

The Relationships among Social Stress, Self-Regulation, Addictive Smartphone Use, and Social Media Usage Behaviour of Generation Z

Sabakun, Naher Shetu^{1*}, Kashfia, Maisha² and Sadia, Islam Promi³

¹Faculty of Business Studies, Jahangirnagar University, Savar, Dhaka 1342, Bangladesh

²Faculty of Business Studies, Bangladesh University of Professionals, Mirpur Cantonment, Dhaka 1216, Bangladesh

³National Institute of Design, Dhanmondi, Dhaka 1209, Bangladesh

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ABSTRACT

Despite rising recognition that addictive smartphone use is a significant concern, there has been insufficient study into how social stress, self-regulation, addictive smartphone use, and social media usage relate to Generation Z's overall psychological aspects. The current study focused on Generation Z students in Bangladesh, a developing country, who are now pursuing higher education. The current study aims to provide a quantitative assessment of the linkages between social stress and self-regulation as they relate to addictive smartphone use, which leads to social media usage in both direct and indirect ways. Furthermore, Generation Z's academic performance is regarded as a moderating construct between addictive smartphone and social media usage behaviour. Primary data were gathered using the non-probability, purposive sampling technique. The structured questionnaire survey was completed by 841 Generation Z university students in total. The study model was evaluated using the Smart PLS-SEM software programme. The study's results demonstrated the significant direct and indirect impacts of self-regulation and social stress. According to the results, a mediating relationship is evident. On the other hand, the moderating construct of academic performance did not find any statistical significance. The results of this study add to the body of knowledge about social stress, regulation, addictive smartphone use, and Generation Z's use of social media, particularly in the setting of developing nations. This study also addressed the study limitations and looked at the practical consequences of its findings.

Keywords: Academic Performance, Social Stress, Self-Regulation, Smartphone Addiction, Social Media Use

1. INTRODUCTION

Generation Z is defined as those who grew between 2000 and 2010 individuals exhibit greater individualism in their approach to learning, interpersonal connections, and communication compared to earlier generations, primarily because of their convenient access to technology (Chicca & Shellenbarger, 2018). Gen Z's values and behaviour have undergone substantial changes in comparison to previous generations, primarily as a result of rapid technological advancements (Pichler et al., 2021). In today's world, most people think of smartphones as necessary tools. Younger people use them the most and feel emotionally linked to them. However, there are problems with people spending too much time on their smartphones (Walsh et al., 2021).

*Corresponding Author: sabakunshetu@juniv.edu

Recently, there has been a rise in behavioural addictions associated with mobile devices (Olson et al., 2022), specifically among young individuals. Additionally, there is a chance that smartphone use may indirectly affect academic performance by contributing to health-related problems. Some of the things that make smartphones addicting are notifications, always-on connection, and many different apps (Bauer et al., 2020).

Concerning Gen Z's perspective on their dependency on social media and cell phones, a majority of students, specifically two-thirds, expressed the belief that they were devoting an excessive amount of time to social media. Additionally, an overwhelming majority of four out of five students admitted to engaging in excessive Internet usage. Regarding social media utilisation, more than 50% of individuals from Gen Z reported utilising various platforms on multiple occasions daily, while over 50% recognised using social media platforms consistently throughout the day (Ahmed, 2019). While social media and smartphones offer numerous advantages, excessive and regular usage can adversely affect an individual's social, physical, and psychological well-being. This includes reduced self-esteem, strained family relationships, heightened stress levels, impaired interpersonal abilities, decreased in-person interactions, and addictive behaviour (Ahmed, 2019; Mason et al., 2022; Samaha & Hawi, 2016).

Additionally, the role of psychosocial and societal influences on smartphone addiction within Gen Z represents a considerable void in the existing literature. Growing up in an environment saturated with technology, Generation Z may have developed altered perceptions of smartphone usage norms and thresholds for addiction, influenced by cultural norms and societal expectations (Twenge et al., 2018). Several research have examined how people of various ages become addicted to smartphones (Abbasi et al., 2021; Sapci et al., 2021; Troll et al., 2021), there have not been enough studies that exclusively focus on Generation Z (Twenge et al., 2018). Although Gen Z has a unique relationship with technology and digital communication, few study initiatives have focused on this topic (Al-Samarraie et al., 2022). Furthermore, despite the identification of several potential triggers for smartphone addiction, such as social media engagement (Adorjan & Ricciardelli, 2021; Elhai et al., 2016; Haddad et al., 2021), psychological distress (Abu Khait et al., 2022; Błachnio et al., 2022), their relative impact on smartphone addiction within the Gen Z cohort remains unknown. This gap is notably evident in the scarcity of comprehensive investigations into the intricate interplay among individual, social, and technological influences that may shape tendencies toward smartphone addiction among this cohort (Al-Samarraie et al., 2022; Elhai et al., 2016; Tateno et al., 2019; Wolfers et al., 2020).

Despite the existence of numerous studies on Gen Z, there is a lack of research specifically investigating the social stress that motivates these students to develop addictions to smartphones and the social media usage behaviour of Gen Z university students in Dhaka City, Bangladesh. While some studies have explored the frequency with which members of this generation use technology (Abbasi et al., 2021; Sapci et al., 2021; Troll et al., 2021) and the internet to express themselves, seek knowledge, or convey their emotions, the underlying social stress remains largely unexplored. Hence, the objectives of our study were to investigate a possible relationship between social stress, self-regulation, and addiction to smartphone use among Gen Z users, specifically focusing on their social media usage behaviour. Additionally, the study examines how Gen Z users' academic performance influences the relationship between addictive smartphone use and social media usage behaviour. Consequently, this investigation will furnish the answers to the research problems it has presented.

There are multiple sections in this article. An introduction is given in the first part. The literature review, the creation of hypotheses, and the theoretical framework are covered in the second section. The research methodology is covered in the third section. The research results are given in the fourth part. A discussion covering both theoretical and practical elements is presented in the fifth section. Ultimately, the study's conclusions and constraints have been clarified.

2. LITERATURE REVIEW

The prominent theoretical framework originates from the tradition of personality psychology and defines self-regulation as a trait that varies among individuals. Proponents of this method emphasise that self-regulation is distinct from self-awareness or self-monitoring since it encompasses an individual's understanding of the actions necessary to attain a specific behaviour or objective (Koestner et al., 1992; Zimmerman, 1995). Several scholars have proposed that self-regulatory behaviour represents a relatively stable personality variable (Karoly, 1993) because people act and react in certain ways based on their inherent temperamental characteristics (Kopp, 1982; Rothbart & Bates, 1998) and because they draw from their prior experiences in goal pursuit. Smartphone addiction is attributed to faulty beliefs and schemata according to the Social Cognitive Theory or SCT (Bandura, 1982). Ultimately, smartphone addiction is believed to arise from a confluence of individual, societal, communal, environmental, and affective elements (Davis, 2001).

2.1 Generation Z (Gen Z)

The eldest members of Generation Z (Gen Z) are currently doing undergraduate studies (Szymkowiak et al., 2021). They were labelled as 'digital natives' because of their upbringing during the digital technology period, which resulted in their early exposure and familiarity with social media and the internet (Haddad et al., 2021). Unlike previous generations, Gen Z consistently seeks new and diverse kinds of knowledge and prefers digital media to traditional media. Gen Z is renowned for their proficiency in technology and their preference for digital communication over in-person relationships with others (Poláková & Klímová, 2019). Due to their heavy dependence on technology for acquiring information in all aspects of their lives, including education, they have a relatively low tolerance for being without digital resources (Szymkowiak et al., 2021). Therefore, it is apparent that the cognitive processes of the younger generation have undergone substantial transformations (Prensky, 2001; Szymkowiak et al., 2021).

2.2 Social Stress, Addictive Smartphone Use, and Social Media Usage Behaviour

Stress perception is highly connected with adolescent smartphone addiction. According to a hypothesis proposed by Chicca and Shellenbarger (2018), Gen Z is believed to have deficient social skills due to their preference for social media over face-to-face contact when establishing relationships. Regular smartphone usage for social interactions elicits emotional reactions characterised by deceit, remorse, and increased levels of stress as a result of the pressure to promptly respond to smartphone communications (Pera, 2020). Smartphones enable adolescents to continuously engage with social media platforms, fulfilling their desire for self-expression, interpersonal relationships, and social validation. A prior investigation conducted by Berger et al. (2018) demonstrated that individuals with impaired self-regulation are prone to promptly react to smartphone notifications, suggesting that people frequently encounter difficulties in managing their behaviour to technology habits. As a result, this causes increased levels of stress and reliance on these technological items (Hawk et al., 2019). Moreover, smartphone-based internet networking is less anxiety-inducing for persons who experience social nervousness compared to offline social networking (Pera, 2020). Those with insecure attachment aspects may become problematic smartphone users as a result of stress management issues or as a means of resolving interpersonal conflicts (Parent et al., 2022). The hypotheses that have been put up are as follows:

- H_{1a}: Social stress has a significant positive correlation with addictive smartphone use.
- H_{1b}: There is a significant positive association between social stress and Gen Z users' social media usage behaviour.
- H_{1c}: Gen Z users' addictive smartphone use mediates the relationship between social stress and social media usage behaviour.

2.3 Self-Regulation, Addictive Smartphone Use, and Social Media Usage Behaviour

The ability to withstand temptations from within and without to accomplish a particular goal is known as self-regulation (Tangney et al., 2018). Prior research suggests that self-regulation has the potential to mitigate the adverse effects of addictive behaviours (Geng et al., 2021). A recent research indicates that possessing exceptional self-regulation is associated with both well-being and flexible behaviour (De Ridder & Gillebaart, 2017; Servidio, 2021). Another recent study investigated the correlation between problematic smartphone usage and self-regulation in the context of stress (Cho et al., 2017). Self-regulation requires the capacity to prioritise and maintain focus on set goals in the face of distractions since people frequently have multiple intended outcomes or goals at once (Parent et al., 2022). The results indicated that the relationship was mediated by self-regulation, suggesting that self-regulation can be considered a protective factor as it decreased with increasing stress. A longitudinal study conducted by Kim and Shin (2016) found that self-control can reduce the link between academic stress and smartphone addiction. Efficient self-regulation fosters individual and communal development, while inadequate self-regulation can lead to difficulties in adapting, below-average academic achievement, diminished well-being, and a range of other problems (Bassi et al., 2023; De Ridder & Gillebaart, 2017). Individuals with robust self-discipline and drive demonstrate superior performance compared to their peers when utilising online platforms (Salmon et al., 2017). A person's lack of self-control is the main factor behind addictive behaviours. This lack of self-control also leads to difficulties in managing impulses for addictive substances and the development of addictive behaviours (Köpetz et al., 2013; Zhang et al., 2022). The subsequent hypotheses are proposed:

- H_{2a}: Self-regulation has a significant positive correlation with addictive smartphone use.
- H_{2b}: There is a significant positive association between self-regulation and Gen Z users' social media usage behaviour.
- H_{2c}: Gen Z users' addictive smartphone use mediates the relationship between self-regulation and social media usage behaviour.

2.4 Gen Z Users' Addictive Smartphone Use and Social Media Usage Behaviour

University students, as educated emerging adults, generally consider their smartphones essential to their identity and lifestyle (Long et al., 2016). Smartphone usage significantly affects several aspects of young individuals' daily routines, rendering them more inclined than other age cohorts to own the latest technological advancements (Parasuraman et al., 2017). Due to its versatility and ability to serve both practical and recreational purposes, mobile phones are used by a wide range of users to meet a variety of needs, which raises the risk of mobile phone addiction (Zhang et al., 2022). Based on prior empirical studies on smartphone addiction and content consumption (Jeong et al., 2016), it has been found that smartphone users mostly utilise their devices for activities such as online gaming, social networking sites, academic study, and entertainment (Abbasi et al., 2021; Jeong et al., 2016). Lin et al. (2016) define smartphone addiction as a condition marked by compulsive and problematic usage patterns, an inability to effectively regulate or control smartphone use, the experience of unpleasant withdrawal symptoms, increased tolerance with prolonged use, and impaired functioning. Furthermore, when a person's need for belonging is low, a fear of missing out on a fulfilling social experience may arise. This worry may then drive people to communicate on social media to satiate their need for belonging (Roberts & David, 2020). Social media use affects study habits and has the potential to divert attention from studying (Van Den Beemt et al., 2020). However, prior studies on social media use in higher education have demonstrated that it may be used to improve academic success and enrich traditional learning while also fostering student collaboration and participation (Awidi et al., 2019; Manca, 2020). Global healthcare students mostly use mobile technology to access social

media platforms for personal and educational objectives (Lee et al., 2018; Vizcaya-Moreno & Pérez-Cañaveras, 2020). The following hypothesis is proposed:

H₃: The addictive use of smartphones by Gen Z users is directly correlated with their usage of social media behaviour.

2.5 The Moderating Role of Academic Performance

The academic performance of students might be hindered and their aims may be impeded by factors such as their proficiency in time management, their dependence on smartphones and social media, as well as the Fear of Missing Out (FoMO) phenomenon (Gupta & Sharma, 2021). Additional research has shown that excessive smartphone use has a negative impact on academic achievement (Amez & Baert, 2020; Baert et al., 2020; Khan et al., 2019). Nevertheless, a study by Khan et al. (2019) has demonstrated that students with proficient time management skills tend to derive advantages from using smartphones. Individuals who excel in their endeavours possess the ability to limit their usage of smartphones and efficiently allocate their time (Jin et al., 2015). Gen Z exhibits a preference for active learning methodologies such as observation and hands-on practice, as opposed to traditional teaching approaches (Vizcaya-Moreno & Pérez-Cañaveras, 2020; Williams, 2019). Rather than literature, they expect the advent of technology (Williams, 2019). Gen Z students prefer to engage in concise communication, a preference that is facilitated by social media platforms. Additionally, they expect to receive prompt responses (Vizcaya-Moreno & Pérez-Cañaveras, 2020; Williams, 2019). The advantages are mostly associated with the availability of course materials, video clips, instructional notes, and other resources. Typically, students perceive mobile devices and social media as the most cost-effective and convenient means to get relevant information (Ansari & Khan, 2020). Online and virtual education may lead to increased dependence on electronic gadgets among higher education students, potentially resulting in smartphone addiction (Rathakrishnan et al., 2021). Hence, a student's excessive smartphone usage can be regulated by their academic performance. The following hypotheses are proposed as:

H_{4a}: Gen Zs' academic performance has a significant positive association with social media usage behaviour.

H_{4b}: Gen Zs' academic performance significantly moderates the relationship between Gen Z users' addictive smartphone use and social media usage behaviour.

The literature review and the suggested constructs served as the foundation for the conceptual framework that is shown in Figure 1.

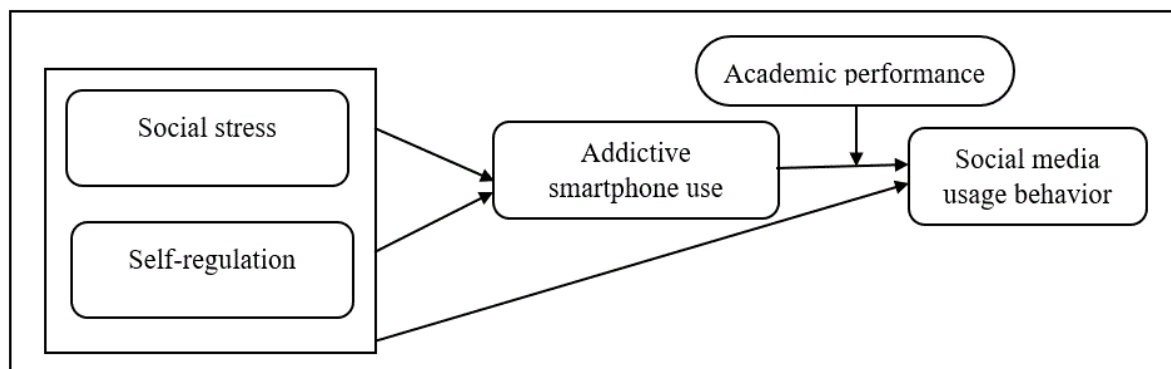


Figure 1. A Proposed Conceptual Framework

3. RESEARCH METHODOLOGY

3.1 Sampling, Questionnaire Development, and Data Collection

The survey included individuals from Gen Z, a cohort predominantly composed of higher education students, who possess a higher level of technological proficiency compared to prior generations. The first part of the process involved selecting the universities using a systematic random sampling method. The admission of students to each chosen university in Dhaka was set proportionally to the overall population. After examining eight different universities in Dhaka city, we chose four public and four private universities. Dhaka University, Jahangirnagar University, Bangladesh University of Professionals, and Sher-E-Bangla Agricultural University have been chosen as public universities. North South University, East West University, BRAC University, and Daffodil International University were selected as the private universities. Classes and semesters were chosen at random from among all undergraduate candidates in the second phase, ranging from first-year to fourth-year students, and master's programme (MBA/MSc). The researchers employed the non-probability, purposive sampling technique (Easterby-Smith et al., 2021). The primary data was collected using a self-administered structured questionnaire method. The data collection techniques were supported by three research assistants. The main period for collecting data, they spanned from September 2023 to November 2023. Information was collected through a variety of techniques. Both digital and traditional technologies were utilised. Participants in the offline mode were invited to participate in the survey and given a consent form in person during an in-person interview. The hard copies of the questionnaire were then distributed.

In addition, online methods such as email survey links and Google Classroom posts were used to collect primary data. In order to carry out this study, a sample of 1500 students were selected at random. A total of 139 survey replies were excluded from the set of 841 completed surveys due to errors made by the respondents while filling out the questionnaire. The survey research achieved a response rate of 56.06%, which is considered sufficient. This was based on the inclusion of 841 replies in the data analysis. The '10 times rule of thumb', which states that the minimum sample size should be 10 times the complexity of the relationships in the research model (Goodhue et al., 2012; Hair et al., 2011). Additionally, the sample size is adequate to analyse PLS-SEM results (Chin, 1998). Table 1 displays the respondents' complete demographic profile. The male respondents constituted 50.06% of the total, and the female respondents comprised 49.94%. Among the respondents, 21.52% were at an MBA/MSc level, 21.40% were 4th-year students, and 20.21% were 3rd-year students. The bulk of the respondents reported spending 5-7 hours a day on social media platforms, with 26.16% of the respondents falling into this category. 25.09% of the respondents spent more than 7 hours of their time.

Table 1 Demographic Profile of the Respondents

Particulars	Category	Frequency	Percentage (%)
Gender	Male	421	50.06%
	Female	420	49.94%
Level of education	1 st year	150	17.83%
	2 nd year	160	19.02%
	3 rd year	170	20.21%
	4 th year	180	21.40%
Time spends on social media platforms [daily]	MBA/MSc	181	21.52%
	1-3 hours	210	24.97%
	3-5 hours	200	23.78%
	5-7 hours	220	26.16%
	More than 7 hours	211	25.09%

3.2 Measures and Scaling

There are two sections on the survey questionnaire. The initial segment will encompass the demographic attributes of the participants, including their gender, education level, and daily social media usage duration. The second section will encompass information regarding user social stress, self-regulation, addictive smartphone use, social media use, and academic performance. The researchers assessed the variables of this study by employing standard scales and modifying them to fit the specific study environment. The ratings for each item associated with the constructs were assessed using a five-point Likert scale, with '1' indicating strongly disagree and '5' indicating strongly agree. The measurement items; Carleton et al. (2006) work inspired the ten-item measurement of social stress. The nine-item measurement was adapted from Diehl et al. (2006). Besides, the ten-item measurement of addictive smartphone use was adapted from Bianchi and Phillips (2005). The six-item measurement of social media use was adapted from Andreassen et al. (2012). The study also used academic performance as a moderator construct, whereas the four-item measurement was adapted from Bian and Leung (2014), Chiu (2014), and Srivastava (2005).

3.3 Data Analysis

The hypotheses of this study were assessed using SmartPLS and Partial Least Square Structural Equation Modelling (PLS-SEM). According to Hair Jr et al. (2021), PLS-SEM demonstrated superior statistical power in comprehending the linkages between construct paths. The researcher employed a two-step process consisting of assessing the measurement model for construct reliability and validity, and evaluating the structural model for predictive power and hypotheses in the research model. Hair et al. (2010) confirm the validity of the multivariate assumptions, which include the absence of data outliers and multi-collinearity issues, as well as the presence of linearity and normal distribution, and adequate sample size. Nevertheless, this analysis could not identify any outlier, since all the Mahalanobis-D squared distances (D^2) remained below the specified threshold level (Hair et al., 2010). The study examined Harman's single-factor model, which consisted of nine constructs (SOS, SER, ASU, SMU, and ACP), and a total of 39 scale items.

This model was chosen based on the recommendations of Harman (1976) and Podsakoff et al. (2003). Nevertheless, no single component was identified as the primary construct accounting for 16.16% of the variation, a value that falls below the 50% threshold suggested by Podsakoff et al. (2003). To further verify the validity and dependability of the model, the researchers carefully examined the Common Method Bias (CMB). The Variance-Inflation Factor (VIF) was utilised in this investigation to evaluate the existence of multi-collinearity between latent variables and to quantify tolerance.

Table 2 indicates that VIF values below 3.3 are considered the threshold level, which aligns with the results of the previous study (Kock, 2015). The VIF analysis in this study supports previous research by demonstrating the absence of CMB or collinearity.

Table 2 Full Collinearity Statistics (Variance-Inflation Factor - VIF)

Item	VIF	Item	VIF	Item	VIF
ACP1	1.362	SMU1	1.119	SER3	1.225
ACP2	1.334	SMU2	1.074	SER4	1.248
ACP3	1.355	SMU3	1.117	SER5	1.126
ACP4	1.283	SMU4	1.170	SER8	1.103
ASU10	1.162	SMU5	1.152	SOS9	1.291
ASU2	1.193	SOS1	1.229	ACP x ASU	1.000

Item	VIF	Item	VIF	Item	VIF
ASU3	1.299	SOS10	1.203	ASU6	1.565
ASU4	1.259	SOS3	1.308	ASU7	1.538
ASU8	1.455	SOS6	1.299	SOS7	1.217
SOS8	1.264				

4. RESEARCH RESULTS

To validate the complex model with numerous dependent variables, PLS-SEM is used to examine both dependent and independent variables to maximise the explained variances using an estimation approach. SmartPLS is utilised to evaluate structural correlations and conduct Confirmatory Factor Analysis (CFA).

4.1 Assessment of Measurement Model

Hair Jr et al. (2021) report that the investigator evaluated the outer measurement model. Table 3 shows the measurement's construct reliability was assessed using Cronbach's alpha (α), rho_A, and Composite Reliability (CR). Meanwhile, the convergent validity of the measure was assessed using Average Variance Extracted (AVE) and cross-loading techniques. The Fornell-Larcker criterion model (see Table 4) and Heterotrait-Monotrait (HTMT) ratio (see Table 5) were employed to assess the discriminant validity of the analysis, in contrast. Hair Jr et al. (2021) examined the measuring model's reliability, convergent validity, and discriminant validity with respect to the study constructs. Table 3 displays item factor loadings, Cronbach's alpha (α), CR, and AVE. To meet the criteria, factor loadings below 0.5 were eliminated. SOS2, SO4, SER1, SER2, SER9, ASU1, ASU9, SMU2, and SMU6 were eliminated during the data analysis stage. Cronbach's alpha values ranged from 0.700 to 0.778, exceeding Hair Jr et al. (2021)'s cut-off values. CR was 0.707 to 0.748, above Hair Jr et al. (2021)'s recommended value. This study's AVE values ranged from 0.504 to 0.562, exceeding Fornell and Larcker (1981)'s 0.50 cut-off value.

Table 3 Construct Reliability and Validity and the Results of the Outer Model

Construct	Measurement Items	Loadings	α	rho_A	CR	AVE	R ²						
Social stress	SOS1	0.530	0.724	0.729	0.803	0.539							
	SOS3	0.648											
	SOS5	0.554											
	SOS6	0.620											
	SOS7	0.627											
	SOS8	0.571											
	SOS9	0.557											
	SOS10	0.540											
	Self-regulation	SER3						0.501	0.734	0.742	0.727	0.504	
		SER4						0.593					
SER5		0.700											
SER8		0.724											
Addictive smartphone use	ASU2	0.553	0.744	0.744	0.817	0.562	0.357						
	ASU3	0.577											
	ASU4	0.548											
	ASU5	0.535											
	ASU6	0.697											
	ASU7	0.700											
	ASU8	0.660											
	ASU10	0.508											
	Social media usage behaviour	SMU1						0.648	0.748	0.751	0.730	0.553	0.490
		SMU3						0.654					
SMU4		0.614											

Construct	Measurement Items	Loadings	α	rho_A	CR	AVE	R ²
	SMU5	0.543					
Academic performance	ACP1	0.769	0.707	0.713	0.819	0.531	
	ACP2	0.692					
	ACP3	0.731					
	ACP4	0.721					

Table 4 presents the computed value within the threshold level based on the measurement of Fornell and Larcker (1981) and the HTMT ratio. Thus, the measurement model's discriminant validity and reliability have been verified.

Table 4 Discriminant Validity (Fornell-Larcker Criterion Model)

Construct	1	2	3	4	5
1. Academic performance (ACP)	0.729				
2. Addictive smartphone uses (ASU)	0.464	0.602			
3. Self-regulation (SER)	0.153	0.307	0.636		
4. Social media usage (SMU)	0.376	0.481	0.479	0.594	
5. Social stress (SOS)	0.331	0.484	0.342	0.373	0.582

The HTMT ratio of correlations, as evaluated by Henseler et al. (2015) was used to determine the discriminant validity of the measurement model. The discriminant validity of the HTMT ratio is questionable if it exceeds 0.90, as recommended by Gold et al. (2001), or 0.85, as recommended by Kline (2015). The HTMT output values are unbiased and deemed acceptable in Table 5.

Table 5 HTMT Ratio

Construct	ACP	ASU	SER	SMU	SOS	ACP x ASU
ACP						
ASU	0.642					
SER	0.239	0.454				
SMU	0.612	0.736	0.794			
SOS	0.458	0.644	0.494	0.545		
ACP x ASU	0.389	0.320	0.204	0.145	0.361	

4.2 Assessment of Structural Model

Henseler et al. (2015) calculate a structural model's explanatory power by multiplying the squared multiple correlations (R²) by the path coefficients' significance level. SmartPLS provides an analysis of the overall goodness-of-fit index, as well as the validity of the model by examining R² and the structural path of the regression model (Chin, 1998). The analysis's results elucidate the data substantiating the hypotheses of the model. The research shows that there is a substantial positive relationship between Gen Z's addictive smartphone use and social media usage behaviour. This relationship is supported by a p-value of less than 0.05. The constructs social stress and self-regulation together explain roughly 35.7% of the variation in social media usage behaviour. The standardised path coefficient between the dependent variable addictive smartphone use and social media usage behaviour, when utilising them, was 0.357. The model accounted for R² at a rate of 49.0%, which is higher than the recommended significance level of 0.20 (Yang & Peterson, 2004). Hence, the model's overall endurance is exceptional.

Table 6 Structural Path Analysis and Hypotheses Testing

Structural paths		Path coefficients (β)	t-value	p-value	f-square	Effect size	LLCI	ULCI	Decision
H _{1a}	SOS -> ASU	0.429	9.269	0.000	0.219	Moderate	0.331	0.515	Accepted
H _b	SOS -> SMU	0.090	2.378	0.017	0.009	Minor	0.127	0.279	Accepted
H _{2a}	SER -> ASU	0.160	3.586	0.000	0.031	Minor	0.217	0.384	Accepted
H _{2b}	SER -> SMU	0.330	8.349	0.000	0.146	Minor	0.348	0.513	Accepted
H ₃	ASU -> SMU	0.266	5.808	0.000	0.074	Minor	0.175	0.354	Accepted
H _{4a}	ACP -> SMU	0.201	3.478	0.001	0.049	Minor	0.086	0.314	Accepted
H _{4b}	ACP x ASU -> SMU	-0.048	1.467	0.142	0.010	Minor	-0.105	0.024	Rejected

The path coefficient of the study model was calculated via bootstrapping, which involved generating 5000 t-values and p-values (Hair et al., 2020). The findings of the hypotheses are displayed in Table 6 following the utilisation of PLS-SEM output to determine the statistical significance of the theoretical model using SmartPLS.

Table 6 shows that hypotheses H_{1a} and H_{1b} were accepted, and the impact of social stress on addictive smartphone uses ($\beta = 0.429$, $t = 9.269$, and $p = 0.000$) and social media usage ($\beta=0.090$, $t=2.378$, $p=0.017$) were significant. Besides, H_{2a} and H_{2b} the outputs showed that self-regulation had a significant influence on addictive smartphone uses ($\beta=0.160$, $t=3.586$, $p=0.000$) and social media usage ($\beta=0.330$, $t=8.349$, $p=0.000$) that supported the proposed hypotheses. Furthermore, addictive smartphone uses had a positive effect on social media usage, and H₃ was found to be statistically significant and positive, supporting the proposed hypothesis ($\beta=0.266$, $t=5.808$, $p=0.000$). In addition, academic performance had also a positive effect on social media usage, and H_{4a} was found statistically significant and supported the proposed hypothesis ($\beta=0.201$, $t=3.478$, $p=0.001$). Finally, the moderating construct, academic performance was found not statistically significant, and the proposed hypothesis H_{4b} was rejected ($\beta=-0.048$, $t=1.467$, $p=0.010$). In addition, the effect size (f^2) was examined. The f^2 values for the significant independent variables were 0.02, 0.15, and 0.35, which indicated minor, moderate, and significant effects, respectively (Cohen, 1992). As effect sizes f^2 control the representative impact of several variables in the research model, the effect's magnitude is crucial (Henseler et al., 2015). As shown in Table 6, the model's effect size range was between 0.009 and 0.219.

4.5 Testing of Mediation Effects

The results of the study's mediation are presented in Table 7, illustrating the extent to which Generation Z consumers' smartphone addiction has been communicated. The bootstrapping analysis has revealed the indirect impacts of social stress ($\beta=0.114$, $t=4.819$, $p=0.000$) and self-regulation ($\beta=0.043$, $t=2.842$, $p=0.005$). The bias-corrected 95% confidence intervals (CI) for the indirect effects of SOS (LLCI=0.072, ULCI=0.164) and self-regulation (LLCI=0.017, ULCI=0.076) do not fall within the range of 0 and 1. This suggests that there is mediation, as stated by Preacher and Hayes (2008). The relationships between social stress and self-regulation among Generation Z users are mediated by their addiction to smartphone usage, as evidenced by the indirect consequences of the significant level in mediation tests. The proposed linkages between H_{1c} and H_{2c} are also substantiated by these findings.

Table 7 Structural Paths of Mediation Effects

Hypothesis	Structural paths	Path coefficients (β)	t-value	p-value	Confidence interval (CI)		Decision
					LLCI	ULCI	
H _{1c}	SOS -> ASU -> SMU	0.114	4.819	0.000	0.072	0.164	Accepted
H _{2c}	SER -> ASU -> SMU	0.043	2.842	0.005	0.017	0.076	Accepted

4.6 Testing of Moderation Effects

The study's moderating results are displayed in Table 8; highlighting the level at which Gen Z users' smartphone addiction has been conveyed. The bootstrapping analysis has identified the moderation connection, H_{4b} , ($\beta=-0.048$, $t=1.467$, $p=0.142$). The effect size, also known as f-square, was determined to be 0.010, indicating a small magnitude. The bias-corrected 95% confidence intervals (CI) for the moderation effects of LLCI= -0.105, and ULCI=0.024. The study findings indicated that the postulated hypothesis H_{4b} did not provide evidence for the presence of a moderation effect.

Table 8 Structural Paths of Moderation Effects

Hypothesis	Structural paths	Path coefficients (β)	t-value	p-value	Confidence interval (CI)		Decision
					LLCI	ULCI	
H_{4b}	ACP x ASU -> SMU	-0.048	1.467	0.142	-0.105	0.024	Rejected

5. DISCUSSIONS AND IMPLICATIONS

This study examines the impact of social stress, self-regulation, addictive smartphone use, social media usage behaviour, and the moderating effect of academic performance on university students belonging to Gen Z. To accomplish this goal, the authors put out a theoretical framework to examine these relationships. This study focuses on the correlation between social stress and the mediating role of addiction to smartphone use and social media usage behaviour. University students often develop a dependency on mobile phones as a means of escaping from family and emotional pressures. This addiction serves to relieve the negative emotions and experiences associated with academic life (Chiu, 2014). The proposed hypotheses H_{1a} and H_{1b} identified statistically significant positive associations (Berger et al., 2018; Chicca & Shellenbarger, 2018; Hawk et al., 2019; Pera, 2020). In addition, the mediating indirect effects analysis revealed a substantial positive link between addictive smartphone use, social stress, and social media consumption behaviour, supporting the presented hypothesis H_{1c} . Individuals exhibiting insecure attachment dimensions may develop problematic smartphone usage as a result of challenges in managing stress and managing one's emotions with relationship issues (Parent et al., 2022).

In addition, the study addresses the function of self-regulation and the mediating role of addiction to smartphones and social media usage behaviour. The study findings revealed that the proposed hypotheses H_{2a} , H_{2b} , and H_{2c} were supported. The current study's findings demonstrated outcomes that were similar to earlier research (Bassi et al., 2021; Cho et al., 2017; Geng et al., 2021; Parent et al., 2022; Zhang et al., 2022). Additional research conducted in South Korea and Lebanon revealed a correlation between reduced self-control, higher stress levels, and increased smartphone addiction (Jeong et al., 2016; Samaha & Hawi, 2016). On the other hand, in their study on addictive smartphone activity, Van Deursen et al. (2015) discovered a negative correlation between self-regulation and addictive smartphone behaviour.

The investigation also looks at the impact of addictive smartphone use and social media usage behaviour. The proposed hypothesis H_3 was validated by the study's findings. The current study's findings demonstrated outcomes that were in line with earlier research (Abbasi et al., 2021; Jeong et al., 2016; Lee et al., 2018; Van Den Beemt et al., 2020; Vizcaya-Moreno & Pérez-Cañaveras, 2020). Moreover, if an individual's desire for social connection is lacking, they may have apprehension about not being able to participate in a satisfying social encounter. Subsequently, individuals may resort to utilising social media platforms as a means to fulfill their desire for a sense of belonging, prompted by this concern (Roberts & David, 2020). The excessive use of social media can yield both advantageous and harmful consequences on students' academic achievements, social relationships, and well-being (Jha et al., 2016).

Moreover, the study findings indicated that addictive smartphone use has a significant positive association with Gen Z users' social media usage behaviour. That supported the proposed hypothesis H_{4a}. Besides, our investigation revealed that the academic performance of Gen Z did not support the stated hypothesis H_{4b}. The previous literature also demonstrated consistent findings with the current studied results (Amez & Baert, 2020; Baert et al., 2020; Khan et al., 2019). Our findings confirmed multiple studies that showed a detrimental correlation between academic achievement and the utilisation of smartphones and engagement with social media (Kibona & Mgya, 2015). Furthermore, in a separate study conducted by Wentworth and Middleton (2014), it was discovered that students who allocated a greater amount of time to utilising technology also allocated less time to study. This correlation was proven to have a significant adverse impact on their academic performance (Karpinski et al., 2013; Lepp et al., 2014; Tindell & Bohlander, 2012).

5.1 Theoretical Implications

The results of this investigation add to this field in several ways. Firstly, drawing on the ambiguous results of earlier studies, which are thought to be potential research gaps, a conceptual model that distinguishes addictive smartphone and social media usage behaviour. Secondly, the majority of social media studies have concentrated on Gen Z's active usage of social media and any potential negative effects social media poses to this generation (Liu et al., 2021; Marciano et al., 2022). The moderating effect of academic performance on the prediction of these patterns among Gen Z students is yet to be examined. Thirdly, this study incorporates variables such as self-regulation & social stress. Deficits in self-regulation have been widely recognised as a substantial threat to the emergence of addictive smartphone use (Parent et al., 2022; Van Deursen et al., 2015). Moreover, it has been theorised, that perceived stress is a key 'fuse' for the development of mobile phone addiction since it predicts harmful behaviour (Parent et al., 2022). These attributes were examined using an online survey and an SEM approach. Lastly, the study findings contribute thus, by using Bandura's Social Cognitive Theory as a framework with a focus on social cognitive and psychological determinants (Kara et al., 2021; Vinnikova et al., 2020), the degree to which social stress, self-regulation, addictive smartphone use and social media usage behaviour relationship among Gen Z in a developing country context, Bangladesh.

5.2 Practical Implications

This study provides unique and practical consequences. To improve the influence of smartphone, use on students' academic performance, it first gives educators knowledge about the kinds of smartphone use that can result in addiction and how to lessen it. Educators can serve as exemplars in discouraging the negative aspects of smartphone usage. In contemporary times, students are experiencing a greater prevalence of psychological disorders compared to earlier generations, leading to an increased reliance on smartphone usage and a greater inclination towards embracing social media platforms. To support adaptive functioning, parents and teachers should be acutely aware of how their children feel when they are under stress and work to create an atmosphere that is relatively less stressful for them. According to previous studies, social media platforms could expose younger users to hazards like increased reliance, improper content exposure, and anti-social behaviour (Al-Samarraie et al., 2022).

However, using social media for educational purposes, regardless of how much time is spent online, can greatly improve students' perceptions of their academic success. The participants in this study have made it quite evident that they would rather learn using contemporary technological means than the more conventional approaches and social media usage can be an effective example of it. Furthermore, social media engagement that includes tools, materials, and themes that promote students' learning should be encouraged in a university curriculum. As a

result, educational institutions ought to offer a venue like this where students' intellectual abilities can flourish. According to the empirical inquiry, students' use of social media communication devices and their involvement with the material makes it easier for them to share the contents of teaching materials with others and retrieve knowledge in real time. In general, this generation utilises electronic devices as protection to evade stress and exert control over their self-regulation. Overall, it appears to be quite challenging to diminish the reliance on smartphones and decrease the amount of time spent on social media.

6. CONCLUSION

The results obtained from our research make a valuable contribution to the existing literature concerning the research on social stress, self-regulation, smartphone addiction, social media behaviour, and the academic performance of Gen Z users. Even though earlier research explored the relationship in a few different ways, it did not emphasise the constructs cumulatively, particularly from the perspective of emerging nations. Moreover, smartphones enhance convenience in our lives. However, this study has identified two specific constructs that indicate addictive smartphone usage patterns. These structures have been proven to have a significant positive correlation with smartphone use. Relying on social media is justifiable given the psychosocial concerns highlighted in the study results. The detrimental utilisation of smartphones and social media has a significant impact on academic performance; however, the study data indicate that the proposed moderating hypothesis was not supported. The authors also highlighted the issue of modern-day life distractions and suggested that doing additional studies in the field of literature will aid in understanding the impact of smartphone devices and related instruments on the development of social anxiety in young individuals. Due to the novelty of smartphones, there is a scarcity of previous research examining the relationship between smartphone addictions, and psychosocial stress; the study is subject to various limitations.

First, there is a lack of generalisability in the study; data from a larger sample of Bangladesh's Gen Z and other generational cohorts living outside of the Dhaka region might be used in future research. Additionally, the authors modified the items from earlier research and conducted a self-administered questionnaire survey. There could be prejudice in responses.

Second, the study only examined two constructs to quantify the link between addictive smartphone use and compulsive social media use. In addition, the constructs of depression, anxiety, loneliness, aggression, life satisfaction, and other psychosocial constructions will be utilised to assess the link. Moreover, additional moderating and mediating constructs might be assessed in subsequent research to reinforce the connections between independent and dependent components.

Thirdly, the current research is quantitative and cross-sectional in design. Moreover, a thorough qualitative, longitudinal, and cross-cultural study might be included. The authors proposed promoting further qualitative research to emphasise the specific psycho-social challenges the youngest group faces. Finally, while gender disparities were not specified, the survey findings indicate the overall characteristics of Gen Z users. Additional research can examine this issue.

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