

# Perceived stress, cyber and psychological resilience among Polish students – preliminary results

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**Abstract:** *One of the many efforts by governments to decrease disease during COVID-19 pandemic was reducing social contact and distance learning. In the long run, these decisions had ramifications beyond the risk of contracting the virus. Young people studying at universities have been deprived of contacts with their peers and forced to efficiently use technology for the purpose of acquiring knowledge. It required the ability to maintain or regain mental health despite experiencing difficulties that is called "resilience". The main aim of this paper is to present the results of quantitative analysis of the perceived stress, cyber and psychological resilience of Polish students. The analyses show that majority of students use digital devices in an informed and safe manner while most of them presented high levels of stress and rather low or medium resilience, which may raise questions about the positive adaptation of students to remote learning and coping with pandemic situations in general.*

**Keywords:** *cyber resilience; perceived stress; psychological resilience; students; Poland*

## 1. INTRODUCTION

The COVID-19 pandemic not only results in a global deterioration of physical health, but also poses a serious threat to mental health [1,2]. In order to limit the spread of a highly contagious disease, millions of people around the world have been forced to socially and physically distance themselves. Closing schools to limit face-to-face learning and teaching has a huge impact on students around the world, seriously affecting their daily functioning, disrupting the normal course of psychosocial development, resulting for example fear of year loss [3]. When faced with remote teaching, both students and lecturers face numerous technical and psychological challenges and difficulties, which had been highlighted even before the pandemic began [4]. Although online learning is one of the promising alternatives to traditional teaching and can allow the development

of many digital skills, many students view it negatively [3]. Poor impacts of remote learning can result from technological, personal, families, institutional and communities obstacles [5,6].

A concept that helps to address the question of why some students do well under the conditions of the pandemic and the digitalisation forced by it, while others develop negative effects is resilience. The term is generally considered to refer to positive adaptation as well as the ability to maintain or regain mental health despite experiencing difficulties [7].

As everyday activity of modern man has moved into cyberspace (during the pandemic it was mainly conducted online in many areas), the term of "resilience" is referring to psychological as well as digital skills. Initially cyber resilience was related to information systems in conjunction with risk management processes and was understood as the ability to adapt to changing conditions and prepare for, withstand, and rapidly recover from disruption [8]. Thereafter, the nature of this term was shifted to the man. Pointing out human skills it includes many different behaviours to protect people and their organization from computer security threats [9].

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Those observations and reflections prompted the researchers from three countries – Serbia, Italy and Poland – to take action addressing the problem of the growing need for psycho-social support in times of crisis by enhancing digital and psychological resilience through peer networking in the online environment. They have created the project that aims to build capacities, readiness and procedures to empower students to enhance their digital and psychological resilience. One of the first steps in that direction was to identify and analyse students' psycho-social needs and difficulties in the distance education environment in times of crises, as well as students' perception of university support for their psychological resilience and wellbeing. For those purposes, the project team prepared the questionnaire consisting of questions and statements on digital and psychological resilience, and conducted the survey in three countries. In this chapter, we present an excerpt from the research results concerning the cyber and psychological resilience as well as the perceived stress, obtained on the Polish students studying at Kazimierz Wielki University.

The main aim of this paper is to analyse activity of students in cyberspace in the context of their self-protection and to present the results of quantitative analysis of the perceived stress, psychological resilience of young people measured by original questionnaire as well as three scales: Perceived Stress Scale, KOP-26 and Brief Resilience Scale.

## 2. MATERIALS AND METHODS

### 2.1. Participants and procedure

The survey was conducted in June 2022 among Polish students studying at Kazimierz Wielki University (Bydgoszcz, Poland). The sample consisted of 311 students (194 females, 62) from Bachelor (77%) and Master (23%), aged 18-52 years (average age 22,97y  $\pm$  4,49). Most of the participants were full-time students (86%) and studied outside their hometown (67%).

### 2.2. Methods

#### **Perceived stress**

The Perceived Stress Scale (PSS-10) [10] was used to evaluate the intensity of perceived stress during the previous month. The responses for 10 items are given on a five-point Likert-type scale. General result is calculated after reversing positive items' scores and then summing up all scores. The total range from 0 (no stress) to 40 points (extreme stress). The reliability of the Polish version was  $\alpha=0.86$  [11]. In our study it was 0.85.

#### **Cyber resilience**

There is no single authoritative definition for cyber resilience, also the scale of measuring this ability does not exist. Therefore, the project team

developed its own set of cyber resilience theorems based on a literature review. In the publications devoted to this topic we can find some good practices or cyber hygiene behaviour, such as using strong passwords and responding adequately to incidents, that help to become more cyber resilient [12]. In others, there are presented and analysed the tips for protecting users in cyberspace and building digital wellbeing [13]. In our survey, we have created the section dealing with statements and questions related to cyber-resilience understanding as the ability to continuously deliver the intended outcome despite adverse cyber events [14]. The section consisted of 12 questions and statements referring to using and managing passwords to network accounts, privacy control, using antivirus program, installing updates and new applications, making data backup, reacting on the warning messages and experience in danger situations online (like hacking or scam). For each question the respondents could choose one of the answers describing possible behaviour in particular situation.

#### **Psychological resilience**

Resilience was checked using two questionnaires: the KOP-26 [15] and Brief Resilience Scale [16] translated into Polish. The questionnaire KOP-26 include 26 items with five-point Likert-type scale. The sum of points for all statements determines the overall score. In addition, the questionnaire makes it possible to determine three aspects: Personal competences (9 items), Family relations (11 items) and Social competences (6 items). The reliability of the original version of questionnaire (Cronbach's alphas was 0.80-0.91) and in our study (0.86-0.94) was satisfying.

The Brief Resilience Scale [16] consists of six items. The answers are given on five-point Likert-type scale. Total score is calculated as a mean of the six items (after reversing three negative items). In original study Internal consistency was good (Cronbach's alpha ranging from 0.80-0.91).

### 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.

For the Perceived Stress Scale, the results obtained were related to the norms for the Polish population, allowing three groups to be defined according to the level of stress (low, medium, high). Temporary norms for KOP-26 [15] allowed comparison for the averages obtained by the students in our survey.

### 3. RESULTS

#### 3.1. Perceived stress

Considering the last month before the survey, most of the students (69%) declared high level of stress (Tab. 1). In our measurement, Cronbach’s alpha for the PSS-10 was 0.85.

**Table 1.** Results of PSS-10 scale

Level of stress	n	%
High	214	68.81
Average	85	27.33
Low	12	3.86

#### 3.2. Cyber resilience

To recognize the cyber resilience of the respondents, we have analysed the answers of the respondents on the questions referring to their activity in the cyberspace. In general, we can evaluate that the majority of studied students use digital devices in an informed and safe manner. 57% of respondents rather use strong passwords (13% for every system and 44% for most systems) and another 33% do so at important systems.

Regarding privacy control of social network accounts, 50% of students set privacy control of social network accounts, another 40% set it for some platforms and left it on default on other.

In the context of regular updates and viruses protection, above 64% use antivirus program installed on their computer and 76% regularly install updates to their device (computer, cell phone). Also 76% of respondents use a cloud platform to back up their important data (like Google Drive or One Drive).

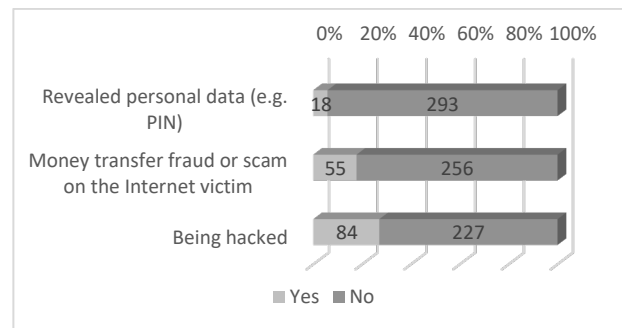
When asking about the reaction on web browser prompting a warning message (such as “this site may not be safe”, “this link is blacklisted”, “this file may contain dangerous data”), 84% answered that they are careful when warning messages appear (48% think that the warnings are serious and do not proceed with further activities and 36% carefully proceed with the activity; only 16,4% ignore the warnings since these are mostly false alarms and I proceed to the desired content).

The students are not so careful when they install new applications but still majority of them get informed before installing – 27,6% always get informed in detail about the application they are about to install on their device and 44% just briefly get informed. 20% of them declare that they just install the application they need, without spending time getting informed about it.

Students' weakest points relate to relying primarily on their memory to store passwords (53%) and making backups less than once a month (72%). When managing passwords, most of them (53%)

remember it; 18,4% keep the passwords on paper; 16,5% use password manager software; 7,4% keep the passwords in a secured file and 5% keep the passwords in a plain file. 30% of students do not back up their data and only 12% do it once a week.

For internet abusing we have asked three questions: Has your account ever been hacked, and has anyone ever accessed your personal information (through e-mail or social network account)? Have you ever been a victim of a money transfer fraud or scam on the Internet? Have you ever replied to an e-mail and revealed your personal data about your PIN code, bank account number, ID number etc.? In each of them the great majority of students did not recognize themselves as victims of such situations. Figure 1 illustrates the results of those answers.



**Figure 1.** Internet abuse.

#### 3.3. Psychological resilience

The obtained results of KOP-26 questionnaire (Tab. 2) were compared to the temporary norms for students given by the authors of the questionnaire [15]. All means for subscales take values for the 30th percentile, however the general score is slightly below this rate, which indicates that the students as a group are on the edge of low and medium resilience. In this study, the internal consistency coefficients (Cronbach’s alpha) of the subscales and total was found to be between 0.86-0.94.

**Table 2.** Results of KOP-26 questionnaire

Resilience scale	M	SD	α
General result	94.25	19.64	0.94
Personal Competences	32.68	7.51	0.86
Family Relations	43.59	9.44	0.93
Social Competences	17.97	6.07	0.88

The mean of the Brief Resilience Scale was 2.88 ± 0.86 (range = 1–5). Cronbach’s alpha for the BRS was 0.82. Comparing our results with means for the samples studied to validate the BRS by Smith et al. [16] we found significant differences between them (p<0.001). Our students declared lower resilience than the participants in prior studies [16].

#### 4. CONCLUSION

The presented results of the analysis provide the knowledge about the perceived stress, cyber and psychological resilience of young people. During COVID-19 pandemic most of universities conducted e-learning or blended learning, requiring students to use cyberspace efficiently and reducing social contacts, which were limited in the period of a large number of infections. Recognition of their cyber and psychological resilience is one of the goals of the project leading to enhancing those skills through peer networking in the online environment in times of crises.

Regarding cyber resilience we may conclude that the majority of studied students use digital devices in an informed and safe manner. The most often frequently practiced activity in cyberspace is using passwords to network accounts, privacy control, using antivirus program, installing updates and reacting on the warning messages. Generally, they are not involved in danger online situation as well. Their weakest points relate to managing passwords and making backups.

Most students presented high levels of stress. It is worth considering to what extent the period of examinations/sessions in which the measurements were conducted influenced the results obtained.

It can also be concluded that the students characterise rather low or medium resilience, which may raise questions about the positive adaptation of students to remote learning and coping with pandemic situations in general.

Those conclusions will be useful for development of training programs for providing horizontal (peer) support to students related to mental health and digital resilience, in an informed and confidential manner.

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