

Digital Resilience and Psychological Wellbeing of Italian Higher Education Students: An Exploratory Study

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Abstract: *Covid-19 pandemic has increased the use of technology in the educational field. While previous literature has demonstrated the benefits of using technology in educational environments, the risks related to problematic digital behaviors have been less investigated. Digital resilience represents a protective factor for students' learning outcomes and emotional wellbeing. The main aim of this study was to explore Italian university students' digital resilience levels and their psychological wellbeing in terms of stress and psychological resilience. 94 students (F=57.4%) aged 19-57 (M=31.11, SD=9.04) completed an ad-hoc questionnaire on digital resilience which included the Perceived Stress Scale, the KOP-26, and the Brief Resilience Scale. Descriptive statistics, item analysis, and bivariate correlations were performed. Results showed that Italian students reported higher levels of stress (M=21.53, SD=6.92) than the Italian normative sample. In addition to this, they perceived good levels of both psychological and digital resilience: they reported being aware of potential strategies for preparing for and responding to cyber threats and how to face negative online experiences. These results could usefully inform interventions aimed at helping them to recognize and manage risks and threats when online.*

Keywords: *digital resilience; digital safety; psychological resilience; stress; higher education;*

1. INTRODUCTION

Since the beginning of 2020, the Covid-19 pandemic has increased the use of technology in different fields, including the educational one. While the benefit of using technology in educational environments are clear, less attention has been paid to identifying the risks related to students' problematic digital behaviors such as digital burnout, mental health distress related to digital failures, or negative online interactions in terms of cyberbullying and cybercrime [1]. Research has shown that the increased use of technology has led to a sudden surge in the levels of perceived webinar fatigue, technology-use anxiety, and digital burnout [2] due to the changes in work and learning imposed by lockdown and social distancing measures. In addition to this, spending more time online has increased the risk of coming across issues [1]. Interestingly, previous studies have shown that higher education students adopt a positive attitude and behaviors to cope with these negative outcomes, showing new forms of resilience in digital environments [1, 3].

According to Eri and colleagues [3] digital resilience can be defined as the ability of students to overcome technological difficulties and continue with online learning while adapting to changes in higher educational contexts. Literature has shown a positive relationship between digital resilience and digital literacy, identifying digital literacy as a potential predictive factor of individual online resilience [4,5]. However, while digital literacy refers to the effective and ethical understanding and use of technologies, digital resilience is more related to "the capacities of accessing, using, understanding, and spreading effective digital sources and common manipulative techniques, in particular, behavioral and attitudinal change aspects" [1]. Specifically, according to the theoretical model developed by Sun and colleagues [1] digital resilience has five main attributes: understanding when you may be at risk online, knowing what to do to seek help, learning knowledge and skills from experience, being able to recover from stress and moving forward through self-efficacy in challenges.

1.1. Antecedents and Consequences of Cyber Resilience

Research has also identified several antecedents and consequences related to digital resilience that

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can help to have a better understanding of this phenomenon [6]. With regard to the antecedents, it is possible to identify deviant use of technology, digital burnout, webinar fatigue [7], and external factors such as environmental facilities and barriers [3], national and international policies [8], and institutional and non-institutional support [9]. Moreover, individual factors such as digital literacy [10], self-control [11], self-efficacy [4], and self-esteem [9] could also impact digital resilience [1]. Considering consequences, instead, good levels of digital resilience can influence, on the one hand, students' learning performance. For example, students showing higher levels of digital resilience use social media more effectively [10] and get better achievements while overcoming stressful situations [3]. On the other hand, higher levels of digital resilience have been found to foster students' psychosocial functioning and a positive lifestyle adjustment [11]. For example, digital resilience has been demonstrated to moderate mental fatigue related to social and academic isolation [3].

1.2. The Current Study

In light of these findings, the main aims of this exploratory study were to (a) analyze the digital resilience levels of Italian higher education students and (b) their psychological functioning in terms of stress and psychological resilience. Previous literature has shown that during the Covid-19 pandemic Italian university students reported high levels of stress that significantly decreased their learning processes and negatively affected their psychological wellbeing [12]. In contrast, resilience skills resulted as a protective factor in overcoming difficulties in learning [12]. For this reason, we hypothesized that our students would report high levels of perceived stress and good levels of psychological resilience and that a negative association would occur between these two variables. Instead, concerning digital resilience, no previous studies have been conducted on the Italian population yet. Thus, we proceeded with explorative analyses.

2. METHODS

2.1. Participants and Procedure

Ninety-four university students (F=57.4%) aged 19 to 57 (M=31.11, SD=9.04) completed an online questionnaire in June 2022. Socio-demographic characteristics of the sample are reported in Table 1.

Table 1. Socio-demographic characteristics of the sample

Variables	n(%)
Gender	
Male	40 (42.6%)
Female	54 (57.4%)
Other	
Level of study	
Bachelor	27 (28.7%)
Master	46 (48.9%)
PhD	21 (22.3%)
Year of study	
1	52 (55.3%)
2	22 (23.4%)
3	14 (14.9%)
4	1 (1.1%)
5	2 (2.1%)
Field of study	
Business	5 (5.3%)
Humanities	9 (9.6%)
Natural and applied sciences	49 (52.1%)
Social sciences	31 (33%)
Studying in hometown	
Yes	63 (67%)
No	31 (33%)
Mode of study	
Full-time	78 (83%)
Part-time	16 (17%)
Worker	
Yes	61 (64.9%)
No	33 (35.1%)

2.2. Measures

The online survey was composed of the following questionnaires:

- A questionnaire created specifically for this study investigating students' digital safety in terms of digital resilience (12 items) and students' negative online experiences (9 items);
- The Perceived Stress Scale [13,14] measures individual perceived stress levels. It is composed of 10 items measured on a 5-point Likert scale (from 0=never to 4=very often) and Cronbach alpha for this sample was .88;
- KOP-26 [15] and the Brief Resilience Scale [BRS; 16] were used to measure students' perceived resilience. KOP-26 was composed of 26 items measured on a 5-point Likert scale (from 1=strongly disagree to 5=strongly agree) and Cronbach alpha for this sample was .93. BRS was composed of 6 items measured on a 5-point Likert scale (from 1=strongly disagree to 5=strongly agree) and Cronbach alpha for this sample was .75.

2.3. Statistical Analyses

Descriptive statistics in terms of means, standard deviations, frequencies, and percentages have been provided for socio-demographic data. Item analysis (means, standard deviation, frequencies, and percentages), total scores and scores for subscales (as means and standard deviations), and internal reliability (Cronbach's alpha) have been reported for each questionnaire. In addition to this, for each scale a chi-square test or t-test, or ANOVA (according to the type of data) have been performed to verify possible differences among participants in terms of sex, age, and course of study. Only significant comparisons have been reported in the tables. For the Perceived Stress Scale, Italian normative data have been found. Thus, a z-test was used to compare our sample with the normative one. Finally, Pearson's *r* bivariate correlations have been performed to analyze possible associations between stress and resilience.

3. RESULTS

3.1. Cyber Resilience and Negative Online Experiences

Overall, the results from the item analysis showed that most respondents are aware of potential strategies for preparing for and responding to cyber threats (Table 2). For example, 51.1% of users set the privacy control of their social network and 84% regularly update their devices. In addition to this, 48.9% of students always get informed in detail about the application they are going to install on their device, and they reported that their account has never been hacked (86.2%), they have never been victims of a money transfer fraud or scam on the Internet (91.5%) and they have never replied to an email unrevealing their personal data (98.9%). The weakest areas seemed to be related to password management, backup of data, and reaction to web browser warning messages. No differences in terms of sex, age, and course of study have been found.

With regard to students' perceived negative online experience (Table 3) most of them reported being often exposed to content that shows people being a target of aggressive attacks or being insulted (36.2%). In addition to this, 79% reported making an effort to avoid content perceived as uncomfortable. After a negative online experience, the majority of students blocked people (76.6%), increased privacy settings (44.7%) or reported someone to a social media company or another organization (51.1%). When students were asked about their previous online negative experiences, most reported that they do not feel angry, afraid, helpless or powerless (51.1%), that they did not feel left out or lost some of their friends (68.1%) or that their reputation was not damaged (74.5%).

Table 2. Digital Resilience

Item	n(%)
How do you use your password?	
For most systems, I use distinct, strong passwords	26 (27.7%)
For important systems, I use distinct, strong passwords, and for non-important, I use simple passwords	34 (36.2%)
For important systems, I use distinct, strong passwords, and for non-important, I use simple passwords	23 (24.5%)
I use the same, strong password for most systems	3 (3.2%)
I use weak but different passwords for most systems I use the same weak password	
for most systems	8 (8.5%)
How do you manage your password?	
I use password manager software	14 (14.9%)
I keep the passwords in a secured file	20 (21.3%)
I keep the passwords in a plain file	5 (5.3%)
I keep the passwords on a paper	22 (23.4%)
I remember the passwords (memorize them)	33 (35.1%)
Did you set the privacy control of your social network accounts?	
I set it on all platforms I use	48 (51.1%)
I set it for some platforms and left it on default on other	32 (34%)
I left the default settings on all the platforms I use	7 (7.4%)
I am not sure	3 (3.2%)
I do not use social networks	4 (4.3%)
Windows	
I use Windows and I have an antivirus program installed on my computer	55 (58,5%)
I use Windows and I am not sure if I have an antivirus program installed on my computer	18 (19,1%)
I use Windows and do not have an antivirus program installed on my computer	6 (6,4%)
I do not use Windows	14 (14,9%)
I do not use Windows	1 (1,1%)
Other ex. VPN	
Do you regularly install updates to your device	
No	10 (10,6%)
Yes	79 (84,0%)
I am not sure	5 (5,3%)
Ho often do you create copies of your most important data (backup)	
Once a week	14 (14,9%)
Once a month	15 (16,0%)
Once in a few months	34 (36,2%)
Once a year	16 (17,0%)
I do not back up my data	15 (16,0%)

Do you use cloud platform to back up your important data		
No	31 (33 %)	
Yes	63 (67%)	
Please describe how you react if your web browser prompts a warning message		
I think that the warnings are serious and do not proceed with further activities	36 (38,3%)	
I carefully proceed with the activity	46 (48,9%)	
I ignore the warnings since these are mostly false alarms and I proceed to the desired content	12 (12,8%)	
Application		
I always get informed in detail about the application I am about to install on my device	46 (48,9%)	
I just briefly get informed about the application I am about to install on my device	25 (26,6%)	
I just install the application I need, without spending time getting informed about it I don't think about it because my cell phone is protected by antivirus app	18 (19,1%)	
	5 (5,3%)	
	No n(%)	Yes n(%)
Has your account ever been hacked and has anyone ever accessed your personal information	81 (86,2%)	13 (13,8%)
Have you ever been a victim of a money transfer fraud or scam on the Internet	86 (91,5%)	8 (8,5%)
Have you ever replied to an e-mail and revealed your personal data about your PIN code, bank account number, ID number	93 (98,9%)	1 (1,1%)

On the contrary, they believed they have become more aware of online risks (44.7%), learned how to use the internet in a more balanced way (42.6%), developed a greater understanding of their behaviors online (47.9%), and became more able to overcome problems experienced online (50.9%). No differences in terms of sex, age, and course of study have been found.

3.2. Stress and Resilience

The mean level of perceived stress reported by our students is 21.53 (SD=6.92), with a significant difference between males (M=19.6; SD=7.64) and females (M=22; SD=6.01; t=2.389(92), p=.019). Comparing our sample with the Italian normative one, we found significant differences between them. According to sex and age, our students perceived higher stress levels than the general Italian population (Table 4).

The main results showed that the youngest students and students attending Bachelor's courses reported lower levels of resilience than older

students or students attending Master's and PhD courses. In addition, according to the t-test analysis, male students perceived higher levels of resilience (on the Brief resilience Scale) than female students (Table 5).

Table 3. Negative Online Experiences

Have you experienced various unpleasant or violent online content, and whether you watch similar content or read messages about such content?	Mean (SD)
I have been insulted or called names on social networks or other online communication channels before	0.54 (.94)
It has happened before that someone spread rumors about me on social networks	0.48 (.90)
I have been threatened on social networks, through e-mails, and other similar online ways of communication	0.28 (.72)
Someone has posted embarrassing photos or video content of me online	0.28 (.78)
I have been blocked/ignored by others on social networks, in chat messages, or group text messages	0.81 (1.03)
It often happens that I read certain content or see video clips/footage which show another person being a target of aggressive attacks or being insulted, etc	1.80 (1.24)
Do you make an effort to avoid online content that you perceive as uncomfortable, for example aggressive, sad or scary content?	1.96 (1.03)
After an online negative experience, the students...	N (%)
Blocked people (including 'unfriending')	72 (76.6%)
Increased my privacy settings	42 (44.7%)
Set up my account so that it does not automatically include my location on my posts	20 (21.3%)
Deleted comments that I had made	9 (9.6%)
Changed my filter preferences	13 (13.8%)
Deleted comments that others had made on my profile	13 (13.8%)
Removed my name from photos that I had been tagged	19 (20.2%)
Reported someone to the social media company or another organization	48 (51.1%)
Reported someone to my friends	14 (14.9%)
Reported someone to my parents	6 (6.4%)
None of these	7 (7.4%)

In relation to previous negative online experiences...	M (SD)
I did not feel good about myself	1.15 (1.59)
I felt angry, afraid, helpless, powerless	1.35 (1.67)
I felt left out/I lost some of my friends	.83 (1.41)
My reputation was damaged	.66 (1.33)
I didn't feel close to my family and/or friends	.51 (1.08)
I became more aware of online risks	2.62 (1.89)
I became more aware of whomyreal friends are	2.16 (1.95)
I learnt to use the internet in a more balanced way	2.60 (1.76)
I developed a greater understanding of my own behavior online	2.68 (1.88)
I became more able to overcome problems that I experienced online	2.85 (1.78)

Table 4. Stress

	M (SD)	Normative Italian Sample M (SD)	z-test
Total	21.53 (6.92)		
Sex (n)			
Female (54)	22 (6.01)	16.3 (5.5)	Z=7.35; p <.000; d=1.00
Male (40)	19.6 (7.64)	15.2 (6.1)	Z=5.27; p <.000; d=.83
Age (n)			
≤30 (56)	23.00 (7.13)	15.9 (6.3)	Z=8.73; p <.000; d=1.16
31-40 (23)	19.56 (7.42)	15.4 (5.4)	Z=4.79; p <.000; d=1.00
41-50 (12)	18.75 (3.38)	14.4 (6.4)	Z=4.79; p <.000; d=1.00
≥51 (3)	20.33 (1.52)	16.7 (5.4)	Z=1.04; p = .298; d=.600

Bivariate correlations performed to explore possible associations between students' perceived stress and resilience showed a negative relationship between variables (Table 6): in our sample higher levels of resilience resulted associated with lower levels of perceived stress.

4. DISCUSSIONS AND CONCLUSIONS

The results of this study bring out interesting aspects about the digital resilience and psychological wellbeing of Italian higher education students. First of all, our students reported high levels of digital resilience. These data are in line with previous studies from other countries. For

example, Erin and colleagues [3] found that university students in Australia and Asia showed good abilities in facing problems around online learning during the Covid-19 pandemic through perseverance and collaboration and most of them felt to be extremely confident or confident in using digital technology.

Table 5. Resilience

	M (SD)	t-tes/ANOVA
KOP-26 Personal competencies	37.36 (4.79)	
Family Relations	46.54 (7.97)	
Age (n)		
≤30 (56)	44.75(8.92)	F=2.823, p=.043 Post-hoc LSD ≤30 Vs 31-40
31-40 (23)	49.91(5.45)	
41-50 (12)	47.33(5.19)	
≥51 (3)	51(6.02)	
Course of Study (n)		
Bachelor (27)	43.11 (9.17)	F=3.721 p=.028 Post-hoc LSD: Bachelor vs Master Bachelor vs PhD
Master (46)	47.84 (7.46)	
PhD (21)	48.09 (6.20)	
Social competencies	20.84 (4.77)	
Age (n)		
≤30 (56)	19.77(4.85)	F=3.079, p=.031 Post-hoc LSD: ≤30 Vs ≥51
31-40 (23)	21.91(4.88)	
41-50 (12)	22.58(2.87)	
≥51 (3)	25.67(2.52)	
Total	104.74 (14.87)	
Age (n)		
≤30 (56)	101.16(15.75)	F=3.225, p=.026 Post-hoc LSD: ≤30 Vs 31-40
31-40 (23)	110(12.86)	
41-50 (12)	108.17(9.34)	
≥51 (3)	117.67(12.74)	
BRIEF RESILIENCE SCALE	3.22 (.68)	
Sex (n)		
Male (40)	3.42 (0.75)	t(92) = -2,470, p=.015
Female (54)	3.08 (0.58)	
Course of Study (n)		
Bachelor (27)	3.06 (0.49)	F=3.851 p=.025 Post-hoc LSD: Bachelor Vs PhD Master Vs PhD
Master (46)	3.16 (0.74)	
PhD (21)	3.56 (0.66)	

Table 6. Bivariate correlations between perceived stress and resilience

	KOP_TOT	Brief Resilience Scale
Perceived Stress	-,402**	-,458**

Note. **. Correlation is significant at the 0.01 level (2-tailed).

Specifically, our students reported being able to recognize the risks or threats online and to make informed decisions about the digital environment that they are in [7-9]. In addition to this, they seemed to know what to do to seek help, considering pros and cons and using critical thinking, even during challenging situations [8,10]. Finally, with regard to negative online experiences, they declared to have learned knowledge and skills from their past experiences and to be able to adapt their future choices where possible [10]. According to literature, these are all main attributes of a good level of digital resilience [1].

Concerning psychological wellbeing, our students reported higher levels of distress than the Italian normative sample. In line with previous research [12,17], after the Covid-19 pandemic, the frequency of distress in university students increased. Especially in Italy, one of the countries most affected by the pandemic, the teaching methods that changed suddenly and the social distancing with professors and classmates have contributed to the increase in students' perceived stress. However, despite this red flag that universities should take into account to promote students' wellbeing [3], our students reported good levels of resilience. Approximately 63 percent of them, indeed, acknowledged that they bounce back quickly after hard times. As previous studies demonstrated, psychological resilience plays an important role in reducing negative feelings while facing difficult situations in higher educational settings [3, 18], such as study fatigue and stress [19].

Considering the results from the current study, and in line with previous studies [1,3], we may speculate that despite the higher perceived stress levels of our students, they were able to adjust to the changes that occurred in higher educational environments imposed by the Covid-19 pandemic, showing good levels of digital and psychological resilience. According to literature, it may be that their knowledge and experience with digital technology could have fostered their resilience, helping them maintain good academic performances and psychosocial adjustment [3, 20]. In conclusion, the results that emerged from our explorative study could usually inform interventions aimed at promoting awareness of the role of digital resilience in education settings as a protective factor for students' learning outcomes and psychosocial adjustment.

The current study presents several limitations that call for careful interpretation of the results while suggesting new perspectives for further research. First, the sample size precluded us from conducting more sophisticated analyses such as the evaluation of predictive effects. Future research with a sample large enough to test a causal model may bring to light a far more complex picture of the relationship between digital resilience, stress and psychological resilience. Furthermore, our study was cross-sectional in nature, limiting the strength of the

inferences that may be drawn from our findings. Finally, future studies should explore the role of other variables in promoting digital resilience, and consequently, students' psychosocial adjustment, such as institutional and interpersonal perceived support.

Despite these limitations and to the best of our knowledge, this is the first study investigating digital resilience skills in Italian higher education students.

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