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## **Resilience, Coping Strategies, and Stress Related to Online Diploma Exam in University Students in Poland**

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### **Abstract**

The present study investigated the association between resilience, coping strategies and stress related to online diploma exam under COVID-19 pandemic conditions. Sample of Polish university students ( $n = 453$ ) in the last year of their bachelor's or master's completed a questionnaire containing questions about stress related to online diploma exam and experiencing difficulties related to studying online and scales: Questionnaire (KOP-26) by Gąsior, Chodkiewicz, Ciechowski, the Polish version of COPE by Wrześniewski, Sense of Stress Questionnaire (KPS) by Płopa and Makarowski. The results showed that higher resilience was associated with lower levels of online diploma exam stress, more frequent use of adaptive coping strategies and less frequent use of maladaptive coping strategies. Lower levels of online diploma exam stress were associated with more frequent use of coping strategies such as focus on the problem, humour and alcohol/drug ideation, and less frequent use of focus on/venting emotions. The relationship between resilience and online diploma exam stress was shown to be mediated by two coping strategies (focus on the

problem and focus on/ venting of emotions). Generalized sense of stress was not a moderator of the mediating effect. The results of the study have shown that the relationship between resilience, coping strategies, online diploma exam stress and sense of stress was different in students who experienced online study difficulties and those who did not.

**Keywords:** resilience, coping with stress, online diploma exam, university students, COVID-19 pandemic.

## Introduction

The global COVID-19 pandemic has had an impact on all areas of individual, family, and community functioning, as well as on higher education. University students experienced an increased sense of stress caused by the change in the education system to remote learning, lack of direct contacts with the academic community, loss of a peer group, uncertainty about the academic future, a general sense of threat, and loss of sense of safety (Keckojevic et al., 2020; Rogowska et al., 2020; Zurlo et al., 2020; Padrón et al., 2021). These changes related to the pandemic provided additional stressors in situations that were already stressful, such as exams. There is still relatively little research focused on exam stress and how to deal with it during a pandemic. The stress related to the final-year diploma exams and its correlations with the coping strategies have not been analysed yet.

### *Academic stress*

The time of university studies is considered to be one of the most stressful periods in human life (Eisenbarth, 2019). Academic stress is defined as the interaction between environmental stressors, student's appraisal of them, and his/her reactions to them (Lee & Larson, 2000). Research indicates above-average stress levels among students (Waghachavare et al., 2013; Bore et al., 2016; Szadowska-Szlachetka et al., 2020) and higher levels of stress than in the general population (Bonneville-Roussy et al., 2017). Thus, university students are at higher risk among their peers in experiencing psychological distress (Larcombe et al., 2021). Students with high levels of academic stress reported problems such as depression, major anxiety disorder, irritability, and behavioural problems (Deb et al., 2015). There are many sources of academic

stress, and the literature documents them thoroughly (Bedewy & Gabriel, 2015; Bore et al., 2016), showing, among others, that exams time at university is associated with increased stress levels and somatic complaints (Zunhammer et al., 2014).

The COVID-19 pandemic is an additional and unique source of stress for students. Research in this area has identified several stressors that contribute to increased levels of stress, anxiety, and depressive thoughts among college and university students. These include, but are not limited to, fear and anxiety about their own and loved ones' health, difficulty concentrating, higher rates of emotional difficulties, sleep disorders, and decreased social interactions. Students also show increased concerns about academic performance (Son et al., 2020; Zurlo et al., 2020; Padrón et al., 2021). The shift to online learning has presented educational institutions with a number of challenges in organizing and administering online exams (e-exams), which were soon considered an effective means of assessment because they allowed students to receive immediate feedback on their performance (Elsalem et al., 2020). Nevertheless, due to technical challenges, the emotional tension experienced when interacting with an online platform, and new methods of testing knowledge, exams became a specific source of stress. That said, the online diploma exam, ending higher education and having a significant impact on the professional fate of the graduates, can be a particularly stressful experience. Hence, despite the extensive literature on academic stress, it is necessary to analyse it in the changed conditions of remote education and online examinations in times of pandemic.

#### *Resilience and academic stress*

Resilience is defined in different ways but it is most often recognized as a personal disposition or a process (Brewer et al., 2019). In the presented research, resilience is defined as a personality characteristic and the effect of interacting resilience processes in the environment (Gąsior et al., 2016). Resilience understood as a trait may play a significant role in active and adaptive coping with stressful situations, even though research results to date are inconclusive. Some studies indicate that resilience is weakly and negatively correlated with stress (Smith & Yang, 2017). Researchers point out that resilience can be a kind of buffer minimising the negative effects of stress (Howard, 2008; Li & Hasson, 2020). According to the protective factor model of resilience, the

protective factors interact with the stressor reducing the likelihood of the negative effects of stress: anxiety, depression, and somatization (Steinhardt & Dolbier, 2008). An experimental study by Steinhardt and Dolbier (2008) in a group of 64 students (31 – experimental group, 33 – control group) examined the effectiveness of a 4-week resilience intervention during a period of increased academic stress in the last weeks of classes. The results showed that the experimental group had greater, more enhanced resilience and applied more effective coping strategies than the control group. Resilience and protective factors can, therefore, be important both in managing (applying effective coping strategies) and preventing stress. Protective factors enable individuals to perceive stressors as less stressful and to deal with them more effectively. Previous studies showed negative correlations between resilience, academic stress (Wilks, 2008; Lyvers et al., 2020), and psychological stress in university students (Bore et al., 2016). Students with lower resilience reported significantly higher levels of psychological distress (Pidgeon et al., 2014). Research suggests that high resilience as a personality characteristic can protect students against excessive stress, promote health, and increase psychological well-being (Bore et al., 2016; Kokou-Kpolon et al., 2020). Researchers also found that resilience was a protective factor against difficulties of learning online (Quintiliani et al., 2021), plus that the relationship between resilience and academic stress can be indirect through other factors, including coping strategies (Campbell-Sills et al., 2006).

### *Coping with academic stress*

Coping with stress is the process where individuals make a cognitive and behavioural effort to deal with internal and external sources of stress (Lazarus & Folkman, 1984). Studies with university students show that they use various strategies of coping with stressful academic situations, both adaptive and maladaptive, positive and negative, etc. (Chai & Low, 2015; Vizoso et al., 2018; Böke et al., 2019; Freire et al., 2020). Higher levels of academic stress were shown to be associated with maladaptive coping strategies, especially avoidance behaviours and less frequent use of adaptive coping. Many factors condition the choice of coping strategies, but it mainly depends on individual characteristics, including resilience. The significance of resilience manifests itself in its association with effective coping with social, mental, emotional,

and educational challenges in university students (Brewer et al., 2019). Previous studies with university students showed a positive correlation between resilience and active coping strategies (Sagone & de Caroli, 2014), focused on the problem and a negative relationship with emotion-oriented coping (de la Fuente et al., 2017). Studies also revealed that coping strategies can be significant mediators in the relationship between resilience, adjustment outcomes, and mental well-being in students. Analyses of how students cope during the COVID-19 pandemic showed the role of positive coping strategies (August & Dapkewicz, 2020), coping through reframing skills and daily routines (Padrón et al., 2021) in decreasing academic stress and emotional difficulties. Munsell, O'Malley and Mackey (2020) report that students use more maladaptive coping strategies to deal with pandemic stress than the general population. Coping strategies also mediated the effect of increased negative emotions related to the COVID-19 pandemic on depression symptoms in university students (Le Vigouroux et al., 2021). As far as we know, the relationship between coping strategies, resilience, and stress related to online diploma exam in university students has not been studied so far.

#### *Aim of the study*

An online diploma exam taken by all students is a new phenomenon caused by the COVID-19 pandemic. In addition to the traditional preparation of the knowledge and competencies acquired during the studies, and the presentation of the prepared research project, the diploma exam at the end of bachelor's or master's studies in 2020 included one more aspect – technical preparation. An additional specific element of this exam was associated with a previously unheard of stressful stimulus (concerning the technological side of the exam) related to the possibility of losing the Internet connection, operating the software, etc. As far as we know, there is no research in the literature to date focusing on the stress associated with online diploma exam. Therefore, the purpose of this study was to check the relationship between stress related to online diploma exam and resilience, with coping strategies as the mediator of the relationship. We also tested if this mediation effect was moderated by a sense of stress and if this model relationship was the same in students who experienced difficulties related to studying online and those who did not experience these difficulties. Difficulties in studying online, related not only

to technical problems but also to a different way of transferring knowledge and active participation in classes, may play a significant role in increasing stress for students, especially those graduating, preparing for their diploma exam. Figure 1 presents the assumed relationships between the variables.

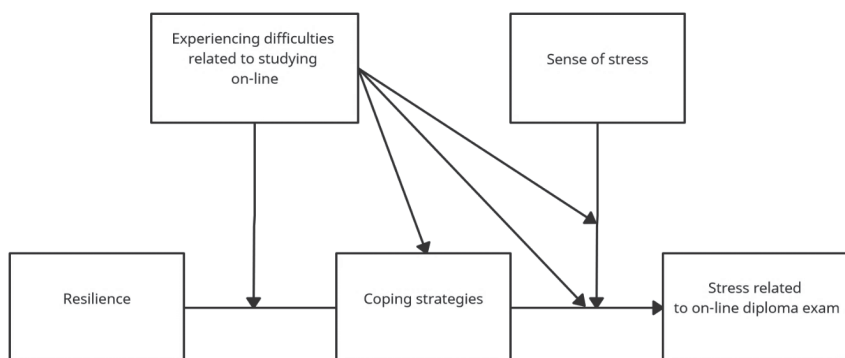


Figure 1. The conceptual model of the relationship between resilience, coping strategies, and stress related to an online diploma exam

Source: Own study.

The following hypotheses were formulated:

H1: Resilience would be correlated with coping strategies (positively with adaptive and negatively with maladaptive) and stress related to an online diploma exam (positively);

H2: Coping strategies would be correlated with stress related to an online diploma exam (negative correlation in the case adaptive coping strategies and positive correlation in the case of maladaptive coping strategies);

H3: The relationship between resilience and stress related to an online diploma exam would be mediated by coping strategies;

H4: The mediation effects of this relationship would be moderated by sense of stress;

H5: The relationship between resilience, coping strategies, stress related to an online diploma exam, and sense of stress would be different in students who experienced difficulties related to studying online and those who did not experience these difficulties.

## **Materials and methods**

### *Participants and procedure*

In total, 500 students from Poland were selected for the study, 35 of them refused to participate, and 12 sets of questionnaires were rejected due to incomplete data. Finally, the sample included 453 university students, 76,90% of whom were women. The age of the respondents ranged from 20 to 26 years ( $M = 23,65$  years,  $SD = 3,29$ ). The respondents were students in the last year of their bachelor's (59,38%) or master's (40,62%) studies in the field of social sciences (38,85%), humanities (30,68%), and science (30,46%). All respondents studied full-time. Most of them (68.76%) experienced difficulties with online education in the three months preceding the study. Data were collected using an online questionnaire on the university online platform to reach potential respondents: students taking their BA or MA diploma exam online. The research was conducted from June to August 2020. The respondents were informed that they would be guaranteed anonymity; they consented to the study by clicking the "I accept" button below the instruction informing about the purpose and procedure of the study.

### *Instruments*

Data were collected using the following inventories:

Stress related to an online diploma exam (S-DE) was measured with a question: How stressed are you before your upcoming online diploma exam? Respondents answered on a 7-point scale, from 0 – I am not stressed at all to 7 – I am completely stressed.

Resilience was measured using the Questionnaire KOP-26 (Resilience Assessment Questionnaire QuR-26) by K. Gąsior, J. Chodkiewicz and W. Ciechowski (2016). It contains 26 statements rated on a 5-point scale. The total score of the KOP-26 is the sum of the results obtained in the 3 subscales: three factors: family relations, personal competences and social competences. The tool explores the construct of resilience as a personality characteristic and the effect of interacting resilience processes in the environment. The internal consistency of the questionnaire is satisfying, with Cronbach's  $\alpha$  for the KOP-26 = 0.90, for particular factors (from 0.78–0.90).

Coping strategies. The Polish version of COPE adapted by Wrześniewski (1996) was used in the study. It contains 60 items (e.g. “I make a plan of action”) determining the frequency of applying the following strategies: focus on the problem (PROB), denial (D), focus on/venting of emotions (EM), seeking emotional support (SUP), acceptance (A), religion (REL), humour (HU), alcohol/drug use ideation (ALK). Cronbach’s  $\alpha$  for individual subscales in the present study ranged from 0.68-0.96.

Sense of stress was measured using Sense of Stress Questionnaire (KPS) by Plopa and Makarowski (2010). KPS is used to measure the level of generalized sense of stress. It contains 27 items (e.g. “I feel tired even when I do nothing”) on a 5-point scale, which form three subscales: external stress, intrapsychic stress, and emotional tension. The total score of the KPS (SS) is the sum of the results obtained in the 3 subscales; it ranges from 21 to 105. Cronbach’s  $\alpha$  for the Total KPS in the present study was 0.84.

Experiencing difficulties related to studying online was measured with a question: Have you experienced difficulties studying online in the last three months? The respondents could answer: “yes” or “no”. When answering yes, the respondents also rated the intensity of the experienced difficulties on a 7-point scale, from 1 – very low to 7 – very high.

### *Data analysis*

Data were analysed in SPSS in several stages. First, descriptive statistics and correlations between the examined variables were prepared. The correlations were assessed using Pearson’s  $r$  coefficient. Student’s  $t$ -test was used to check the differences between the groups in terms of the variables included in the study. Moderation tests and mediation tests for the relationships between the variables were performed using Hayes’s models with bootstrapping (2013).

## **Results**

Table 1 shows descriptive statistics and correlations between resilience, coping strategies, stress related to an online diploma exam, and sense of stress.

As presented in Table 1, resilience was negatively related to an online diploma exam and sense of stress. We also found that resilience was positively correlated with coping strategies: focus on the problem, seeking emotional



Table 1. Intercorrelations (Pearson's *r*) between analysed variables

	1	2	3	4	5	6	7	8	9	10	11
1.R-T	-										
2. PROB	0.40***	-									
3. D	-0.23*	-0.25*	-								
4.EM	-0.22*	-0.04	0.17*	-							
5.SUP	0.47***	0.29**	-0.07	0.46***	-						
6. A	0.18*	0.34**	-0.16	-0.11	0.07	-					
7.REL	0.16	-0.01	0.31**	0.02	-0.01	-0.03	-				
8.HUM	0.07	0.10	0.15	-0.08	0.05	0.28**	0.08	-			
9.ALK	-0.23*	-0.17*	0.38***	0.06	-0.07	-0.01	-0.10	-0.09	-		
10.S-DE	-0.32**	-0.44***	0.09	0.40***	-0.08	0.13	-0.11	-0.35***	-0.19*	-	
11.SS	-0.38***	-0.39***	-0.37***	0.56***	-0.12	0.12	0.08	-0.18	-0.14	0.45***	-

R-T: total score KOP-26; PROB: Focus on the problem; D: Denial; EM: Focus on/venting of emotions; SUP: Seeking emotional support; A: Acceptance; REL: Religion; HUM: Humour; ALK: Alcohol/drug use ideation; S-DE: stress related to an online diploma exam; SS: sense of stress

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

Source: Authors' research.

support, and acceptance, and negatively with denial, focus on/venting of emotions, and alcohol/drug use ideation. Analyses also revealed that coping strategies: focus on the problem, humour, and alcohol/drug use ideation correlated negatively with stress related to an online diploma exam, whereas focus on/venting of emotions correlated positively with it. Sense of stress correlated positively with coping strategies: denial, and focus on/venting of emotions and negatively with focus on the problem. We also found that sense of stress correlated positively with stress related to an online diploma exam.

We also checked if there were differences between students who experienced difficulties related to studying online and those who did not experience these difficulties in terms of the measured variables. Analysis using the t-test revealed that students who experienced difficulties related to studying online and those who did not experience these difficulties differ significantly in terms of sense of stress, stress related to an online diploma exam, and coping strategy focus on/venting of emotions. Students, who experienced difficulties related to studying online obtained significantly higher results in sense of

stress ( $t(449) = 4.38$ ;  $p < 0.001$ ;  $M = 61.72$ ;  $SD = 13.02$  vs.  $M = 54.80$ ;  $SD = 16.64$ ;  $d = 0.45$ ), stress related to an online diploma exam ( $t(451) = 3.76$ ;  $p < 0.001$ ;  $M = 5.99$ ;  $SD = 1.60$  vs.  $M = 5.27$ ;  $SD = 1.97$ ;  $d = 0.37$ ), and in focus on/venting of emotions ( $t(451) = 2.54$ ;  $p = 0.011$ ;  $M = 11.40$ ;  $SD = 2.23$  vs.  $M = 10.56$ ;  $SD = 2.20$ ;  $d = 0.32$ ).

Tests of the moderating effects in the relationship between resilience and coping strategies revealed that experiencing difficulties (or not) related to studying online did not moderate the relationship of these variables (Resilience – PROB:  $F(1.449) = 0.72$ ;  $p = 0.397$ ; Resilience – D:  $F(1.449) = 0.07$ ;  $p = 0.979$ ; Resilience – EM:  $F(1.449) = 0.09$ ;  $p = 0.923$ ; Resilience – SUP:  $F(1.449) = 0.96$ ;  $p = 0.327$ ; Resilience – AKC:  $F(1.449) = 0.22$ ;  $p = 0.634$ ; Resilience – REL:  $F(1.449) = 6.82$ ;  $p = 0.119$ ; Resilience – HUM:  $F(1.449) = 2.62$ ;  $p = 0.106$ ; Resilience – ALK:  $F(1.449) = 4.95$ ;  $p = 0.227$ ). We also checked if experiencing difficulties (or not) related to studying online moderates the relationship between coping strategies and stress related to an online diploma exam. Analyses revealed that experiencing difficulties (or not) related to studying online is a moderator of the relationship between focus on the problem and stress related to an online diploma exam ( $F(1.449) = 32.83$ ;  $p < 0.001$ ;  $B = -0.163$ ,  $SE = 0.031$ ,  $CI95\% = [-0.224, -0.102]$ ) and between focus on/venting of emotions and stress related to an online diploma exam ( $F(1.449) = 10.16$ ;  $p = 0.002$ ;  $B = 0.351$ ,  $SE = 0.073$ ,  $CI95\% = [0.207, 0.495]$ ). Focus on the problem was negatively related to stress related to an online diploma exam only in the case of not experiencing difficulties related to studying online. In turn, focus on/venting of emotions was positively correlated with stress related to an online diploma exam only in the case of experiencing difficulties related to studying online.

In the next step, we tested the mediation effect of coping strategies in the relationship between resilience and stress related to an online diploma exam using the bootstrapping method. The obtained results are presented in Table 2.

The analysis revealed that the mediators of the relationship between resilience and stress related to an online diploma exam were two coping strategies: focus on the problem and focus on/venting of emotions. The other coping strategies were not statistically significant mediators of this relationship. We also checked if the mediation effect was moderated by a sense of stress. The obtained results showed that sense of stress was not a statistically significant

Table 2. Mediation effects of coping strategies in the relationship between resilience and stress related to an online diploma exam

Mediators	b	bootSE	95% CI
Focus on the problem	0.065	0.032	<b>-0.047, -0.189</b>
Denial	-0.002	0.002	-0.006, 0.002
Focus on/venting of emotions	-0.058	0.031	<b>0.132, 0.009</b>
Seeking emotional support	0.012	0.018	-0.031, 0.040
Acceptance	-0.011	0.012	-0.036, 0.012
Religion	0.014	0.002	-0.003, 0.036
Humour	-0.016	0.012	-0.041, 0.050
Alcohol/drug use ideation	0.018	0.016	-0.011, 0.051

Source: Authors' research.

moderator of the mediation of the relationship between resilience and stress related to an online diploma exam (Table 3).

Table 3. Sense of stress as a moderator of the mediation effects in the relationship between resilience and stress related to an online diploma exam

Mediators	index	bootSE	95% CI
Focus on the problem	0.077	0.038	-0.076, 0.114
Denial	0.067	0.016	0.034, 0.174
Focus on/venting of emotions	0.084	0.038	-0.115, 0.201
Seeking emotional support	0.019	0.011	-0.054, 0.028
Acceptance	0.043	0.029	0.011, 0.059
Religion	0.026	0.017	0.001, 0.058
Humour	-0.066	0.037	-0.032, 0.069
Alcohol/drug use ideation	0.021	0.014	-0.012, 0.048

Source: Authors' research.

In the last stage of the analysis, we tested if experiencing (or not) difficulties related to studying online moderated the moderation of the mediation. The analysis revealed that experiencing (or not) difficulties related to studying online was a statistically significant moderator of this moderation of

the mediation only in the case of one coping strategy: focus on/venting of emotions. This means that in students who experienced difficulties related to studying online and a high sense of stress, coping strategy: focus on/venting of emotions mediated the relationship between resilience and stress related to an online diploma exam more strongly ( $b = 0.164$ ; boot SE = 0.087) compared to the mediation effect for a low sense of stress ( $b = 0.021$ ; boot SE = 0.043). In students who did not experience difficulties related to studying online, with a higher overall sense of stress, the mediating role of this coping strategy was weaker: the effects decreased from  $b = 0.092$  (boot SE = 0.057) for a high sense of stress to  $b = 0.062$  (boot SE = 0.044) for a low sense of stress.

## Discussion

The presented research aimed to check the relationship between resilience and stress related to an online diploma exam in university students in Poland, taking into account the mediating role of coping strategies. The diploma exam completing higher education is always a potential source of stress for students. The changed conditions for taking this exam, caused by pandemic-induced distance learning, are an additional stress factor that triggers a certain response in university students.

The obtained results showed that higher resilience was associated with lower levels of stress related to an online diploma exam, more frequent use of adaptive coping strategies: focus on the problem, seeking emotional support, and acceptance, and less frequent use of maladaptive coping strategies: denial, focus on/venting of emotions and alcohol/drug use ideation. H1 hypothesis was thus confirmed. We also found that lower stress related to an online diploma exam was associated with more frequent use of coping strategies such as focus on the problem, humour, and alcohol/drug use ideation, and less frequent use of focus on/venting of emotions. In this case, H2 hypothesis was partially confirmed, as it was found that stress related to an online diploma exam negatively correlates with avoidance coping as well. In line with our expectations, data showed that the relationship between resilience and stress related to an online diploma exam was mediated by coping strategies, but only by two: focus on the problem and focus on/venting of emotions (H3). However, contrary to our expectations, generalized sense of stress was not

a moderator of the mediating effect (H4 was not confirmed). The conducted analysis revealed that the relationship between resilience, coping strategies, stress related to an online diploma exam, and sense of stress was different in students who experienced difficulties related to studying online and who did not experience these difficulties. H5 was, therefore, confirmed.

The results we obtained on the negative relationship between resilience and stress related to an online diploma exam in university students are consistent with previous findings on academic stress (Wilks, 2008; Lyvers et al., 2020), psychological distress (Bore et al., 2016; Bacchi & Licinio, 2017), as well as student stress related to COVID-19 (Lai et al., 2020; Quintiliani et al., 2021). Therefore, they confirm the importance of resilience as a characteristic that can facilitate the management of academic requirements, including the specific online examination situation caused by the pandemic.

According to the obtained data, the relationship between resilience and stress related to an online diploma exam in university students is indirect, mediated by coping strategies. This means that students with higher resilience, choosing strategies focused on the task, preparing for the exam, and using less emotional coping, experience lower levels of stress associated with their online diploma exam. First, these results are consistent with other research with university students indicating that resilience predicted active coping (Li & Yang, 2016) and pointing out the positive relationship between resilience and task-oriented coping (Konaszewski et al., 2019; Fullerton et al., 2021). Secondly, they align with findings that reveal a negative relationship between active coping and stress (Straud & McNaughton-Cassill, 2019), and higher exam stress in the case of less frequent use of problem-oriented coping and more frequent emotion-oriented coping in students (Crego et al., 2016). Thirdly, the results obtained here are consistent with the findings indicating an indirect impact of resilience on stress in students (Fullerton et al., 2021), including through emotion-oriented coping (Chen, 2016).

Importantly, the measured generalized sense of stress did not moderate the power of mediation for any of the analysed coping strategies. A positive (moderate) relationship was established between general sense of stress and stress related to an online diploma exam. But we found that the level of general sense of stress (caused by the pandemic), and fundamental changes it brings to the student functioning (Quintiliani et al., 2021), does not dif-

ferentiate the relationship between resilience and stress related to an online diploma exam by coping strategies. The established pattern of connections can be attributed to the focus on situational aspects of coping, the specific strategies used to deal with the exam situation with an additional stressor: its online form. The online exam format in current research is rated as a stronger source of stress for students than coronavirus itself (Arora et al., 2022). Regardless of the level of general sense of stress, the use of specific coping strategies before the exam (more problem-focused, less emotional regulation) with higher resilience may ultimately be associated with lower stress related to an online diploma exam in students.

Due to the sudden change in studying caused by the COVID-19 pandemic and difficulties in distance learning, including its technical and interactive aspects (changed contact with lecturers and peers) (Quintiliani et al., 2021), we checked whether the students' experience (or lack of it) of this the type of difficulty would moderate the relationship between the analysed variables.

The obtained data showed that experiencing difficulties (or not) related to studying online was a significant moderator of the relationship between coping strategies (focus on the problem and focus on/venting of emotion) and stress related to an online diploma exam. It also moderated the moderated mediation by emotion-oriented coping. The mediating importance of emotion-oriented coping was greater in students experiencing difficulties studying online with simultaneous higher levels of stress. Importantly, only in the case of experiencing difficulties related to studying online, higher stress related to an online diploma exam was associated with more frequent use of this type of coping strategy in university students. The obtained results suggest, therefore, that students experiencing difficulties with online studies may at the same time anticipate difficulties during their online diploma exam, which may cause intense negative emotions in the pre-exam period, and as a result, more frequent coping focused on emotional regulation. We also found that higher stress related to an online diploma exam was more often associated with problem-oriented coping, but only in students who did not report difficulties studying online. Our results correspond to previous findings among university students indicating the mediating role of emotion-oriented coping in the relationship between resilience and negative affect (Chen, 2016); also those conducted during a pandemic, reporting diffi-

culties in remote education, students' anxiety about exam results (Quintiliani et al., 2021), increased stress, and concerns about academic achievement (Son et al., 2020), or academic workload in changed study conditions (Yang et al., 2021).

### **Limitations of the present study and suggestions for future research**

The presented study provides important, although preliminary, information on the importance of resilience to stress related to online diploma exam. It points to the protective role of resilience, but also to the complex relationships of this personality trait with stress related to online diploma exam, determined by contextual factors, including coping strategies used by students (mediators), as well as difficulties they experience studying online (moderator). This is a cross-sectional study, therefore it is not free from limitations in the analysis of the presented causal relationships between the variables. It was conducted in a unique period, before the first online diploma exam, preceded by new study circumstances resulting from the pandemic. It would be valuable to do replication research before the next diploma exam among students who have completed longer online education and have already acquired greater technical competencies while controlling their adaptability to study in pandemic conditions. In the presented exploratory research only factors traditionally included in the analysis of stress and coping were analysed to investigate the relationships between them in completely changed circumstances of studying at university.

Future research should include a more extensive tool for measuring stress related to online diploma exam. Moreover, personality and social resources, as well as the importance of amenities introduced by universities to facilitate distance learning, should be tested to a greater extent to better explain stress related to online diploma exam. It would be important to control variables such as general student well-being in the context of a prolonged pandemic and social isolation; orientation towards the future (especially significant for students finishing higher education and preparing to enter the currently uncertain labor market), adaptability to radically changing circumstances or demographic variables. Admittedly, the negative correlation identified in

the present study between avoidance coping involving the consumption of alcohol and other substances and stress related to online diploma exam calls for a closer look at this issue in future studies. What is important, the measurement of the level of difficulties during online education is based on a very simple scale. In future research, it is worth using a more extensive tool.

The presented research was conducted at one university. Although e-learning was suddenly introduced at all universities, it is likely that different technological possibilities and, consequently, different (more or less difficult) means of contacting academic teachers, or different teaching methods defined by the functionalities of the available online platform, could diversify students' experience of difficulties related to studying.

## Conclusion

University students are a group of increased risk of mental stress (Eisenberg et al., 2013) increasing in later university years (Böke et al., 2019). Remote education, and as a result, the changed conditions for taking the diploma exam at the end of higher education, became an additional stress factor. Data presented here suggest that resilience – a personality trait and a resource – contributes to lower levels of stress related to online diploma exam in university students. However, this relationship is not direct: it is mediated by coping strategies. Moreover, it differs significantly in students who experience difficulties with studying online from those who do not report such difficulties. The results of these studies can be used in the development of a support system for students with difficulties in online learning and training to effectively cope with stress.

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