

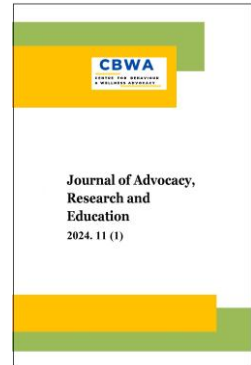


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Technostress and Determinants of Academic Success among University Students: Mediation Role of Technological Literacy

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Abstract

Technology integration has become pervasive in the constantly evolving domain of education, presenting diverse avenues for learning and engagement among university students. However, amidst these benefits, technology's widespread use also brings challenges, with technostress emerging as a prominent concern. This research aims to assess the impact of technostress on students' academic motivation and psychological well-being while concurrently exploring the mediating influence of technological literacy. Using a time-lagged cross-sectional design, data on technostress, academic motivation, psychological well-being and technological literacy were gathered from 349 university students. Data analysis was conducted using JASP software with Bootstrap resampling of 5,000 replications. Findings from the study revealed a negative impact of technostress on determinants of academic success (academic motivation and psychological well-being) among students. Technological literacy was also identified as a partial mediator of the adverse effects of technostress on the determinants of academic success (academic motivation and psychological well-being). These findings have implications beyond academia, offering valuable insights for educators, policymakers, and mental health professionals. Recognising the crucial role of technological literacy in mitigating the adverse effects of technostress enables the development of effective interventions aimed at empowering students to enhance their academic motivation and psychological well-being.

Keywords: Academic Motivation, Academic Success, Psychological Well-being, Technological literacy, Technostress, University students.

1. Introduction

Scholarly attention has increasingly shifted towards identifying the factors predicting university students' academic success (Whelan et al., 2022). These determinants are instrumental in shaping the future achievements of students. Vallone et al. (2023) emphasised that elucidating these determinants is crucial for enhancing student success within the higher educational context. Academic motivation and psychological well-being have emerged as significant determinants of students' academic success (Consiglio et al., 2023; Peng, 2021). Focusing on these factors is

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significant for developing comprehensive strategies to promote student success and well-being in academic settings.

Academic motivation is a fundamental predictor of student success (Hu, Luo, 2021). This multifaceted construct encapsulates both internal cognitive processes and external environmental factors that drive, guide, and maintain students' actions toward academic objectives. Interest in understanding the dynamics of student academic motivation has surged, drawing considerable attention from intellectuals and researchers alike (Asad et al., 2023; Rey-Merchán, López-Arquillos, 2022). This heightened interest can be attributed to the profound impact of academic motivation on students' levels of engagement, perseverance, and academic accomplishments (Consiglio et al., 2023).

Similarly, psychological well-being is critical in shaping students' academic success (Peng, 2021). Psychological well-being encompasses various mental and emotional health dimensions, including life satisfaction, sense of purpose, resilience, and quality of interpersonal relationships (Addai et al., 2023; Peng, 2021). Recognizing the interconnectedness of academic motivation and psychological well-being is essential for cultivating a supportive learning environment conducive to students' holistic development and academic achievement (Hu, Luo, 2021). Since the emergence of academic motivation and psychological well-being as prominent research areas, scholars have diligently sought to identify the predictors of these crucial determinants of student performance (Upadhyaya, Vrinda, 2021). However, researchers studying factors affecting academic motivation and psychological well-being, especially in Ghana, have largely overlooked technostress despite its significance as a pressing concern among students.

This oversight is particularly significant given the limited empirical research addressing how technostress impacts academic motivation and psychological well-being (Peng, 2021; Rey-Merchán, López-Arquillos, 2022). Consequently, scholars have highlighted the imperative need to investigate the influence of technostress on these pivotal determinants of academic success. This study thus represents a modest endeavour to bridge this research gap and address this critical lacuna in the existing literature. Moreover, existing empirical investigations on technostress among students have predominantly adopted a main effects approach to examine the impact of technostress on academic success determinants (Rey-Merchán, López-Arquillos, 2022; Tinmaz, 2022). However, these studies have tended to overlook the potential influence of various personal and contextual factors that may mitigate the relationship between technostress and determinants of academic success.

Recent studies (Asad et al., 2023; Upadhyaya, Vrinda, 2021) in the domain of technostress and determinants of students' performance have ventured beyond the main effect relationship. They have begun to explore alternative explanatory mechanisms underlying this relationship. Remarkably, these studies have highlighted the importance of considering additional personal and contextual variables that may mediate the relationship between technostress and academic success determinants (Tinmaz, 2022; Whelan et al., 2022). Thus, there is a growing recognition of the need to investigate further diverse factors that may elucidate the relationship between technostress and students' performance determinants.

In light of this, the present research adopts a novel approach by introducing technology literacy as a mediating variable. This innovative perspective aims to enhance our understanding of the association between technostress and determinants of student success. By examining the role of technology literacy in mediating the effect of technostress on academic motivation and psychological well-being, this study aims to reveal detailed insights into the complex interplay of technostress within the academic context. Through this exploration, we aim to contribute to the existing body of knowledge by offering fresh perspectives and shedding light on previously unexplored avenues through which technostress influences students' academic experiences and outcomes.

2. Literature review and hypothesised predictions

Technostress

In an era defined by rapid technological advancements, the integration of technology into educational environments has become ubiquitous, with promises of enhanced learning experiences and improved academic outcomes (Peng, 2021). However, alongside these advancements comes a growing concern regarding the negative impact of technology use, particularly among university students who are increasingly reliant on technology for their academic pursuits. This growing

concern has given rise to the concept of technostress (Upadhyaya, Vrinda, 2021). Technostress refers to the negative psychological and physiological reactions that individuals experience as a result of their interaction with technology (Asad et al., 2023). It encompasses feelings of frustration, anxiety, and overwhelm stemming from constant exposure to digital devices (Tinmaz, 2022).

There are numerous sources of technostress among students in higher institutions. One primary source of technostress is overwhelmed exposure to emails, notifications, and online information to manage daily (Whelan et al., 2022). This perpetual bombardment of digital stimuli can lead to feelings of anxiety, distraction, and cognitive overload, ultimately hindering students' ability to concentrate effectively on their academic tasks (Masluk et al., 2023). Additionally, the rapid pace of technological innovation and frequent updates to software and hardware can contribute to technostress among students (Hu, Luo, 2021). Many students struggle to keep up with the latest technological advancements and adapt to new digital tools and platforms introduced in academia. This constant need to learn and master new technologies can create frustration, inadequacy, and apprehension, particularly for students with little knowledge of technology (Hu, Luo, 2021).

Determinants of Academic Success

Academic motivation

Academic motivation refers to individuals' drive, desire, and commitment towards engaging in academic tasks (Mahapatra et al., 2023). It encompasses the internal processes and external factors that energise, direct, and sustain students' behaviour towards learning and academic endeavours (Whelan et al., 2022). Academic motivation can be categorised into intrinsic and extrinsic motivation (Mahapatra et al., 2023). Intrinsic motivation is characterised by students' internal desire for learning and personal growth, while extrinsic motivation involves external rewards or consequences influencing students' behaviour (Boyer-Davis et al., 2023). Various factors contribute to academic motivation, including students' self-efficacy beliefs, goal orientation, perceived autonomy, and the perceived value of academic tasks. Academic motivation is essential for student success and achievement because it influences students' engagement in learning activities and persistence in facing challenges (Saleem et al., 2024). It also fosters a strong internal desire in students to engage in academic tasks and achieve academic success (Upadhyaya, Vrinda, 2021).

Psychological well-being

Psychological well-being among students encompasses their overall satisfaction with life, sense of purpose, ability to handle challenges, and the quality of their relationships (Dragano, Lunau, 2020). It is a multidimensional construct involving both subjective experiences and objective indicators of mental health and well-being (Ioannou et al., 2024). This well-being is crucial for students' overall quality of life, academic success, and achievement (Galvin et al., 2022). They are better equipped to manage stress, cope with academic challenges, and maintain a positive attitude towards learning (Masluk et al., 2023). Students with high levels of psychological well-being can more effectively engage in their studies, develop meaningful relationships, and thrive academically and personally (Schauffel et al., 2022). Educators, parents, and institutions play a crucial role in promoting psychological well-being among students by providing support, fostering positive relationships, and offering resources for mental health and wellness (Sommovigo et al., 2023).

Technostress and determinants of academic success

Existing research has demonstrated a strong negative correlation between technostress and students' academic performance (Mahapatra et al., 2023; Schettino et al., 2022). Technostress can significantly impact the determinants of academic success, namely psychological well-being and academic motivation, in two main ways. Firstly, technostress often arises from factors such as information overload, constant interruptions, and the rapid evolution of technology (Dragano, Lunau, 2020). This can overwhelm students, leading to feelings of anxiety, frustration, and cognitive exhaustion, thereby undermining their psychological well-being and diminishing their academic motivation (Asad et al., 2023; Schettino et al., 2022). Secondly, technical glitches, software errors, and connectivity issues are commonplace when using digital tools and online platforms for academic purposes (Masluk et al., 2023). Dealing with such technological malfunctions can be frustrating and time-consuming, resulting in increased stress levels and decreased motivation to engage in academic activities (Ioannou et al., 2024). Moreover, the unpredictability of technology and the uncertainty surrounding the successful completion of

academic tasks using technology may further exacerbate students' anxiety and undermine their confidence in their ability to achieve academic success.

According to Saleem et al. (2024), technostress is a determining factor in students' motivation levels in higher education institutions. Technostress has been found to significantly impact academic motivation, influencing students' drive, enthusiasm, and commitment to engage in academic tasks and pursue their educational goals (Boyer-Davis et al., 2023). Researchers who support this view argue that technostress-induced information overload may diminish students' motivation to seek out additional resources, conduct research, or explore new topics, as they may perceive such tasks as daunting and mentally exhausting (Upadhyaya, Vrinda, 2021; Vallone et al., 2023). Supporting this perspective, a study by Saleem et al. (2024) indicated a significant negative association between technostress and academic motivation.

Prior research has established a positive correlation between psychological well-being and academic performance, underscoring its significance in determining student academic success (Galvin et al., 2022). Technostress can lead to information overload, characterised by an excessive influx of digital information that surpasses students' cognitive capacity to process and absorb academic activities (Masluk et al., 2023; Schaufel et al., 2022). This overload can result in cognitive strain, hindering students' ability to concentrate, retain information, and make effective decisions. Consequently, students may experience heightened mental fatigue, frustration, and difficulty managing academic tasks, ultimately compromising their psychological well-being (Mondo et al., 2023; Sommovigo et al., 2023). A study conducted by Ioannou et al. (2024) unveiled a significant negative relationship between technostress and psychological health. Similarly, Dragano and Lunau (2020) identified a significant negative correlation between technostress and students' psychological well-being. These findings highlight the detrimental impact of technostress on students' mental health and overall psychological well-being.

Examining the consequences of technostress, it becomes apparent that the persistent presence of information overload and the intricate nature of technology align with diminished academic success, encompassing both academic motivation and psychological well-being among students. Consequently, we propose the following predictions (Figure 1):

H1. Technostress will exert a negative and statistically significant impact on academic motivation among students.

H2. Technostress will exert a negative and statistically significant impact on the psychological well-being of students.

Technological literacy as a mediator

According to Ozkan Hidiroglu et al. (2021), technological literacy refers to the capability to understand, evaluate, and utilise various technologies proficiently and knowledgeably. It encompasses various skills and competencies for navigating digital tools, platforms, and systems (Tatli et al., 2023). Technological literacy requires not only practical proficiency in using technology but also critical thinking skills to assess the impact, reliability, and ethical considerations associated with technological applications (Erdem et al., 2022). Within an educational setting, technological literacy is crucial for students to excel in a technology-driven world and actively engage in contemporary society (Yeşilyurt, Vezne, 2023). It empowers individuals to adapt to rapidly changing technological landscapes, critically analyse digital information, and leverage technology to improve learning, communication, and productivity (Yeşilyurt, Vezne, 2023).

Technological literacy is recognised as a significant contributor to the modern workplace, playing a crucial role in enhancing the determinants of academic success (Ozkan Hidiroglu et al., 2021). A proficient and optimistic grasp of technological literacy instils a sense of inspiration among employees, thereby improving leadership ideals in predicting determinants of academic success (Yeşilyurt, Vezne, 2023). Research conducted by Sousa and Rocha (2019) highlighted that technological literacy mediates the relationship between technostress and academic achievement. Similarly, Yeşilyurt and Vezne (2023) found that technological literacy influences the relationship between technostress and psychological well-being. Technological literacy equips individuals with various digital coping resources and strategies to mitigate technostress. For example, technologically literate students may utilise digital tools such as stress management websites to alleviate stress and promote well-being (Erdem et al., 2022; Tatli et al., 2023).

In this study, technological literacy is a mediator facilitating the connections between technostress and the determinants of academic success, namely academic motivation and psychological well-being. It can be contended that technological literacy plays a crucial role in understanding how technostress impacts academic motivation and psychological well-being among students. As suggested by Sousa and Rocha (2019), one effective approach to assess technological literacy in academic settings is to view it as a facilitator (or mediator) in the relationship between technology-related factors and academic success. Therefore, perceived technological literacy serves as a framework for elucidating the interplay between technological factors and the determinants of academic success among students. Building upon this premise, we propose the following hypotheses (Figure 1):

H3. Technological literacy will mediate the relationship between technostress and academic motivation among students.

H4. Technological literacy will mediate the relationship between technostress and psychological well-being.

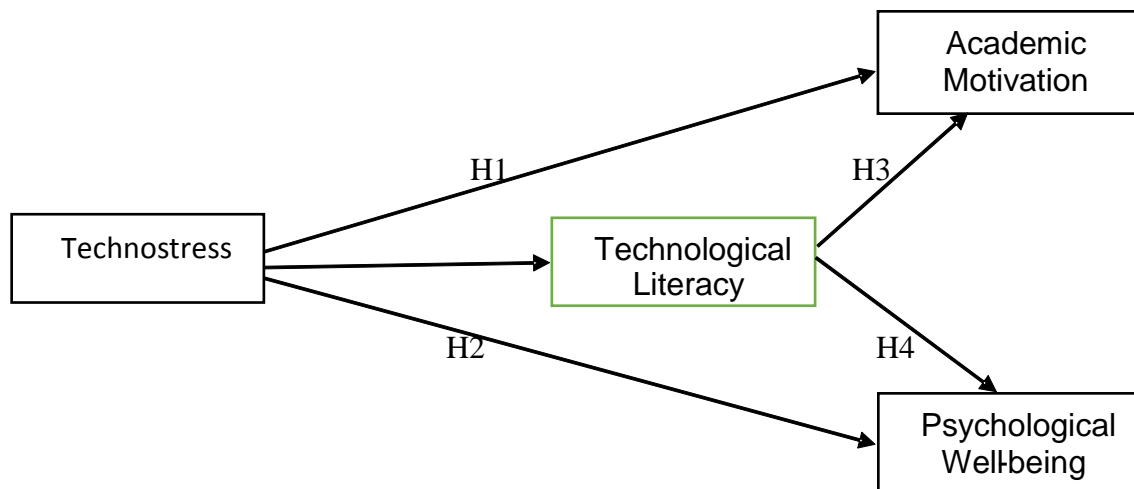


Fig. 1. Conceptual Framework

3. Methods

Research design

The study utilised a quantitative survey delving into the role of technological literacy as a mediator in the relationship between technostress and students' determinants of academic success, namely academic motivation and psychological well-being. Adopting a time-lagged survey approach, data on the determinants of academic success (T1) were gathered three weeks prior to collecting data on technostress and technological literacy (T2). The time-lagged design was chosen to mitigate common method bias and control for temporal confounds, as data were collected at different time points from the same participants (Fan et al., 2024).

Purposive sampling was employed to select university students in Accra, Ghana. Participants who met the criteria of regularly engaging with digital technologies in their academic pursuits were included in the study after securing informed consent. Also, the determination of the sample size was facilitated by the Raosoft online calculator, which considered various factors, including population size, confidence interval, margin of error, and response distribution.

A link to the Google Form questionnaire was dispatched to the participants' email addresses, with each email assigned a unique response code to enable efficient tracking for the time-lagged study. Initially, 370 questionnaires assessing the determinants of academic success (academic motivation and psychological well-being) were disseminated (T1), garnering 364 responses. Two weeks later, questionnaires on technostress and technological literacy were distributed (T2) to the 364 participants who responded to the initial set of questionnaires (T1) using their designated tracked emails. This follow-up effort yielded 349 responses. As a result, the achieved response rate was 94.3 %.

Demographically, among the valid respondents, 62.2 % were male, while 37.8 % were female, with an average age of 29.5 years. Regarding educational level, 28.4 % were in level 400, 27.2 % in

level 200, 24.9 % in level 300, and 19.5 % in level 100. Regarding faculty distribution, 53.9 % were in information technology, 30.3 % in business, and 15.8 % in engineering. Further details on demographic characteristics are presented in [Table 1](#).

Table 1. Demographic characteristics (n = 349)

Demographic Characteristics	Frequency	Valid Percent
Gender		
Males	217	62.2
Females	132	37.8
Age		
Not more than 20 years	49	14.0
21–25 years	126	36.1
26–30 years	107	30.7
More than 30 years	67	19.2
Educational Level		
Level 100	68	19.5
Level 200	95	27.2
Level 300	87	24.9
Level 400	99	28.4
Faculty		
Business	106	30.3
Information Technology	188	53.9
Engineering	55	15.8

Measures

All variables were evaluated using a four-point Likert scale, ranging from “strongly agree” to “strongly disagree.”

Academic motivation of students was assessed using the 14-item Academic Motivation Scale developed by Kotera et al. (2022), which demonstrated high reliability ($\alpha = 0.97$). An example item from the scale is: “I am motivated to achieve academic success to secure future career opportunities.” Higher scores on this scale signify a more robust academic drive among participants.

Psychological well-being was gauged via the 6-item Psychological Well-being Scale (Díaz et al., 2006), revealing a robust Cronbach’s alpha coefficient of 0.92. Participants indicated their level of agreement with statements such as, “In general, I feel confident and positive about myself” and “I feel good when I think of what I have done in the past and what I hope to do in the future.” Higher scores on this scale indicated a greater level of psychological well-being among respondents.

To measure technostress, participants completed the 20-item Students Technostress Questionnaire (Porcari et al., 2023), which exhibited strong internal consistency ($\alpha = 0.89$). This scale encapsulated various facets of technostress, including loss of control, stress and emotional reactions, and causal attribution. Participants responded to statements like, “The prolonged use of multiple technological devices for school activities reduces my level of concentration and makes me more easily distracted.” Higher scores denoted heightened levels of technostress.

Technological literacy was evaluated using the Technological Literacy Questionnaire developed by Gu et al. (2019). The twelve-item questionnaire exhibited strong reliability, boasting a Cronbach’s alpha coefficient of 0.91. The scale aimed to assess participants’ proficiency in utilizing technology. Participants were asked to indicate their level of agreement with statements such as, “I am proficient in using various software programs and applications to accomplish specific tasks.” Higher scores on this scale indicated a greater understanding, usage, and interaction with technology among respondents.

Analysis

The data analysis proceeded in three stages. First, data entry was conducted, which included validity and reliability checks, as well as an examination of data distribution. Second, the adequacy

of the model was evaluated through various indices such as the root-mean-square error of approximation and the Parsimony Normed Fit Index. Lastly, the hypotheses were tested using the JASP software, employing Bootstrap resampling with 5,000 replications.

The following syntax was generated and used for the mediation model:

```
# dependent regression
AMotivation ~ b11*TechLiteracy + c11*Technostress
PsycWell ~ b21*TechLiteracy + c21*Technostress

# mediator regression
TechLiteracy ~ a11*Technostress

# dependent residual covariance
AMotivation ~~ PsycWell

# effect decomposition
# y1 ~ x1
ind_x1_m1_y1 := a11*b11
ind_x1_y1 := ind_x1_m1_y1
tot_x1_y1 := ind_x1_y1 + c11

# y2 ~ x1
ind_x1_m1_y2 := a11*b21
ind_x1_y2 := ind_x1_m1_y2
tot_x1_y2 := ind_x1_y2 + c21
```

Reliability Assessment of Measures

Item analysis was conducted to detect and eliminate items that did not contribute to the internal consistency of the constructs (technostress, technological literacy, academic motivation, and psychological well-being). During the evaluation of inter-item reliability, it was noted that each item produced a total-item coefficient surpassing 0.3 except item 5 of the technostress scale (Griffiths et al., 2022). Consequently, item 5 of the technostress scale was excluded from further analysis. Moreover, all variables demonstrated a satisfactory level of internal consistency, with reliability values surpassing 0.70 (Table 2).

Table 2. Item analysis and reliability of the constructs

Measures	Number of items	Items retained	Item deleted	Cronbach Alpha
Technostress	20	19	1	.85
Technological literacy	12	12	0	.91
Academic motivation	14	14	0	.94
Psychological well-being	6	6	0	.82

Confirmatory factor analysis (CFA)

CFA was utilised to assess the validity of the constructs, as presented in Table 3.

The analysis presented in Table 3 explores the construct validity of the scales through confirmatory factor analysis (CFA). Following the criteria outlined by Goyal and Aleem (2023), the scales underwent evaluation for both discriminant and convergent validity using JASP software. To confirm the discriminant validity of the predicted variables, the hypothesised five-factor model was compared with alternative models, ensuring that the measurement tools used in the research accurately captured the intended constructs (Griffiths et al., 2022).

Table 3. CFA showing the uniqueness of the variables

Model		χ^2	Df	P	RMSEA	PNFI	RNI	TLI
(1)	Four-factor model	994.27	659	<.001	0.63	0.83	0.95	0.95
(2)	Three-factor model	1408.43	662	<.001	0.56	0.78	0.90	0.89
(a)	Technostress	179.31	77	<.001	0.72	0.78	0.95	0.94
(b)	Tech Literacy	51.35	27	.003	0.55	0.73	0.97	0.96
(c)	Acad Motivation	52.83	20	<.001	0.67	0.67	0.96	0.95
(d)	Psyc Well-being	50.47	14	<.001	0.69	0.62	0.94	0.92
(2)	One factor model	660.74	665	.011	0.05	0.52	0.60	0.58

Notes: RMSEA, root-mean-square error of approximation; PNFI, Parsimony Normed Fit Index; RNI, Relative Noncentrality Index, TLI, Tucker-Lewis Index

In line with the findings in [Table 3](#), the hypothesised four-factor model (comprising technostress, technological literacy, academic motivation, and psychological well-being) displayed a favourable fit with the dataset ($\chi^2 = 994.27$, RMSEA = 0.63, PNFI = 0.83, RNI = 0.95, TLI = 0.95, $p < 0.001$). This proposed model remained distinct from the three-factor alternative ($\chi^2 = 1408.43$, RMSEA = 0.56, PNFI = 0.78, RNI = 0.90, TLI = 0.89, $p < 0.001$). Additionally, the hypothesised model demonstrated a robust fit compared to alternative models.

Furthermore, each item significantly loaded onto its respective construct, reaffirming the convergence of validity within these constructs. To evaluate the potential impact of common method variance, a single-factor assessment was conducted. The results revealed an inadequate fit for the single-factor model ($\chi^2 = 660.74$, RMSEA = 0.05, PNFI = 0.52, RNI = 0.60, TLI = 0.58, $p < 0.001$), thereby emphasizing the distinctiveness of the constructs and emphasizing their robust discriminant validity.

4. Results

Descriptive Statistics and Construct Correlations

As illustrated in [Table 4](#), age did not exhibit significant relationships with any of the main variables (technostress, technological literacy, academic motivation, and psychological well-being). Concerning the main variable, technostress demonstrated significant correlations with technological literacy ($r = -0.39$), academic motivation ($r = -0.36$), and psychological well-being ($r = -0.37$). Additionally, technological literacy displayed significant correlations with academic motivation ($r = 0.51$) and psychological well-being ($r = 0.55$). Academic motivation also correlated significantly with psychological well-being ($r = 0.44$). The skewness and kurtosis values of the constructs fell within the range of -1 to +1, indicating a normal distribution of the data.

Table 4. Descriptive statistics of the variables

Variable	1	3	4	5	6
1. Age	-				
2. Technostress	.03	-			
3. Technological Literacy	.01	-.39**	-		
4. Academic Motivation	-.02	-.36**	.51**	-	
5. Psychological Well-being	.07	-.37**	.55**	.44**	-
Mean	29.42	51.63	31.81	17.79	17.66
SD	7.54	11.01	9.146	5.79	5.33
Skewness	0.07	0.02	-0.19	0.29	-0.03
Kurtosis	-0.05	-0.20	-0.59	-0.95	-0.05

Test of Hypotheses

[Table 5](#) illustrates a significant negative direct impact of technostress on academic motivation, with technostress accounting for -10 % of the variance in academic motivation ($b = -0.100$, $z = 3.88$, $p < 0.001$). To further validate this outcome, the bootstrap method with 5000 replications indicated negative lower and upper confidence levels (L95 % CI = -0.15, U95 %

CI = -0.04), supporting the statistical significance of the direct effect of technostress on academic motivation and thereby supporting H1.

Moreover, there is a negative direct effect of technostress on psychological well-being, with technostress explaining -9 % of the variance in psychological well-being ($b = -0.09$, $z = 3.82$, $p < 0.001$). The bootstrap method with 5000 replications also corroborated this finding, with the confidence intervals not including a positive value (L95 % CI = -0.13, U95 % CI = -0.04), confirming the support for the second hypothesis.

Table 5. Direct effects of technostress on determinants of academic success

	Estimate	Std. Error	z-value	P	95 % Confidence Interval	
					Lower	Upper
TS → AM	-0.10	0.03	-3.88	< .001	-0.15	-0.05
TS → PW	-0.09	0.02	-3.82	< .001	-0.13	-0.04

Notes: TS, Technostress; AM, Academic motivation; PW, Psychological Well-being

Table 6. Indirect effect of technological literacy

	Estimate	Std. Error	z-value	p	95% Confidence Interval	
					Lower	Upper
TS → TL → AM	-0.02	0.01	-5.91	< .001	-0.02	-0.01
TS → TL → PW	-0.03	0.01	-6.27	< .001	-0.03	-0.02

Notes: TS, Technostress; AM, Academic motivation; TL, Technological literacy; PW, Psychological Well-being

From [Table 6](#), the observed indirect effect of the impacts of technostress on academic motivation ($z = -5.91$, $p < 0.001$) and psychological well-being ($z = -6.27$, $p < 0.001$) is significant. The amount of variance accounted for in the indirect effect of technostress on academic motivation ($b = -0.02$) and psychological well-being ($b = -0.03$) when technological literacy was included as a mediator remained significant, indicating partial mediation. Further assessment of the significance of these findings using the bootstrap method with 5000 replications revealed confidence intervals that did not include a positive value for the effect of technostress on academic motivation (L95 % CI = -0.02, U95 % CI = -0.01) and psychological well-being (L95 % CI = -0.03, U95% CI = -0.02), providing support for H3 and H4.

Table 7. Path estimates of technostress

	Estimate	Std. Error	z-value	p	95 % Confidence Interval	
					Lower	Upper
TL → AM	0.43	0.05	8.81	< .001	0.33	0.54
TS → AM	-0.02	0.01	-3.88	< .001	-0.03	-0.01
TL → PW	0.48	0.05	10.19	< .001	0.38	0.58
TS → PW	-0.02	0.01	-3.82	< .001	-0.03	-0.01
TS → TL	-0.04	0.01	-7.96	< .001	-0.05	-0.03

Notes: TS, Technostress; AM, Academic motivation; TL, Technological literacy; PW, Psychological Well-being

[Figure 1](#) provides a visual representation of the path estimates described in [Table 7](#).

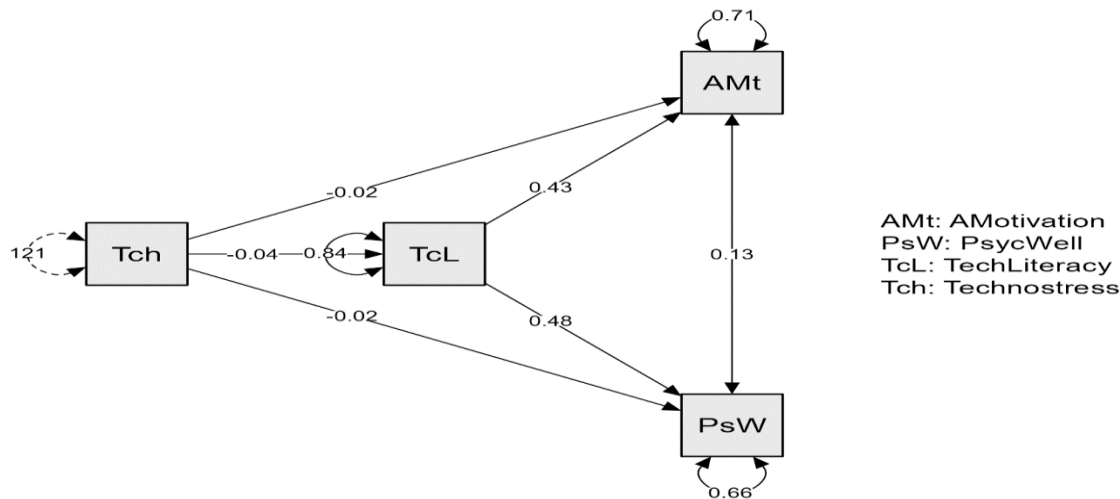


Fig. 1. Path plot showing the mediation effect

5. Discussion

The study aimed to achieve two objectives: firstly, to examine the relationship between technostress and determinants of academic success, namely academic motivation and psychological well-being; secondly, to explore technological literacy as a potential mediator in the association between technostress and these determinants of academic success.

Regarding the first objective, the findings supported the hypothesis that technostress significantly correlates with academic motivation and psychological well-being. This suggests that technostress plays a crucial role in influencing students' academic motivation and psychological well-being, highlighting its importance as a factor contributing to reduced motivation and well-being among students. These results align with prior research indicating negative associations between technostress and academic motivation (Den Hartog, De Hoogh, 2009) and psychological well-being (Lu, 2014; Quenson, 2013). One plausible explanation for this association is that continuous exposure to digital technologies and information overload can overwhelm students, resulting in cognitive overload and difficulty maintaining motivation (Brown, Mitchell, 2010). Additionally, feelings of being overwhelmed by technology and a perceived loss of control can undermine students' confidence in their academic abilities, further diminishing motivation and well-being (Dinc, Nurovic, 2016).

Regarding the second objective, the results revealed that technological literacy mediates the relationship between technostress and determinants of academic success, including academic motivation and psychological well-being. These findings suggest that students' perception of technological literacy significantly influences the association between technostress and academic success determinants. Thus, the ability to effectively navigate and utilise technology appears to be crucial in alleviating the adverse impacts of technostress on academic motivation and psychological well-being. These findings are consistent with previous studies highlighting the role of perceived technological literacy in elucidating the relationship between technological factors, such as technostress, and academic success determinants among students (Eshet-Alkalai, 2012; Sousa, Rocha, 2019). It stands to reason that higher levels of technological literacy enhance students' self-efficacy beliefs in using technology, thereby buffering against the adverse effects of technostress and promoting psychological well-being and academic motivation.

6. Limitations and suggestions for future research

Although the present study made concerted efforts to address potential limitations, it is important to acknowledge certain constraints that warrant consideration. One limitation pertains to the research design employed. This study exclusively utilised a quantitative design, which may have restricted the depth of understanding regarding the relationships among the variables under investigation. Future research endeavours would benefit from adopting a mixed-methods approach, allowing for a more comprehensive exploration of the associations identified in the study.

Additionally, the present study focused solely on one mediating variable, namely technological literacy, in elucidating the relationship between technostress and determinants of academic success. Future investigations could adopt a more integrative approach by considering multiple personal and contextual factors as potential mediators. This would provide a more nuanced understanding of the complex interplay between technostress and academic success determinants.

Another limitation concerns the research context. The study was conducted exclusively among university students in the Capital City of Ghana, potentially limiting the generalisability of the results to other populations, such as employees who may experience higher levels of technostress in workplace settings. Therefore, there is a need for future research to replicate the study using samples comprising working professionals, thereby expanding the scope and applicability of the findings.

7. Conclusion and implications

The determinants of academic success among students contribute significantly to their overall growth, development, and fulfilment in their educational journey. Factors such as academic motivation and psychological well-being are key contributors to improved student learning outcomes. The findings of this study have established that academic success determinants, including academic motivation and psychological well-being, are influenced by technostress. Moreover, the predictive effect of technostress on students' academic success (academic motivation and psychological well-being) depends on the mediating mechanism of technological literacy.

The results revealed that the relationship between technostress and students' academic success is facilitated by the knowledge, skills, and competencies required to effectively and responsibly engage with technology in academic contexts. The practical and theoretical implications of the research suggest several important considerations. Based on the study results, which indicated a negative and significant relationship between technostress and academic success determinants, it can be inferred that heightened levels of technostress can hinder students' academic success. Therefore, students can take proactive steps to manage their technology use, such as setting boundaries on screen time, practising digital detoxes, and seeking support if they experience mental health issues related to technology use.

Moreover, the findings revealed that technological literacy mediates the relationship between technostress and academic success determinants among students. This implies that technological literacy reduces the negative impact of technostress on academic success. Educational institutions can incorporate technological literacy programmes into their curriculum to equip students with the necessary skills to effectively navigate digital environments and manage technostress. Institutions can empower students to develop competencies in using technology productively and healthily by offering courses or workshops focused on enhancing technological literacy. Theoretically, the study will address the lack of research on the topic and enhance understanding of the determinants of academic success from the perspective of technostress.

8. Declarations

Ethics approval and consent to participate

Institutional approvals and participants' consent were obtained before the commencement of the study. The authors ensured that the study conformed with the requirements per the Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects, developed by the World Medical Association in 1964.

Consent for publication

All authors read and approved the final version of the manuscript for publication and agree to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Availability of data and materials

Available upon formal request to the corresponding author.

Conflict of interest statement

The authors report no conflicts of interest.

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Authors' contributions


All authors contributed equally to this work. They collaboratively developed the concept and design of the study, collected data, and contributed to the analysis and interpretation of the collected data. Additionally, all authors were involved in drafting, revising, and finalising the manuscript.


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