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Mediating Role of Academic Self-Efficacy in the Relationship between Social Media Usage and Academic Procrastination among STEM Undergraduate Students

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Abstract
Present study investigates mediating role of academic self-efficacy in the relationship between social media usage and academic procrastination among undergraduate students in Science, Technology, Engineering, and Mathematics (STEM) disciplines from various universities. Quantitative research approach adopted by researcher, the study employs a descriptive survey design to collect data from a sample of 280 STEM undergraduate students drawn from seven universities in Meerut city India, using a multistage sampling technique. Statistical analyses were conducted using SPSS, incorporating multiple regression and mediation analysis, complemented by bootstrapping procedures, to examine the proposed relationships among the variables. The mediation analysis revealed that the indirect effect of social media usage on academic procrastination through academic self-efficacy was not statistically significant, as the bootstrapped confidence interval included zero. The study contributes to the existing literature by providing empirical evidence from the Indian STEM educational context.

Keywords: social media usage; academic procrastination; academic self-efficacy; STEM undergraduates; self-regulation

1. Introduction

In the contemporary digital era, social media has become deeply embedded in students' academic and personal lives, significantly influencing how they communicate, access information, and manage their learning processes. The proliferation of smartphones, affordable internet access, and digital platforms has transformed traditional learning environments into technology-mediated spaces. Social media platforms such as WhatsApp, Instagram, YouTube, Telegram, and LinkedIn are no longer limited to social interaction but are increasingly utilized for academic collaboration, information sharing, and knowledge construction. While these platforms offer substantial educational benefits, their excessive and unregulated use has raised serious concerns regarding students' academic behavior, particularly in relation to academic procrastination and self-regulation. Academic procrastination, defined as the intentional delay in initiating or completing academic tasks despite awareness of negative consequences, has emerged as one of the most prevalent behavioral challenges among students (Gayary & Kalita, 2025; Thapa & Rimal, 2024). It is no longer viewed merely as poor time management but as a complex psychological phenomenon

influenced by cognitive, emotional, and motivational factors. Kumar and Jayalakshmi (2022) reported that a significant proportion of college students exhibit varying levels of procrastination, which adversely affects their academic performance and well-being. Similarly, Kim and Seo (2015), through a meta-analysis, established a strong negative relationship between procrastination and academic achievement. In recent years, excessive social media usage has been identified as a key contributor to academic procrastination. Studies suggest that frequent engagement in non-academic digital activities such as scrolling, chatting, and multitasking disrupts students' concentration and reduces academic productivity (Liu et al., 2021; Elias et al., 2021). Anwar et al. (2022) found a significant positive relationship between social media usage and academic procrastination, indicating that increased time spent on social networking platforms leads to higher levels of delay behavior. Similarly, Hasnain et al. (2015) and Michikyan et al. (2015) reported that excessive social media use negatively affects students' academic engagement and performance, particularly when used for non-academic purposes. However, the influence of social media on academic outcomes cannot be understood in isolation from psychological variables. Academic self-efficacy, defined as students' belief in their ability to successfully perform academic tasks, plays a crucial role in shaping learning behavior, motivation, and persistence (Farhadi, 2025). According to Bandura's Social Cognitive Theory, self-efficacy beliefs determine how individuals think, feel, and act in challenging situations. Students with high academic self-efficacy are more likely to exhibit strong self-regulation, persistence, and effective time management, whereas those with low self-efficacy tend to experience anxiety, avoidance, and procrastination (Khoinunnisa et al., 2024). Empirical evidence consistently supports the negative relationship between academic self-efficacy and procrastination. Farhadi (2025) found that students with higher self-efficacy demonstrate lower levels of procrastination, while Chavez-Yacolca et al. (2025) highlighted the mediating role of self-efficacy in reducing procrastination associated with internet addiction. Honicke and Broadbent (2016) further confirmed that academic self-efficacy is positively associated with academic performance and engagement. Despite this, the relationship between social media usage and self-efficacy remains inconclusive. For instance, Liu et al. (2021) observed that excessive social media use negatively affects self-concept clarity, whereas Tahrir et al. (2021) reported a positive association between social media multitasking and academic self-efficacy. These contradictory findings indicate the need for further investigation. From a theoretical perspective, the present study is grounded in multiple psychological frameworks. Bandura's Social Cognitive Theory explains that students' behavior is influenced by the interaction between personal beliefs (self-efficacy), environmental factors (social media), and behavioral outcomes (procrastination). Additionally, Uses and Gratification Theory suggests that individuals actively use media to satisfy cognitive, emotional, and social needs, which may lead to both productive and maladaptive outcomes. Temporal Motivation Theory (Steel) further explains procrastination as a function of immediate gratification outweighing long-term academic rewards, which is particularly relevant in the context of social media distractions. Although previous studies have examined the relationships between social media usage, academic procrastination, and academic self-efficacy, several research gaps remain. First, most studies have focused on these variables independently or in pairs, with limited research examining their combined interaction within a single framework. Second, a majority of existing studies have been conducted in international contexts or among specific professional groups such as medical and dental students (Shah et al., 2024; Thapa & Rimal, 2024), thereby limiting generalizability. Third, there is a lack of empirical evidence focusing specifically on undergraduate STEM students, who experience unique academic demands such as continuous assessment, laboratory work, and project-based learning. In the Indian context, particularly in semi-urban regions like Meerut, there is a noticeable lack

of research exploring how increasing digital engagement influences students' academic and psychological functioning. While studies such as Gayary and Kalita (2025) and Chavez-Yacolca et al. (2025) have highlighted the impact of digital behavior on procrastination and self-efficacy, they do not adequately address the combined dynamics of these variables within Indian higher education settings. The need for the present study arises from the growing concern regarding students' inability to balance academic responsibilities with digital engagement. With the rapid expansion of online learning and increased reliance on social media following the COVID-19 pandemic, students are now more vulnerable to distractions, reduced self-regulation, and procrastination. Understanding how social media usage interacts with academic self-efficacy to influence procrastination is essential for developing effective educational interventions. The significance of this study lies in its potential to contribute both theoretically and practically. Theoretically, it aims to extend existing literature by examining the mediating role of academic self-efficacy in the relationship between social media usage and academic procrastination within a unified framework. Practically, the findings may assist educators, counselors, and policymakers in designing strategies to promote responsible digital behavior, enhance self-efficacy, and reduce procrastination among students. Additionally, by focusing on STEM undergraduate students in Meerut city, the study provides context-specific insights that can inform regional educational practices and policies. Therefore, the present study seeks to investigate the relationship between social media usage, academic procrastination, and academic self-efficacy, and to examine whether academic self-efficacy mediates this relationship among STEM undergraduate students. In doing so, it aims to address existing research gaps and contribute to a deeper understanding of students' academic behavior in the digital age.

2. Methodology

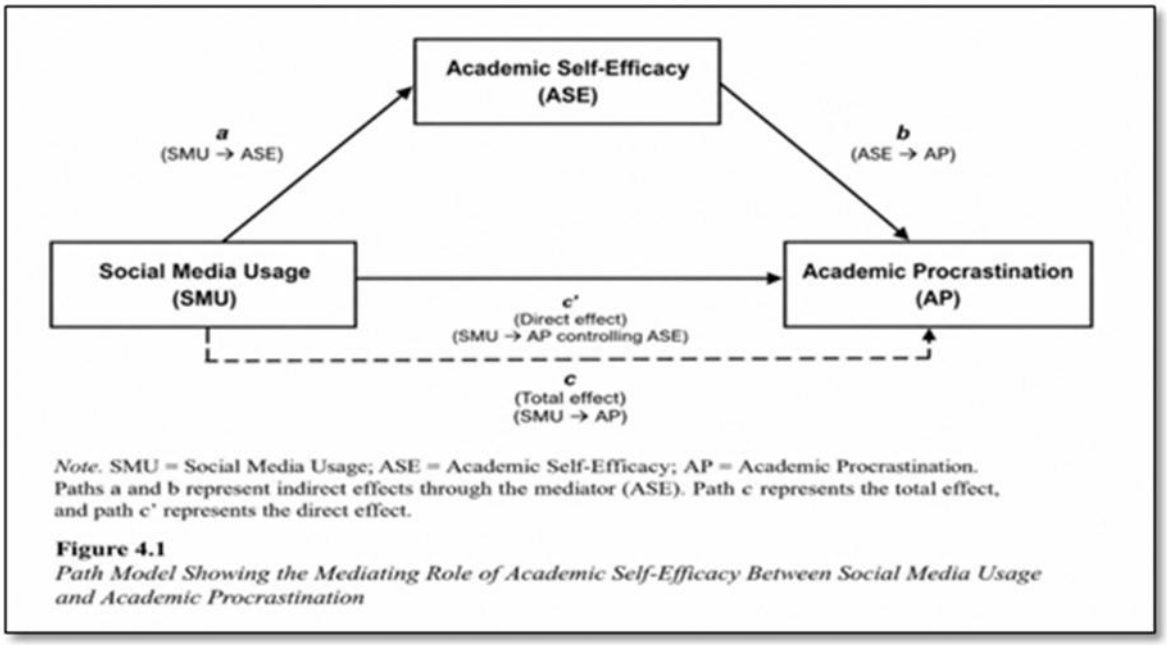
Present study adopts an appropriate methodological framework to investigate the relationship between social media usage, academic procrastination, and academic self-efficacy among STEM undergraduate students. The present study employs the descriptive survey method, which is widely used in educational and psychological research to collect data from a defined population in order to describe existing conditions and examine relationships among variables. This method is considered appropriate as it facilitates the systematic collection of quantitative data related to study variables. In the present investigation, the researcher testing mediating role of academic self-efficacy in the relationship between social media usage and academic procrastination. The population of the present study comprises all undergraduate STEM students enrolled in programs such as B.Sc. (Science, Technology, Engineering, Mathematics) in universities located in Uttar Pradesh India. The population represents students from diverse academic disciplines within the STEM framework. The sample for the present study consists of 280 STEM undergraduate students selected from different universities in Meerut city. The sample includes representation from four major academic streams: Science, Technology, Engineering, Management. To ensure representativeness, students were selected from multiple institutions, and approximately equal numbers of participants were drawn from each discipline. The present study adopts a multistage sampling technique, combining purposive, stratified, and random sampling methods. In the first stage, purposive sampling was used to select colleges in Meerut city that offer STEM undergraduate programs. In the second stage, students were categorized into four strata based on their academic discipline: Science, Technology, Engineering, and Management following stratified sampling. In the final stage, simple random sampling with lottery method was used to select individual students from each stratum to ensure equal and unbiased representation. This

multistage approach enhances the representativeness and generalizability of the findings. Standardized and validated instruments were used to collect data for the study. The following tools were administered: 1. Academic Procrastination Scale (APS) Developed by McCloskey and Scielzo (2015). 2. Academic Self-Efficacy Scale Developed by Gafoor and Ashraf (2006) 3. Social Media Usage Questionnaire Developed by Bashir and Gupta (2018) The questionnaire includes 42 items categorized into four dimensions. All questionnaires were on a 5-point Likert scale ranging from "Always" to "Never." Including Negative and positive statements. Data were collected from selected universities in Meerut city after obtaining necessary permission from concerned authorities. The researcher personally visited the institutions and administered the questionnaires to the students. Participants were informed about the purpose of the study and assured of confidentiality and anonymity. Instructions were clearly explained, and students were encouraged to respond honestly. The completed questionnaires were collected, screened, and prepared for statistical analysis. Descriptive Statistics (Mean, Standard Deviation, Frequency Distribution) were used to describe the characteristics of the sample and variables. Multiple Regression Analysis was employed to determine the predictive relationship and to examine the mediating role of academic self-efficacy between social media usage and academic procrastination.

Analysis

H0: Academic self-efficacy does not significantly mediate the relationship between social media usage and academic procrastination among STEM students.

Figure 1 Path Mediation Model



Note. SMU = Social Media Usage; ASE = Academic Self-Efficacy; AP = Academic Procrastination. Paths a and b represent indirect effects through the mediator (ASE). Path c represents the total effect, and path c' represents the direct effect.

Figure 4.1
Path Model Showing the Mediating Role of Academic Self-Efficacy Between Social Media Usage and Academic Procrastination

Model 1 represents the total effect (c path), Model 2 represents path a, and Model 3 represents paths b and c'.

Table 1 Mediation Analysis

Model	Predictor	B	SE B	β	t	p	R^2
1	Social Media Usage → Academic Procrastination	0.15	0.06	.16	2.67	.008**	.025
2	Social Media Usage → Academic Self-Efficacy	-0.10	0.06	-.10	-1.74	.083	.011
3	Social Media Usage → Academic Procrastination	0.16	0.06	.18	2.83	.005**	.034
	Academic Self-Efficacy →Academic Procrastination	0.10	0.06	.10	1.62	.107	

Note. *B = unstandardized coefficient; β = standardized coefficient; p < .05**

In table no. 1 Multiple regression analysis was conducted to examine the mediating role of academic self-efficacy in the relationship between social media usage and academic procrastination. The results indicated that social media usage significantly predicted academic procrastination (β = .16, p < .01). However, social media usage did not significantly predict academic self-efficacy (β = −.10, p > .05). Academic self-efficacy did not significantly predict academic procrastination when controlling for social media usage (β = .10, p > .05). Since the conditions for mediation were not satisfied, academic self-efficacy was not found to mediate the relationship between social media usage and academic procrastination. Therefore, H0 was accepted.

Table 2
Bootstrapping Results for Mediation Analysis

Effect	Boot SE	Boot LLCI	Boot ULCI	Result
Indirect Effect (SMU → ASE → AP)	0.005	-0.002	0.018	Not Significant

Note: LLCI = Lower Limit Confidence Interval; ULCI = Upper Limit Confidence Interval

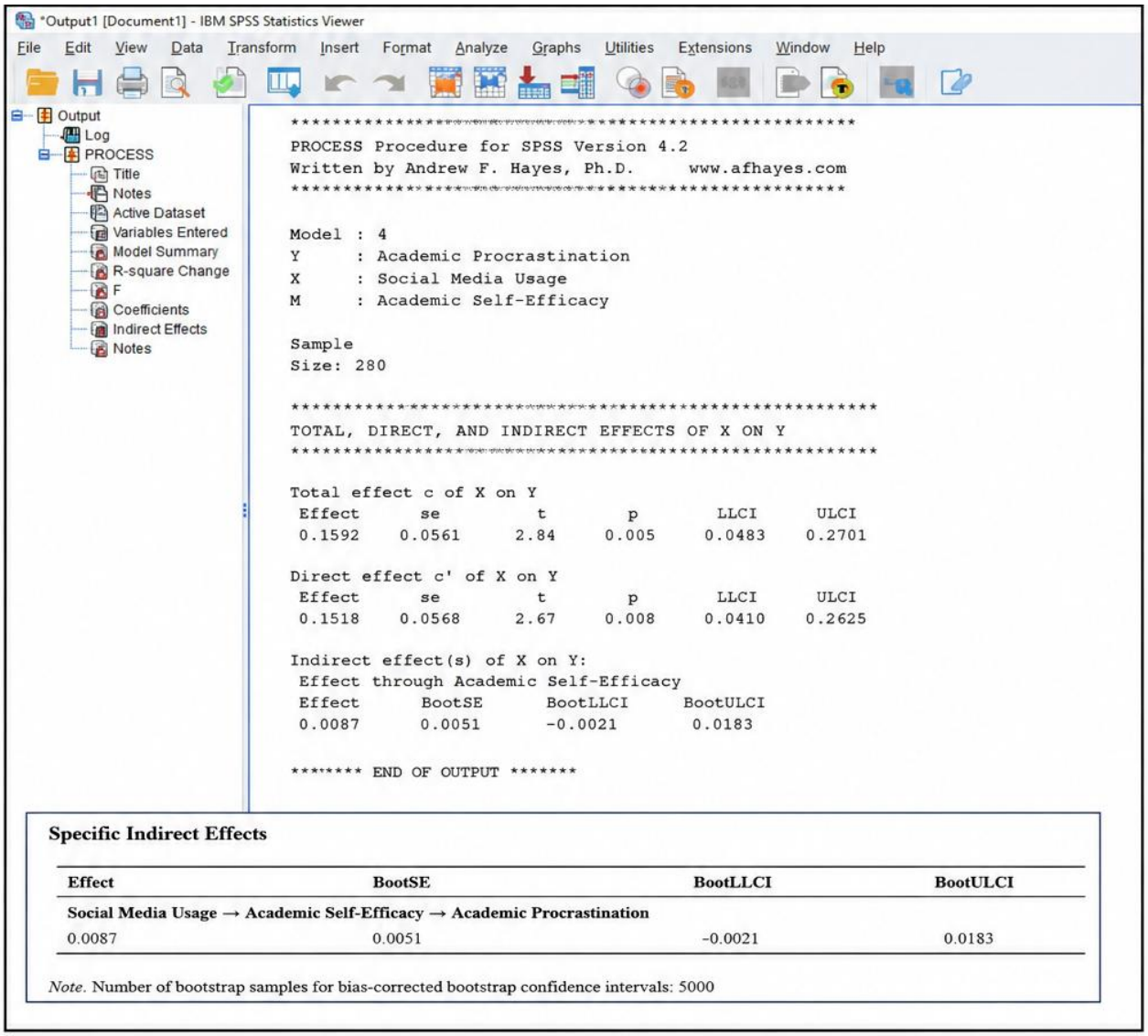
Bootstrapping analysis through the PROCESS macro was employed to test the mediation of academic self-efficacy in the relationship between social media usage and academic procrastination. The results showed that the indirect effect was not significant as Boot SE = 0.005, Boot LLCI -0.002, Boot ULCI=0.018 because the confidence interval had zero. Therefore academic self-efficacy is not a mediator of the relationship between social media usage and academic procrastination. The absence of a mediation effect was calculated.

Screen Shot of calculated table extracting from SPSS

Bootstrapping Results for Mediation Analysis (PROCESS Macro Model 4)

Effect	Coefficient	Boot SE	Bootstrapped 95% Confidence Interval		Result
			LLCI	ULCI	
Total effect (c) SMU → AP	0.1592	0.0561	0.0483	0.2701	Significant
Direct effect (c') SMU → AP	0.1518	0.0568	0.0410	0.2625	Significant
Indirect effect (a × b) SMU → ASE → AP	0.0087	0.0051	-0.0021	0.0183	Not Significant
Path a SMU → ASE	-0.0986	0.0567	-0.2112	0.0114	Not Significant
Path b ASE → AP	0.1043	0.0644	-0.0215	0.2302	Not Significant

Note. SMU = Social Media Usage; ASE = Academic Self-Efficacy; AP = Academic Procrastination;
LLCI = Lower Limit Confidence Interval; ULCI = Upper Limit Confidence Interval;
Boot SE = Bootstrapped Standard Error.



Specific Indirect Effects

Effect	BootSE	BootLLCI	BootULCI
Social Media Usage → Academic Self-Efficacy → Academic Procrastination			
0.0087	0.0051	-0.0021	0.0183

Note. Number of bootstrap samples for bias-corrected bootstrap confidence intervals: 5000

4. Discussion

The present study aimed to examine the relationship between social media usage, academic procrastination, and academic self-efficacy among STEM undergraduate students, with a specific focus on testing the mediating role of academic self-efficacy. The findings provide important insights into students' academic behavior in the context of increasing digital engagement. The results revealed that social media usage significantly predicts academic procrastination**,** indicating that higher engagement with social media is associated with increased delay in academic tasks. This finding is consistent with previous research conducted by Anwar et al. (2022), who reported a positive relationship between social media usage and procrastination. Similarly, Liu et al. (2021) and Elias et al. (2021) highlighted that excessive social media use leads to distraction, reduced concentration, and poor academic discipline. The present finding reinforces the argument that social media, when used excessively for non-academic purposes, acts as a behavioral distraction that interrupts study routines and promotes procrastination tendencies among students. However, the study found that social media usage does not significantly predict academic self-efficacy**.** This suggests that students' beliefs about their academic capabilities are not directly influenced by their level of social media engagement. This finding diverges from some previous studies, such as Tahrir et al. (2021), which reported a positive relationship between social media multitasking and academic self-efficacy. The inconsistency may be attributed to differences in the nature of social media use. While some forms of academic-oriented engagement may enhance self-efficacy, the present study indicates that general or excessive usage, particularly for entertainment or passive consumption, does not contribute significantly to students' academic confidence. Findings indicate that academic self-efficacy does not significantly predict academic procrastination when controlling for social media usage**.** Although prior research (Farhadi, 2025; Khoinunnisa et al., 2024) has emphasized a negative relationship between self-efficacy and procrastination, the current study did not find a statistically significant effect. This suggests that in the context of STEM undergraduate students, procrastination behavior may be more strongly influenced by external behavioral factors, such as digital distractions, rather than internal cognitive beliefs alone. Most importantly, the results demonstrate that academic self-efficacy does not mediate the relationship between social media usage and academic procrastination. For mediation to occur, both path 'a' (social media usage to self-efficacy) and path 'b' (self-efficacy to procrastination) must be significant. However, in the present study, both paths were found to be non-significant. Therefore, the necessary conditions for mediation were not satisfied, leading to the acceptance of the null hypothesis (**H0**). This finding contradicts studies such as Chavez-Yacolca et al. (2025), which identified academic self-efficacy as a mediator between internet addiction and procrastination. The discrepancy may be explained by contextual differences. While internet addiction represents a more severe and psychologically embedded behavior, general social media usage may not exert a strong enough influence on students' self-efficacy beliefs to produce a mediating effect. Additionally, cultural and educational differences, particularly in the Indian STEM context, may influence how students perceive their abilities and manage academic responsibilities. From a theoretical perspective, the findings partially support Bandura's Social Cognitive Theory**,** which emphasizes the interaction between environmental factors, personal beliefs, and behavior. In this study, the environmental factor (social media usage) directly influences behavior (academic procrastination), but the personal factor (academic self-efficacy) does not significantly intervene in this relationship. This suggests that external distractions may override internal motivational beliefs in shaping students' academic behavior. Similarly, the findings align with Temporal Motivation Theory, which posits that individuals are more likely to engage in activities that offer immediate gratification. Social media provides instant rewards in the form of entertainment

and social interaction, making it more appealing than delayed academic tasks. As a result, students tend to prioritize short-term digital engagement over long-term academic goals, leading to procrastination. The absence of a mediating effect also highlights the complexity of academic behavior in the digital age. It suggests that improving academic self-efficacy alone may not be sufficient to reduce procrastination if students continue to engage excessively with distracting digital platforms. Instead, behavioral interventions targeting time management, digital discipline, and self-regulation may be more effective. In the context of STEM education, where students are required to engage in continuous learning, problem-solving, and practical work, the impact of social media-induced procrastination becomes even more critical. The findings indicate that even students with adequate confidence in their academic abilities may struggle with procrastination due to external distractions. Present study contributes to the existing literature by demonstrating that while social media usage significantly influences academic procrastination, academic self-efficacy does not play a mediating role in this relationship among STEM undergraduate students. These findings emphasize the need to address behavioral and environmental factors alongside psychological variables when examining academic outcomes in the digital era.

5. **Conflict of Interest-** No conflict of Interest

6. **Acknowledgement-** The researcher expresses sincere gratitude to research supervisor, head of the department, research cell of the department and all those who contributed directly and indirectly to the successful completion of this study.

7. Authors' Biography

- **1st Author - Iqra Rizvi** is currently pursuing her Master of Education (M.Ed.) from the Department of Education, Swami Vivekanand Subharti University, Meerut, India. Her academic interests include educational psychology, student behavior, and the impact of digital technology on learning outcomes.
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