Exploring dropout risk in higher education in Croatia: An empirical analysis

Josip Šabić and Saša Puzić
Institute for Social Research in Zagreb, Croatia

The study examines the association of social background, academic-related and institution-related factors with indicators of higher education dropout risk, i.e. students' perceived probability of graduating and their consideration of leaving their studies. Bivariate analysis and multilevel logistic models were used to analyse data from 1533 students from 25 study programs of the University of Zagreb, Croatia. The results confirmed the assumption that higher education dropout risk may be associated with different factors (i.e. social background, academic and institution-related characteristics), but also that there may be differences regarding the two indicators of perceived dropout risk. Moreover, the analysis revealed that perceived dropout risk may be viewed as part of a process of self-selection in which a combination of different factors leads a student to withdraw from higher education. Accordingly, the impact of the covariates of dropout risk should not be viewed only relative to each other, but should be evaluated in the context of educational decision-making net of academic ability.

Introduction

A key message from a report on dropout and higher education completion in Europe (Quinn, 2013) stated that it is not widening participation in higher education that produces dropout, but the problem appears to be "a lack of attention to the needs of a more diverse student population" (Quinn, 2013: 7; cf. Christie, Munro & Fisher, 2004). Along these lines, European higher education policy has increasingly focused on the issue of high dropout rates. By strengthening the social dimension in higher education, these policy initiatives aim to provide appropriate conditions that may enable students from under-represented and vulnerable groups to succeed in their studies (EHEA Ministerial Conference, 2015). Yet, if more students are to complete their studies regardless of their social background, a more profound understanding of dropout from higher education is needed (Vossensteyn et al., 2015).

The factors that influence the international context also apply even more heavily to the Croatian higher education context. Similar to other national settings (Quinn, 2013), research on dropouts in Croatia is rare (Dodig, 2017; Mihaljević Kosor, 2010). A major cause for this is the fact that, due to decentralisation of the Croatian higher education system, a national data base with student-level records is not available. However, from the 1990s Croatian higher education underwent a massive expansion process. During that time, the number of students enrolled in institutions of higher education increased by more than 125 per cent, from 70,781 in the academic year 1990/1991 to 159,638 in 2017/2018 (Croatian Bureau of Statistics, 2021).

Although international studies have identified several factors (socio-economic, socio-cultural, academic, institutional) that may have an impact on dropout behaviour (Behr et

al., 2020a; Quinn, 2013; for more details see the next section), these factors have not been sufficiently validated in Croatian higher education (Dodig, 2017; Mihaljević Kosor, 2010). According to existing findings, the dropout rate for university students in Croatia is around 30 per cent (Farnell et al., 2014; Mihaljević Kosor, 2010). Further, it can be assumed that the main occurrence of dropping out is at the beginning of tertiary education, during the first and second year of study (Matković & Kogan, 2014). It was also observed that the risk of dropping out will more likely affect males than females (Farnell et al., 2014), students whose parents have a lower level of education (Doolan, 2010), as well as unmotivated and older students (Farnell et al., 2014; Mihaljević Kosor, 2010). At the same time, dropout risks in Croatian higher education are significantly lower for students with parents in professional or managerial positions, or for students who receive financial aid (Matković, Tomić & Vehovec, 2010).

With regard to the massive expansion of higher education in Croatia and the present lack of research on higher education completion, the aim of this study was to examine the relationships of social background, academic-related and institution-related factors on the one hand and different indicators of higher education dropout risk on the other. In doing so, our dataset allows for a comprehensive analysis of dropout risk as it combines explanatory factors that, as a whole, are not part of administrative data or existing research on dropout from higher education in Croatia.

Conceptual framework

According to cultural reproduction theory (Bourdieu, 1984), the system of higher education operates in a biased way in favour of students from privileged backgrounds. It thereby reproduces existing class inequalities based on the social distribution of different types of capital (economic, social and cultural) (Bourdieu, 1997). The main reason for this socio-reproductive effect is the fact that the culture of the privileged classes serves as the legitimate culture in higher education and education as a whole. In this respect, students from privileged backgrounds have more cultural capital than their underprivileged counterparts. This includes students' linguistic and cognitive competencies, as well as other incorporated aspects of the dominant culture (e.g. cultural habits and tendencies) that can be translated into academic success (Bourdieu and Passeron, 1990). Furthermore, when cultural practices, values and attitudes are transmitted from parents to children, they are converted into a family *habitus*, that is, a system of experiences, perspectives and predispositions that family members share (Reay, 1998; Bourdieu, 1984). These classed attributes of socialisation may create a rift between students' habitus of origin, and the values and norms of academic institutions that can be hard to overcome for students of underprivileged backgrounds (Müller & Schneider, 2013; Thomas, 2002).

It can be expected that this socio-cultural rift may negatively affect underprivileged students' educational aspirations and academic adaptation. From this perspective, students' dropout risk may be shaped by a number of factors including their socio-economic, socio-cultural and academic-related characteristics as well as the characteristics of academic institutions (Bourdieu & Passeron, 1990). Furthermore, all of these factors

can be understood as elements of a self-selection mechanism that relates to differences in educational outcomes after differences in academic ability are taken into consideration (Nash, 2003; Dupriez et al., 2012; cf. Boudon, 1974). This corresponds with an integrated perspective on self-selection processes (Nash, 2003), that is, a perspective that takes into account students' experiences in the family environment, at school and at the higher education institution and which presumes that the perception of such experiences is often an act of "various degrees of self-awareness and deliberation" (Nash, 2003: 448).

We use the term "dropout risk" as referring to students' perception of the risk of not completing their study program (proxied by students' perceived probability of graduating and their consideration of leaving the studies; for more detail see the Method section). As indicated, dropout risk may be shaped by a number of factors (cf. Behr et al., 2020b; Quinn, 2013; Vossensteyn et al., 2015). The factors suggested here are those which can be measured quantitatively from our dataset. Although some of these explanatory factors have been investigated in previous studies, this is, to the best of our knowledge, the first time that they included indicators of students' habitus and cultural capital, and that they were examined within one analysis of higher education dropout risk.

Prior research on different factors related to dropout risk

Social background factors

Social background factors refer to students' economic (e.g. financial situation), social (e.g. social networks) and cultural capital (e.g. cultural habits and tendencies, parental education) (Bourdieu, 1997). Depending on these different types of capital, students form their behaviour and expectations in relation to educational opportunities and provision. Drawing on data of a representative sample of university students in Italy, Cingano and Cipollone (2007) found that parental educational background significantly affected students' withdrawal decisions, that is, the dropout probability was negatively associated with fathers' years of formal education. Corroborating evidence was found by Aina (2013), who showed that dropout rates from university in Italy were higher for children of parents with low levels of education. Apart from parental education, another important characteristic of students' social background refers to their financial situation. Investigating dropout from university in England, Bennett (2003) emphasised that the most powerful influence on students' dropout was "the extent to which they reported having severe financial problems" (p. 134). Although poor academic performance also affected dropout behaviour, "its impact was less substantial than that of financial hardship" (p. 134). Along these lines, Glocker (2011) found that higher financial support for students in Germany was associated with lower dropout rates.

Academic-related factors

Different studies have demonstrated that type of secondary school, as well as pre-study and in-study educational performance, impact on student dropout and retention. In a study of university students in the UK, Johnes (1990) showed that better secondary school performance, attending an academically oriented secondary school, as well as higher

results on early university examinations, were negatively associated with early withdrawal from university. Investigating the role of pre-study education, Müller and Schneider (2013) found that dropout rates in German higher education depended on students' pre-tertiary educational pathways, that is, students who took the direct track to higher education via the Gymnasium had lower dropout rates than students who completed vocational qualifications. Drawing on data from the National Educational Panel Study in Germany, Behr et al. (2020a) corroborated the association of a lower educational pathway and a poorer school performance with students' higher dropout risk. However, these findings are at odds with the analysis of Belloc et al. (2010) for Italy, who found that, contrary to what might be expected, students who attended general high schools and those with better secondary school performance were more likely to drop out from university. This was interpreted as a signal of "consumer oriented" behaviour of high-performing students, who "easily withdraw from the university once they have realized that they do not enjoy the subject" (p. 135).

Institution-related factors

Institution-related factors refer to the ways in which the values and practices of higher education institutions impact on student dropout and retention. Variations in the risk of non-completion may be related to characteristics such as assessment and teaching approaches, course guidelines or fields of study (Korhonen & Rautopuro, 2019). In the process, institutional characteristics affect students' study satisfaction and their commitment to finish their studies (Bennett, 2003). Korhonen and Rautopuro (2019) revealed that the risk of non-completion in Finland is the highest for mathematics and sciences students, as well as for those in the economics and business fields. The latter result is in line with the findings of Beloc et al. (2010) for Italy, who demonstrated that university students of economics were more likely to dropout than students in other fields of study. Behr et al. (2020a) showed that factors that impact dropout risk in Germany included type of higher education institution and field of study. While the risk of dropping out was higher for students of general universities than for students of universities of applied sciences, it was highest in the fields of mathematics, natural sciences and engineering, which is also in line with previous studies (Korhonen and Rautopuro, 2019; Ulriksen et al., 2010).

Besides objective measures such as field of study, institution-related factors of student dropout also include subjective variables that may refer to students' study satisfaction or the institution's outside reputation. Along these lines, Bennett (2003) reported a strong relation "between motivation and students' beliefs that their degree courses enjoyed a high reputation in the outside world" (p. 138). Further, the same study supported the importance of teaching quality for students' satisfaction with their study course, as well as for commitment and staying at university. The importance of study satisfaction for dropout risk was confirmed by Suhre et al. (2007) for students in the Netherlands. The results of the study showed that degree program satisfaction had a direct positive effect on academic accomplishment and a negative effect on dropout.

Research questions

The aim of this study was to examine the association of social background, academic-related and institution-related factors (predictor variables) with different indicators of higher education dropout risk (outcome variables). With regard to this aim the following research questions were formulated:

1. What is the relationship between social background, academic-related and institution-related factors on the one hand and students' perceived probability of graduating on the other?

2. What is the relationship between social background, academic-related and institution-related factors on the one hand and students' consideration of leaving their studies on the other?

Method

Sample and procedure

The data used in the present study were collected during the 2016/17 academic year as part of a research project "Study choice, educational achievement and family background: Horizontal differences in the higher education system" that was conducted by the Institute for Social Research in Zagreb. The dataset used in this study contained the data obtained from 1,533 students in the second and third years of their program from 13 faculties and 25 study programs of the University of Zagreb (faculties and study programs are listed in Appendix 1). The faculties were sampled intentionally with the purpose of recruiting students from different fields of study (e.g. Cohen, Manion & Morrison, 2018). The data were obtained via a paper-and-pencil questionnaire (e.g. Cohen, Manion & Morrison, 2018), which students completed during their classes.

Measures

Higher education dropout risk
We used two measures of dropout risk that served as the two outcome variables in our study. Students' perceived probability of graduating was measured on a four-point scale (from *I will certainly not finish these studies* to *I will definitely finish these studies*), however, since only 2.2% of students chose one of the two negative answers, we dichotomised this variable (i.e. 0 = *Some degree of uncertainty in finishing studies*, 1 = *I will definitely finish these studies*). Students' consideration of leaving their studies was operationalised as a dichotomous variable (*Have you ever seriously considered leaving your current studies? Yes – No*).

Social background
The questionnaire contained multiple-choice items about students' mother and father employment status. Answers were recoded in two categories (*Permanently employed – Not permanently employed*) because students rarely marked other specific categories (namely,

Employed occasionally [e.g. seasonally] or on a part-time basis, Retired, Homemaker, Something else) and the effects of those categories on the outcome variables did not differ statistically significantly (not reported here). Furthermore, students were asked to specify the main source of funding for their studies (including living expenses). The answers to this multiple-choice item were recoded in two categories: *Their own work* and *Not their own work* (*Parents, Other family members, Scholarship, Something else*). Students were also asked if they were paying the tuition fee (*No - Yes*). Students' answers to multiple-choice items about their mother's and father's education levels were recoded to one variable with two categories: *Parents do not have a higher education degree* and *At least one parent has a higher education degree*. We also asked them to specify their place of residence (village, small city [10,000 to 35,000 inhabitants], large city [more than 35,000 inhabitants], Zagreb [about 800,000 inhabitants]).

Students' social background characteristics also included measures of their cultural activities and reading behaviour as two indicators of cultural capital. Cultural activities of students in the last year were assessed by three items (*In the last year, how often did you attend: Theatre plays; Ballet, opera or classical music concerts; Museums or art galleries?* Scale: *Never, Approximately 1 or 2 times, Approximately 3 or 4 times, Approximately 5 or 6 times, 7 times or more*; Cronbach's alpha = .69). Students' reading behaviour was measured with five items (*How often do you read the texts below, unrelated to studies' obligations [including electronic editions]?* E.g. *Articles about politics or culture in daily or weekly newspapers, Prose and poetry [novels, short stories, stories, etc.]*; Scale: *Never or almost never, Several times a year, Approximately once a month, Several times a month, Several times a week or every day*; Cronbach's alpha = .68). Furthermore, we operationalised students' habitus by asking them to specify when they started thinking about enrolling in higher education (multiple-choice item; *From elementary school, From upper secondary school, I have always thought about enrolling in higher education*). The same or very similar indicators of social background were used as predictors of students' educational outcomes in previous studies (e.g. Faulk, Srinivasan & Bingham, 2012; Polasek & Kolcic, 2006; Prka, Pulanić & Glavaš, 2001; Puzić, Gregurović & Odak, 2021; Puzić, Šabić & Odak, 2021; Radford, 2013; Šabić & Jokić, 2021).

Academic-related variables
In addition, we tested the effects of type of upper secondary school that the student attended prior to enrolling in the university studies (gymnasium [i.e. schools that focus on general secondary education and prepare graduates for the transition into higher education] vs. other [e.g. vocational and art schools]), student's upper secondary school grade-point average (GPA; expressed on a scale of five points which is officially used in the Croatian educational system: 1 = insufficient, 2 = sufficient, 3 = good, 4 = very good, 5 = excellent) and enrolled year of studies (*Second - Third*). Students were also asked if the enrolled study program was their first choice (*No - Yes*), if they studied something else before (*No - Yes*), and what their achievement in studies had been so far (from 2 = sufficient to 5 = excellent). The variables were selected based on previous studies that used those variables to predict students' higher education outcomes (e.g. Carnoy et al., 2012; Korhonen et al., 2017; Lörz, Schindler & Walter, 2011; Müller & Schneider, 2013; Von Hippel & Hofflinger, 2021).

Institution-related variables

Study programs were classified in six study fields (technical, biotechnical, health care, science and mathematics, social sciences and humanities). Students' satisfaction with their study program was measured using 11 items (*Please indicate how satisfied you are with the above elements of the studies you are attending?* e.g. *Availability of literature, Course contents, Professors' support in performing student duties*; four-point scale from *Completely dissatisfied* to *Completely satisfied*; alpha=.80). Perceived reputation of the faculty was measured with one item (*The faculty I am studying at has a high reputation in society*; five-point scale from *I do not agree at all* to *I completely agree*). Students in Croatia have to specify their study program enrolment choices in the National IT system of applications to higher education institutions. Desirability of study programs was measured with two indicators taken from that system: the number of students in the generation who marked the particular study program as their first enrolment choice and ratio of first enrolment choices and study program's enrolment quota (Agency for Science and Higher Education, 2017). In previous studies, fields of academic disciplines (Zając & Komendant-Brodowska, 2019), students' satisfaction with their studies (Duque, 2014), as well as the reputation of the higher education institutions (Bennett, 2003), were all used to predict dropout behaviour.

Finally, the effect of gender was controlled, because women far outnumber men in completing higher education in both Croatia (Croatian Bureau of Statistics, 2021) and the European Union (Jurviste, Prpić & Claros, 2015). Descriptive statistics of all variables are presented in Table 1.

Statistical analyses

We employed multilevel binary logistic modelling in order to take into account the hierarchical nature of the sample and the fact that students were nested within different faculties and/or study programs. Students' perceived probability of graduating and their consideration of leaving their studies served as the outcome variables. The analyses were performed using the mixed model procedure in IBM *SPSS 22*. We used robust estimation for the tests of fixed effects to account for possible violations of model assumptions (e.g. Heck, Thomas & Tabata 2012). The intra-class correlation coefficient values (ICC) for students' perceived probability of graduating and consideration of leaving the studies were .061 and .045, respectively. The belonging design effects were larger than 2 (4.7 and 3.7, respectively), which confirmed that multilevel analyses, rather than single-level analyses, should be conducted (Huang 2018).

The majority of students (n=1,449; 94.5%) provided responses to all variables, which produced an almost complete dataset (99.7% of all cells were completed). The missing rates for individual variables were low ($\leq$ 2.7%) and, because a missing rate of 5% or less is usually considered inconsequential for data analysis (Dong & Peng 2013; Schafer 1999), we decided to run a complete-case analysis. All variables had the variance inflation factors (VIF) smaller than two, meaning that there were no signs of multicollinearity.

Results

Descriptive statistics

About two thirds of the students in our sample were females (Table 1). Related to social background variables, the majority of students had parents who were both employed at the time of research. Most of the students did not depend on their own work, that is, they had other sources of funding for their studies. Less than one fifth of students had to pay tuition fees. About a half of the students had at least one parent who held a higher education diploma. On average, students participated in the listed cultural activities one or two times in the previous year and they engaged in the listed reading activities less than once a month. More than a half of students reported that they had always thought about enrolling in higher education. Most of the students lived in Zagreb before they entered university.

Table 1: Descriptive statistics of predictor (social background, academic-related variables, institution-related variables) and outcome variables (higher education dropout risk)

	M, %	SD	Range
Control variable			
Gender (%)			
Males	34.8%		
Females	65.2%		
Social background			
Mother's employment (%)			
Not permanently employed	26.2%		
Permanently employed	73.8%		
Father's employment (%)			
Not permanently employed	28.4%		
Permanently employed	71.6%		
Source of funding for the studies (%)			
Their own work	8.0%		
Not their own work	92.0%		
Paying tuition fee (%)			
No	81.4%		
Yes	18.6%		
Parents' education (%)			
Parents do not have HE degree	52.5%		
At least one parent has HE degree	47.5%		
Cultural activities in the last year	2.1	0.85	1-5
Reading behaviour	2.6	0.86	1-5
Thinking about HE (%)			
From elementary school	23.2%		
From upper secondary school	21.7%		
I have always thought about enrolling in HE	55.1%		
Student's place of residence (%)			
Village	21.7%		
Small city (10,000 – 35,000)	22.7%		

Large city (>35,000)	14.8%		
Zagreb	40.8%		
Academic-related variables			
Upper secondary school (%)			
Not gymnasium	15.4%		
Gymnasium	84.6%		
Upper secondary school GPA	4.4	0.41	2.8-5.0
Enrolled year of studies (%)			
Second year	66.3%		
Third year	33.7%		
Enrolled studies were student's first choice (%)			
No	29.8%		
Yes	70.2%		
Student has studied something else before (%)			
No	87.7%		
Yes	12.3%		
Student's achievement in studies	3.7	0.68	2-5
Institution-related variables			
Study field (2nd level) (%)			
Technical studies	17.9%		
Health	17.2%		
Science and mathematics	7.0%		
Biotechnical studies	11.7%		
Social studies	34.1%		
Humanities	12.1%		
Students' satisfaction with their study program	2.8	0.43	1-4
Perceived reputation of the faculty	3.4	1.25	1-5
Number of 1st choices (2nd level)	248.0	193.34	18-610
Number of 1st choices / enrolment quota (2nd level)	1.4	0.60	0.3-2.9
Outcome variables			
Perceived probability of graduating			
Some degree of uncertainty in finishing studies	30.8%		
I will definitely finish these studies	69.2%		
Consideration of leaving the studies			
No	76.4%		
Yes	23.6%		

Academic-related variables resulted in the majority of students attending gymnasium secondary schools prior to transitioning to university and having an average GPA of 4.0 (i.e. very good). About two thirds of the students were enrolled in the second year of their studies. The majority of students indicated that their current course enrolment was their first choice and they had not studied anything else before. On average, their achievement in studies corresponded to grade 4 (i.e. very good).

Regarding institution-related variables, the largest proportion of students studied in the field of social studies. On average, students were mostly satisfied with their studies and they neither agreed nor disagreed that their faculty had a high reputation in society. Average number of first enrolment choices per study program was 248, and average ratio of first choices and study program's enrolment quotas was 1.4.

Regarding the outcome variables, more than two thirds of students perceived that they will definitely finish their studies. About one quarter of students at some point seriously considered leaving the studies.

Bivariate associations of predictor and outcome variables are presented in Appendix 2. The effects of these associations were small or not statistically significant.

Multilevel models of higher education dropout risk with social background, academic-related and institution-related variables as predictor variables

The results of multilevel models of higher education dropout risk are presented in Table 2. Regression parameters of social background variables indicated that students were more confident in graduating if they did not have to pay tuition fees, if they attended more cultural activities in the last year and if they had always thought about enrolling in higher education. Similarly, academic-related variables (attending gymnasium, higher upper-secondary school GPA, previous attending of higher education and higher achievement in current studies) positively predicted students' perceived probability of graduating. When it comes to institution-related variables, students from the science-and-mathematics field and biotechnical field were more confident in graduating than their counterparts from the humanities field. In addition, students who were more satisfied with their study program were also more confident about graduating.

On the other hand, students were more likely to consider leaving their studies if they had to work in order to finance their studies and if they were paying tuition fees, indicating that social background was relevant for this criterion variable as well. Related to academic-related variables, students were more likely to consider leaving their studies if they were not studying their first enrolment choice, if they have not studied anything else before and if they had lower achievement in their current studies. Regarding institution-related variables, students from the technical and bio-technical field were less likely to consider leaving their studies than students from the humanities field. Students who were less satisfied with their study program were also keener to consider leaving their studies.

In comparison with bivariate analyses (Appendix 2), multilevel models did not show statistically significant effects of gender, enrolled year of studies and ratio of first choices and enrolment quota on students' perceived probability of graduating. Also statistically insignificant were the effects of upper secondary GPA, perceived reputation of the faculty, number of first enrolment choices and ratio of first choices and enrolment quota on consideration of leaving the studies. Additionally, the effects of students' previous experience of attending higher education were statistically significant in both multilevel models, but not in bivariate analyses, which is probably due to suppressor effects. Bivariate and multilevel analyses resulted in different findings related to effects of study fields, probably because these effects were negligible and nonrobust, as indicated by pseudo R^2 values (i.e. Nagelkerke R^2; Appendix 2).

Table 2: Multilevel binary regression models of higher education dropout risk

	Perceived probability of graduating (I will definitely finish studies)	Consideration of leaving studies (Yes)
Intercept	-6.01**	8.28**
Control variable		
Gender (females)	0.01	0.00
Social background		
Mother's employment (permanently employed)	0.00	0.10
Father's employment (permanently employed)	-0.11	0.18
Source of funding for the studies (not their own work)	0.20	-0.80**
Paying tuition fee (yes)	-0.61**	0.83**
Parents' education (at least one parent has HE degree)	-0.17	0.16
Cultural activities in the last year	0.20*	-0.02
Reading behaviour	0.03	-0.01
Thinking about HE (Ref: I have always thought about enrolling in HE)		
From elementary school	-0.61**	0.15
From upper secondary school	-0.48**	0.06
Student's place of residence (Ref: Zagreb)		
Village	-0.24	0.25
Small city (10,000 – 35,000)	-0.14	0.13
Large city (>35,000)	0.21	-0.13
Academic-related variables		
Upper secondary school (gymnasium)	0.33*	0.12
Upper secondary school GPA	0.37**	-0.02
Enrolled year of studies (third year)	0.26	-0.08
Enrolled studies were student's first choice (yes)	0.08	-0.48**
Student has studied something else before (yes)	0.44*	-0.83**
Student's achievement in studies	0.44**	-0.25*
Institution-related variables		
Study field (2nd level) (Ref: Humanities)		
Technical studies	0.30	-1.36**
Health	0.53	-0.69
Science and mathematics	0.76**	-0.42
Biotechnical studies	0.94**	-0.71**
Social studies	0.45	-0.60
Students' satisfaction with their study program	0.52**	-1.45**
Perceived reputation of the faculty	-0.03	-0.16
Number of 1st choices (2nd level)	-0.01	-0.00
Number of 1st choices / enrolment quota (2nd level)	0.13	0.20
Random effect - intercept	0.09	0.28
-2LL	6 832.6	7 192.9
AIC	6 834.6	7 194.9
BIC	6 839.9	7 200.1
Accuracy	71.3%	78.7%

Discussion

As mentioned in the introductory part of our study, there is a lack of research that addresses dropout behaviour in higher education in Croatia. At the same time, international studies have identified several factors associated with dropout prediction. Therefore, the aim of this study was to cross-check potential covariates of dropout risk in the context of Croatian higher education. We used bivariate analysis as well as multilevel binary logistic models to predict the higher education dropout risk using social background, academic-related and institution-related factors. Dropout risk was measured by students' perceived probability of graduating and their consideration of leaving their studies.

The first step in our analysis was to provide an overview of a wide range of possible covariates of perceived dropout risk. The results of bivariate analysis indicated that, apart from students' social background characteristics, dropout risk can be shaped by a variety of academic-related and institution-related factors that construct dropping out of higher education as a real possibility for students. This finding is in line with results from international research that detected similar factors associated with withdrawal from higher education (e.g. Behr et al., 2020a). Since bivariate effects can change substantially when related variables are analysed simultaneously, in a second step, we estimated the effects of our variables in a multilevel model using logistic regression. The results of the two multilevel models confirmed the assumption that dropout from higher education may be associated with different factors (i.e. social background, academic and institution-related characteristics), but also that there may be differences regarding the two indicators of perceived dropout risk. In both models we controlled for student's achievement in studies. Therefore, the estimated effects can be interpreted as self-selection processes.

Regarding students' social background characteristics, which include their financial situation, the only variable that had an effect on both analysed measures of dropout risk was the paying of tuition fees. It lowered students' perceived probability of graduating and increased their consideration of leaving their studies. Other identified social background effects were associated with only one of the examined indicators of dropout risk: the need to work during studies with an increased consideration of leaving the studies; the attendance of cultural activities and an early determination of enrolling in higher education indicated a stronger perceived probability of graduating. It follows that withdrawal concerns are closely related to students' financial situation, a finding that echoes Quinn's (2013) assertion about socio-economic constraint as the primary factor leading a student to drop out. In contrast, it seems that students' perceived probability of graduating may be understood more in relation to their cultural capital and family habitus - a particular way of reasoning and acting that family members share (Reay, 1998). As such, students' perceived probability of graduating may reflect a system of classed dispositions internalised in a family environment shaped by cultural participation and familiarity with higher education. This finding extends previous studies on the effects of social background on dropout risk as it gives plausibility to interpreting students' perception of dropout risk in the broader context of socio-cultural reproduction processes (Bourdieu & Passeron, 1990).

Moreover, the analysis revealed a consistent association of both measures of perceived dropout risk with academic-related variables. While higher secondary school achievement, type of secondary school, previous attending of higher education and higher achievement in studies positively predicted students' perceived probability of graduating, not studying the first enrolment choice, not studying anything else before, and lower achievement in studies all strongly predicted students' considerations of leaving their studies. Other than the effects of student's achievement in studies on both measures of perceived dropout risk, these findings may be partly explained in terms of inconsistency between secondary vocational and tertiary education (in relation to perceived probability of graduating), and negative selection processes and lack of information regarding higher education (in relation to considerations of leaving the studies). These results are in line with previous studies which pointed out the relevance of pre-tertiary education and school success (e.g. Behr et al., 2020a; Johnes, 1990; Müller and Schneider, 2013), as well as student's achievement in studies and choice of study for risk of withdrawal (e.g. Christie et al, 2004; Johnes, 1990).

As for institution-related variables, the results indicated the significance of field of study and satisfaction with study program for students' perceptions of dropout risk. The analysis indicated that perceived dropout risk may be lower for students in different STEM fields compared to students in the humanities, meaning that students in science-and-mathematics and biotechnical studies perceived higher probability of graduating, while students in technical studies as well as biotechnical studies were less likely to consider leaving their studies. A possible explanation for this may be that students in the study-intensive STEM fields are more engaged in their studies than their counterparts in the humanities, which results in higher perceived probability of graduating and less consideration of leaving the studies. However, these findings deviate from previous studies which reported highest dropout rates to be in the STEM fields, e.g. engineering, mathematics or sciences (Behr et al., 2020a; Korhonen & Rautopuro, 2019).

In addition to individual level variables, institution-related dropout risk was also estimated at the institutional level - in line with students' preferences in the National IT system of applications to higher education institutions. It is worth noting that none of these second-level institution-related variables (namely, first enrolment choice of study program and ratio of first enrolment choices and study program's enrolment quota), had significant effects on the two measures of perceived dropout risk. Such results indicate that, when students begin with their studies, the ex-ante desirability of the study programs they attend may not be significant for their perceptions of dropout risk. This finding deviates from the assumption that it is also students' assessment of the reputation of the study program that may influence the decision to withdraw from higher education (Bennett, 2003). Rather than reputation and desirability, according to our analysis, it is a student's satisfaction with the study program that could affect the decision to drop out. The analysis revealed that a higher level of study program satisfaction was associated with higher perceived probability of graduating and fewer considerations of leaving the studies. These findings are in line with findings reported by Suhre et al. (2007), according to which decreased study program satisfaction is related to higher risk of withdrawal.

An important limitation of the present study is that students in first year were not included in the research. Dropping out mostly occurs at the beginning of tertiary education (Matković & Kogan, 2014). Hence, including first-year students would probably have resulted in a larger percentage of students expressing the risk of dropping out. Accordingly, the reported effect sizes would probably have been larger. In addition, future research would benefit from using objective measures of dropout instead of self-reported measures of dropout risk. Furthermore, it would be preferable to use longitudinal data, as this would allow researchers to distinguish between students' long-term and short-term dropout behaviour.

Conclusion

In summary, the results from our analysis indicate that factors associated with dropout risk in international research are also at work in Croatian higher education. Moreover, the analysis revealed that perceived dropout risk may be viewed as part of a complex process of self-selection in which it is often a combination of different factors, individual, institutional and socio-cultural, that leads a student to withdraw from higher education. This conclusion is supported by the fact that the regressors in our model affect the two measures of perceived dropout risk independent of students' academic ability (cf. Dupriez et al., 2012). Qualitative research has shown that students' self-selection processes can take the form of a self-fulfilling narrative that creates an expectation that many lower-class students will not succeed in higher education (Quinn, 2004). According to our analysis, this expectation may be related to students' socio-cultural dispositions (manifested through their habitus and cultural capital), financial constraints, different educational pathways, academic performance and preferences (field of study) and satisfaction with the study program. Such a finding supports Nash's assertion that students' self-selection processes should not be limited to simplified rational models, but should be replaced by those "with a greater level of complexity" (Nash, 2003: 449).

The main implications of our findings are twofold. Firstly, the identification of different covariates associated with dropout risk may allow for the adoption of specific prevention programs that, according to our findings, can include improved financial aid for students, field-specific bridging courses, extended information on study fields, and regular surveys on student satisfaction (cf. Behr et al., 2020a). Secondly, policy measures should take into account that students act as a result of their combined experiences at home, at school and at higher education institutions (Nash, 2003). This means that the impact of the covariates of dropout risk should not be viewed only relative to each other (cf. Bennett, 2003), but should be evaluated in the wider context of educational decision-making net of academic ability.

One important aspect of such a position is that different factors can work to the disadvantage of some students in the sense that their educational achievement may not depend primarily on their talent and individual effort (Bourdieu & Passeron, 1990). As our analysis has shown, different factors affect dropout risk when academic achievement is held constant. Accordingly, an integrated approach to preventing dropout behaviour

would include not just the adoption of specific prevention programs, but would address the responsibility of educational institutions for not being genuinely meritocratic (Doolan, Puzić & Baranović, 2018).

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Appendix 1: Faculties and study programs attended by students in the sample

Faculty	Program
Architecture	Architecture and urbanism [n=87]
Law	Law [n=143]
Science	Biology [n=33]
	Biology and chemistry education [n=24]
	Mathematics education [n=51]
Transport and Traffic Sciences	Aeronautics [n=15]
	Intelligent transportation systems and logistics [n=14]
	Transport [n=58]
Mechanical Engineering and Naval Architecture	Mechanical engineering [n=100]
School of Medicine	Medicine [n=118]
School of Dental Medicine	Dental medicine [n=146]
Agriculture	Agroecology [n=42]
	Organic agriculture [n=17]
	Plant sciences [n=19]
Forestry and Wood Technology	Forestry [n=32]
	Urban forestry, nature conservation and environmental protection [n=47]
	Wood technology [n=22]
Political Science	Political science [n=91]
	Journalism [30]
Teacher Education	Teacher education [n=109]
Humanities and Social Sciences	English language [n=69]
	Ethnology and cultural anthropology [n=21]
	Psychology [n=62]
	Sociology [n=87]
Croatian Studies	Faculty of Croatian Studies [n=96]

Appendix 2: Bivariate associations of predictor (social background, academic-related variables, institution-related variables) and outcome variables (higher education dropout risk)

Variable		Perceived probability of graduating (I will definitely finish studies)	Consideration of leaving studies (Yes)
Control variable	Gender	.09**	.01
	Males (0)		
	Females (1)		
Social background	Mother's employment	-.00	.00
	Not permanently employed (0)		
	Permanently employed (1)		
	Father's employment	-.00	.00
	Not permanently employed (0)		
	Permanently employed (1)		
	Source of funding for the studies	.03	-.11**
	Their own work (0)		
	Not their own work (1)		
	Paying tuition fee	-.17**	.15**
	No (0)		
	Yes (1)		
	Parents' education	.03	-.01
	Parents do not have HE degree (0)		
	At least one parent has HE degree (1)		
	Cultural activities in the last year	.11**	-.02
	Reading behaviour	.04	-.01
	Thinking about HE	Nagelkerke R^2=.02**	Nagelkerke R^2=.00
	From elementary school	B=-.38**	
	From upper secondary school	B=-.68**	
	I have always thought about enrolling in HE (Ref.)		
	Student's place of residence	Nagelkerke R^2=.01	Nagelkerke R^2=.00
	Village		
	Small city (10,000 – 35,000)		
	Large city (>35,000)		
	Zagreb (Ref.)		
Academic-related variables	Upper secondary school	.09**	-.01
	Not gymnasium (0)		
	Gymnasium (1)		
	Upper secondary school GPA	.13**	-.09**
	Enrolled year of studies	.07**	.01
	Second year (0)		
	Third year (1)		

	Enrolled studies were student's first choice	.03	-.12**
	No (0)		
	Yes (1)		
	Student has studied something else before	.03	-.05
	No (0)		
	Yes (1)		
	Student's achievement in studies	.22**	-.09**
Institution-related variables	Study field (2nd level)	Nagelkerke R²=.03**	Nagelkerke R²=-.03**
	Technical studies	B=-.28	B=-.82**
	Health	B=.74**	B=-.76**
	Science and mathematics	B=.34	B=-.39
	Biotechnical studies	B=.22	B=.08
	Social studies	B=.38*	B=-.43*
	Humanities (Ref.)		
	Students' satisfaction with their study program	.09**	-.24**
	Perceived reputation of the faculty	.01	-.13**
	Number of 1st choices (2nd level)	-.03	-.12**
	Number of 1st choices / enrolment quota (2nd level)	.14**	-.11**

Note: Associations between predictor and outcome variables were tested using Spearman's *rho* or binary logistic regression. B - logistic regression coefficients (in log-odds units). Ref. - reference category.

Dr Josip Šabić is a research associate at the Institute for Social Research in Zagreb, Centre for Educational Research and Development, Croatia. He received a PhD in psychology at the University of Zagreb. He studies educational inequalities and transitions as well as the determinants of students' academic aspirations and achievement.
Email: josip@idi.hr

Dr Saša Puzić works as a senior research associate at the Institute for Social Research in Zagreb, Centre for Educational Research and Development, Croatia. He obtained his PhD in sociology at the University of Zagreb. He studies how socio-cultural and institutional factors play a role in the mechanisms of reproduction of existing educational inequalities.
Email: puzic@idi.hr