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Beyond the Screen: Predictors of Academic Stress and Resilience among University Students in Online Education

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Abstract

Online education is a type of distance education in which the entire teaching process is mediated by technology. There are many benefits and challenges to online education, like time management, maintaining social interactions, and motivation. Studying itself is full of challenges that arise from academic activities, which can lead to academic stress. The ability to adapt and respond to such challenges is known as academic resilience. Since the pandemic pushed universities online, there was no time to adapt to such circumstances. Therefore, the first aim of this study was to investigate the similarities and differences between online and in-class education in time management, assessments and group tasks, social interactions, and motivation from the perspective of students in higher education in Croatia. Our second aim was to identify the role of these factors in predicting academic stress and academic resilience. The study was conducted online, and 704 students participated. Most of them believe that they have learned less during online courses, they were less motivated to learn, and they have cheated more during online compared to in-class courses. Time flexibility and lower tendency for procrastination, satisfaction with assessments and group tasks, and higher motivation were highlighted as important factors contributing to lower academic stress and higher academic resilience. There were no associations between social support and changes in academic stress or resilience. Recommendations for online courses and stakeholders in education who care about the mental health of students are discussed.

Keywords: online education, academic stress, academic resilience, time management, motivation

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Introduction

Online education can be traced back to the 1980s when it was recognized as a nice-to-have alternative model of teaching (Sun & Chen, 2016). It is a type of distance education in which the entire teaching process is mediated by technology (Harasim, 2000). Due to the onset of COVID-19 and social distancing, during the winter semester of 2020/2021 all teaching activities at universities in Croatia were organized online, and this continued throughout the summer semester for most universities which could not accommodate COVID-19-related public health measures (Croatian Institute of Public Health, 2020).

There are several benefits linked to online education. Online courses may offer students the flexibility to complete their tasks or attend the classes while balancing other responsibilities. This flexibility can be a great advantage, especially for students who have part-time jobs, student-athletes, and those who travel long distances to attend courses (Davis et al., 2019). It is accessible to a wide range of students, including those who live far from a physical campus, have mobility issues, or have other responsibilities that make attending on-campus classes difficult. Online education is often less expensive than traditional on-campus education, since there are no costs associated with transportation, accommodation, or campus facilities, which make it a cost-effective option (Davis et al., 2019).

One of the major challenges in online education is maintaining social interactions. Without personal connections, students may perceive professors as point-holders rather than dependable educators. Students may not regard faculty as an ally for their education if they do not actively try to break through the online format, humanize themselves, and develop relationships with both the class as a whole and with individual students (Pacansky-Brock et al., 2020). Studies show that students who take online courses often feel isolated from their peers and instructors, which can lead to decreased motivation and engagement, and they often struggle with feelings of disconnection and disengagement from the learning process (Artino & Stephens, 2009; Van Wart et al., 2020). Another significant disadvantage of online education is the potential for cheating. Online courses often lack the physical oversight and supervision that is present in traditional classroom settings, making it easier for students to cheat. While cheating rates in online courses are not necessarily higher than in traditional face-to-face courses, certain types of academic dishonesty, such as obtaining responses from others during an online test or quiz, are more prevalent in online courses (Mayadas et al., 2009).

Some studies have shown that online education during COVID-19 has led to an increase in academic procrastination among students, mostly due to the overwhelming assignments and lack of understanding of course materials (Cahyani et al., 2023; Chaturvedi et al., 2021; Moawad, 2020). Academic procrastination is a complex phenomenon that involves delaying assignments, and it has a significant impact on student's aversion to work under pressure, general tendency to

procrastinate, and inability to complete tasks before the deadline (Grunschel et al., 2016; Sandhya & Gopinath, 2019). Online education also requires a high level of self-discipline and motivation and good time-management skills, as students are often responsible for managing their own learning activities and keeping up with coursework without the structure and support of traditional on-campus courses (Picciano, 2021). Motivation is considered the core principle of teaching and learning. Psychologists have emphasized the importance of motivation in education because of its direct relationship with learning, abilities, strategies, and behaviors (Ferrer et al., 2022; Malinauskas & Pozeriene, 2020). Lessard and Puhl (2021) revealed that the most commonly reported concern among U. S. secondary school students during COVID-19 pandemic was the lack of motivation to focus on schoolwork. Abou El-Seoud et al. (2014) examined the influence of online education on students' motivation in the context of higher education and found a positive correlation between motivation and academic achievement, indicating that motivated students are more likely to perform better academically even during online education.

Individual characteristics are very important for academic performance, and stress and resilience are one of the most studied in the recent literature. Academic stress refers to stressors that arise from academic activities, such as coursework, exams, and research projects, but also expectations from parents and teachers, and relationships with peers (Adom et al., 2020). In line with the transactional model of psychosocial stress (Lazarus & Folkman, 1984), the level of perceived academic stress is a combination of several academic stressors and the way students interpret these stressors. Moderate levels of stress can lead to motivation and improved task performance, however high levels can cause anxiety, depression, and social issues, which are linked to mental health problems and poor academic performance (Aihie & Ohanaka, 2019). Low levels of stress are not necessarily related to good academic performance, as some students may find such ambiance unchallenging and become bored, which may lead to poor performance. One study investigated the impact of online education on academic stress among university students during COVID-19 pandemic and found that students experienced moderate levels of academic stress and that their perception of online education was negatively associated with academic stress (Moawad, 2020). On the other hand, academic resilience refers to the ability to cope (adapt and respond) with academic pressures, obstacles and stress related to learning (Southwick et al., 2014). According to current models, the factors that affect academic resilience include having caring relationships, high expectations from others (family, school, peer groups), encouragement, along with individual characteristics such as communication, empathy, well defined goals and strong problem-solving skills, high self-efficacy, and self-awareness (Jowkar et al., 2014). Resilient students are more likely to view setbacks as opportunities for growth and respond constructively to academic challenges (Leary & DeRosier, 2012). They tend to be more engaged in their coursework, achieve better grades, encounter fewer academic problems, and experience less academic fatigue. Consequently, highly resilient students tend to be more satisfied with their academic experiences and

performance, compared to those with low resilience (Cassidy, 2015; Hwang & Shin, 2018). Kumalasari and Akmal (2021) showed that higher academic resilience is related to better readiness to learn in online environment. Students who are resilient maintain high levels of motivation and performance despite facing stressful situations that could negatively impact their academic success, including the risk of dropping out or facing a global pandemic (Meneghel et al., 2019).

Since the pandemic forced us to social distancing and pushed universities online, both students and faculty did not have the opportunity to adapt to such circumstances. The question that arises is how this unexpected and rapid transition affected university students' perspectives on education, their stress levels and resilience. Puljak et al. (2020) found that the majority of students in Croatia had a positive attitude towards online education, but many faced challenges such as lack of motivation, technical difficulties, and inadequate communication with professors and peers. However, their study included only undergraduate university students of health sciences. Our first aim was to investigate the similarities and differences between online and in-class education in time management, assessments and group tasks, social interactions, and motivation from the perspective of students in higher education in Croatia. In order to contribute to a better understanding of the predictors of academic stress and academic resilience in online education, our second aim was to identify the role of time management, assessments and group tasks, social interactions, and motivation in predicting academic stress and academic resilience. Such knowledge could help university professors in designing their online courses, but also stakeholders in education and mental health care professionals who work with students, given that academic stress and resilience can have a significant impact on students' mental health. Based on the literature, we expect that students will emphasize differences between online and in-class education in terms of assessment, group tasks, and social interactions. In addition, we hypothesize that time management, assessments and group tasks, social interactions, and motivation will be positive predictors of academic resilience, and negative predictors of academic stress.

Materials and Methods

Participants

Using a purposive sampling method, data were collected on a sample of 704 students (531 females), with average age of 22.2 years (SD = 3.04; age range 18 - 50 years). Most students were undergraduates (60.4%) or graduates (38.7%) with several doctoral students (0.4%), studying social (37.8%) or technical sciences (20.2%). The rest were studying biomedicine and health (15.5%), humanities (12.8%), natural sciences (7.5%), and interdisciplinary studies in science or arts (4%).

Instruments

Experience with Online Courses Questionnaire

For the purpose of this study and in reference to the literature (Wallace, 2010; Yang & Durrington, 2010), we devised questions to investigate the quality of and satisfaction with the online education at universities and colleges across Croatia. The questions included the following: (1) time management - five questions: satisfaction with time management during online education, flexibility, free time, procrastination, duration of online courses compared to in-class; (2) group tasks and assessment - five questions: satisfaction with online assessments, online group tasks and grades, comparison of online and in-class grades, cheating during online exams compared to in-class; (3) social interactions - two questions: interactions with colleagues, interactions with professors online compared to in class; (4) satisfaction with online education - two questions: comparison of what was learned online and in class, teaching staff's rigor online and in class; and (5) motivation - three questions: comparison of motivation online and in class, motivation for attendance and motivation for learning online and in class.

Several questions were rated on a 3-point scale (Table 1): duration of online courses compared to in-class (*shorter, equal, longer*), comparison of online and in-class grades (*better, equal, worse*), comparison of what was learned online and in class (*more, equal, less*), teaching staff's rigor online and in class (*stricter, equal, lenient*), and comparison of motivation online and in class (*more, equal, less*). All other responses (Table 2) were given on a five-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Perception of Academic Stress Scale

Perceptions of Academic Stress Scale (PASS; $\alpha = .84$) is an 18-item scale, which assesses the perception of academic stress and its sources in college students. The English version of the PASS (Bedewy & Gabriel, 2015) was first independently forward-translated in Croatian language by a group of three master psychology students and their mentor, all fluent in Croatian and English. After comparing the results and agreeing on the final version, the PASS was back-translated by an English professor and compared to the original version. The responses are rated on a five-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) and higher score indicates lower levels of perceived academic stress.

Academic Resilience Scale

Academic Resilience Scale (ARS-30; $\alpha = .88$) consists of 30 items encompassing behavioral and cognitive-affective statements which individuals have to rate on a 5-point Likert scale after reading a personal adversity case vignette (Cassidy, 2015). This vignette describes a hypothetical situation in which a student

received a "fail" grade for a recent assignment after previously receiving lower than expected grades on two other assignments along with quite critical comments from tutors. This might hinder the student's career goals and disappoint the family. The participants were instructed to try to imagine themselves in that situation, and it is believed that the failure and its wider negative impact is sufficient to introduce academic adversity (Cassidy, 2015). The items were translated in the same way as the PASS, and the vignette was translated and adapted for Croatian students. The Croatian version of the vignette is available on request. Positively phrased items were reversed, and a higher score indicates higher academic resilience.

Procedure

The study was conducted in accordance with the relevant regulations and guidelines (the recommendations of the Croatian Psychological Chamber Code of Ethics and the American Psychological Association) and was approved by the Ethical Committee of the Catholic University of Croatia. Participants completed a series of above describe questions about their experience with the online education, as well as PASS and ARS-30 scales prepared in the form of an online questionnaire using Jotform (eu.jotform.com). Students were approached via personal contacts, social media, and university advertisements and the data were collected from 21/02/2021 until 02/03/2021. Prior to the onset of the questions and scales, a brief summary of the study and its purpose with researchers' contact details were provided and all participants gave consent before proceeding. At the end, participants responded to questions about age, sex, level, and area of study.

Statistical Analysis

The data collected in this research were processed using the IBM SPSS Statistics 23 statistical package for social sciences.

Descriptive statistical analysis was performed on the variables: gender, level of study, field of study, and the questions related to the experience with the online compared to in-class courses. Prior to the analysis, all variables were checked for regression model assumptions. To investigate the predictors of academic stress and academic resilience, we applied separate multiple regression analyses, using time management, assessments, and group tasks, motivation and social interactions variables as predictors, and academic stress and academic resilience variables as outcomes.

Results

Table 1 describes the quality and students' satisfaction with different aspects of online compared to in-class courses. Most of the students stated that regardless of the way the courses were conducted (online or in class), they lasted the same amount of time, students had the same grades, and their teachers showed the same amount of strictness. However, when comparing how much they have learned, most of the students stated that they have learned less during online courses, they were less motivated to learn, and they have cheated more during online compared to in class courses.

Table 1

Quality and Satisfaction With Different Aspects of Online Compared to In-Class Courses (N = 704)

Variables	*Frequency*	*Percentage (%)*
Duration of online courses compared to in-class		
shorter	180	25.6
equal	434	61.6
longer	90	12.8
Comparison of online and in-class grades		
better	216	30.7
equal	419	59.5
worse	69	9.8
Teachers' rigor during online compared to in-class courses		
stricter	159	22.6
equal	376	53.4
lenient	169	24.0
Learning during online compared to in-class courses		
learned more	76	10.8
learned equal	304	43.2
learned less	324	46.0
Motivation during online compared to in-class courses		
more	80	11.4
equal	229	32.5
less	395	56.1
Cheating during online compared to in-class exams		
not at all	283	40.2
less	32	4.5
the same	87	12.4
more	302	42.9

Table 2 depicts associations between academic stress, academic resilience, time management, assessments, group tasks, motivation, and social interactions variables.

Table 2

Pearson's Correlations Between Academic Stress, Academic Resilience, Time Management, Assessments, Group Tasks, Motivation and Social Interactions Variables (N = 704)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Academic stress	-											
2. Academic resilience	-.46**	-										
3. I am satisfied with my time management during online courses.	.23**	-.31**	-									
4. I am more flexible with time needed for preparation for online courses.	.19**	-.14**	.39**	-								
5. I have more time for other activities during online courses.	.19**	-.18**	.32**	.56**	-							
6. I tend to procrastinate on my coursework.	-.18**	.26**	-.55**	-.16**	-.11**	-						
7. I am satisfied with the online assessments.	.17**	-.12**	.35**	.33**	.33**	-.18**	-					
8. I am satisfied with the online group tasks.	.15**	-.16**	.35**	.41**	.32**	-.18**	.48**	-				
9. I am satisfied with my final work and grades during online courses.	.29**	-.22**	.39**	.36**	.32**	-.23**	.47**	.43**	-			
10. I am less motivated to attend online compared to in-class courses.	-.15**	.16**	-.43**	-.37**	-.29**	.36**	-.31**	-.35**	-.29**	-		
11. I am less motivated to learn during online compared to in-class courses.	-.17**	.21**	-.49**	-.37**	-.30**	.46**	-.33**	-.38**	-.33**	.74**	-	
12. I miss the interaction with my colleagues during online courses.	-.02	-.03	-.29**	-.22**	-.21**	.27**	-.23**	-.24**	-.14**	.43**	.40**	-
13. I have less interaction with teaching staff during online compared to in-class courses.	-.01	.03	-.24**	-.25**	-.23**	.23**	-.26**	-.27**	-.16**	.41**	.36**	.50**

**$p < .01$.

Predictors of Academic Stress

Table 3 summarizes descriptive statistics for outcome and predictor variables.

Table 3

Descriptive Statistics for Academic Stress, Academic Resilience, Time Management, Assessments and Group Tasks, Motivation, and Social Interaction Variables (N = 704)

Variables	min – max[a]	*M* (*SD*)
Academic Stress	30 – 90	61.4 (10.94)
Academic Resilience	38 – 134	77.2 (15.60)
Time Management		
I am satisfied with my time management during online courses.	1 – 5	3.3 (1.21)
I am more flexible with time needed for preparation for online courses.	1 – 5	4.2 (1.11)
I have more time for other activities during online courses.	1 – 5	3.8 (1.30)
I tend to procrastinate on my coursework.	1 – 5	3.5 (1.32)
Assessments and Group Tasks		
I am satisfied with the online assessments.	1 – 5	3.3 (1.21)
I am satisfied with the online group tasks.	1 – 5	3.3 (1.17)
I am satisfied with my final work and grades during online courses.	1 – 5	3.9 (1.05)
Motivation		
I am less motivated to attend online compared to in-class courses.	1 – 5	3.4 (1.52)
I am less motivated to learn during online compared to in-class courses.	1 – 5	3.3 (1.49)
Social Interactions		
I miss the interaction with my colleagues during online courses.	1 – 5	4.3 (1.16)
I have less interaction with teaching staff during online compared to in-class courses.	1 – 5	3.7 (1.33)

Note. [a]min = minimum score; max = maximum score.

Time management variables (Tables 3 & 4) significantly predicted academic stress, $F(4, 699) = 14.48$, $p < .001$, explaining 8% of the variance ($R^2 = .08$). Higher satisfaction with time management, having more time for other activities, and lower tendency for procrastination was related to lower academic stress. Assessments and group tasks variables (Tables 3 & 4) significantly predicted academic stress, $F(3, 700) = 22.25$, $p < .001$, explaining 9% of the variance ($R^2 = .09$), and higher satisfaction with final work and grades was related to lower academic stress. Motivation variables (Tables 3 & 4) significantly predicted academic stress, $F(2, 701) = 10.73$, $p < .001$, explaining 3% of the variance ($R^2 = .03$), and higher motivation for learning was related to lower academic stress. None of the social interaction variables (missing the interaction with colleagues, less interaction with teaching staff; Tables 3 & 4) significantly predicted academic stress, $F(2, 701) = .16$, $p = .85$.

Table 4

Summary of Multiple Regression Analysis for Time Management, Assessment and Group Tasks, Motivation, and Social Interaction Variables Predicting Academic Stress (N = 704)

Variables	*B*	95% CI for *B*		*SE B*	β	R^2	ΔR^2
		LL	UL				
Time Management						.08	.07***
Constant	54.22	49.29	59.16	2.51			
I am satisfied with my time management during online courses.	1.06*	.22	1.90	.43	.12*		
I am more flexible with time needed for preparation for online courses.	.73	-.15	1.61	.45	.07		
I have more time for other activities during online courses.	.85*	.11	1.58	.37	.10*		
I tend to procrastinate on my coursework.	-.76*	-1.47	-.04	.36	-.09*		
Assessments and Group Tasks						.09	.08***
Constant	48.77	45.53	52.00	1.65			
I am satisfied with the online assessments.	.27	-.50	1.05	.39	.03		
I am satisfied with the online group tasks.	.23	-.55	1.01	.40	.02		
I am satisfied with my final work and grades during online courses.	2.79***	1.92	3.66	.44	.27		
Motivation						.03	.03***
Constant	65.84	63.78	67.91	1.05			
I am less motivated to attend online compared to in-class courses.	-.31	-1.09	.74	.10	-.04		
I am less motivated to learn during online compared to in-class courses.	1.01*	-1.81	-.22	.40	-.14		
Social Interactions						.000	-.002
Constant	62.31	59.09	65.52	1.64			
I miss the interaction with my colleagues during online courses.	-.19	-.99	.62	.41	-.02		
I have less interaction with teaching staff during online compared to in-class courses.	-.02	-.73	.68	.36	.00		

Note. CI = confidence interval; LL = lower limit; UL = upper limit.
*$p < .05$. **$p < .01$. ***$p < .001$.

Predictors of Academic Resilience

Time management variables (Tables 3 & 5) significantly predicted academic resilience, $F(4, 699) = 23.47$, $p < .001$, explaining 12% of the variance ($R^2 = .12$). Higher satisfaction with time management, having more time for other activities, and lower tendency for procrastination was related to higher academic resilience. Assessments and group tasks variables (Tables 3 & 5) significantly predicted academic resilience, $F(3, 700) = 12.81$, $p < .001$, explaining 5% of the variance

(R^2 = .05), and higher satisfaction with final work and grades was related to higher academic resilience. Motivation variables (Tables 3 & 5) significantly predicted academic resilience, $F(2, 701) = 16.86$, $p < .001$, explaining 5% of the variance (R^2 = .05), and higher motivation for learning was related to higher academic resilience. None of the social interaction variables (missing the interaction with colleagues, less interaction with teaching staff; Tables 3 & 5) significantly predicted academic resilience, $F(2, 701) = 1.33$, $p = .27$.

Table 5

Summary of Multiple Regression Analysis for Time Management, Assessment and Group Tasks, Motivation, and Social Interaction Variables Predicting Academic Resilience (N = 704)

Variables	*B*	95% CI for *B*		*SE B*	β	R^2	ΔR^2
		LL	UL				
Time Management						.12	.11***
Constant	84.05***	77.21	90.95	3.50			
I am satisfied with my time management during online courses.	-2.69	-3.86	-1.51	.60	-.21		
I am more flexible with time needed for preparation for online courses.	.33	-.90	1.55	.62	.02		
I have more time for other activities during online courses.	-1.32	-2.34	-.30	.52	-.11		
I tend to procrastinate on my coursework.	1.65	.66	2.64	.51	.14		
Assessments and Group Tasks						.05	.05***
Constant	91.44***	86.74	96.14	2.39			
I am satisfied with the online assessments.	.08	-1.05	1.20	.57	.01		
I am satisfied with the online group tasks.	-1.13	-2.26	.01	.58	-.08		
I am satisfied with my final work and grades during online courses.	-2.71	-3.98	-1.45	.64	-.18		
Motivation						.05	.04***
Constant	69.75	66.82	72.67	1.49			
I am less motivated to attend online compared to in-class courses.	.00	-1.10	1.11	.56	.00		
I am less motivated to learn during online compared to in-class courses.	2.24***	1.11	3.36	.57	.21		
Social Interactions						.004	.001
Constant	78.30	73.72	82.87	2.33			
I miss the interaction with my colleagues during online courses.	-.86	-2.01	.29	.59	-.06		
I have less interaction with teaching staff during online compared to in-class courses.	.69	-.31	1.70	.51	.06		

Note. CI = confidence interval; LL = lower limit; UL = upper limit.
*$p < .05$. **$p < .01$. ***$p < .001$.

Discussion

The first aim of this study was to investigate the similarities and differences between online and in-class education in time management, assessments and group tasks, social interactions, and motivation. Our second aim was to identify the role of these factors in predicting academic stress and academic resilience in students in higher education in Croatia.

Most of the students in our study stated that regardless of the way the courses were conducted (online or in class), they lasted the same amount of time, students had the same grades, and their teachers showed the same amount of strictness. This finding is in line with findings from other studies, which have also found no significant differences in grades in online compared to traditional or in-class education (Paul & Jefferson, 2019; Sapp & Simon, 2005). However, when comparing how much they have learned, most of the students stated that they have learned less during online courses, they were less motivated to learn, and they have cheated more during online compared to in-class courses. Several other studies have found that students feel that they learn better in class than through online education (Bojović et al., 2020; Chakraborty et al., 2021). Students generally believe that they are able to clear their doubts more effectively during traditional courses compared to online ones (Selvaraj et al., 2021). Despite the availability of various teaching methods and apps that allow communication with professors and other students, they are not as effective in clarifying doubts during online classes.

However, another possibility should be considered here. Recently a curious trend has emerged concerning student performance in online versus in-class education. Despite achieving similar grades, students have expressed lower levels of motivation as well as lower perceived gains in knowledge. This phenomenon has uncovered a pattern in student testimonials indicating a rise in cheating during online courses. For example, Gillis and Krull (2020) found a decrease in students' motivation level compared to the pre-COVID-19 era. The decline in motivation was linked to a decrease in the level of commitment, as students reported dedicating less time to their studies and attending fewer lectures and small-group meetings. Since online exams are conducted without face-to-face supervision, students could exploit this situation to potentially use their notes or the internet to answer questions. Additionally, communication through video call platforms allowed them to collaborate during their exams, facilitating cheating (Bilen & Matros, 2021; Jenkins et al., 2023). Indeed, new studies have uncovered a link between COVID-19 and the rise of cheating behavior. Gamage et al. (2020) identified several reasons behind this increase. For instance, it is harder to enforce assignment restrictions during online education, and students had less educational support due to pandemic-related limitations, such as limited access to library resources. The challenge of identifying academic misconduct remotely further contributed to this trend.

Our second aim was to identify the role of time management, assessments and group tasks, social interactions, and motivation in academic stress and academic resilience. We found that lower academic stress was associated with higher satisfaction with time management, having more time for other activities, and a lower tendency for procrastination. Karaman et al. (2019) reported that students who experienced higher levels of procrastination tended to also experience greater levels of academic stress, while Stan et al. (2022) showed that time management and the ability to understand course materials represent potential stressors for students in online courses. The way students manage their time can have an impact on their stress levels as they strive to balance their academic responsibilities with personal achievements. This can be challenging for students who struggle with task aversion and uncertainty, which can lead to procrastination due to a lack of organizational skills (Razali et al., 2018). Moreover, our results have shown that higher satisfaction with assessments and group tasks, final work and grades was related to lower academic stress. Previous studies have pointed out that academic stress and student satisfaction have a negative correlation (Addiarto & Hasanah, 2022; Guldager et al., 2021; Hwang & Shin, 2018). As they experience higher levels of stress, student satisfaction levels tend to decrease. Even though academic stress is negatively associated with satisfaction with online learning, this relationship is weaker among students with higher levels of academic resilience (Kumalasari & Akmal, 2021). Interestingly, it has been found that the amount of stress in students who participate in online education will decrease their motivation for learning (Addiarto & Hasanah, 2022). The same was found in our study since higher levels of motivation correlated with lower levels of academic stress. Higher academic stress levels can worsen the feeling of losing control, which is commonly linked to reduced motivation and recent studies have highlighted a decline in academic motivation among students during the pandemic (Caron et al., 2022; Ferrer et al., 2022).

Our study also found that higher academic resilience is associated with higher satisfaction with time management, having more time for other activities, and a lower tendency for procrastination. Indeed, academic resilience has a significant negative relationship towards procrastination (Cahyani et al., 2023). Resilient students use time management and planning skills more than less resilient ones and time management training can boost students' resilience (Johnson et al., 2015; Mak et al., 2011). Having more time for other activities, such as recreation or hobbies, can positively affect students' emotional wellbeing (Zhang & Zheng, 2017) and mental resources for resilience (Takiguchi et al., 2022). *The broaden-and-build theory* suggests that leisure activities elicit positive emotions, which in turn increase mental resources for coping with stressful events in our daily lives (Denovan & Macaskill, 2017). Moreover, higher satisfaction with online assessments and group tasks, final work and grades was related to higher academic resilience in our study. Other researchers also found that students who demonstrate strong academic resilience generally experience greater satisfaction with their academic experiences (Hwang & Shin, 2018; Meneghel et al., 2019). Considering the results of this study, they seem

to be in line with the concept of resilience proposed by Kuldas and Foody (2022). They argue that resilience is neither a trait nor a state, but a result of dynamic interactions between intrapersonal, interpersonal, and unpredictable aspects that surround different individuals.

Interestingly, unlike previous studies that identified the importance of social support in mitigating student stress and building resilience, we did not find associations between social support and changes in academic stress or resilience following the onset of COVID-19 and the transition to online education. Recent studies have demonstrated that the lack of social interactions in academic context is a possible source of academic stress and can affect students' everyday life (Chaturvedi et al., 2021; Pavin Ivanec, 2022). The belief that peers, family, and teachers provide social support appeared to be associated with both academic stress and resilience, enabling students to cope with the challenges and increased academic pressures that come with higher education (Narayanan & Weng Onn, 2016). It is worth noting that we only assessed students' satisfaction with social interactions in the academic context. This raises the possibility that students may have received social support from their families, friends, or peers outside the university, which could have compensated for any lack of social interaction in the academic setting. Perhaps our results are due to the satisfaction with group projects, which the students in our study reported. Our students may not have found the lack of social interaction during the pandemic to be particularly stressful, because they had found other ways to compensate for it. For example, Scheffert et al. (2021) did not find significant correlation between social support and academic stress after the onset of COVID-19 and suggested that this could be due to students' ability to seek out other types of technology-based support, or because the pandemic has caused changes in their access to in-person social support. Indeed, studies show that university students mostly use online channels, such as social media or mobile apps, to communicate with their peers (Swanson et al., 2020).

Some limitations of this study should be taken into consideration. The sample in this study is predominantly female, which requires caution when generalizing the findings. Previous studies have shown conflicting results, some revealing significant differences between male and female students in their behavior and reactions to academic stress and resilience, while others found no differences. Additional studies with gender-balanced samples are necessary to gain a clearer understanding of the potential role of gender in the association between academic stress and resilience during online education. Since this study provides students' perceptions, it would be beneficial for future studies to include a more objective assessment as well, and to include other factors that contribute to academic stress and resilience, such as personality, coping strategies or mental health. Current study was cross-sectional, meaning that it provided a snapshot of the associations between the variables at a single point in time. Future research could use a longitudinal design to examine the changes in time management, assessments, group tasks, motivation, and academic

stress over time. This could help to identify the factors that contribute to changes in academic stress and resilience together with the potential mechanisms underlying these changes.

Having in mind these limitations, we believe that this study offers important insights for current theoretic models by better defining the contributions of time management, assessments and group tasks, social interactions, and motivation to academic stress and resilience among university students. Despite the satisfaction with some of the advantages that online education brings, the concerning rise in cheating habits should be acknowledged by researchers. Universities and teachers could collaborate to develop processes that decrease the possibility of cheating and promote academic integrity, possibly by boosting student motivation. Another practical implication that results from this study is the importance of time management for students. Universities could organize and promote time management workshops as they have a responsibility to provide students with the necessary skills and resources to succeed academically. Universities could offer these workshops as part of their orientation programs or as standalone events throughout the academic year. In addition to organizing the workshops, universities could also promote time management strategies and tools through their online learning platforms and social media channels. By doing so, universities could help students develop a sense of accountability and ownership of their time management skills.

Conclusion

While comparing the online and in-class education from students' perceptive, we found that online courses lasted the same amount of time as the in-class ones, students received the same grades and teachers showed the same amount of strictness. On the other hand, students believe that they have learned less, they were less motivated to learn, and they have cheated more during online compared to in-class courses. While investigating the predictors of academic stress and academic resilience during online education, we found that good time management like time flexibility or lower tendency for procrastination, satisfaction with assessments and group tasks, and higher motivation are important factors contributing to lower academic stress and higher academic resilience. Interestingly, we did not find associations between social support and changes in academic stress or resilience, possibly because students may have received social support from their families, friends, or peers outside the university or they had found other ways to compensate for lack of personal contact during the online education. We believe that such knowledge could help university professors in designing their online courses, but also as guidelines for universities, mental health professionals and decision-makers in education policy whose aim is to increase academic resilience and reduce academic stress.

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S druge strane ekrana: prediktori akademskoga stresa i otpornosti tijekom *online* obrazovanja

Sažetak

Online obrazovanje vrsta je obrazovanja na daljinu u kojemu je cjelokupni nastavni proces posredovan tehnologijom. Mnogo je prednosti i izazova u *online* obrazovanju, poput upravljanja vremenom, održavanja društvenih interakcija ili motivacije. Samo studiranje puno je izazova koji proizlaze iz akademskih obveza, što može dovesti do akademskoga stresa. Sposobnost prilagodbe i odgovora na takve izazove poznata je kao akademska otpornost. Budući da je nedavna pandemija prisilila sveučilišta da nastavu održavaju *online*, nije bilo vremena za prilagodbu takvim okolnostima. Stoga je prvi cilj ovoga istraživanja bio istražiti sličnosti i razlike između *online* obrazovanja i obrazovanja u učionici u upravljanju vremenom, ocjenjivanju i grupnim zadacima te društvenim interakcijama i motivaciji iz perspektive studenata u Hrvatskoj. Naš je drugi cilj bio istražiti ulogu tih čimbenika u predviđanju akademskoga stresa i akademske otpornosti. Istraživanje je provedeno *online*, a sudjelovala su 704 studenta muškoga i ženskog spola. Većina njih vjeruje da su tijekom *online* nastave manje naučili, da su bili manje motivirani za učenje i da su više varali tijekom *online* nastave u usporedbi s nastavom u učionici. Fleksibilnost vremena i manja sklonost odgađanju, zadovoljstvo ocjenjivanjem i grupnim zadacima te veća motivacija istaknuti su kao važni čimbenici koji pridonose nižemu akademskom stresu i većoj akademskoj otpornosti. Nije bilo povezanosti između socijalne podrške i promjena u akademskome stresu ili otpornosti. Nakraju smo razmotrili i preporuke za *online* obrazovanje koje bi mogle koristiti svima koji se brinu o mentalnome zdravlju studentica i studenata.

Ključne riječi: *online* obrazovanje, akademski stres, akademska otpornost, upravljanje vremenom, motivacija

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