse research contexts (Fatima & Siddiqui, 2020). In our investigation, both of these methodologies were applied to scrutinize the DV. Hair et al., (2017) noted that an HTMT value surpassing 0.9 suggests a whole resemblance among variables within a framework. Our analysis, delineated in Table 2, reveals a satisfactory DV value, specifically HTMT <0.9. In summary, our model affirms the appropriateness of the measurement model concerning internal reliability, convergent validity (CV), and the dependent variable, as illustrated in Table 1.

Structural Model Evaluation

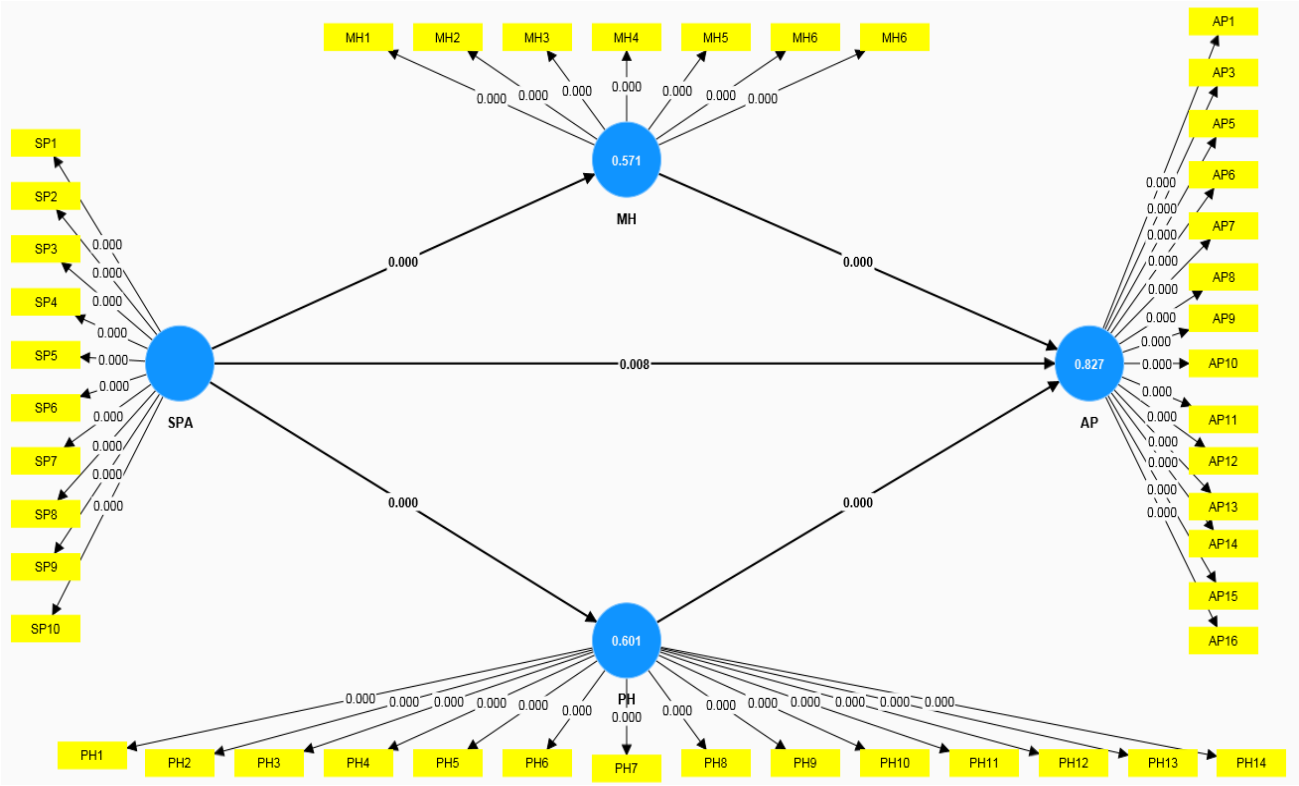

Figure 3: Structural Modeling

The significance of the proposed model as shown in Figure 3 was estimated using bootstrapping with 5,000 resamples, following the recommendation by Hair et al. (2017). The outcomes of hypothesis testing are delineated in Table 3. The research revealed a negative association between smartphone addiction and academic performance. (H1: $\beta = -0.110$, $p < 0.05$), thereby supporting hypothesis 1. This suggests that smartphone addiction is linked to lower academic performance among adolescents. Further, results show a negative correlation between smartphone addiction and MH of adolescents (H2: $\beta = -0.756$, $p < 0.05$), denoting that smartphone addiction leads to poor MH. Moreover, the findings also show a negative correlation between SPA and PH (H3: $\beta = -0.780$, $p < 0.05$), denoting that excessive smartphone use drives toward poor PH. Our findings show that there is a positive relationship between MH and AP (H4: $\beta = 0.0310$, $p < 0.05$), and there is a positive relationship between PH and AP (H5: $\beta = 0.530$, $p < 0.05$). Further, our findings show that MH mediates the relationship between SPA and AP (H6: $\beta = -0.236$, $p < 0.05$), and PH mediates the relationship between SPA and AP (H7: $\beta = -0.410$, $p < 0.05$). Thus, addiction to smartphone utilization emerges as a potential trigger for low academic performance among adolescents.

Table 3: Path Coefficients

Hypothesis	Paths	Beta value	Mean	Standard deviation	t-value	BLL	BUL	P values	Decision
H1	SPA -> AP	-0.11	0.111	0.042	2.674	-0.028	-0.192	0.008	Supported
H2	SPA -> MH	-0.76	0.759	0.018	41.719	-0.722	-0.793	0	Supported
H3	SPA -> PH	-0.78	0.778	0.022	35.667	-0.732	-0.817	0	Supported
H4	MH -> AP	0.31	0.312	0.06	5.156	0.193	0.432	0	Supported
H5	PH -> AP	0.53	0.528	0.07	7.557	0.39	0.665	0	Supported
H6	SPA -> MH -> AP	-0.236	0.237	0.046	5.085	-0.146	-0.329	0	Supported
H7	SPA -> PH -> AP	-0.41	0.411	0.057	7.135	-0.299	-0.525	0	Supported

DISCUSSION

This study intends to investigate the impact of SPA on the AP of adolescents from upper and upper-middle-class backgrounds in metropolitan areas of Pakistan. Drawing on social cognitive theory (Ewen, 2014), all hypotheses proposed in this study received support. The findings suggest that excessive smartphone use leads adolescents to suffer from poor mental and physical health, ultimately contributing to low academic performance. Given that adolescents are the most susceptible group to smartphone addiction (Mohamed & Mostafa, 2020), overreliance on smartphones can divert students' attention in classrooms, thereby diminishing their overall academic effort. Consequently, adolescents may achieve lower grades due to mental health disorders and physical health issues

resulting from uncontrolled smartphone usage. The study concludes by discussing theoretical as well as practical implications.

CONCLUSION

This research work focuses on building vocabulary at the elementary level. Having a good vocabulary is essential for students at the elementary level. It helps them express their thoughts and ideas more clearly and enables them to understand the complex context of words during reading. Due to a lack of vocabulary knowledge, students could not express their ideas, but the Corpus of Storybooks is an ideal approach to fill this gap. This study provides an effective method for learning and teaching language. Frequent exposure of students to vocabulary by the communicative approach greatly influences acquisition. Multimedia resources and the Corpus also serve as crucial tools to increase vocabulary at students' developmental stages.

Theoretical Implications

This study offers novel insights into the relationship between SPA and AP. Firstly, it sheds light on how rapid technological assimilation and widespread mobile device adoption, particularly among adolescents in Pakistan, contribute to smartphone addiction (Tariq et al., 2018; Mohamed & Mostafa, 2020). Additionally, the study highlights the significant influence of socioeconomic status on internet usage patterns, which in turn affects the academic performance of adolescents (Rahmati et al., 2012; Abd Rashid et al., 2020). Furthermore, it provides evidence of the positive relationship between MH and AP, a relationship supported by existing literature (Agnafors et al., 2021). Similarly, the study reveals insights into the positive association between PH and AP among adolescents, aligning with previous research findings (Winkler et al., 2013).

Practical Implications

The verdicts of this study propose practical insights for health and educational policymakers. It underscores the importance of assessing the prevalence of smartphone addiction among adolescents and implementing age-appropriate interventions to promote responsible smartphone usage. Given that adolescents are the future citizens of any nation, it is imperative for policymakers to address this contemporary issue from a health and education perspective (Sahu et al., 2019)

. Public awareness campaigns and policy initiatives are crucial for creating supportive environments in schools and homes that foster resilience among adolescents as they navigate the challenges of adolescence in the digital age. Furthermore, collaborative efforts between clinicians, youth, and their families are essential in mitigating the potential harms associated with smartphone addiction through education and practical strategies (Yang & Zhao, 2020).

Limitations and Future Research

Notwithstanding its valuable contributions, this study exhibits certain limitations. Data collection was confined to adolescents aged 13-18 years in Lahore and Faisalabad. Consequently, there is a possibility that the findings may be limited in their general applicability. Subsequent research endeavors could enhance the breadth of the study by encompassing additional metropolitan areas in Pakistan and extending the age range, thereby augmenting the generalizability of the outcomes. Additionally, while this study went through a quantitative approach via closed questionnaires, future research could utilize qualitative methods such as focus group discussions to delve deeper into the factors influencing adolescents' academic performance. Furthermore, future studies may explore behavioral variables, such as self-esteem, to better understand the relationship between smartphone addiction, mental health, and academic performance.

CONCLUSION

In summary, this research investigated the correlation between smartphone addiction and academic achievement in adolescents, along with the potential mediation of mental and physical health in this connection. The results indicate that adolescents who engage excessively with smartphones may face heightened vulnerability to mental health issues, diminished physical well-being, and, consequently, reduced academic performance.

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