

TECHNOSTRESS AND PSYCHOLOGICAL WELL-BEING AMONG UNDERGRADUATE STUDENTS AT UNIVERSITY LEVEL: A CORRELATIONAL STUDY

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ABSTRACT

Digital technologies are now at the center of university teaching and learning. They can also cause technostress, a strain that arises when technology demands outpace a person's capacity to cope. This study examined how technostress relates to psychological well-being in undergraduates and how these variables differ across demographic and academic groups. The study used a cross-sectional survey design. Using multi-stage sampling, the study selected 1001 undergraduate students (317 male and 684 female). They were enrolled in the faculties of education, arts, and science at two public and two private universities in Lahore district, Pakistan. The study used a 21-item scale to assess technostress across five creators: overload, complexity, uncertainty, insecurity, and invasion. Well-being was assessed with the 42-item form of the Ryff scales. In a pilot sample of 300 students, internal consistency was .71 for technostress and .88 for well-being. Analyses were run in SPSS version 21 and included correlation, t tests for two groups, and ANOVA for more than two groups. The pilot study aimed to determine the instrument's Cronbach's alpha reliability (TS = .70 and RSPW = .84). Experts were consulted to confirm the instrument's validity. The study tested the hypotheses using both descriptive and inferential statistics. The findings revealed a weak positive relationship between technostress and psychological well-being among undergraduate students ($r = .22$), which was statistically significant. There was no significant difference between male and female students in technostress and psychological well-being. However, the mean values indicate that females ($M = 68.38$) have slightly higher technostress than males ($M = 67.16$). Therefore, universities should foster a supportive digital environment that helps diminish the negative effects of technostress on students' psychological well-being.

I. INTRODUCTION

In the last twenty years, digital technology has entered nearly every part of university life. It has changed how students learn and how teachers teach. Information, course resources, and online classes are now within easy reach. Students rely on digital platforms to download material, join virtual lectures, search the literature, and stay in touch with teachers and classmates. These gains have a cost. Heavy technology use has brought its own psychological problems, and technostress (TS) is one of the most discussed. Brod (1984) coined the term to

describe the trouble some people have coping with new computer technology in a healthy way. Later researchers narrowed the definition. For them, technostress is the strain people feel when they cannot keep up with information and communication technologies and their frequent changes (Ragu-Nathan et al., 2008; Tarafdar et al., 2007). Tools meant to make learning easier can thus also leave students anxious, frustrated, or tired. In universities, where students need digital tools for both study and social life, this issue deserves attention. Undergraduates may be especially exposed to technostress. Starting university already brings major changes in academic, social, and personal life. Students face heavy coursework, more independent study, new friendships and new responsibilities. On top of this, much of their learning now happens through technology. They are often called digital natives. Yet being comfortable with a phone or laptop is not the same as coping with the psychological load of technology-based study. Studies with university students link technostress to burnout, weaker perceived performance and lower academic productivity (Upadhyaya & Vrinda, 2021; Wang et al., 2020). The sudden move to online and blended teaching made these worries more pressing. Students came to depend even more on digital platforms, and their daily academic routines changed (Aristovnik et al., 2020).

Dimensions of Technostress

Seen as a form of stress, technostress arises when technology demands more of a person than they feel able to give. At university, students may be pushed to learn new applications quickly. They receive a steady flow of messages, juggle several online platforms and are expected to stay available. Such demands can lead to frustration, anxiety, mental fatigue and uncertainty. The problem is worse for students with weak digital skills, poor internet access or unsuitable devices. Research with university students shows that technology alone is only part of the story. What also matters is how well the learning environment fits students' abilities and needs (Wang et al., 2020). Using technology and adjusting to it psychologically are two different things. As universities adopt more technology, students' experiences of technology-related stress need study in their own right, beyond questions of access. The literature names five sources of technostress, known as technostress creators: overload, invasion, complexity, insecurity, and uncertainty (Ragu-Nathan et al., 2008; Tarafdar et al., 2007). Overload means that technology makes students work more or faster. A student may have to check several learning platforms, read a large amount of material, reply to online messages, and still meet tight deadlines.

Workload feels heavier, and concentration suffers. Invasion means that technology spills into personal time. Some students are expected to stay logged in to university platforms or to answer academic messages late in the evening. Switching off then becomes hard. Constant connection leaves less time for rest and recovery (Tarafdar et al., 2011).

Complexity refers to systems that students find hard to understand or use. Learning a new application, finding one's way around an online course, or fixing a technical fault then takes extra time and effort. Insecurity is the fear of falling behind classmates who are more skilled with technology. Uncertainty is the stress of constant changes and upgrades to the systems in use (Ragu-Nathan et al., 2008). Taken together, the five creators show that the stress may come from workload, intrusion into private time, feelings of inadequacy, and the need to keep adjusting to new systems. Which creator matters most may differ between offices and universities. It may also differ between countries with stronger and weaker technological infrastructure. In Pakistan, frequent connectivity problems and unequal access to devices can make online learning harder for some students than for others.

Psychological Well-Being of University Students

Psychological well-being (PWB) concerns how well a person functions and has several components. Research on well-being follows two main traditions. The hedonic tradition looks at pleasant feelings, good mood, and life satisfaction (Diener et al., 1999). The eudaimonic tradition looks at meaning, growth, and the use of one's potential (Keyes et al., 2002). Ryff (1989) proposed a widely used eudaimonic model. It goes beyond fleeting happiness and includes broader aspects of how people function. This distinction is useful for students. A student may feel cheerful on a given day and still struggle to manage duties, keep relationships or work toward personal goals. Ryff described well-being through six components. Self-acceptance is a positive view of oneself and one's past. Positive relations with others mean having close and trusting relationships. Autonomy is the capacity to think and decide for oneself. Environmental mastery is the ability to handle everyday demands. Purpose in life means having goals and a sense of direction. Personal growth means continuing to develop and staying open to new experiences (Ryff, 1989; Ryff & Keyes, 1995). These six components provide a useful picture of how students function as they manage coursework, relationships, and changing ways of learning.

Going to university is a major turning point for young people. Students must adapt to new academic expectations, become more independent, build new friendships and take on more personal responsibility. Many also face academic pressure and money worries at the same time. Depression, anxiety and stress have been found to be common in college populations (Beiter et al., 2015). Student distress can even exceed that of the general population (Stallman, 2010). For many students, well-being drops during the first year (Cooke et al., 2006). Busy schedules and heavy technology use may add to these difficulties. Well-being also depends on students' relationships and on how well they manage daily responsibilities. Good relationships help students cope with academic pressure. Isolation weakens their sense of belonging. Technology can help here, because it lets students keep in touch with classmates and teachers, and digital contact is now a normal part of social life (Chayko, 2014). However, the same connectivity can create pressure to always be available. Some authors propose positive uses of technology to prevent technostress (Brivio et al., 2018). For these reasons, students' well-being should be viewed in the context of their whole educational and social experience, not just their grades.

Technostress and Psychological Well-Being

There are good reasons to expect a link between technostress and well-being. Heavy digital workloads, constant connectivity, technical problems, and uncertainty about new systems can make it harder for students to manage their studies and personal lives. In workplaces, technostress has been linked to lower job satisfaction and productivity (Tarafdar et al., 2007, 2011). Among university students, they have been tied to burnout and lower academic productivity (Upadhyaya & Vrinda, 2021; Wang et al., 2020). Links with particular Ryff components are also likely. Overload may leave students feeling that there is never enough time, which touches environmental mastery. Invasion may cut into rest, personal activities and face-to-face contact, which touches positive relations. Complexity may weaken students' confidence in tasks that need digital tools. These links make sense in theory. However, their size and direction must be tested with data. Studies of heavy technology use point the same way. In a study of college students, frequent mobile phone use was associated with more anxiety and poorer grades, both of which were in turn tied to lower life satisfaction (Lepp et al., 2014). Smartphone addiction has likewise been connected with higher perceived stress and lower life satisfaction (Samaha & Hawi, 2016). In Pakistan, excessive internet use among undergraduates has been linked with poorer academic performance and disturbed daily routines (Suhail & Bargees, 2006). The closest study involved 564 postgraduate students at a private university in Sindh. It found only a weak link between techno-stressors and psychological well-being, and techno-insecurity had the strongest effect (Asad et al., 2023). The link need not run in one direction only. Tarafdar et al. (2019) point out that technology demands can produce techno-eustress as well as techno-distress, depending on whether people see them as challenges or threats. Whether technostress goes with lower or higher well-being may therefore depend on who is studied, how the variables are measured, and how technology is used.

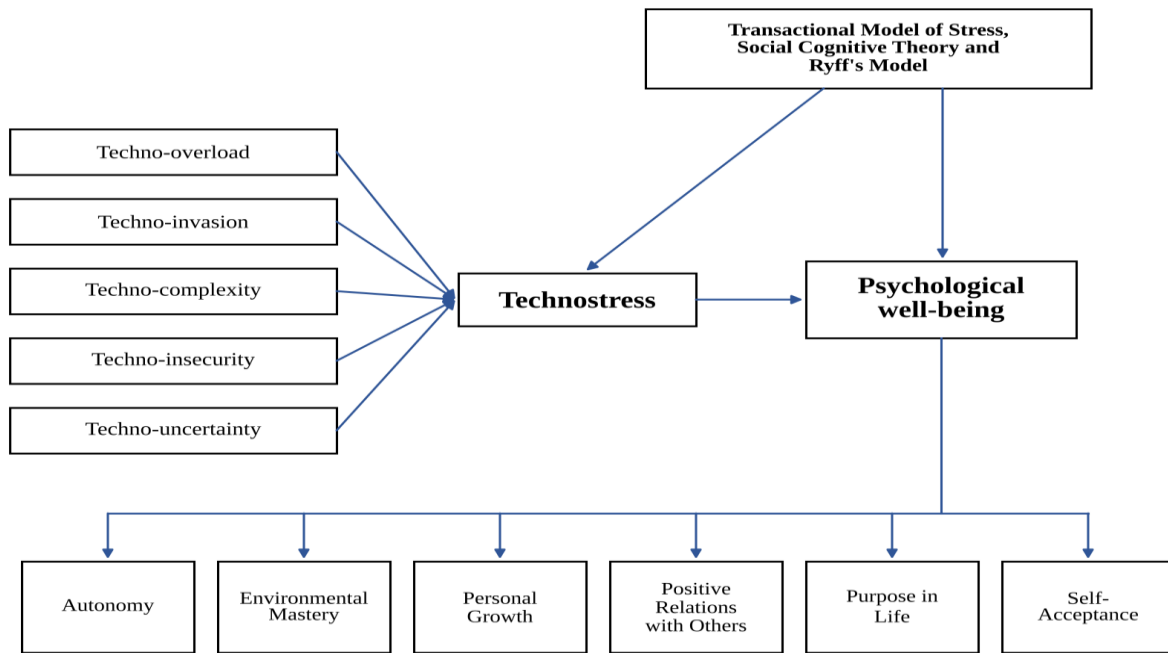
Research Gap and Rationale

Early research on technostress largely examined employees and organizational settings, where technology demands influence work-related strain, satisfaction and commitment (Fuglseth & Sørrebø, 2014; Ragu-Nathan et al., 2008). Later studies extended the concept to teachers and academic staff (Al-Fudail & Mellar, 2008; Jena, 2015; Joo et al., 2016). Findings from workplaces cannot simply be generalized to university students, whose technology demands and responsibilities differ. In higher education, students use digital tools for more than just completing tasks. They also use them to attend lectures, communicate with teachers, participate in online discussions, submit assignments, and access learning resources. As a result, they meet technology demands across many parts of their academic and personal lives. Evidence on technostress and psychological well-being among university students remains limited, particularly in South Asia. Asad et al. (2023) examined only postgraduate students at one private university and did not assess how each technostress creator relates to each dimension of Ryff's model. Little is known about undergraduates, who are still adjusting to university life. Little is also known about students in public and private universities of Punjab, or about differences across gender, study shift, semester, age, and CGPA. Filling this gap has practical value. Students could learn to spot the technology-related stressors in their own routines. Teachers, administrators, counselors, and policymakers could also use such evidence. They decide on digital literacy support, the design of online platforms, rules for digital communication, and the support services students can use. With these aims, the researcher examined technostress and well-being in undergraduates from Lahore, both as overall scores and dimension by dimension.

II. THEORETICAL FRAMEWORK OF THE STUDY

Our study is built on Lazarus and Folkman's (1984) transactional model of stress and coping. The model holds that stress does not lie in the environment or in the person alone. It arises from the way the two interact. A person first asks whether a demand matters and whether it is threatening (primary appraisal). The person then asks whether they have the resources to deal with it (secondary appraisal). Technostress research uses the same logic. Technostress creators are treated as demands, and their effect depends on how users appraise them and on the resources at hand (Ragu-Nathan et al., 2008; Tarafdar et al., 2019). Take a new learning management system introduced by a university. One student may see it as a threat. Another may see it as a manageable challenge. Social Cognitive Theory (Bandura, 1986) adds a further piece. It explains how students' beliefs about their own abilities shape these appraisals. In this theory, the person, the person's behavior, and the environment keep influencing each other. Its central idea is self-efficacy: a person's confidence in their ability to plan and do what a situation requires. In online and blended learning, students differ in how confident they feel using digital tools, handling technical problems, and completing technology-based tasks. These differences can affect how they read and react to technology demands. Accordingly, computer self-efficacy has been found to reduce technostress (Shu et al., 2011). A student who feels capable with technology may treat an unfamiliar application as a manageable task and keep trying when problems arise. A student who doubts these abilities may see the same task as a threat and feel frustrated, helpless or anxious. Such reactions can lower well-being, especially when technical problems shake the student's sense of competence, independence, and control over learning. In this study, self-efficacy helps interpret individual differences. It was not measured or tested as a mediator or moderator.

Ryff's model defines this study's outcome variable. Ryff (1989) viewed positive functioning as having several parts and as reaching beyond short-term happiness or life satisfaction. These parts are the six components described earlier: autonomy, mastery of the environment, growth, positive relations, purpose, and self-acceptance. They describe how much a person values themselves, keeps developing, manages their surroundings, maintains good relationships, lives with purpose, and acts independently. All six matter for undergraduates. University life requires them to manage coursework, make friends, make their own decisions, and adapt to new expectations. Technostress may weaken these areas when technology demands become hard to manage. Repeated trouble with a learning platform, for example, may shake a student's sense of control over their environment. Constant connectivity for study may make it hard to keep study and private life separate. Ongoing frustration with technology may also hold back personal growth and confidence in new situations. These are plausible links, not proven causes. Ryff's model also lets us test whether separate technostress creators relate to separate parts of well-being. It provides a fuller picture of well-being than measures that focus only on negative symptoms. Together, these three perspectives form the basis of this study. The transactional model and Social Cognitive Theory help explain why the same technology demands affect students in different ways. Ryff's model treats well-being as positive functioning with several distinct parts. Following this framework, the researcher placed technostress as the predictor and well-being as the outcome. The design is correlational, so it tests association and not cause. The framework does not assume that technology use must be harmful. Students' experiences are expected to depend on the demands they meet, on how able they feel to deal with them, and on the support their institution offers. The framework is shown in Figure 1.

Figure 1: Theoretical Framework of the Study

Objectives And Hypotheses of the Study

The study had three objectives:

1. To examine whether technostress is related to psychological well-being in undergraduate students.
2. To examine how the five technostress creators relate to the six components of psychological well-being.
3. To compare technostress and psychological well-being by gender, university type, shift, semester, age group and CGPA.

In line with these objectives, the following null hypotheses were tested:

- H₀₁: There is no significant relationship between technostress and psychological well-being among undergraduate students.
- H₀₂: There is no significant relationship between the dimensions of technostress (techno-overload, techno-complexity, techno-uncertainty, techno-insecurity, and techno-invasion) and the dimensions of psychological well-being (autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance).
- H₀₃: There is no significant difference in undergraduate students' technostress on the basis of gender.
- H₀₄: There is no significant difference in undergraduate students' technostress on the basis of university type.
- H₀₅: There is no significant difference in undergraduate students' technostress on the basis of shift.
- H₀₆: There is no significant difference in undergraduate students' technostress on the basis of age group.
- H₀₇: There is no significant difference in undergraduate students' technostress on the basis of semester.
- H₀₈: There is no significant difference in undergraduate students' technostress on the basis of CGPA.
- H₀₉: There is no significant difference in undergraduate students' psychological well-being on the basis of gender.
- H₀₁₀: There is no significant difference in undergraduate students' psychological well-being on the basis of university type.
- H₀₁₁: There is no significant difference in undergraduate students' psychological well-being on the basis of age group.
- H₀₁₂: There is no significant difference in undergraduate students' psychological well-being on the basis of shift.
- H₀₁₃: There is no significant difference in undergraduate students' psychological well-being on the basis of semester.

- H₀₁₄: There is no significant difference in undergraduate students' psychological well-being on the basis of CGPA.

III.METHOD

This was a quantitative study. Data were collected once through a survey and analyzed using correlational techniques to examine the relationship between technostress and well-being among undergraduates. Such a design can show whether two variables move together, but it cannot show that one causes the other.

Participants

The population comprised all undergraduates enrolled in public and private universities in Lahore, Pakistan. Participants were chosen in three stages. First, the Higher Education Commission-recognized universities of Lahore (15 public and 21 private) were divided by sector, and two universities were chosen from each sector. Second, the faculties of Education, Arts, and Science were chosen purposively. Third, students in these faculties were drawn from each university by simple random sampling. In total, 1001 students took part. Of these, 317 were male (31.7%), and 684 were female (68.3%); 498 (49.8%) were from public and 503 (50.2%) from private universities. There were 581 morning-shift and 417 evening-shift students, and shift was not recorded for three students. Each university's administration gave permission before any data were gathered. The researcher explained the study's purpose, and only those who agreed took part after giving informed consent. Personal information was used only for research purposes. The researcher visited each sampled university in person to administer the questionnaires and answer participants' questions directly. Responses were then keyed into SPSS and checked for missing data and typing errors before analysis.

Measures

Two existing instruments were used. The 21-item technostress scale covers five constructs: overload (TO), complexity (TC), uncertainty (TU), insecurity (TI), and invasion (TIN). Researchers assessed well-being using the 42-item Ryff scales, which cover self-acceptance, positive relations, environmental mastery, personal growth, autonomy, and purpose in life. [I] Technostress Scale: Asad et al. (2023) used the 21-item version of the technostress scale. It draws on the technostress creator’s framework developed by Ragu-Nathan et al. (2008) and Tarafdar et al. (2007). Its items fall into five groups: overload, complexity, uncertainty, insecurity, and invasion (Table 1). Responses range from 1 (never) to 5 (almost always), giving a possible total of 21 to 105. A higher total means more technostress.

Table 1: Dimensions and Items of the Technostress Scale

Factors	Item No.
Overload	1 to 5
Complexity	6 to 9
Uncertainty	10 to 13
Insecurity	14 to 17
Invasion	18 to 21

[II] Ryff Scales of Psychological Well-Being: Well-being was assessed with the 42-item form of Ryff's scales (Ryff, 1989; Ryff & Keyes, 1995). Each of the six components (autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance) has seven items. Students answered on a six-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). Negatively worded items were reverse-scored before subscale and total scores were computed. Totals range from 42 to 252, with higher scores indicating better well-being. Before the main survey, both questionnaires were administered to 300 undergraduates who did not take part in the main study. Subject experts reviewed the items to judge their content validity. Internal consistency (Cronbach's alpha) was .715 for technostress and .880 for well-being (Table 2), both exceeding the usual threshold of .70.

Table II: Reliability of the Instruments (Pilot Study, n = 300)

Instruments	Reliability
Technostress	0.715
Ryff scales of psychological well-beings	0.880

Procedure

SPSS version 25.0 was used for all analyses. Means and standard deviations summarised each variable. Pearson's r was computed for technostress and well-being as a whole and for each pair of their dimensions. Groups were compared with t tests for independent samples and with one-way ANOVA, followed by LSD post hoc tests where needed. Cohen's d (for t tests) and eta squared (η^2 , for ANOVA) were reported as effect sizes and judged against Cohen's (1988) benchmarks. Researchers used $p < .05$ as the significance value.

IV. RESULTS

Descriptive Statistics

Table III: Descriptive Statistics for Technostress and Psychological Well-Being (N = 1001)

Variable	Items	Possible Range	M	SD	Mean item score
Technostress	21	21–105	67.99	8.70	3.24
Psychological well-being	42	42–252	164.58	20.81	3.92

Table 3 shows a mean technostress score of 67.99 ($SD = 8.70$). Divided by the number of items, this gives 3.24 on the five-point scale, a little above the midpoint. Students therefore reported moderate technostress. The mean psychological well-being score was 164.58 ($SD = 20.81$), corresponding to 3.92 per item on the six-point scale and indicating moderately positive psychological functioning.

Relationship Between Technostress and Psychological Well-Being

H_{01} : There is no significant relationship between technostress and psychological well-being among undergraduate students.

Table IV: Pearson Correlation Between Technostress and Psychological Well-Being

Variables	N	r	P
Technostress and psychological well-being	1001	0.223	< .001

According to Table 4, technostress and well-being were weakly but significantly and positively correlated, $r(999) = .223$, $p < .001$, 95% CI [.163, .281]. The null hypothesis H_{01} was therefore rejected. Contrary to expectations, students who reported more technostress also reported slightly higher psychological well-being. The coefficient of determination ($r^2 = .05$) shows that the two variables share only about 5% of their variance.

H_{02} : There is no significant relationship between the dimensions of technostress (techno-overload, techno-complexity, techno-uncertainty, techno-insecurity, and techno-invasion) and the dimensions of psychological well-being (autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance).

Table V: Pearson Correlations Between Dimensions of Technostress and Dimensions of Psychological Well-Being

Factors		Autonomy	Environmental mastery	Personal growth	Positive relations	Purpose in life	Self-acceptance
Techno-overload	<i>r</i>	.160	.153	.158	.118	.113	.128
	<i>p</i>	< .001	< .001	< .001	< .001	< .001	< .001
Techno-complexity	<i>r</i>	.108	.066	.072	.048	.045	.049
	<i>p</i>	.001	.037	.023	.128	.152	.121
Techno-uncertainty	<i>r</i>	.089	.061	.047	.046	.048	.054
	<i>p</i>	.005	.054	.139	.147	.131	.087
Techno-insecurity	<i>r</i>	.133	.149	.103	.110	.098	.128
	<i>p</i>	< .001	< .001	.001	.001	.002	< .001
Techno-invasion	<i>r</i>	.148	.155	.090	.164	.082	.160
	<i>p</i>	< .001	< .001	.004	< .001	.010	< .001

Table 5 shows that all 30 correlations between the technostress and well-being dimensions were positive and weak, ranging from $r = .045$ to $r = .164$. Of these, 22 reached $p < .05$, so H_{02} was partially rejected. Overload, insecurity, and invasion were each linked to all six well-being components. The largest coefficients were for techno-invasion with positive relations ($r = .164$) and self-acceptance ($r = .160$), and for techno-overload with autonomy ($r = .160$). Techno-complexity was significantly correlated only with autonomy, environmental mastery, and personal growth. Techno-uncertainty was significantly correlated only with autonomy ($r = .089$, $p = .005$).

Differences by Demographic and Academic Variables

H_{03} : There is no significant difference in undergraduate students' technostress on the basis of gender.

Table VI: Independent-Samples t Test for Technostress by Gender

Gender	N	M	df	t	P
Male	317	67.16	999	2.071	.039
Female	684	68.38			

Table 6 shows that female students ($M = 68.38$) reported slightly higher technostress than male students ($M = 67.16$). This gap reached significance, $t(999) = 2.07$, $p = .039$, although its size was negligible ($d = 0.14$). H_{03} was therefore rejected.

H_{04} : There is no significant difference in undergraduate students' technostress on the basis of university type.

Table VII: Independent-Samples t Test for Technostress by University Type

Group	N	M	df	t	P
Public university	498	68.44	999	1.63	.103
Private university	503	67.54			

Technostress was similar in public ($M = 68.44$) and private universities ($M = 67.54$), $t(999) = 1.63$, $p = .103$, $d = 0.10$ (Table 7). H_{04} was therefore not rejected.

H_{05} : There is no significant difference in undergraduate students' technostress on the basis of shift.

Table VIII: Independent-Samples t Test for Technostress by Shift

Group	N	M	df	t	p
Morning shift	581	14.17	996	0.27	.787
Evening shift	417	14.21			

Table 8 shows no significant difference in technostress between morning-shift and evening-shift students, $t(996) = 0.27$, $p = .787$. H_{05} was therefore not rejected.

H_{07} : There is no significant difference in undergraduate students' technostress on the basis of semester.

Table IX: One-Way ANOVA for Technostress by Semester

Source	Sum of squares	Mean square	df	F	p
Between groups	33.60	8.40	4	0.11	.979
Within groups	75646.37	75.95	996		
Total	75679.98		1000		

Semester made no significant difference to technostress, $F(4, 996) = 0.11$, $p = .979$, $\eta^2 < .001$ (Table 9). H_{07} was therefore not rejected.

H_{06} : There is no significant difference in undergraduate students' technostress on the basis of age group.

Table X: One-Way ANOVA for Technostress by Age Group

Source	Sum of squares	Mean square	df	F	p
Between groups	613.61	306.80	2	4.07	.017
Within groups	75066.36	75.21	998		
Total	75679.98		1000		

Table 10 shows a significant difference in technostress across age groups, $F(2, 998) = 4.07$, $p = .017$, although the effect size was small ($\eta^2 = .008$). H_{06} was therefore rejected.

Table XI: LSD Post Hoc Comparison of Technostress by Age Group

Age groups compared	Mean difference (I – J)	P
18–21 vs. 22–25	1.29	0.019

Post hoc comparison with the LSD test (Table 11) showed that students aged 18–21 scored on average 1.29 points higher on technostress than students aged 22–25 ($p = .019$).

H_{08} : There is no significant difference in undergraduate students' technostress on the basis of CGPA.

Table XII: One-Way ANOVA for Technostress by CGPA

Source	Sum of squares	Mean square	df	F	P
Between groups	361.13	72.22	5	0.95	0.44
Within groups	75318.84	75.69	995		
Total	75679.98		1000		

CGPA category made no significant difference to technostress, $F(5, 995) = 0.95$, $p = .448$, $\eta^2 = .005$ (Table 12). H_{08} was therefore accepted.

H_{09} : There is no significant difference in undergraduate students' psychological well-being on the basis of gender.

Table XIII: Independent-Samples t Test for Psychological Well-Being by Gender

Group	N	M	Df	t	P
Male	317	163.10	999	1.53	.126
Female	684	165.27			

Well-being scores of females ($M = 165.27$) and male students ($M = 163.10$) were similar, $t(999) = 1.53$, $p = .126$, $d = 0.10$ (Table 13). H_{09} was therefore accepted.

H_{010} : There is no significant difference in undergraduate students' psychological well-being on the basis of university type.

Table XIV: Independent-Samples t Test for Psychological Well-Being by University Type

Group	N	M	Df	t	p
Public university	498	166.61	999	3.084	.002
Private university	503	162.57			

Table 14 shows that students of public universities ($M = 166.61$) reported significantly higher psychological well-being than students of private universities ($M = 162.57$), $t(999) = 3.08$, $p = .002$, $d = 0.19$. H_{010} was therefore rejected, although the effect size was small.

H_{012} : There is no significant difference in undergraduate students' psychological well-being on the basis of shift.

Table XV: Independent-Samples t Test for Psychological Well-Being by Shift

Group	N	M	Df	t	p
Morning shift	581	163.07	996	2.74	.006
Evening shift	417	166.71			

Evening-shift students ($M = 166.71$) reported significantly higher psychological well-being than morning-shift students ($M = 163.07$), $t(996) = 2.74$, $p = .006$, $d = 0.18$ (Table 15). H_{012} was therefore rejected, with a small effect size.

H_{013} : There is no significant difference in undergraduate students' psychological well-being on the basis of semester.

Table XVI: One-Way ANOVA for Psychological Well-Being by Semester

Source	Sum of squares	Mean square	df	F	p
Between groups	880.77	220.193	4	0.50	0.73
Within groups	432287.65	434.02	996		
Total	433168.42		1000		

Semester made no significant difference to psychological well-being, $F(4, 996) = 0.51$, $p = .731$, $\eta^2 = .002$ (Table 16). H_{013} was therefore accepted.

H_{011} : There is no significant difference in undergraduate students' psychological well-being on the basis of age group.

Table XII: One-Way ANOVA for Psychological Well-Being by Age Group

Source	Sum of squares	Mean square	df	F	P
Between groups	1444.25	722.12	2	1.66	.191
Within groups	431724.17	432.58	998		
Total	433168.42		1000		

Age group, likewise, was not related to psychological well-being, $F(2, 998) = 1.66$, $p = .191$, $\eta^2 = .003$ (Table 17). H_{011} was therefore accepted.

H_{014} : There is no significant difference in undergraduate students' psychological well-being on the basis of CGPA.

Table XVIII: One-Way ANOVA for Psychological Well-Being by CGPA

Source	Sum of squares	Mean square	df	F	P
Between groups	1695.12	339.02	5	0.78	0.56
Within groups	431473.29	433.64	995		
Total	433168.42		1000		

Finally, CGPA category made no significant difference to psychological well-being, $F(5, 995) = 0.78$, $p = .564$, $\eta^2 = .004$ (Table 18). H_{014} was therefore accepted.

V. DISCUSSION

This study aimed to explore the relationship between technostress and psychological well-being among undergraduates in Lahore. Students reported moderate technostress and moderately positive psychological well-being. The main finding was a weak but significant positive correlation between the two variables ($r = .223$), and the dimension-level correlations followed the same pattern. This direction contrasts with organizational and student research, which has associated technostress with poorer outcomes (Tarafdar et al., 2011; Upadhyaya & Vrinda, 2021; Wang et al., 2020). However, this aligns with the weak association reported by Asad et al. (2023) among Pakistani postgraduate students. Several explanations are possible. First, the transactional view of stress holds that demands can be appraised as challenges rather than threats (Lazarus & Folkman, 1984). Students who are more engaged in university life are also more likely to use digital platforms. They may therefore report both more technology demands and a stronger sense of purpose, growth, and mastery. This aligns with what Tarafdar et al. (2019) call techno-eustress. Second, students reported both technostress and well-being in a single session. A shared response style may have contributed to the positive association (Podsakoff et al., 2003). Because the result runs counter to most previous research, researchers should confirm it in further samples before drawing firm conclusions.

Across dimensions, overload, insecurity, and invasion were most consistently linked to well-being, whereas complexity and uncertainty showed few links. The strongest coefficient was between techno-invasion and positive relations. Perhaps students who are always online also stay in closer contact with friends and classmates (Chayko, 2014), even if the constant connection feels intrusive at times. Still, every one of these correlations was small, explaining 3% of the variance or less. Female students reported slightly more technostress than male students. Findings on gender in the technostress literature have been mixed, and the very small effect here ($d = 0.14$) suggests that the difference has limited practical importance. Students aged 18–21 reported more technostress than those aged 22–25. This is consistent with organizational evidence that technostress tends to be lower among older users (Ragu-Nathan et al., 2008). A likely reason is that younger students have had less time to adapt to the digital requirements of university study. Technostress did not differ by university type, shift, semester, or CGPA. Psychological well-being was higher among students of public universities and among evening-shift students, and it did not differ by gender, semester, age, or CGPA. These sector and shift differences were small and may reflect differences in student background or in each group's academic routines, which were not measured here. Overall, technostress and psychological well-being appear to be fairly evenly distributed across student groups. Institutional responses should therefore be directed to all undergraduates rather than to particular groups.

Recommendations

On the basis of these findings, researchers make four recommendations:

1. Universities could offer short programs that teach students practical ways of handling the pressures of constant technology use. Particular attention should be given to first-year and younger students, who reported more technostress.
2. Workshops on digital skills, time management, and healthy technology use should be offered to incoming students to help them adjust to the technological demands of university life. Online modules can make these resources available to students of both morning and evening shifts.
3. Counseling services should be made more accessible to students who experience technology-related stress. Peer support groups can also be developed so that students can share their experiences and coping strategies.

4. Faculty members should be encouraged to set reasonable expectations for digital communication outside class hours and to use a limited number of well-supported platforms. This matters because overload and invasion were the technostress dimensions most consistently linked to students' well-being.

VI. CONCLUSION

Undergraduates in Lahore reported moderate technostress and fairly positive well-being. Technostress and well-being were weakly and positively related, both in total scores and across dimensions. Technology demands, then, do not seem harmful for everyone, and some students may take them as a challenge. Female and younger students reported a little more technostress. Students in public universities and in evening classes reported somewhat better well-being. None of these group differences were large. Researchers therefore argue for a balanced response. Universities can keep using digital tools in teaching while helping students develop the skills.

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