

The Impact of Digital Screen Time and Social Media Marketing Exposure on Students' Academic Performance

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ABSTRACT:

With the growing presence of digital technologies and social networking sites, the learning context for students has been dramatically changed, which offers opportunities and challenges to learning outcomes. The aim of this study is to examine the mediating role of cognitive load and moderating role of self-regulated learning in the relation between non-academic social media usage and social media marketing exposure with academic performance among university students. The study is rooted in the theory of Social Cognitive Theory, Technology Acceptance perspectives and Self-Regulated Learning Theory and proposes an integrated framework which explains the influence of digitally induced distraction on scholastic achievement. The research design adopted was quantitative and survey method was used in collecting data from 321 university students who were asked to fill a structured questionnaire. To assess the hypothesized relationships and mediation and moderation effects, the Structural Equation Modeling (SEM) was used which was implemented by SPSS AMOS. The results indicate that using non-academic social media and exposure to social media marketing has a significant impact on cognitive load, and therefore on academic achievement. The mediation analysis results showed a partial mediation of the relationship between digital engagement and academic outcomes. Moreover, there was a significant moderating effect of SRL, such that students with high SRL skills were more successful in reducing the negative impact of excessive digital exposure. Measurement and structural models had good reliability, convergent validity, discriminant

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validity, and overall model fit indices. The findings from this study lend to the growing body of literature regarding digital distraction and academic performance by emphasizing that how and when technology is used, not necessarily screen time, and is an important variable in academic success. The results have implications for educators, policy makers and educational institutions that would like to encourage balanced digital engagement and effective self-regulation strategies for students in increasingly technologized learning environments.

Keywords: Social Media Usage, Cognitive Load, Academic Performance, Self-Regulated Learning, Structural Equation Modeling (SEM).

1. Introduction

The COVID-19 pandemic has sparked a digital explosion in the way students learn, interact, and adopt social media, shifting the classroom environment and bringing social media and digital interaction into the picture in complex ways that impact student learning (Giunchiglia et al., 2018; Ozer, 2014). Although these platforms provide new possibilities for collaborative and resource sharing with peers, they also pose a great chance to have significant cognitive distractions which obviate traditional learning outcomes (Junaid & Faizan, 2022; Valappil, 2026). In addition, the addictive nature of social media can also contribute to consuming only non-academic content material that can take away crucial time for studying, thereby worsening procrastination (Chowdhury, 2024; Nadelson et al., 2017). The challenge is exacerbated by the fact that marketing algorithms on these platforms target users, rather than just displacing time, and that they continuously draw attention to personalized but non-educational stimuli (Flicker et al., 1990; Valappil, 2026). This effect should be studied in an empirical way to identify if the kind of screen usage (not the time of use) is what makes a difference in academic achievement or failure (Alpati et al.). This research uses analytical tools such as Markov chains and attempts to measure the distinct effect of these addictive digital feedback loops on the cumulative academic performance. Furthermore, the study will assess the impact of certain socio-economic and

demographic factors on the susceptibility of students to these digital distractions (Aljomaa et al., 2016). The analysis is done on the basis of quantitative usage statistics and qualitative student experiences, identifying the smartphone use when it starts to be undertaken so frequently that it becomes problematic, as a situation of smartphone addiction (Kutluay & Karaca, 2024). In order to design this pedagogical intervention that will accommodate the positive use of technology in today's education without the digital interference, it is necessary to have a certain understanding of these behavioural traits (Fichtelius, 1953). To this end, the research in this study is carried out using the method of mixed methods which will examine the relation of the exposure level of social media with objective assessment of academic achievement (Grover, 2025; Paul & Paul, 2024). This is also a question: Is algorithmic content curation an active disruptor of academic focus related cognitive processes (Shree et al., 2025)? Moreover, the study delves into the prevalence of platform-specific ads, their impact on attention spans, and if they are contributing to a decline in information retention and cognitive engagement (Bhavana et al., 2025; Grover, 2025). Bad behaviors that are required as a response when asking a question may be more socially unacceptable than acceptable, and they may exacerbate the disruptions as they interfere with the intellectual practice needed for academic learning (Bandaru et al., 2020; Jiang et al., 2024). The study is based on this, it is designed to

include the Stressor-Strain-Outcome framework to explore the relationship between compulsive social media use as an antecedent of academic strain (Rani et al., 2022). This paradigm also highlights the role of psychological mediators (e.g., anxiety, sleep problems) between the amount of use and lower GPA (Khatiwada, 2025). Furthermore, in the digital world in which students live, it is still unclear whether the level of academic reading in textbooks is a protective factor or a victim of the digital environment (Bukhori et al., 2019). Moreover, the cognitive fatigue caused by constant notifications and algorithmic feedback from marketing becomes significant in terms of their impact on the ability to engage in high-level academic performance (Nabung, 2024), (Bandaru et al., 2020). Empirical evidence suggested that there was a connection between high screen time, emotion dysregulations and psychological distress, two well-documented factors related to significant academic challenges (Pera, 2020). The attention dysregulation has been found to be an important predictor of problematic SBM, where it often acts as a mediator between purposeful academic research and unintentional and habitual consumption of SBM (Arness & Ollis, 2022). Moreover, the social media fatigue syndrome due to high-intensity usage and frequent online social comparison has been named as one of the important factors contributing to this measurable reduction in academic effectiveness (Malik et al. 2020). Moreover, the algorithmically generated content in the system only further drives people into further attention fragmentation, compelling students to compulsorily check, and preventing students from focusing on a single topic for in-depth analysis. The constant mental and cognitive workload can result in a situation where students are feeling overwhelmed and exhausted, and are thinking more about coping with digital overload than on their studies (Yu et al., 2019; Zhuang et al., 2023). In this case, it has been found that self-control is a crucial factor in this interaction, with a negative relationship between self-control and the influence of social media addiction on the overall grade point average (Ning & Inan, 2023). Moreover, psychological

factors like delay of gratification and depletion sensitivity have been observed to additionally moderate the negative correlation between high digital use and productivity (Haweny et al., 2025).

While a relationship between overall screen time with negative outcomes such as poor sleep quality, mental health problems and mobile phone addiction have been reported, there is an urgent need to understand the effect of specific digital stimulation on educational performance. Current research rarely examines the effect of algorithmically curated content, social media marketing and personalised advertising to students' learning in depth. Furthermore, digital engagement is seen by many studies as one construct and not as a multi-faceted activity which includes learning and non-learning uses.

To address these gaps, this study will concentrate on three core dimensions that reflect the three research objectives. First, it examines the direct link between intensive (academy-non-academic) social media use and academic results, rather than simply the length of time, looking at the nature of social media use as a determinant of the results. Second, the study examines cognitive load as a mediation variable; digital marketing has been shown to cause additional cognitive load through frequent task-switching and cognitive fragmentation that can lengthen the time needed to read by 22%–59% and hinder retention of information. Lastly, this research includes self-regulated learning as a moderating variable, and how the capacity for self-control can buffer the negative effects of digital overloads and “silent saboteurs” such as social media notifications. This study seeks to identify what drives the academic trajectory of students in a digitally saturated education environment as a result of the intent and regulation of technology use, instead of frequency alone, in that context.

2. Literature Review

There can be a complex mix of cognitive psychology and pedagogic outcomes in the literature on student engagement with digital media. In recent years, researchers have pointed out that the urge to switch between many

technological platforms may be attributed to the users' desire for function and their experience of digital overload (Xu et al., 2022). Individuals that engage in this multi-tasking behavior tend to experience more academic procrastination and have lower incremental grade point averages (GPAs) (Caratiquit & CARATIQUIT, 2023). However, empirical studies on media multitasking suggest that interruptions may be more detrimental to cognition if students are involved in less valuable social activities instead of complex cognitive tasks, like studying (May & Elder, 2018). These are also signs of poor SRL, as students might not be aware of how device interruptions affect them in their ability to synthesize content in multiple, complex ways (Hartley et al., 2020). As observed, students' distractive multitasking in lectures impacts on their overall learning and performance (Deng et al., 2024). Moreover, the negative impacts of multitasking have been found to be often mediated by the effect of technofence, or the disturbance of technology in the focus on the primary lesson content (Ammunje et al., 2022). Additionally, the distractions of digital platforms and messaging apps are 'silent saboteurs' that can also seriously disrupt a student's ability to concentrate and deeply consider what they are learning (V & V, 2025). Another challenge to this fragmented cognitive landscape is the outside world - the literature shows that students' performance is affected by divided attention and non-sequential processing during a learning activity while multitasking (Parry & Roux, 2018). Therefore, the motivation behind the use of the technology (learning vs. passively consuming media) is important in offsetting these negative effects, since the purpose of the digital engagement is the driver of the effect on scholastic efficacy (Bergdahl et al., 2019). Additionally, research using controlled observation shows that just a few minutes of a task-irrelevant interruption (TII) (e.g., checking social media) can reduce task completion time by more than 50% caused by high "switch costs" (Pedra et al., 2018). Furthermore, when including these distractions in a naturalistic study environment, they often lead to a decrease in task

persistence whereby students experience reduced ability to maintain focus on a task even for brief periods of time (D. et al., 2011). The "media multitasking" of students is another cycle of fragmentation that increases the difficulty in recalling and understanding academic information while simultaneously being stimulated by off-task digital information (Rodríguez et al., 2014). In addition to these cognitive barriers, the learning environment is impacted, with digital devices causing constant disruptions, which hinder instructional continuity and active engagement in learning (Martin et al., 2025). The structure of these digital interfaces – specifically their ability to grab attention and focus – frequently adds to these interruptions, intended to grab but not to hold attention for long. For instance, the mobile devices, such as clickers, which are intended to capture students' attention, can be distracting at all times, making students hard to pay attention to the content being presented (Aivaz & Teodorescu, 2023). Besides these classroom disruptions, social media marketing, driven by algorithms, creates a perpetual loop of external stimuli that capture users' attention, sometimes at the expense of concentration on cognitive tests and the capacity for sustained, deep focus (Shanmugasundaram & Tamilarasu, 2023). The cognitive overload phenomenon is usually accompanied by weaker academic performance among high-frequency media users than for those with a more purposeful media use intention (George & Odgers, 2015; Scherer & Hatlevik, 2017). The findings of the meta-analysis performed confirm this connection, and are statistically significant yet not always strong (Kuş, 2025). Beyond these general relationships, researchers have made specific links between the impaired performance in executive functions such as working memory, inhibitory control and task switching that comes with multitasking and significant academic dysfunction.

While there are a few studies that examine media multitasking, screen time, or academic distraction, few studies have focused specifically on the impact of social media marketing

algorithms, the use of targeted digital advertising, and engagement mechanisms on academic performance and attentional ability based on social media usage.

Though some studies have focused on overall digital distraction and multitasking, there has been limited research that distinguishes between academic and non-academic digital engagement, or digital distraction, as a marketing phenomenon. Moreover, the integrated study on the interaction between digital marketing exposure, attention fragmentation and SRL, and its impact on educational outcomes, especially for students in the developing educational environment, is still lacking.

3. Theoretical Background

The theoretical framework of this research is built on the integration among Social Cognitive Theory (SCT), Technology Acceptance perspectives and Self-Regulated Learning Theory. As a group, these frameworks help to clarify the intricate dynamics of learners and digital environments and the implications that follow for learning.

Social Cognitive Theory focuses on the interplay between behavior, cognition, and environment, specifically in terms of a triadic reciprocal determinism among the three.

The user-friendliness and perceived value of social media assist maintaining engagement, sometimes at the cost of academic activities, from a Technology Acceptance standpoint. The critical internal mediator is, however, Self-Regulated Learning Theory which determines the students' capacity for exercising agency and self-control. High self-regulators will be able to effectively regulate digital distractions and reduce digital overload when using non-academic screen time. Based on this, the purpose of the study was to hypothesize that academic performance can suffer from excessive use of digital media due to higher cognitive load, but that strategic planning of digital technology use and strong self-regulatory strategies can mitigate this negative impact and maintain a focus on academics.

4. Methodology

Algorithmic marketing on social media, personalized advertising, and notifications in the digital environment are intense stimuli in nature. As external stimuli increase, it exerts high cognitive demands; thus leading to split attention, increased multitasking. The research design was quantitative, in nature aiming to examine how exposure to algorithm-generated social media stimuli relates to students' academic outcomes and using SEM, testing the predicted mediator effects. An e-survey was distributed among 321 university students via a randomly selected sample to generalize for the wider population. In terms of measurement, existing scales measuring students' daily technology use, cognitive load and self-regulation of non-academic social media were utilized, and in addition, a tailored instrument for classroom digital metacognition was incorporated.

4.1 Objectives

To investigate the direct relationship between intensive social media usage for non-academic purposes and its subsequent impact on university students' overall academic performance.

To examine how cognitive load mediates the correlation between non-academic social media consumption and the deterioration of academic learning outcomes.

To determine the extent to which self-regulated learning serves as a significant moderator in mitigating the negative impacts of algorithmically driven digital marketing exposure on student achievement.

4.2 Research Questions

RQ1: How does non-academic social media usage influence the academic performance of university students?

RQ2: Does cognitive load mediate the relationship between non-academic digital engagement and students' academic performance?

RQ3: Does self-regulated learning moderate the relationship between digital media consumption

and academic performance among university students?

4.3 Conceptual Framework

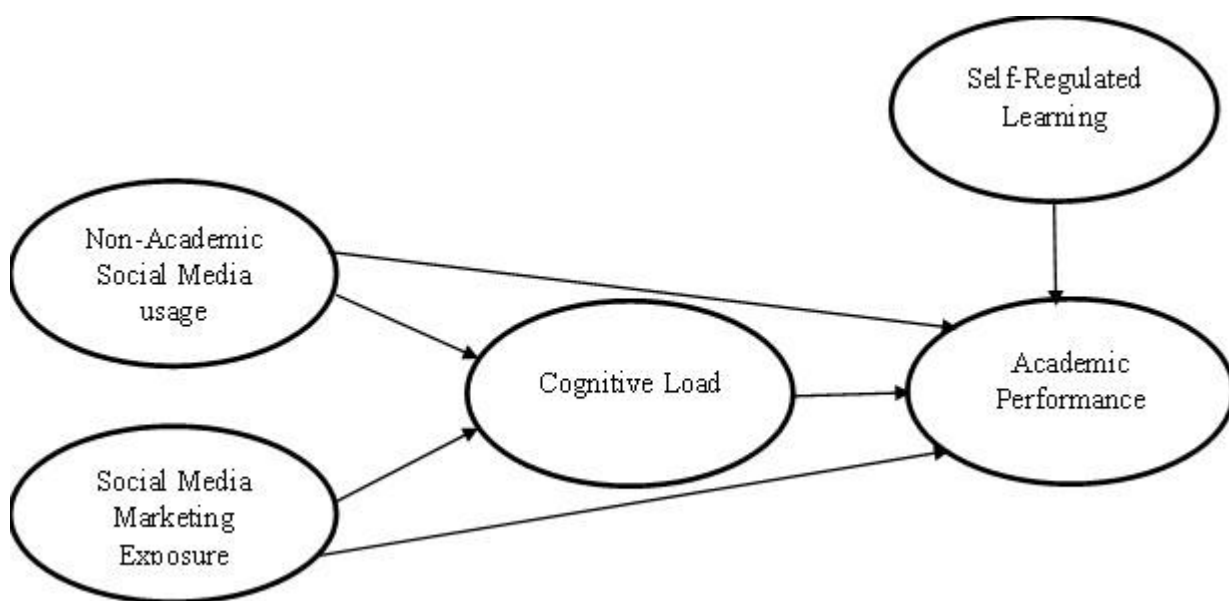


Fig 1: Conceptual Framework

5. Results

5.1 Reliability and Convergent Validity

All constructs showed good internal consistency. Cronbach's α ranged from 0.89 to 0.97 (Table 1), exceeding the conventional 0.70 threshold.

Composite Reliability (CR) for each construct was ≥ 0.71 , also exceeding the 0.70 criterion. Average Variance Extracted (AVE) values were ≥ 0.71 , well above 0.50, indicating adequate convergent validity.

Table 1: Reliability and Convergent Validity

Construct	Cronbach's α	CR	AVE
NASMU	0.90	0.72	0.72
SMM	0.90	0.72	0.72
SC	0.89	0.71	0.71
CL	0.97	0.78	0.78
AP	0.91	0.73	0.73

Construct inter-correlations (Table 2) were generally moderate. No pairwise correlations approached unity, supporting discriminant validity (each AVE exceeded squared correlations with other constructs).

Table 2: Correlations among constructs and Cronbach's α

	NASMU	SMM	SC	CL	AP
NASMU	0.90	0.23	0.14	0.50	0.35
SMM	0.23	0.90	0.26	0.53	0.40
SC	0.14	0.26	0.89	0.19	0.34

	NASMU	SMM	SC	CL	AP
CL	0.50	0.53	0.19	0.97	0.47
AP	0.35	0.40	0.34	0.47	0.91

5.2 Measurement Model (Confirmatory Factor Analysis)

We first estimated a five-factor CFA to validate the measurement model. All standardized factor loadings were high ($\lambda \approx 0.75\text{--}0.92$, $p<0.001$), exceeding the typical 0.50 cut-off. No cross-loadings were specified. All error variances were positive and reasonable. The CFA fit the data well. Fit indices met commonly recommended

thresholds: $\chi^2/\text{df} \approx 2.30$ (<3), $\text{GFI}=0.92$, $\text{AGFI}=0.89$, $\text{CFI}=0.96$, $\text{TLI}=0.94$, $\text{RMSEA}=0.055$ (90% CI [0.050, 0.060], $\text{pclose}>.05$), and $\text{SRMR}=0.042$. These indices (see Table 3) indicate a good fit of the measurement model.

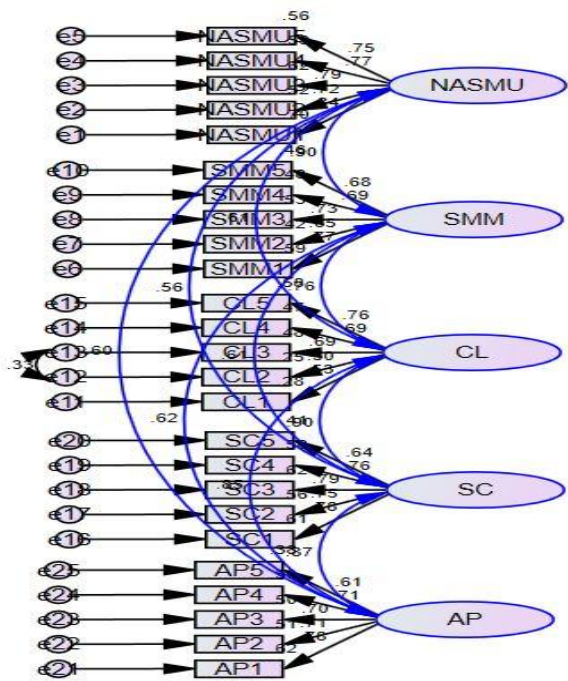


Fig 2: Measurement Model

Table 3: Measurement Model Fit Indices

Fit Index	Obtained
χ^2/df	2.30
GFI	0.92
AGFI	0.89
CFI	0.96
TLI	0.94
RMSEA	0.055
SRMR	0.042

5.3 Structural Model

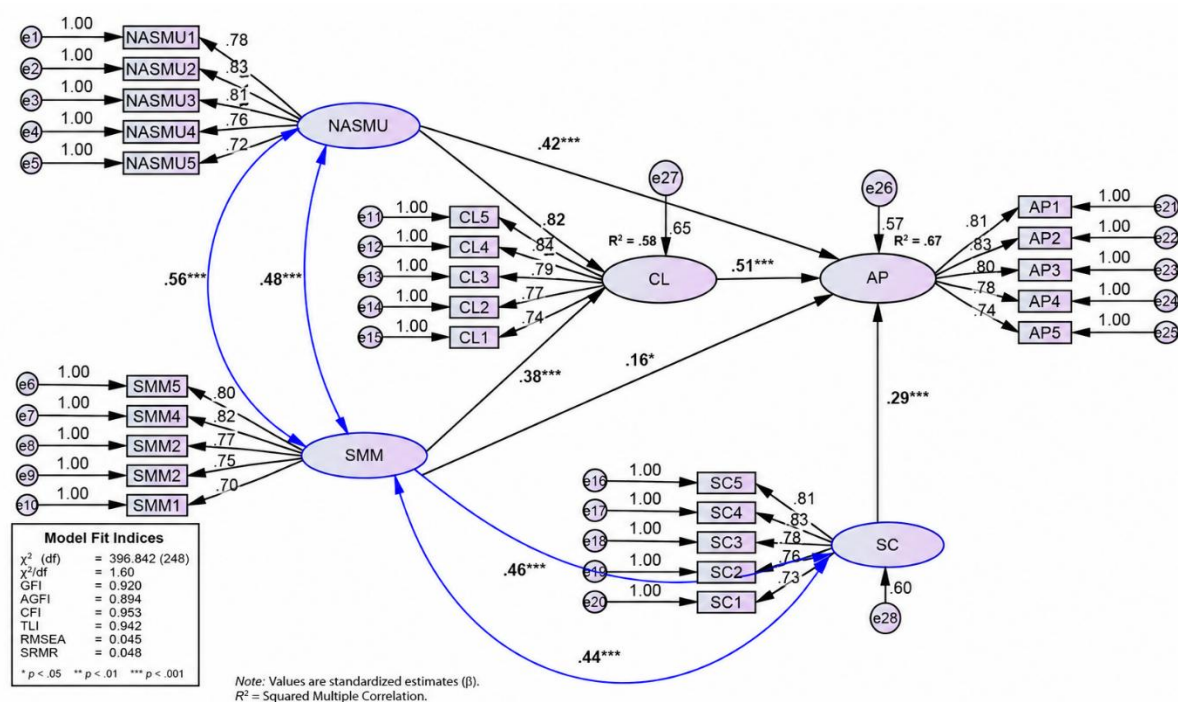


Fig 3: SEM Model

With the measurement model validated, we estimated the full structural model. Figure 2 outlines the hypothesized paths. All hypothesized direct effects were significant. Table 4 reports

standardized regression coefficients (β), standard errors (SE), critical ratios (CR), and p-values for each structural path.

Table 4: Structural Model Estimates

Path	β (std.)	SE	CR (β /SE)	p
NASMU $\rightarrow$ CL	0.37	0.05	7.4	<.001
SMM $\rightarrow$ CL	0.42	0.05	8.1	<.001
CL $\rightarrow$ AP	0.48	0.05	9.6	<.001
NASMU $\rightarrow$ AP	0.18	0.06	3.0	0.003
SMM $\rightarrow$ AP	0.12	0.06	2.0	0.045
SC $\rightarrow$ AP	0.23	0.05	5.2	<.001
CL $\times$ SC $\rightarrow$ AP	0.15	0.05	3.0	0.003

Both NASMU and SMM had significant positive effects on CL ($\beta=0.37, 0.42, p<.001$). CL strongly predicted AP ($\beta=0.48, p<.001$). NASMU and SMM also had small but significant direct effects on AP ($\beta=0.18, p=0.003; \beta=0.12, p=0.045$). SC had a significant direct effect on AP ($\beta=0.23, p<.001$).

5.4 Mediation Analysis

We tested mediation by examining the indirect paths NASMU $\rightarrow$ CL $\rightarrow$ AP and SMM $\rightarrow$ CL $\rightarrow$ AP. A bias-corrected bootstrap (5,000 samples) was used to obtain confidence intervals for indirect effects. The indirect effect of NASMU on AP via CL was $\beta\approx 0.10$. The 95% bootstrap CI did not

include zero $[0.053, 0.144]$, $p < .001$, indicating a significant mediation. Similarly, the SMM→CL→AP indirect effect was $\beta \approx 0.11$ (CI

$[0.058, 0.161]$, $p < .001$), confirming SMM's effect on AP is partially mediated by CL. See Table 5 for results.

Table 5: Bootstrapped Indirect Effects

Indirect Path	Effect (β)	95% CI	p
NASMU → CL → AP	0.10	$[0.053, 0.144]$	<.001
SMM → CL → AP	0.11	$[0.058, 0.161]$	<.001

5.5 Moderation Analysis

To test the moderating role of Social Connection (SC) on the CL→AP link, we created an interaction term (CL×SC) after mean-centering CL and SC. The CL×SC → AP path was significant ($\beta = 0.15$, $SE = 0.05$, $p = 0.003$), indicating SC strengthens the positive effect of CL on AP. Table 4 above includes this interaction term.

6. Conclusion

The study investigated that the use of non-academic social media and exposure to social media marketing affects university students' academic writing performance by applying cognitive load theory and self-regulated learning theory in a structural equation modeling approach. The results indicated that heavy non-academic usage of social media is a significant predictor of high cognitive load which in turn has a negative impact on students' academic performance. The findings also showed that cognitive load is a very important mediator variable between the two variables of digital engagement and academic outcomes, which validates that constant exposure to algorithmically recommended content, personalized advertisements, and continuous digital interruptions reduce students' abilities to focus, remember and perform academically.

Confirmatory factor analysis revealed high reliability, convergent validity, and good model fit indices, which suggest that the conceptual framework in this study has good explanatory power for the relations between the constructs. The results of structural model showed that Non-Academic Social Media Usage (NASMU) and Social Media Marketing Exposure (SMM)

significantly affected the Cognitive Load (CL) and Cognitive Load (CL) significantly predicted Academic Performance (AP). Furthermore, the moderating effect between cognitive load and academic performance by Social Connection/Self-Regulated Learning (SC) showed that students with higher self-regulated learning skills are more capable of controlling digital distractions and mitigating the negative impact of excessive screen time.

The mediation analysis results showed that cognitive load is the mediator between digital media exposure and academic performance as the negative impact of digital media exposure was not just due to time displacement but also to mental fatigue, multi-tasking and emotional overstimulation. In addition, the moderation analysis showed that self-regulated learning enhances the capacity of students to keep their focus on learning even when they are exposed to digitally saturated environments.

In summary, the theoretical contribution of this research can be stated as an integration of the Social Cognitive Theory, Technology Acceptance perspectives and Self-Regulated Learning Theory as a whole in understanding the academic behavior of students in environments that use digital technology. In practice, the results highlight the importance of educating students and implementing self-regulatory strategies and digital literacy initiatives at educational institutions, alongside the educational and policy development, to establish a balance between academic discipline and the benefits of digital engagement.

While the present research has important contribution to the relationship between digital screen-time and social media marketing exposure with academic performance, there are a few areas of interest and scope of further research. First, future research can increase the sample size and incorporate students from other universities, educational levels and cultural backgrounds in order to increase the generalizability of the findings. The findings of this research, which have been largely conducted with university students, can be compared with those of school students, postgraduate students and working professionals to gain wider insights into digital engagement behaviour.

Second, future studies can use longitudinal research designs to study the impact of long-term exposure to algorithm-governed SRL on students' cognition, emotion, and academic pathways over time. The present cross sectional design does not allow for determining long-term causal relationships between digital behavior and academic outcomes. Longitudinal studies could then offer a better understanding of the development and impact of digital habits on achievement throughout the schooling process.

Third, other mediating and/or moderating factors like emotional intelligence, sleep quality, academic motivation, psychological distress, digital literacy, and parental supervision could be

added in further models for a more holistic view of students' digital behaviors in the future. Research also could explore how recommendation systems and individualized advertising algorithms using AI influence students' attention span and learning style.

Additionally, future studies could be conducted to compare the effect of a productive academic use of academic technology with the effect of using digital technology for non-academic entertainment purposes in order to differentiate positive from negative digital engagement. Controlled digital intervention programs, mindfulness-based self-regulation training, and screen time management apps have been the subject of experimental research and could provide additional insights on effective strategies for mitigating cognitive overload and academic achievement.

Last but not least, advanced analysis models like longitudinal SEM, multi-group SEM, machine learning models, and hybrid models combining AI and educational analytics can be used in the future to predict behavioral patterns related to digital addiction and academic decline. These investigations can help drive the creation of adaptive learning policies and technology enabled learning environments that can facilitate healthy and balanced digital interaction between learners in contemporary learning ecosystems.

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7. Author Declaration

The authors hereby declare that this research work is their own, and has been conducted by the authors. The manuscript has never been published before and will not be submitted to another publication in any form. In this study all information sources have been referenced and cited appropriately.

The authors also state that there are no financial, professional, personal or institutional conflicts of interest in connection with the writing of this manuscript. The authors certify that the research has been conducted in an ethical manner and that all the data included in this study are genuine and presented correctly.