



# Student Burnout in Higher Education: A Demand-Resource Model Approach

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## Abstract

Student burnout is a serious problem in higher education. It is associated with harmful consequences, such as decreased engagement, performance, and motivation, which can lead to dropout. The job demand-resource model of burnout is a comprehensive framework to grasp the factors related to the emergence of burnout. Although numerous studies claim its suitability in explaining burnout in work environments, its applicability in the educational context is less explored. The study aimed to analyze the structure and reliability of the newly developed University Demand-Resource Questionnaire (UDRQ) and to explore the links between its subscales and symptoms of student burnout. Using the online survey method, 743 Hungarian undergraduate students participated in the data collection. The student version of the Maslach Burnout Inventory was used in addition to the UDRQ. In the data analysis procedure, confirmatory factor analysis, correlation analysis, and structural equation modeling were utilized. The confirmatory factor analysis identified a five-factor structure related to both demands and resources. Correlation analysis revealed burnout to be associated positively to the subscales of demands and negatively to resources. Structural equation modeling analysis indicated that all five demands and two resources subscales can be used to build a model that predicts a significant proportion of the variance of student burnout scores. The findings suggest the demand-resource theory is an appropriate framework to predict burnout in higher education. The newly developed UDRQ has stable structure and good reliability and can be a useful tool in subsequent research related to student burnout.

**Keywords** Student burnout · Job demand-resource model · University resource · University demand · Structural equation modeling

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## Introduction

Numerous studies (OECD, 2019; Rump et al., 2017) indicate that student dropout is a serious problem in higher education, as a significant proportion of students do not complete the courses necessary for a degree. Specifically, in Hungary, 35–45% of university student fails to successfully finish their studies (Lukács & Sebő, 2015; Varga, 2010). These results are similar to the Organization for Economic Co-operation and Development (OECD) countries' average statistics, which show that only 67% of students around the world successfully complete their bachelor's degree programs (OECD, 2019). While increased dropout rates are harmful for the educational institutions, these results are also alarming from an individual perspective, as dropout is often associated with sociocultural or psychological issues (Tamin, 2013). Various psychological factors are related to dropout, such as decreased academic motivation (Bardach et al., 2020), self-regulatory learning strategies, and school engagement (Richardson et al., 2012). In the recent years, many studies have focused on student burnout, which is a serious mental health problem of its own (Farina et al., 2020; Fiorilli et al., 2017; Herrmann et al., 2019; Jagodics et al., 2021) and is linked to increased dropout (Bask & Salmela-Aro, 2013; Marôco et al., 2020). Burnout is also proved to be associated with lower academic motivation (Chang et al., 2016; Isoard-Gautheur et al., 2016; Tuominen-Soini et al., 2012), which leads to decreased engagement, study effort, and performance (Fiorilli et al., 2017; Salmela-Aro & Tynkkynen, 2012; Schaufeli et al., 2002a; Zhang et al., 2007). Studying the factors contributing to undesirable outcomes in higher education is increasingly important. The goal of our study is to apply a widely used concept, the demand-resource model (Demerouti et al., 2001) to explore student burnout in higher educational contexts.

## Burnout in higher education

Burnout syndrome was first described by Herbert Freudenberger (1974) after examining the symptoms of fatigued health care professionals suffering from the consequences of prolonged job stress. Maslach (1982) classified the symptoms of burnout as emotional exhaustion, depersonalization, and decreased personal accomplishment. Although early studies (e.g., Hare et al., 1988) described the symptoms mainly among health care workers, the research on burnout widened to include other professions as well, and the phenomenon was generalized as “job burnout” (Chang et al., 2000; Leiter & Schaufeli, 1996; Shirom, 1989). Based on research results, the World Health Organization incorporated job burnout in the 11th Revision of the International Classification of Diseases as an occupational problem (World Health Organization, 2019).

Burnout research extended beyond different professions to educational contexts as well. School burnout came to be described as the specific symptoms that developed due to school-related stress and demands associated with studying among higher education (D'Aurora & Fimian, 1988; Fimian & Cross, 1986) and university students (Garden, 1991; Meier & Schmeck, 1985). Student burnout was described

along three main symptoms, which are similar to those used when discussing job burnout: exhaustion caused by study demands, cynical attitude toward learning and study goals, and feelings of incompetence and decreased performance (Schaufeli et al., 2002b).

Student burnout is associated with several pernicious processes. Higher burnout scores are linked to lower study engagement (Cilliers et al., 2017; Fiorilli et al., 2017; Shih, 2015) and changes in motivation; students affected by burnout are proven to develop avoidance-goal orientation instead of mastery goal orientation (Jagodics et al., 2021; Chang et al., 2016; Tuominen-Soini et al., 2012). Burnout is also associated with lower academic performance (Author, in press; Herrmann et al., 2019; Seibert et al., 2016) and higher absenteeism (Seibert et al., 2016).

Research on student burnout often uses the student version of the Maslach Burnout Inventory (MBI-SS; Schaufeli et al., 2002a) to assess the severity of symptoms. MBI-SS was developed to assess the three main symptoms of burnout in the context of higher education (Schaufeli et al., 2002b). It distinguishes three subscales of burnout in accordance with the symptoms: emotional exhaustion, cynicism, and reduced accomplishment. The factor structure of the MBI-SS proved to be stable as it was successfully validated in different countries and cultures (e.g., Gumz et al., 2013; Hederich-Martínez & Caballero-Domínguez, 2016; Hu & Schaufeli, 2009; Mostert et al., 2007; Pérez-Mármol & Brown, 2019; Shin et al., 2011). The MBI-SS was also successfully translated to Hungarian (Ádám & Hazag, 2013; Hazag et al., 2010).

Although this questionnaire is available to use for research purposes, burnout among university students is a less-studied topic in Hungary. One study using the MBI-SS estimated the prevalence of high burnout between 41 and 51% among Hungarian medical students (Ádám & Hazag, 2013). As more extended assessments of the prevalence of student burnout among Hungarian students outside of medical training programs are lacking, our study aimed to use a more heterogeneous sample for measuring the symptoms of burnout.

## The job demand-resource model of burnout

The job demand-resource model of burnout (JD-R; Bakker & Demerouti, 2017; Demerouti et al., 2001) is widely used to explain the development of burnout symptoms. The JD-R model differentiates between two types of workplace effects. Demand is a collective term for those effects that cause stress, strain, and exhaustion, such as emotionally loaded situations; mentally challenging tasks; conflicts with superiors, colleagues, and clients; time pressure; and long working hours. On the other hand, there are resources that generally help people cope with workplace tasks, such as supportive peers and superiors, opportunities for personal development, being part of decision making, and having control and autonomy over organizing work (Bakker & Demerouti, 2017; Demerouti et al., 2001). The JD-R model proved to be suitable to explain the development of burnout symptoms; demands were usually associated with higher burnout, but the availability of resources can

counteract the negative effects of demands (Bakker et al., 2007; Bakker & Demerouti, 2007; Brouwers et al., 2011; Xanthopoulou et al., 2007).

The JD-R model has various applications related to educational contexts. Demands and resources are associated with burnout among teachers (Author, 2014; Bottiani et al., 2019; Cao et al., 2020; Dicke et al., 2018). Moreover, the components of the JD-R model were found to be linked to student burnout (Cilliers et al., 2017; Hodge et al., 2019; Salmela-Aro & Upadyaya, 2014; Williams et al., 2018). Researchers use different approaches when applying the JD-R model among students. Certain studies focus on one component of resources, such as sense of control, which is found to be linked to higher academic achievement (Collie et al., 2015) or regular feedback, which is related to higher engagement and motivation (Hattie & Timperley, 2007; Krijgsman et al., 2019).

Other studies use the full spectrum of the JD-R model, but there are differences between the conceptualization of demands and resources (Cilliers et al., 2017; Hodge et al., 2019; Ouweneel et al., 2011; Salmela-Aro & Upadyaya, 2014). For example, resources can be defined as personal resources, such as self-esteem and optimism (Ouweneel et al., 2011), but the concepts of the JD-R model also can be described as task difficulty and possibility for personal development (Salmela-Aro & Upadyaya, 2014). Another study applies a more complex model in which demands refer to study-related workload while resources consist of the perceived support of teachers and opportunity for personal growth (Cilliers et al., 2017). Although only a few studies linked study-related demands and resources to burnout, the results show that student burnout is positively associated with demands and negatively related to resources (Cilliers et al., 2017; Hodge et al., 2019; Ouweneel et al., 2011; Salmela-Aro & Upadyaya, 2014).

The aim of the current study was to analyze the structure and reliability of the newly developed University Demand-Resource Questionnaire (UDRQ) and to explore the links between its subscales and symptoms of student burnout. The UDRQ is based on the School Demand-Resource Questionnaires (Author, in press) whose items were modified to suit the university context. The UDRQ was designed to test a five-factor model for both demands and resources. Demands consist of mental and emotional demands, work style, career choice anxiety, and conflicts with lecturers.

Mental and emotional demands are the core components of the JD-R model of burnout, as they are often associated with strain and exhaustion (Bakker & Demerouti, 2017; Demerouti et al., 2001). In university contexts, the number of courses or the amount of study material within a specific course can contribute to mental demands, while performance anxiety can cause a harmful emotional load. Another important contributor to the formation of emotional load is negative relationships with lecturers, as a proper student-lecturer relationship is linked to increased academic engagement (Farr-Wharton et al., 2018). On the other hand, perceived lack of fairness or credibility is associated with adverse outcome (Zhang & Sapp, 2009). Moreover, conflicts with peers, clients, or superiors were part of the original JD-R model, which underpins the necessity of involving conflicts with lecturers in the model (Demerouti et al., 2001). Demands related to work style, such as long study hours and the increased amount of challenging tests and exams, can also lead to

exhaustion (Bakker & Demerouti, 2007; Bowyer, 2012). Finally, career choice anxiety is considered to be important because students who could not see the possible career outcomes of their training program could easily become less committed and begin to doubt the usefulness of their studies (Germeijs et al., 2006).

Among resources, perceived possibility of development, control, information, feedback, and support of lecturers were included. Personal growth and development is an important component of the original JD-R model (Bakker & Demerouti, 2007), as experiencing advance and improvement in someone's skills and competencies makes challenging tasks worth the effort. Perceived control is another key component of the original model (Demerouti et al., 2001; Karasek, 1979), as it enhances personal autonomy and self-efficacy (Bakker & Demerouti, 2017). Control can be further enhanced with giving appropriate information about the given tasks, course requirements, or training programs (Bakker et al., 2007; Demerouti et al., 2001). Performance-related feedback is also important for both workers (Demerouti et al., 2001) and students. Generally, students get evaluative feedback on their test or exam based on points, grades, and percentages, but more elaborate written feedback is often more useful for reflection and establishing future growth (Quinton & Smallbone, 2010). Therefore, it is important that lecturers give specific and useful feedback to their students regularly. Appropriate feedback is connected to the fifth element of resources, lecturer support. From the students' perspective, it is important that the lecturers are perceived as accessible and approachable when help or guidance is needed regarding the course requirements or curriculum (Hagenauer & Volet, 2014).

## The context of Hungarian higher educational

In Hungary, higher education placement is based on the results of high school grades and graduation exams. The majority of the training programs consist of a 3-year Bachelor's program and a 2-year Master's program. Hungarian higher education is free for the majority of training programs, but paid programs are also available. In 2017, 247,008 students (52.77% female) enrolled in higher education programs in Hungary (Educational Authority, 2020).

Entering a training program in higher education in Hungary is not a seamless transition from secondary education for the students, as there are differences between the approaches of high schools and universities. Secondary education generally applies a top-down approach to manage learning processes, which means that students have little control and a limited voice in decisions regarding curriculum, courses, or scheduling their school work. In contrast to secondary schools, university training programs give students more room for personal choices regarding subjects, scheduling exams, or joining student groups. On the other hand, compared to other higher education systems, the framework of Hungarian university training programs is generally more limited in terms of curriculum and course choices if students aim to acquire a given qualification. Most courses are mandatory; therefore, options for individual learning paths are limited. These barriers are acknowledged in the OECD Skill Studies report focusing on Hungary (OECD & European Union, 2017).

## The current study: Developing the university demand-resource questionnaire

The main goal of the study was to analyze the structure and the UDRQ and explore the relationship of the subscales with student burnout. The relevance of the research is to gain better understanding of the processes which contribute to the development of student burnout in order to prevent it. Measurement tools are needed to create prevention programs based on empirical evidence, therefore analyzing that the UDRQ is the first step to gather more data of student burnout. The main hypotheses of the study were:

H1. Demands would be associated positively with student burnout scores (Cilliers et al., 2017; Hodge et al., 2019; Lesener et al., 2020)

H2. Resources were expected to be linked negatively to burnout (Cilliers et al., 2017; Hodge et al., 2019; Lesener et al., 2020)

H3. Based on the previous findings regarding the potential protective role of resources against the negative effect of demands (Bakker et al., 2007; Salmela-Aro & Upadyaya, 2014), we assumed that the difference between demand and resource scores labeled as “workload” would be more strongly connected to burnout scores than demands and resources alone

H4. We assumed that the scales of the UDRQ would prove to be suitable for model building to predict the symptoms of student burnout (Cilliers et al., 2017; Hodge et al., 2019; Lesener et al., 2020).

## Methods

### Participants and procedure

Participants were informed about the study on online surfaces which are popular among students (e.g., social media pages and webpages of universities). All participants decided to answer the questions voluntarily. A total of 743 Hungarian university students participated in the study (563 females and 173 males, seven without answer,  $M_{age} = 23.2$  years,  $SD_{age} = 5.09$  years) using online questionnaires and convenience sampling. Women were slightly over-represented compared to the population of university students in Hungary (52.7%; Educational Authority, 2020). Students in the first year of their Bachelor’s program consisted 16.6% of the sample; 19.8% were in the second year, and 27.0% were in the third year. In the Master’s program, 17.3% were in the first year, and 13.9 were in the second year. Since some Master’s programs in Hungary consist of a third year, 5.6% reported attending another grade.

Informed consent was obtained from all individual participants included in the study. Participants were informed about the goal and content of the study before answering the questionnaires, and they were assured of the confidentiality and

anonymity of data processing. The students could withdraw from participating without any consequences. The study procedures were conducted in accordance with the Declaration of Helsinki. The research process was approved by a research ethical committee of the Institute of Psychology prior to data collection.

## Instruments

### MBI-SS

The MBI-SS (Schaufeli et al., 2002a; Schaufeli et al., 2002b) is a 15-item scale that consists of three subscales: emotional exhaustion (five items, e.g., “I feel that studying is exhausting”), cynicism (four items, e.g., “I doubt the significance of my studies”), and reduced accomplishment (six items, e.g., “I can effectively solve the problems that arise in my studies” [reversed coding]). The items of the inventory are answered on a 7-point Likert-type scale (1: completely disagree; 7: strongly agree). The Hungarian adaptation of the MBI-SS proved to have stable structure and good reliability (Ádám & Hazag, 2013; Hazag et al., 2010). The indicators of scale reliability in the current study met the standards of each of the three subscales (Cronbach  $\alpha$  values ranging between 0.853 and 0.904; see Table 1).

### University demand-resource questionnaire

The UDRQ was developed by the authors for the current study. The UDRQ consists of subscales for demands and resources. The questionnaire items are rated on a 6-point Likert-type scale (1: completely disagree; 6: strongly agree). As this is the first application of the UDRQ, confirmatory factor analysis was used to test the scales.

In case of demands, a four-factor structure was used: work style (four items, e.g., “I don’t have enough time because my tasks related to the university”), mental demands (three items, e.g., “Exams completely exhaust me mentally”), emotional demands (four items, e.g., “I worry a lot about my grades”), career choice anxiety (three items, e.g., “It is difficult to decide what to do after I finish university”), and conflict with lecturers (three items, e.g., “There are lecturers who treat me unfairly”). Based on the modification indices of the initial model, we decided to use correlated errors in the model in the event of five item pairs that belonged to the same factor (Brown, 2015). The model proved to have good fit indices according to the cutoff criteria of Hu and Bentler (1999):  $\chi^2(104) = 334$ ,  $p < 0.001$ ;  $\chi^2/df = 3.21$ ; RMSEA = 0.054;  $0.048 \leq 90\% \text{ CI} \leq 0.061$ ; SRMR = 0.037; CFI = 0.962; TLI = 0.95. The indicators of scale reliability ranged from acceptable to good ( $0.741 < \text{Cronbach } \alpha < 0.875$ ; see Table 1).

Regarding resources, a five-factor structure was used: possibility of personal development (4 items, e.g., “I have possibilities to improve in the university”), information (four items, e.g., “My lecturers express clearly what they expect from me”), feedback (three items, e.g., “The feedback that my lecturers gave me helps my development”), perceived control (three items, e.g., “When I study for my exams, I can

**Table 1** Descriptive statistics and intercorrelations between all measures. Note: \* $p < 0.05$ , \*\* $p < 0.01$

Scale	Student burnout				Demands				Resources					
	Cyn	Acc	Exh	Ment	WS	Emot	CCA	Conf	PD	Inf	Feed	Cont	SL	WL
<b>Student burnout</b>														
Cynicism (Cyn)	–													
Reduced accomplishment (Acc)	.56**	–												
Exhaustion (Exh)	.692**	.46**	–											
<b>Demands</b>														
Mental demands (Ment)	.271**	.207**	.551**	–										
Work style demands (WS)	.269**	.099*	.485**	.652**	–									
Emotional demands (Emot)	.444**	.392**	.589**	.597**	.437**	–								
Career choice anxiety (CCA)	.464**	.343**	.403**	.274**	.204**	.528**	–							
Conflict with lecturers (Conf)	.118**	0.073*	.183**	.214**	.111*	.225**	.116*	–						
<b>Resources</b>														
Possibility of development (PD)	–.713**	–.573**	–.426**	–.115*	–.137**	–.246**	–.323**	–.100*	–					
Information (Inf)	–.459**	–.431**	–.345**	–.203**	–.265**	–.268**	–.242**	–.191**	.537**	–				
Feedback (Feed)	–.439**	–.485**	–.328**	–.162**	–.170**	–.240**	–.195**	–.099*	.513**	.639**	–			
Control (Cont)	–.382**	–.353**	–.358	–.255**	–.304**	–.273**	–.206**	–.149**	.440**	.469**	.395**	–		
Support of lecturer (SL)	–.442**	–.457**	–.300	–.153**	–.189**	–.219**	–.247**	–.121**	.525**	.696**	.656**	.445**	–	
<b>Workload (WL)</b>	.651**	.549**	.655**	.606**	.578**	.679**	.582**	.393**	–.624**	–.716**	–.639**	–.625**	–.671**	–



Table 1 (continued)

Scale	Student burnout					Demands					Resources				
	Cyn	Acc	Exh	Ment	WS	Emot	CCA	Conf	PD	Inf	Feed	Cont	SL	WL	
<b>Range</b>	1–7	1–7	1–7	1–6	1–6	1–6	1–6	1–6	1–6	1–6	1–6	1–6	1–6	–5–5	
<i>M</i>	3.59	3.23	4.03	4.15	4.01	3.41	3.22	3.42	4.31	3.83	3.51	4.56	4.24	–0.446	
<i>SD</i>	1.87	1.17	1.53	1.3	1.41	1.33	1.69	1.42	1.19	1.25	1.21	1.2	1.21	1.6	
<b>Cronbach <math>\alpha</math></b>	.919	.853	.882	.804	.875	.741	.869	.744	.868	.893	.743	.808	.862	–	

make my own schedule”), and support from lecturers (three items, e.g., “When I ask them, my lecturers usually make an effort to help me”). Based on the modification indices of the initial model, we decided to use correlated errors in the model in the event of two item pairs that belonged to the same factor (Brown, 2015). The model proved to have good fit indices according to the cutoff criteria of Hu and Bentler (1999):  $\chi^2(107)=358$ ,  $p<0.001$ ;  $\chi^2/df=3.34$ ; RMSEA=0.056;  $0.049\leq 90\% CI\leq 0.062$ ; SRMR=0.037; CFI=0.967; TLI=0.958. The indicators of scale reliability ranged from acceptable to good ( $0.743 < \text{Cronbach } \alpha < 0.893$ ; see Table 1).

## Results

### Data analysis

SPSS for Windows 24.0, JASP (JASP Team, 2018), and Jamovi 0.6.9.6. (The Jamovi Project, 2021) software were used for statistical analysis. Data distribution was checked before the statistical analysis using descriptive statistics, and then the structure and reliability of the measures were tested as described in the previous section. Pearson’s correlation analysis was used to test the hypotheses (H1–H3). Finally, structural equation modeling (SEM) was applied to reveal the relationship between the subscales of UDRQ and student burnout (H4).

Before the main statistical analysis, the data distribution was checked. Values of kurtosis and skewness were compared with the value of 12.581, which indicates the normal distribution of the data in large sample sizes (Ghasemi & Zahediasl, 2012). Normal distribution was assumed in the case of all variables based on the values of the descriptive statistics.

### Descriptive statistics and preliminary analysis

During the first step of preliminary analysis, descriptive statistics were explored. Student burnout scores were highest on the emotional exhaustion subscale ( $M=4.03$ ), followed by cynicism ( $M=3.59$ ) and reduced accomplishment ( $M=3.53$ ; see Table 1.). Compared to previous research among Hungarian students (Hazag et al., 2010), the burnout scores of the current samples were similar on the emotional exhaustion subscale, but participants scored more than one standard deviation higher on cynicism and reduced accomplishment. The previous data collection studied medical and engineer students, while the current sample was heterogeneous, which can explain the differences in burnout scores.

Differences between males and females were tested using independent sample *t*-tests. There were no significant differences in case of reduced accomplishment ( $p=0.585$ ) and cynicism ( $p=0.172$ ), but females ( $M=4.12$ ;  $SD=1.55$ ) scored significantly higher ( $t[736]=3.007$ ,  $p=0.003$ ) on emotional exhaustion than males ( $M=3.73$ ;  $SD=1.45$ ). The effect size measured by Cohen’s *d* value (= 0.258) indicated a small effect as it refers to less than a third of a standard deviation difference between groups (Cohen, 2013; Lakens, 2013). The relationship between grades and

burnout scores was explored by Pearson's correlation analysis. There were no significant links between grades and reduced accomplishment ( $p=0.19$ ), but there was a statistically significant result for emotional exhaustion ( $r[740]=0.084$ ,  $p=0.022$ ) and cynicism ( $r[741]=0.247$ ,  $p<0.001$ ), indicating no or extremely weak relationships between the variables. Age was negatively associated with all burnout subscales, although the strength of the relationship remained extremely weak: reduced accomplishment ( $r[741]=-0.185$ ,  $p<0.001$ ), cynicism ( $r[741]=-0.109$ ,  $p=0.003$ ) and emotional exhaustion ( $r[741]=-0.138$ ,  $p<0.001$ ).

In the next step of the analysis, descriptive statistics for UDRQ subscales were measured. Among the subscales of demands, participants scored highest on mental demands ( $M=4.15$ ), followed by work style ( $M=4.01$ ), conflicts with lecturers ( $M=3.42$ ), emotional demands ( $M=3.41$ ), and career choice anxiety ( $M=3.22$ ; see Table 1). Differences between males and females were tested using independent  $t$ -sample tests. There was no significant difference between males and females regarding conflicts with lecturers ( $p=0.838$ ); however, females scored higher on all other subscales of demands (all  $p<0.007$ ; see Table 1). The effect size measured by Cohen's  $d$  value ranged between 0.233 and 0.331, indicating small differences between males and females.

Among the subscales of resources, participants scored the highest on perceived control ( $M=4.56$ ), followed by possibility of development ( $M=4.31$ ), support of lecturers ( $M=4.24$ ), information ( $M=3.83$ ), and feedback ( $M=3.51$ ; see Table 1). Differences between males and females were tested using independent  $t$ -sample tests. Results showed statistically significant differences only in case of perceived support of lecturers ( $p=0.012$ ), with males scoring higher ( $M=4.44$ ,  $SD=1.14$ ) than females ( $M=4.18$ ,  $SD=1.23$ ; see Table 1). The effects size measured by Cohen's  $d$  value ( $=-0.215$ ) indicated a small difference between males and females.

The relationship between student burnout and the subscales of UDRQ was tested using Pearson's correlation analysis. In our hypothesis (H1), positive links between demands and burnout were assumed. The results supported our initial assumptions, as all subscales of demands were positively associated with burnout scores (see Table 1 for details), although not all links between demands and burnout scores are considered strong. A moderate link was found between emotional exhaustion and emotional demands ( $r[741]=0.589$ ,  $p<0.001$ ), mental demands ( $r[741]=0.551$ ,  $p<0.001$ ), and work style demands ( $r[741]=0.485$ ,  $p<0.001$ ). Our hypothesis (H2) regarding the negative link between burnout and resources was also supported, as the results showed a statistically significant relationship between resources and burnout, indicating a weak to strong link between variables (see Table 1 for details).

To test H3, a new variable called workload was created by subtracting the mean score of resources from the mean scores of demands. Workload ranged from  $-5$  to  $5$ , and positive values indicated the predominance of demands, while negative values revealed prevailing resources. Descriptive statistics showed that the mean score for workload was  $-0.445$  ( $SD=1.6$ ), indicating the predominance of resources. Only 37.7% of the participants had a positive value in workload index, which means that the two-third of the students perceived resource-dominant university environment. Using Pearson's correlation analysis, a statistically significant positive relationship was found between workload and burnout scores: emotional exhaustion

( $r[741]=0.655$ ,  $p<0.001$ ), decreased accomplishment ( $r[741]=0.549$ ,  $p<0.001$ ), and cynicism ( $r[741]=0.651$ ,  $p<0.001$ ). These results fit the initial assumptions, as the coefficients indicated generally stronger connections to burnout than the individual demands and resources subscales.

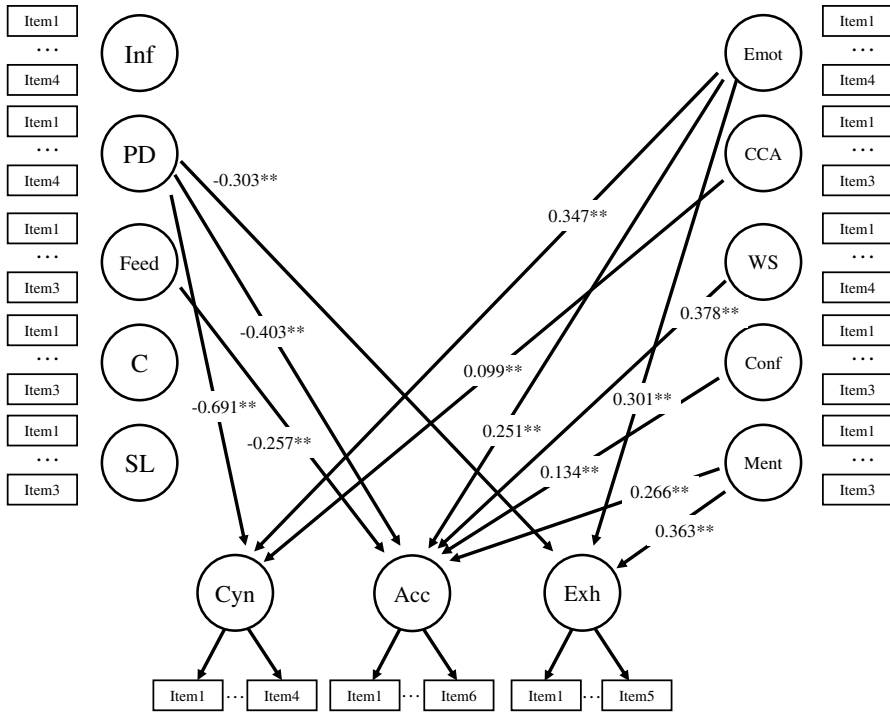
### Main analysis: Model estimation

The main goal of the current study was to test the ability of the JD-R model in prediction of student burnout scores (H4). To test this hypothesis, SEM was applied using JASP (JASP Team, 2018). During the analysis, a diagonally weighted least squares estimator was used. According to Hu and Bentler's (1990) criteria chi-square, chi-square/df, CFI, TLI, RMSEA, and SRMR were used as goodness-of-fit indices to evaluate the results. Variables from the model that did not have a significant effect on the outcome variables were excluded.

The model included demands and resources factors as exogenous variables and subscales of student burnout as endogenous variable. After excluding the variables lacking significant effects on the outcome variables, the results of model fit indicated good fit to the data ( $\chi^2(1067)=4629.55$ ,  $p<0.001$ ;  $\chi^2/df=4.33$ ; RMSEA=0.067;  $0.065\leq 90\% \text{ CI}\leq 0.069$ ; SRMR=0.061; CFI=0.984; TLI=0.983). The results of the SEM analysis are shown in Fig. 1. The variables included in the model explained a significant proportion of the variance between burnout symptoms ( $R^2_{\text{exhaustion}}=0.664$ ;  $R^2_{\text{cynicism}}=0.721$ ;  $R^2_{\text{reduced accomplishment}}=0.636$ ). Reduced personal accomplishment scores were negatively linked to the possibility of development ( $\beta=-0.403$ ) and feedback ( $\beta=-0.257$ ), while they were positively associated with conflicts with lecturer ( $\beta=0.134$ ), work style demands ( $\beta=0.378$ ), emotional ( $\beta=0.251$ ), and mental demands ( $\beta=0.266$ ). Cynicism was positively linked to career choice anxiety ( $\beta=0.099$ ) and emotional demands ( $\beta=0.347$ ), while it related negatively to the possibility of development ( $\beta=-0.691$ ). Emotional exhaustion scores were associated positively to mental ( $\beta=0.363$ ) and emotional demands ( $\beta=0.301$ ), while it was negatively linked to possibility of development ( $\beta=-0.303$ ). The detailed results of the SEM analysis are shown in Fig. 1.

### Discussion

The aim of the current cross-sectional study was to analyze the structure and reliability of the newly developed University Demand-Resource Questionnaire (UDRQ) and to explore the links between its subscales and symptoms of student burnout. Although the JD-R model of burnout is widely used in workplace-related studies (Bakker & Demerouti, 2017; Bakker & Sanz-Vergel, 2013; Brouwers et al., 2011; Xanthopoulou et al., 2007), its application in educational context is less extensive (e.g., Cilliers et al., 2017; Ouweneel et al., 2011; Salmela-Aro & Upadyaya, 2014). As the processes that contribute to student burnout need to be better understood in order to create intervention methods to tackle the symptoms, the development of the UDRQ seemed to be an important step to establish new



**Fig. 1** Structural model results showing standardized path coefficients between school demands, school resources, and burnout symptoms. Intercorrelations, insignificant paths, and error terms were removed for simplicity. Cyn=Cynicism, Exh=Emotional exhaustion, Acc=Reduced accomplishment; Inf=Information, PD=Possibility of development, Feed=Feedback, C=Control, SL=Support of lecturers; Emot=Emotional demands, CCA=Career choice anxiety, WS=Work style demands, Conf=Conflicts with lecturers, MD=Mental demands. Note: \* $p < 0.05$ , \*\* $p < 0.01$

ways of studying and preventing burnout. The main goal of the study was to analyze the newly developed UDRQ scale. Besides, we hypothesized that burnout is linked positively to demands (H1) and negatively to resources (H2). Moreover, it was assumed that the difference between demand and resource scores labeled as “workload” would be more strongly connected to burnout scores than demands and resources alone (H3). Our final hypothesis was that the scales of the UDRQ would prove to be suitable for model building to predict the symptoms of student burnout (H4). According to the results of the statistical analysis, UDRQ showed stable structure and good reliability, while the subscales were linked to student burnout as supposed in the initial hypothesis.

The main goal of the study was to analyze the newly developed UDRQ scale. The structural analysis of the UDRQ confirmed a five-factor structure in case of both demands and resources. Among demands, the mental and emotional components of strain were the most strongly connected to the symptoms of burnout, although all demands subscales were included in the SEM analysis, as significant connections were revealed between them and burnout scores. These results may

indicate that the UDRQ is suitable for measuring those factors that are associated with strain and exhaustion among university students.

In the case of resources, the initial five-factor structure was also verified. Although correlation analysis showed that all subscales are linked to burnout scores, the strength of the relationship between the variables varied from weak to strong. In the SEM analysis, only two components of resources, namely, possibility of personal development and feedback, had statistically significant links to burnout scores. These results show that although information about course material, perceived control, and support of the lecturers are associated with burnout scores, these links are not strong enough to be included in the model built to explain the variance of burnout scores. It is particularly interesting in the case of perceived control, which has been in the focus of the JD-R model of burnout for a long time (Bakker & Demerouti, 2007; Demerouti et al., 2001; Xanthopoulou et al., 2007), especially if prior theoretical frameworks are also taken into account (Kain & Jex, 2010; Karasek, 1979).

A possible explanation for these results could be found in the abovementioned characteristics of Hungarian education (OECD & European Union, 2017). In primary and secondary school, students experience a strictly controlled school environment where teachers manage the learning processes, and students have little or no room for making decisions or experiencing control. In contrast to these experiences, students who enroll in higher education may generally feel more control as they have many more personal choices regarding their studies and way of living than before. Therefore, students may have gotten accustomed to having less control, and the lack of autonomy became a common experience; thus, students do not perceive it as a lacking resource.

The results draw attention to several possible practical implications. The analysis regarding mental and work style demands indicates the importance of developing more balanced training programs in which students face course requirements that they perceive to be more achievable. Lowering mental demands possibly could help in reducing emotional load too, as worrying about test results and grades would be less frequent.

Redesigning training programs to reduce demands is not the only possible solution based on the results. Just as previous studies indicated, resources are able to counterbalance the possible harmful effects of demands (Bakker et al., 2007; Hodge et al., 2019; Ouweneel et al., 2011). Our analysis regarding workload values revealed that the ratio of demands and resources is strongly linked to burnout scores, especially to emotional exhaustion and cynicism. Moreover, results showed that one-third of the participants reported the dominance of demands according to the workload index, which may indicate a group at risk by the development of burnout. These results suggest the importance of shaping university training programs in a way that enables students to access more resources. The perceived possibility of development is a key resource for students based on the results. If students feel that the curriculum and the way it is taught is useful for their personal growth and supports their career opportunities, students' engagement can be reinforced. This perception could be important, as disengagement and alienation from studies can lead to worse academic performance and potential dropout (Ketonen et al., 2016). Moreover, lecturers can further enhance resources. Giving

meaningful support, proper information about course material, and sufficient feedback are factors controlled by the lecturers. An important conclusion of the results is that the behavior and efforts of university lecturers are determining factors of student performance, a finding in line with other results showing that perceived teacher burnout and enthusiasm is linked to student motivation (Hastings & Bham, 2003; Klusmann et al., 2016; Orosz & Karsai, 2012; Shen et al., 2015).

### Limitations and further research

Several limitations have to be taken into account when evaluating the results of the current study. First, university students have different living conditions, which can enhance or reduce the effect of demands and resources. Having a part-time or full-time job in addition to school can add to workload, and financial background overall can influence the perception of emotional demands. Further research is needed to explore the links between socioeconomic variables and the components of demands and resources.

Secondly, convenience sampling was used; therefore, the current data set is not representative of the overall Hungarian university student population. Moreover, academic success or grades were not included in the analysis. Variables that can reveal how effectively students cope with course requirements could make deeper analysis possible.

An important area of further research is the differences in the perception of demands and resources across different training programs. These data, pieced together with dropout statistics, would enable further analysis of links between workload and student performance, which could be useful in data-based revision and modification of training programs. This approach could also help us identify the individual patterns of at-risk students, who may perceive demands more intensely than their peers. This way of research could also be useful in exploring and understanding academic resilience (Agasisti et al., 2018; Martin, 2013), as identifying the characteristics of students who are able to withstand demand-dominated learning environments would supplement the existing understanding of the topic. In subsequent studies, a longitudinal setting would be preferred, as it would enable researchers to identify struggling students who may face the risk of dropout. Finally, it is important to note that the conclusions drawn based on the results are focusing only on the characteristics of Hungarian higher education contexts. To gain deeper understanding regarding the variety of possible explanations, cross-cultural comparative examinations are preferred.

**Data availability** The data that support the findings of this study are available from the corresponding author upon reasonable request.

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### Declarations

**Ethics approval** All procedures were carried out with the adequate understanding and consent of the participants and with the approval of the University of Szeged and the Hungarian United Ethical Review Committee for Research in Psychology prior to data collection.

**Competing interests** The authors declare no competing interests.

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