The Impact of Resilience and Coping Strategies on Techno-Stress in Chinese University Students

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ARTICLE INFO	ABSTRACT

Aim: With the pervasive influence of information technology, contemporary university students encounter significant techno-stress challenges. This stress can recipitate various psychological issues, prompting students to adopt resilience and coping strategies to mitigate these technological pressures. This study aims to achieve two main objectives: firstly, to investigate the mediating role of coping strategies; and secondly, to examine the influence of resilience and coping strategies on techno-stress among 280 undergraduate students, comprising 137 from a private institution and 143 from five public institutions. **Method:** The study utilized the Connor-Davidson Resilience Scale (CD-RISC), the Simplified Coping Style Questionnaire (SCSQ), and a Techno-stress Scale, with Cronbach's alpha coefficients of 0.899, 0.736, and 0.906, respectively, indicating strong internal consistency. Descriptive statistics and regression analysis were employed for data analysis. **Results:** The Bootstrap 95% confidence interval for the mediating effect (-0.23 to -0.08) excludes zero, signifying a statistically significant mediating role. The proportion of this mediating effect to the total effect is 48.39%, affirming coping strategies' mediation in the relationship between resilience and techno-stress. **Conclusion:** The impact of resilience and coping strategies on techno-stress among Chinese students was statistically significant at the 0.05 level (F=32.08, df=6, 273, p=0.00). These findings underscore the importance of addressing psychological factors contributing to techno-stress among Chinese university students, advocating for the enhancement of resilience and the adoption of effective coping strategies to alleviate students' techno-stress burden.

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Introduction

Mental health challenges persist, particularly during the transition of students from traditional face-to-face instruction to online or blended learning formats, which often lack the interpersonal interaction that undergraduates traditionally rely on to express their emotions. Scholars have noted that while innovative and enhanced learning methods offer

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benefits such as increased access to resources and skills development (Weinert et al., 2020), they also impose additional time commitments. Research indicates that prolonged exposure to computer screens can induce stress, fatigue, and restlessness among students (Ishola et al., 2022). Furthermore, studies have documented that performing educational tasks under such conditions can contribute to anxiety, reduced well-being, and heightened stress levels among college students (Cant, 2018; Dekker et al., 2020). Therefore, increased reliance on technology and prolonged engagement may exacerbate levels of techno-stress experienced by students (Jurek et al., 2021).

Several studies have documented various relationships between coping styles, resilience, and mental health outcomes. A prior study suggests that coping styles influence the association between resilience and mental health. Conversely, literature also indicates that coping styles can predict resilience, potentially acting as a mediator in the link between coping strategies and mental health or negative symptoms. These findings highlight the relevance of coping strategies in college settings, encompassing factors such as fear, psychological stress, and resilience, which offer valuable insights for the development of educational support programs. Moreover, resilience and coping strategies are noted to mediate the effects of managing unpleasant emotions and thoughts, as well as employing stress management techniques focused on problem-solving.

Previous research has primarily examined techno-stress and coping strategies among employees in workplace settings. However, there remains a dearth of studies focusing on techno-stress among contemporary Chinese university students. Additionally, while existing research has explored the relationship between stress and independent variables, there is limited discussion regarding the nexus between techno-stress and these variables. Therefore, this study seeks to investigate the impact of resilience and coping strategies on techno-stress. Furthermore, by considering coping strategies as mediators, it aims to explore the interplay between resilience and coping strategies. The study aims to offer insights into fostering effective coping strategies and resilient thinking among college students to enhance their mental well-being. Additionally, it intends to provide practical guidance for educators, counsellors, and psychological professionals, validating empirical approaches for group counselling and psychology courses aimed at developing teaching strategies and promoting positive mental health practices.

Literature Review

Techno-stress manifests as a maladaptive condition resulting from individuals' inability to effectively adjust to the psychological and social demands associated with technological innovations. When people fail to adequately adapt to changes brought about by information technology, they experience techno-stress (Tarafdar et al., 2007). Studies have demonstrated that engagement with information technology in the workplace can lead to various psychological and physical health issues (Arnetz, 1997; MJ, 1997), as well as job dissatisfaction and overall life dissatisfaction (La Torre et al., 2019). These challenges often arise from techno-stress induced by multitasking, information overload, and the demands of information and communication technologies (ICT) (Raja Zirwatul Aida et al., 2007). Resilience encompasses more than the ability of an individual to recover to their initial state following significant setbacks or traumatic stress. It also entails the capacity to endure stress threats and to grow

beyond adversity to embrace new life opportunities. Scholars vary in their definitions of resilience; some view it as the ability to rebound from adversity, frustration, and misfortune (Ledesma, 2014). In the context of Chinese scholarship, resilience is understood considering Chinese cultural characteristics, often measured using the Modified Resilience Scale (Connor & Davidson, 2003) and influenced by spiritual factors (Yu & Zhang, 2007). Coping strategies refer to cognitive and behavioural adaptations individuals make to manage specific internal or external stressors (Billings & Moos, 1981; Folkman & Lazarus, 1985). These strategies serve as mechanisms for individuals to navigate challenging situations and maintain psychological equilibrium (Li, 2021).

Resilience and Techno-Stress

In practice, remote workers frequently face technological demands such as complexity, overload, and intrusion, which can induce feelings of exhaustion and deplete their energy and psychological reserves. This depletion may result in negative emotions and hinder their ability to effectively manage cognitive and emotional challenges. Research indicates that an individual's resilience significantly influences their cognitive responses to various ICTs. Resilience serves to mitigate the adverse effects of technological overload while enhancing the beneficial impacts of communication technologies.

Coping Strategies, and Techno-Stress

Variations in the effects of technological stressors can be attributed to individuals' diverse perceptions of these stressors within specific contexts. Recent research has highlighted that users may interpret certain technological stressors as challenges and others as threats, leading to varying impacts. For instance, studies indicate that individuals tend to perceive technological overload and uncertainty as challenges, whereas they regard technological complexity and insecurity as threats.

Experts have developed a trading pressure model that applies to understanding and analysing technical pressures within the context of students' work and quality of life. Studies indicate that students experience technological pressures due to the pervasive use of information and communication technology. Negative appraisals, such as perceiving harm and threat, tend to prompt students to adopt an emotion-centred coping style, whereas positive and challenging evaluations encourage a problem-centred coping approach. Regarding educational technology pressures, students who possess extensive experience with online and blended learning, exhibit higher levels of computer confidence, and report lower anxiety levels demonstrate greater capability in managing technological pressures.

Resilience, Coping Strategies, and Techno-Stress

Certain studies have highlighted that grasping effective coping strategies, such as adaptability, can influence the effects of technological stress and COVID-19-related stress on employee burnout, potentially yielding positive outcomes. Furthermore, technical self-efficacy and mindfulness have been identified as effective measures in reducing technological stress.

The study aims to achieve the following research objectives:

1. To explore the mediating role of coping strategies.
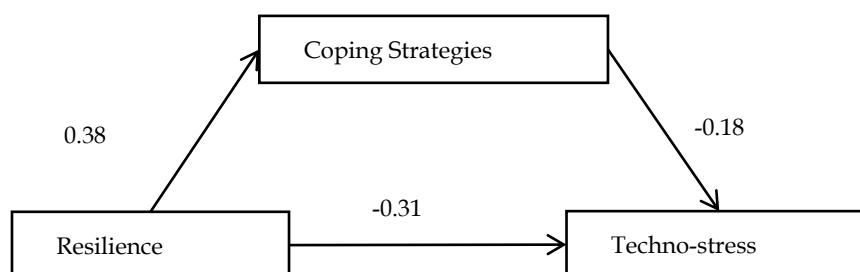2. To explore the impact of resilience and coping strategies on techno-stress.

Figure 1: *Proposed Conceptual Framework.*

Method

Research Design

This study employs quantitative methods to conduct a descriptive analysis. Data were collected through a cross-sectional survey utilizing a voluntary, anonymous, and self-administered online questionnaire. Students were informed about the research objectives and provided verbal consent. The sample consisted of 280 students randomly selected from Xi'an Eurasian University, alongside five public universities.

Participants and Procedure

This study received approval from the Ethics Committee of Xi'an Eurasian University. All participants provided voluntary informed consent to participate. Data collection involved distributing individual questionnaires comprising resilience scales, coping strategies, and techno-stress psychological scales. The data collection period spanned from January 2024 to March 2024, totalling two months. Subsequently, data were scored according to the study instrument's criteria. Statistical software was utilized for data analysis.

Questionnaires were distributed online across private and public universities in mainland China using random sampling. The quantitative research design determined the sample size using multiple linear regression analysis with parameters set at α = 0.05, power = 0.95, and effect size f^2 = 0.15. Sample size calculation performed with G*Power 3.1.9.7 software indicated a requirement of 107 students per type of school, totalling 214 cases. The study aimed to include a minimum of 300 participants, comprising 150 students from public schools and 150 from private schools. In total, 305 questionnaires were distributed. Following screening for response speed and consistency, questionnaires with excessively brief responses or noticeable patterns were excluded. Ultimately, 280 valid questionnaires were collected, achieving an effective response rate of 92.71%.

Instruments

Xiao Nan from the Chinese University of Hong Kong, as described by Yu et al. (2007),

adapted the Connor-Davidson Resilience Scale (CD-RISC). The scale comprises 25 items across three dimensions: tenacity, strength, and optimism, rated on a four-point scale to evaluate an individual's adaptability. It categorizes resilience levels into low, medium, and high based on cut-off points. The Cronbach's α coefficient was 0.89, indicating strong internal consistency. The Chinese version of the CD-RISC has proven reliable and effective for assessing resilience among Chinese adolescents (Yu et al., 2011).

The Simplified Coping Style Questionnaire (SCSQ), a 20-item instrument, assesses coping behaviours using a 4-point Likert scale (0= never; 3= very frequent), as developed by Folkman and Lazarus (1988). Widely utilized in China, it has demonstrated satisfactory reliability and effectiveness (Xie, 1998). The questionnaire comprises three factors: "self-regulation," focusing on behaviour control with a reliability coefficient of 0.760; "fantasy and evasion," involving escapist tendencies with a reliability coefficient of 0.749; and "Seeking Help and Problem-Solving," emphasizing interpersonal support and problem-solving skills with a reliability coefficient of 0.737. This study highlights superior model fit compared to a two-factor structure (Fang et al., 2018) and exhibits strong internal consistency reliability with a Cronbach's alpha of 0.89.

Researchers developed the Techno-stress Questionnaire and employed participation-promoted projects. The end-user satisfaction project was adapted from prior literature. Responses for all items were measured using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), with an additional option for "not applicable" or "I don't know." All reliability coefficients exceeded 0.8, indicating strong reliability.

Procedures

The survey underwent pre-testing and pilot studies before commencing data collection, which spanned two months from February 2024 to April 2024. Online surveys were administered and subsequently analysed using SPSS.

The collected data from the study were analysed quantitatively through the following steps:

(1) Conduct mediation analysis utilizing the PROCESS macro program.
(2) Correlation analysis was employed to initially examine the relationship between each variable.
(3) Hierarchical regression analysis was employed to assess the predictive impact of individual variables on each respective dependent variable.

Results

In the general data of Chinese students, the majority were female, comprising 63.57%, while males accounted for 36.43%. Regarding educational status, freshmen constituted 65.00%, followed by sophomores at 24.29%, seniors at 10.00%, and juniors at 0.71%. Private colleges represented 51.07% of the sample, while public colleges comprised 48.93%. A significant portion of students, 74.29%, reported having two siblings, whereas 25.71% reported having one. Most students resided in cities (43.93%), followed by counties (20.00%), villages (19.64%), and towns (16.43%). Regarding psychological counselling agency visits, the majority, 69.64%, indicated they had not visited, while 16.43% answered "No," 10.71% reported having received psychological counselling, and 3.21% were unaware of such service.

Table 1

Number and Percentage of the General Data of Chinese Students (n=280)

Information on Subject Demographic Variables (N=280)			
	Category	Frequency	Percentage
School	Public college	137	48.93
	Private college	143	51.07
Gender	Male	102	36.43
	Female	178	63.57
Grade	Freshman	182	65.00
	Sophomore	68	24.29
	Junior	2	0.71
	Senior	28	10.00
Whether Only Children or Not	The only child	72	25.71
	Non-only child	208	74.29
Psychological Counselling Agency	I have had psychological counselling	30	10.71
	I haven't been there	195	69.64
	No	46	16.43
	I haven't heard of it	9	3.21
Usually, Live	City	123	43.93
	Town	46	16.43
	County	56	20.00
	Village	55	19.64

To examine the mediating influence of Coping Strategies in the relationship between Resilience and techno-stress, a bias-corrected nonparametric percentile Bootstrap method was employed. Model 4 of the PROCESS macro program in SPSS, designed for simple mediating models, was utilized for 5000 bootstrap resamples to assess the mediating effect. Additionally, the researcher conducted an analysis of the demographic data of Chinese students, presenting the results in Table 2, detailing frequencies and percentages.

The mediation model results (Table 2) demonstrate that Resilience significantly predicts Coping Strategies positively (β = 0.38, t = 8.50, p < 0.001). When both Resilience and Coping Strategies are included in the regression equation, Resilience (β = -0.18, t = -3.51, p < 0.001) and Coping Strategies (β = -3.36, t = -5.61, p < 0.001) significantly and negatively predict the level of attribution requirement.

Table 2

Regression Analysis of the Relationships Between Variables in the Mediation Model (N=280)

Variable	Model 1		Model 2		Model 3	
	β	t	β	t	β	t
Resilience	-0.31	-6.46***	0.38	8.50***	-0.18**	-3.51***
Coping Strategies					-3.36	-5.61***
R^2		0.13		0.45		0.21
F		41.77**		72.33**		38.94**

Note: (1)* p < .05. ** p < .01. *** p < .001. (2) All variables in the model are normalized and

inputted into the regression equation. （3）Model 1 Resilience predicts techno-stress: Model 2 Resilience predicts Coping Strategies: Model 3 Resilience and Coping Strategies jointly affect techno-stress.

The Bootstrap 95% CI of the mediating effect excludes 0 ([-0.23, -0.08]), indicating a statistically significant mediating effect. Figure 1 illustrates the mediating pathway diagram. The proportion of the mediating effect relative to the total effect is 48.39%, confirming the mediating role of Coping Strategies in explaining the impact of Resilience on techno-stress (Table 3).

Table 3

Analysis of the Mediating Effects of Expected Coping Strategies

	Effect	Standard Error	Bootstrap 95% CI LLCI	ULCI	Ratio to the Total Effect
Total Effect	-0.31	0.04	-0.40	-0.21	
Direct Effect	-0.18	0.05	-0.28	-0.08	
Indirect Effect	-0.15	0.03	-0.23	-0.08	48.39%

Descriptive Statistics of Impact of Resilience and Coping Strategies on Techno-Stress of Chinese Students

The researcher conducted an analysis of the mean and standard deviation to assess the impact of resilience and coping strategies on techno-stress among Chinese students, as presented in Table 2.

In Table 4, the resilience factors among Chinese students were as follows: tenacity (M=3.38, S.D.=0.56) and strength (M=3.48, S.D.=0.64) were at a moderate level, while optimism (M=3.56, S.D.=0.76) was rated at a high level. Regarding coping strategies, self-regulation (M=3.03, S.D.=0.51) and seeking help and problem-solving (M=2.97, S.D.=0.46) were perceived to be at a high level, whereas fantasy and evasion (M=2.50, S.D.=0.50) were at a lower level. Techno-stress (M=2.96, S.D.=0.50) was reported to be at a moderate level.

The Study Relationship Between Resilience and Coping Strategies on Techno-Stress of Chinese Students

Table 4

Mean and standard deviation of the impact of resilience and coping strategies on techno-stress of Chinese students (n=280)

The Impact of Resilience and Coping Strategies on Techno-Stress		M	S.D.	Levels
Resilience	Tenacity	3.38	0.56	Moderate
	Strength	3.48	0.64	Moderate
	Optimism	3.56	0.76	High
Coping Strategies	Self-Regulation	3.03	0.51	High
	Fantasy and Evasion	2.50	0.60	Low
	Seeking Help and Problem Solving	2.97	0.46	High
Techno-Stress	Techno-Stress	2.96	0.50	Moderate

The study examines the correlation between resilience, coping strategies, and techno-stress among Chinese students using Pearson's product-moment correlation coefficient, presented in Table 5. Table 5 explores the associations between resilience and techno-stress among Chinese students, revealing negative correlation coefficients ranging from -0.21 to -0.46. Specifically, optimism exhibits the strongest negative correlation coefficient of -0.46 with techno-stress, while tenacity shows the weakest negative correlation coefficient of -0.21. These findings indicate that students with higher levels of resilience tend to experience lower levels of techno-stress. Similarly, the relationship between coping strategies and techno-stress among Chinese students is examined, revealing negative correlation coefficients ranging from -0.18 to -0.49. Seeking help and problem-solving exhibit the highest negative correlation coefficient of -0.49, suggesting that actively seeking solutions can effectively mitigate techno-stress. On the other hand, self-regulation displays the lowest negative correlation coefficient of -0.18. In contrast, fantasy and avoidance demonstrate a positive correlation coefficient of 0.27 with techno-stress, indicating that this passive coping approach may exacerbate techno-stress. This study investigates the impact of resilience and coping strategies on techno-stress among Chinese students.

Table 5

Correlation Coefficient of the Resilience and Coping Strategies on Techno-Stress of Chinese Students (n=280)

	Variables	Techno-Stress	Tenacity	Strength	Optimism	Self-Regulation	Fantasy and Evasion	Seeking Help and Problem Solving
Techno-Stress	Techno-Stress	1.00						
	Tenacity	-0.21*	1.00					
Resilience	Strength	-0.37*	0.74*	1.00				
	Optimism	-0.46*	0.25*	0.39*	1.00			
Coping Strategies	Self-Regulation	-0.18*	0.63*	0.57*	0.27*	1.00		
	Fantasy and Evasion	0.27*	0.07	-0.02	-0.01	0.10*	1.00	
	Seeking Help and Problem Solving	-0.49*	0.40*	0.45*	0.40*	0.50*	-0.02	1.00

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

Before examining the relationship between resilience, coping strategies, and techno-stress among Chinese students, the researcher verified the impact of resilience and coping strategies on techno-stress using Tolerance and VIF. Subsequently, multiple regression analysis was conducted using the entered method. Table 6 presents Tolerance values ranging from 0.39 to 0.97, all below 3, and VIF values ranging from 1.03 to 2.58, all below 10. These results indicate that there is no issue of collinearity, confirming the consistency and reliability of the relationships analysed among resilience, coping strategies, and techno-stress in Chinese college students.

The multiple regression analysis examining the impact of resilience and coping strategies on techno-stress among Chinese students revealed significant results at the .05 level (F = 32.08, df = 6, 273, p = .00). The analysis indicated that variables including tenacity, strength, optimism, self-regulation, fantasy and evasion, and seeking help and problem-

solving collectively explain techno-stress (see Table 7).

Table 6

Verified Relationships Between Analysed Resilience and Coping Strategies of College Chinese Students (n=280)

	Resilience and Coping Strategies	Tolerance	VIF
Resilience	Tenacity	0.39	2.58
	Strength	0.39	2.56
	Optimism	0.78	1.28
	Self-Regulation	0.52	1.92
Coping Strategies	Fantasy and Evasion	0.97	1.03
	Seeking Help and Problem Solving	0.66	1.52

The impact of resilience on techno-stress among Chinese students showed significant relationships at the 0.05 level, with optimism demonstrating the highest negative standardized regression coefficient of -0.28, followed by strength with a slightly lower coefficient of -0.21, while tenacity did not reach significance at the 0.05 level. This suggests that higher levels of optimism and strength are associated with lower levels of techno-stress among college students. Regarding coping strategies and their impact on techno-stress among Chinese students, significant relationships were observed at the 0.05 level in descending order: fantasy and evasion exhibited the highest positive standardized regression coefficient of 0.23, followed by self-regulation with a lower positive coefficient of 0.13, while seeking help and problem-solving showed the lowest negative standardized regression coefficient of -0.41. This reflects that as students tend to adopt more positive coping strategies, their techno-stress levels may increase, possibly due to the heightened psychological burden associated with applying these strategies.

Table 7

Multiple Regression Analysis of the Impact of Resilience and Coping Strategies on Techno-Stress of Chinese Students (n=280)

	Resilience and Coping Strategies	b	SE	β	t	p
	Constant	4.30	0.20	-	21.05*	0.00
Resilience	Tenacity	0.06	0.07	0.07	0.94	0.35
	Strength	-0.17	0.06	-0.21	-2.84*	0.00
	Optimism	-0.18	0.03	-0.28	-5.30*	0.00
	Self-Regulation	0.13	0.06	0.13	2.10*	0.04
Coping Strategies	Fantasy and Evasion	0.20	0.04	0.23	4.92*	0.00
	Seeking Help and Problem Solving	-0.41	0.06	-0.38	-6.59*	0.00

Note. R^2= 0.41 R^2_{adj}= 0.40 F=32.08 df=6, 273 p=0.00

1. Therefore, the researcher constructed an equation to predict the factors influencing the psychological well-being of college students.
2. Equation Predict Raw Score.
3. Y= 4.30 (Constant) + 0.06 (Tenacity - 0.17 (Strength - 0.18 (Optimism + 0.13 (Self-Regulation) + 0.20 (Fantasy and Evasion) - 0.41 (Seeking Help and Problem-Solving).
4. Equation Predict Standard Score.

5. ZY= 0.07 (Tenacity) -0.21 (Strength) - 0.28 (Optimism) + 0.13 (Self-Regulation) + 0.23 (Fantasy and Evasion) - 0.38 (Seeking Help and Problem Solving)

Discussion

This study seeks to investigate the influence of resilience and coping strategies on techno-stress, including the mediation effect of coping strategies. The findings substantiate the study's objectives. Specifically, the results demonstrate a negative association between resilience and techno-stress, as well as a positive correlation between resilience and coping strategies. Thus, students facing techno-stress tend to employ proactive coping mechanisms and exhibit higher resilience levels. These findings validate previous research indicating that coping mediates the relationship between resilience and stress (Denovan & Macaskill, 2017; Ursu & Măirean, 2022). The mediation analysis indicates that coping strategies account for 48.39% of the total effect, underscoring their pivotal role in mitigating the impact of resilience on techno-stress. This study illustrates the correlation between the psychological well-being of Chinese undergraduate students and techno-stress, highlighting Coping Strategies as mediators. It underscores that Resilience is directly linked to techno-stress.

In this study, the average score of the resilience variable, particularly optimism (M=3.56, S.D.=0.76), was found to be higher compared to earlier research. This underscores the association between optimism and enhanced physical and mental well-being in challenging circumstances (Carver & Connor-Smith, 2010; Pritchard et al., 2007). Self-regulation (M=3.03, S.D.=0.51) and seeking help and problem-solving (M=2.97, S.D.=0.46), as supported by prior studies (Fullerton et al., 2021), also highlight the significance of effective and proactive coping strategies. The study further identified a positive correlation between resilience and coping strategies. Optimism emerged as a highly correlated variable, suggesting its potential utility in psychological intervention plans (Xia & Duan, 2020), particularly in facilitating positive coping strategies through social support, which has been linked to a notable reduction in psychological distress.

In this study, the focus was on techno-stress and its psychological implications among students. The correlation between resilience and techno-stress among Chinese students ranged from -0.21 to -0.46 (p<0.05). This indicates that individuals with higher resilience levels tend to experience lower levels of techno-stress, suggesting that resilience may enhance the positive impacts of information and communication technology use while mitigating negative effects such as technology overload and educational techno-stress (Diller, 2016). Moreover, coping strategies and techno-stress among Chinese students showed negative correlation coefficients ranging from -0.18 to -0.49 (p<0.01), underscoring the significant role of effective coping strategies in reducing perceptions of techno-stress. During times of crisis, seeking social support often proves to be one of the most adaptive methods for managing various stressors (Sun et al., 2020). In regression analysis, optimizing the resilience factor (β = -0.28, t = -5.30, p < 0.001) and strength (β = -0.21, t = -2.84, p < 0.001) significantly negatively impacts techno-stress, indicating that college students with higher levels of optimism and strength experience lower levels of techno-stress. This study delineates the differential effects of various coping strategies on techno-stress. Seeking Help and Problem-Solving exhibit a significant negative impact on techno-stress (β = -0.38, t = -6.59, p < 0.001), highlighting that seeking social support during crises is often a highly adaptive coping mechanism for managing diverse stressors (Sun et al., 2020). Conversely, fantasy and avoidance strategies

are positively associated with techno-stress ($\beta = 0.23$, $t = 4.92$, $p < 0.001$). Limited research exists on positive emotional responses and coping efficacy in stressful situations, suggesting a lower tendency to address problems internally (Jackson & Warren, 2000). Therefore, consistent with prior studies (Chew et al., 2020), promoting proactive coping strategies such as seeking social support, active problem-solving, and positive thinking strategies (Anwar et al., 2020) is recommended.

There is a growing interest in developing educational interventions such as emotion regulation and educational counselling programs, which underscore the importance of designing activities aimed at developing social-emotional competencies and emphasizing emotional dimensions (Morales Rodríguez, 2017). Stress management through mindfulness promotion is also receiving increasing attention in educational contexts (Getachew, 2020; Valero et al., 2020). This study highlights the increasing popularity of psychological counselling and its preventive role in supporting students to persist in college. Psychological support aids in identifying and acquiring skills that are instrumental in achieving educational and life goals effectively (Danger et al., 2018; Turner & Berry, 2000). With the aim of addressing contemporary issues related to technological stress, researchers intend to utilize these findings to assist college students in enhancing resilience and improving coping strategies. It is essential for individuals to assess their levels of technological stress and cultivate resilience through optimism and strength. Strategies to mitigate technological stress include enhancing help-seeking behaviours and reducing tendencies towards fantasy and avoidance. Researchers propose to conduct a group counselling intervention aimed at identifying coping behaviours through various psychological counselling methods, assessing participants' technological stress levels, and training them in effective strategies to manage daily stressors (La Torre et al., 2019). This program aims to guide the enhancement of emotional and mental well-being among college students.

Limitations

Researchers have examined the resilience profiles of students, a dynamic phase during which students may adapt their strategies and encounter varying levels of technological stress influenced by backgrounds and cultural adaptation. Considering the dynamic interplay among techno-stress, coping mechanisms, and resilience, it is suggested that future research gather longitudinal data to establish definitive evidence and test correlations (Rindfleisch et al., 2008). Furthermore, this study primarily focused on the factors within the regression equation, yet resilience and other coping strategies merit researchers' attention. Research indicates that various aspects of resilience play a role in mitigating adolescent stress when confronted with setbacks (Yu et al., 2011). It is crucial to consider these factors along with the sources of stress and students' backgrounds as part of future research endeavours.

Implications for Behavioural Science

Drawing from the findings and conclusions, the exploration of optimism and strength (resilience factors) in positive psychology to alleviate techno-stress represents an expanded theoretical framework. In terms of practical significance, this study identifies the importance, within the Chinese educational context, of fostering positive attitudes and behaviours to help students seek effective solutions as a key strategy in reducing techno-stress.

Furthermore, this study highlighted that educational techno-stress among students is a

highly significant factor contributing to overall techno-stress levels. It underscores the importance for educators to observe how college students engage with current technologies for learning and to identify reasons why students might resort to avoidance or procrastination, aiming to mitigate techno-stress among students. University administrators are urged to formulate policies that support counsellors in addressing these issues. Additionally, college administrators should endorse undergraduate programs aimed at preventing and reducing techno-stress, encompassing counselling initiatives and practical courses on effective technology use in education. Given the scientific rigor and breadth of this study, future research could consider a longitudinal design to track how the studied variables evolve as participants age. Additionally, a multilevel study could expand upon the current variables by incorporating factors like family support and peer support (Morales-Rodríguez et al., 2019).

Conclusion

Through an in-depth analysis, this study unveils the pivotal role of resilience and coping strategies in mitigating techno-stress among college students. These findings offer crucial insights into how students confront escalating technological challenges, providing essential data for higher education institutions to develop effective mental health and well-being support strategies. Particularly in the context of the digital era's growing prevalence, enhancing understanding and interventions related to these factors are critical for promoting students' mental health and enhancing their learning efficiency. Future research should continue to investigate resilience and coping strategies across diverse contexts and explore their synergistic effects in alleviating techno-stress.

College students, the focus of this study, exhibit adaptive flexibility in their coping strategies within techno-stress environments to achieve optimal outcomes. When confronted with educational techno-stress, undergraduates do not adhere to singular coping methods or rigid approaches; instead, they dynamically adjust their strategies based on the specific technical challenges they encounter. They demonstrate a tendency to cultivate positive coping styles, characterized by enhanced self-awareness and a readiness to seek assistance through various channels. Moreover, coping strategies act as mediator variables that effectively influence resilience and techno-stress factors, encompassing fears, psychological stress, and resilience. These findings provide valuable insights for developing educational interventions aimed at enhancing students' adaptive capabilities and resilience in the face of techno-stress.

This study underscores the pivotal role of resilience in enabling college students to effectively manage techno-stress. Through descriptive, correlation, and regression analyses, the research identifies a significant negative association between optimism, strength, and techno-stress, indicating their predictive potential in mitigating techno-stress. This suggests that nurturing students' optimism and strength can bolster their resilience, enabling them to better confront technological challenges. Educational institutions are encouraged to integrate resilience training into student development initiatives, particularly focusing on enhancing traits of strength and positive outlooks. Furthermore, the study emphasizes the importance of coping strategies in techno-stress management. While overall coping strategies exhibit a negative correlation with techno-stress, signifying their role in alleviating techno-stress, fantasy and avoidance—a passive coping style—are positively linked to techno-stress. This underscores that the effectiveness of coping strategies varies with their type. Hence, educators and counsellors should

promote proactive coping approaches among students, such as seeking assistance and actively problem-solving, rather than relying on avoidance or fantasy-based strategies.

Declaration of Conflicting Interests

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Data Availability Statement

The data that support the findings of this study are available upon reasonable request from the corresponding author. The data are not publicly available because they contain information that could compromise the privacy of research participants.

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