PREDICTORS OF EARLY ACADEMIC PERFORMANCE AMONG ROMANIAN FIRST-YEAR STUDENTS: THE ROLE OF SOCIO-DEMOGRAPHIC, EDUCATIONAL, AND CONTEXTUAL FACTORS

ROXANA ELENA STOICA*
Faculty of Psychology and Educational Sciences, Transilvania University of Brașov;
School of Advanced Studies of the Romanian Academy, Constantin Rădulescu-Motru Institute of Philosophy and Psychology, The Doctoral School of Philosophy and Psychology

Abstract

This study examined socio-demographic, educational, and contextual predictors of first-semester grades and failed exams among 1,151 first-year students at Romanian universities. Participants completed a factual questionnaire. Grades were analyzed using hierarchical linear regression and failed exams using negative binomial regression. The hierarchical model explained 22.4% of grade variance; adding high school track, field of study, and housing increased explained variance. Baccalaureate grade showed the strongest association with both outcomes. After adjustment, technological-track graduates had lower grades and more failed exams than theoretical–science-track graduates. State-funded enrollment and extracurricular participation were associated with better outcomes on both measures. Associations of gender and parental education with grades diminished in the extended model, whereas female gender remained associated with fewer failed exams. Although the outcomes shared predictors, medicine students had relatively high raw grades but elevated adjusted failed-exam counts. Findings support monitoring both indicators without treating these associations as validated individual risk predictions..

Keywords: academic performance; first-year students; high school track; failed exams; first-generation students

INTRODUCTION

In Romania, student success is concentrated at the beginning of higher education: 62% of students who enter a bachelor's programme complete it on time (above the OECD average of 43%), yet 21% leave after the first year (versus 13% across the OECD), and the share of 25-34-year-olds with tertiary education fell from 26% in 2019 to 23% in 2024 (OECD, 2025). First-year performance is

* Faculty of Psychology and Educational Sciences, Transilvania University of Brașov;
School of Advanced Studies of the Romanian Academy, Constantin Rădulescu-Motru Institute of Philosophy and Psychology, The Doctoral School of Philosophy and Psychology, Bucharest, E-mail: roxana.stoica@unitbv.ro

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prognostic: retention depends primarily on first-year grades (Mills *et al*., 2009), and 71% of students who perform poorly early subsequently fail at least one course (Winston *et al*., 2014).

Recent research on Romanian first-year students has focused on dropout intention and its motivational correlates (Cazan *et al*., 2024). That prior academic performance predicts subsequent performance is among the best-documented findings in this literature; less is known about whether high school track adds explanatory value once the baccalaureate grade is accounted for, how far the predictors of grades and of failed exams coincide once socio-demographic, educational, and contextual characteristics are examined simultaneously, and whether the associations of gender and parental education with performance change after this adjustment. The present study addresses these questions using two complementary criteria, first-semester grade point average and number of failed exams.

THEORETICAL BACKGROUND

Academic performance at university entry is explained by two complementary perspectives. The first emphasizes integration and involvement, whereby persistence follows from academic and social integration (Tinto, 1993, as cited in Chrysikos *et al*., 2017; Astin, 1993, as cited in Pike *et al*., 2008), though these constructs explain grades poorly (d = 0.06; Schneider & Preckel, 2017) and institutional integration has even been negatively associated with first-semester grades (McKenzie & Schweitzer, 2001). The second perspective explains performance through the transmission of social inequality: family cultural capital converts into educational outcomes through assessment and sorting within the educational system (Bourdieu & Passeron, 1977, as cited in Wilbur & Roscigno, 2016), and tracking may exacerbate this inequality (Lucas, 1999, as cited in Giersch, 2018; Machin & Vignoles, 2004). This justifies examining parental education, high school track, and field of study together, although the observational design does not allow causal effects to be identified.

PRIOR PREPARATION AND HIGH SCHOOL TRACK

Prior academic performance is among the strongest correlates of university achievement: high school GPA (d = 0.90) and admission test scores (d = 0.79) outperform socioeconomic status (d = 0.25; Schneider & Preckel, 2017), and entrance scores explained 39% of first-semester grade variance (McKenzie & Schweitzer, 2001; Mills *et al*., 2009) - though continuity is imperfect, with many students' grades declining relative to high school (Wintre *et al*., 2011). Track may capture preparation beyond test scores: students from higher academic tracks achieve better outcomes even at equal standardized scores (Giersch, 2018), and a recent quasi-experimental study similarly found gains among students assigned to higher tracks (Bach *et al*., 2024), though international classifications do not map

directly onto Romanian tracks (30% of upper secondary students enrolled in vocational programmes, versus 23% across the OECD; OECD, 2025).

PARENTAL EDUCATION, GENDER, AND AGE

First-generation students earn fewer credits, work more hours, and obtain lower grades even controlling for high school grades (Pascarella *et al*., 2004), though their disadvantage operates largely through prior achievement (Wilbur & Roscigno, 2016; López *et al*., 2023) and post-admission GPA differences are modest (Douglass & Thomson, 2012; Wintre *et al*., 2011). Female students obtain slightly higher grades on average ($d = 0.21$; Voyer & Voyer, 2014, as cited in Schneider & Preckel, 2017), partly reflecting their unequal distribution across tracks and fields (Douglass & Thomson, 2012); the relationship with age is ambivalent and weak ($r = .08$; Richardson *et al*., 2012; McKenzie & Schweitzer, 2001).

UNIVERSITY CONTEXT AND PERFORMANCE CRITERIA

Working more than 16–20 hours per week is negatively associated with grades (Pike *et al*., 2008; Body *et al*., 2014), and financial aid is positively associated with GPA (Stater, 2009), though funding status in Romania's selective public system may also reflect academic selection (OECD, 2025). Grades also differ across institutions and fields (Richardson *et al*., 2012; Douglass & Thomson, 2012). Because predictors do not necessarily behave identically across criteria – working reduced credits earned without affecting grades (Thies, 2023) – grade point average and failed exams were analyzed separately.

THE PRESENT STUDY

The present study examines the contribution of socio-demographic, educational, and contextual characteristics to individual differences in first-year academic performance, assessed through two complementary outcomes: first-semester grade point average and number of failed exams. The data come from a broader research project; psychological and motivational measures also collected there were excluded by design, to assess the explanatory relevance of the remaining characteristics when examined simultaneously. The analyses investigate both the relative and incremental contributions of different predictor groups and how far their associations differ across outcomes. Given the observational design, "predictor" refers throughout to an adjusted statistical association, not a causal claim.

H1. The baccalaureate grade will make the largest unique contribution to first-semester grades among individual predictors, consistent with the established role of prior achievement (McKenzie & Schweitzer, 2001; Richardson *et al*., 2012; Schneider & Preckel, 2017).

H2. The educational-trajectory block will explain significant additional variance in grades beyond socio-demographic characteristics (Richardson *et al*., 2012; Schneider & Preckel, 2017).

H3. After controlling for the baccalaureate grade, technological-track graduates will have lower grades and more failed exams than theoretical–science-track graduates (Giersch, 2018); other track contrasts are exploratory.

H4a. Female gender and parental higher education will be associated with higher grades and fewer failed exams (Mills *et al*., 2009; Pascarella *et al*., 2004).

H4b. These coefficients will decrease after adjustment for high school track, field of study, and housing situation (Douglass & Thomson, 2012; Giersch, 2018; Wilbur & Roscigno, 2016).

H5. Extracurricular participation will be associated with higher grades and fewer failed exams after controlling for prior preparation (Astin, 1993, as cited in Pike *et al*., 2008).

Two exploratory questions were also formulated: **Q1.** Are employment during studies, funding status, and age associated with performance after controlling for prior preparation? **Q2.** To what extent do the predictors of grades coincide with those of failed exams?

METHOD

PARTICIPANTS AND PROCEDURE

The study used a cross-sectional, observational design. The sample comprised 1151 first-year students from several Romanian universities (60.5% at Transilvania University of Brașov; 67.5% women), mean age 20.38 years (*SD* = 3.62). Participants were recruited via email, social media, and internal communication platforms, took part voluntarily on the basis of informed consent, and were surveyed anonymously. The study followed the Declaration of Helsinki and was approved by the Ethical council of the Romanian Academy.

MEASURES

Data were collected through a factual questionnaire; first-semester grade point average and number of failed exams were self-reported. Socio-demographic predictors were gender, age, having at least one parent with higher education (first-generation students being those whose parents had none), and vulnerable status – coded “yes” for students orphaned of one or both parents, from a residential care centre, with a parent working abroad, or with a disability or chronic illness. The educational trajectory included the baccalaureate grade, admission to the first-choice programme, a previously uncompleted degree, number of admission applications, and high school track; the university

admission grade was excluded for its high correlation with the baccalaureate grade (r = .79) and limited cross-institution comparability. University context included funding status (state-funded vs. tuition-paying), employment, extracurricular participation (dichotomous), university, field of study, and housing.

DATA ANALYSIS

Semester grade point average was analyzed using a three-step hierarchical linear regression (socio-demographic characteristics, educational trajectory, university context), with the educational-trajectory block restricted to continuous and binary indicators of prior achievement and admission history. High school track, though conceptually part of this trajectory, is a multi-category factor and was kept out of the three hierarchical blocks so these remained limited to continuous and binary indicators; its contribution was tested separately, as a fourth step entered alone after the hierarchical baseline, before field of study and housing situation were added together in a final extended model, with bias-corrected and accelerated (BCa) bootstrap confidence intervals (2000 resamples) for the coefficient comparisons. Failed exams were analyzed using negative binomial regression (log link, compared against a Poisson model), with predictor contributions assessed by Wald tests. For H4b, hierarchical-versus-extended coefficient differences were estimated on the common sample (N = 1147) using percentile bootstrap confidence intervals. Bivariate comparisons used Welch and nonparametric tests, with Holm–Bonferroni correction across 13 comparisons per criterion. An exploratory parental education × employment status interaction was also tested, outside the pre-specified models. Analyses used IBM SPSS Statistics 23 and Python 3.13 (NumPy 2.5, SciPy 1.18).

RESULTS

PRELIMINARY AND DESCRIPTIVE ANALYSES

Field of study was missing for four participants; models including this variable were therefore estimated on 1147 cases. Sample characteristics are presented in Table 1. Students obtained a mean semester grade of 8.17 (SD = 1.12) and, on average, 0.65 failed exams (SD = 1.23; 64.7% had none, and the variance of 1.51 was more than twice the mean, indicating overdispersion); the baccalaureate grade averaged 8.71 (SD = 0.93). The two criteria were substantially but not redundantly correlated ($\rho = -0.55$, $p < 0.001$), and the baccalaureate grade showed the strongest bivariate association with both ($r = 0.41$ for grades; $\rho = -0.28$ for failed exams; both $p < 0.001$). Age was not associated with either criterion at the bivariate level, whereas weekly working hours were weakly associated only

with failed exams ($\rho = 0.08$, $p = 0.008$). Collinearity was low throughout (all VIFs < 1.25, largest = 1.21, for age), and the residuals of the grade model showed no evidence of autocorrelation (Durbin–Watson = 2.08).

Table 1

Sample characteristics (N = 1151)

Characteristic	*n* (%)	Characteristic	*n* (%)
Socio-demographic		*University context*	
Female	777 (67.5)	Transilvania University	696 (60.5)
Age 18–20 years	896 (77.8)	State-funded place	801 (69.6)
Age 21–24 years	207 (18.0)	Employed	198 (17.2)
Age ≥ 25 years	48 (4.2)	Extracurricular activities	444 (38.6)
First-generation student	566 (49.2)	*Field of study*[a]	
Vulnerable status[b]	168 (14.6)	Social sciences, psychology, law	424 (36.8)
Educational trajectory		Engineering and sciences	400 (34.8)
Theoretical–science track	539 (46.8)	Economics	130 (11.3)
Theoretical–humanities track	329 (28.6)	Humanities and arts	98 (8.5)
Technological track	179 (15.6)	Medicine and health	95 (8.3)
Vocational track	104 (9.0)	*Housing*	
Admitted to first choice	883 (76.7)	Rented accommodation	407 (35.4)
Previous uncompleted degree	70 (6.1)	Student dormitory	367 (31.9)
		With family / relatives	281 (24.4)
		Own property	80 (7.0)
		Other	16 (1.4)

Note. Age: $M = 20.38$, $SD = 3.62$. [a] Four missing values. [b] Orphaned of one or both parents, from a residential care centre, with parent(s) working abroad, or with a disability or chronic illness.

In bivariate comparisons, after Holm–Bonferroni correction across 13 comparisons per criterion, eight predictors were associated with grades and seven with failed exams; group means, standard deviations, and test statistics are presented in Table 2. The largest difference in grades was for gender, with female students outperforming male students. High school track differentiated both criteria most strongly: technological-track graduates had lower grades and more failed exams than the other three tracks, most clearly relative to the two theoretical tracks; because only omnibus tests were performed, these are descriptive rather than pairwise-tested differences, with exact group values in Table 2. Field of study also differentiated both criteria: grades were lowest in engineering and sciences and highest in humanities and arts, with medicine close behind, whereas failed exams were most frequent in engineering and the humanities; medicine students, despite few raw failed exams, showed the highest adjusted risk once the baccalaureate grade and other predictors were held constant (see below). State funding, extracurricular participation, enrollment outside Transilvania University, parental higher education, and first-choice admission were also associated with grades; housing situation and employment status differentiated neither criterion.

Table 2

Bivariate associations between predictors and first-semester performance criteria (N = 1151; N = 1147 for field of study)

Characteristic	*n*	Semester grade *M* (*SD*)	Failed exams *M* (*SD*)
Gender			
Male	374	7.85 (1.23)	0.93 (1.53)
Female	777	8.32 (1.02)	0.52 (1.03)
High school track			
Theoretical–science	539	8.30 (1.12)	0.54 (1.24)
Theoretical–humanities	329	8.26 (1.02)	0.53 (1.11)
Technological	179	7.51 (1.15)	1.18 (1.36)
Vocational	104	8.32 (0.95)	0.71 (1.09)
Field of study			
Social sciences, psychology, law	424	8.33 (0.92)	0.45 (0.77)
Economics	130	8.15 (0.96)	0.49 (1.00)
Engineering and sciences	400	7.88 (1.30)	0.86 (1.47)
Medicine and health	95	8.40 (0.91)	0.65 (1.40)
Humanities and arts	98	8.42 (1.23)	0.88 (1.59)
State funding			
State-funded place	801	8.24 (1.14)	0.61 (1.27)
Tuition-paying place	350	8.00 (1.05)	0.76 (1.13)
Extracurricular activities			
Participates	444	8.36 (1.16)	0.48 (1.03)
Does not participate	707	8.05 (1.07)	0.76 (1.33)
University			
Transilvania University	696	8.03 (1.14)	0.73 (1.26)
Other university	455	8.38 (1.04)	0.54 (1.17)
Parental education			
≥ 1 parent with higher education	585	8.30 (1.08)	0.59 (1.17)
First-generation student	566	8.03 (1.14)	0.72 (1.28)
Admission			
Admitted to first-choice programme	883	8.22 (1.08)	0.60 (1.18)
Not admitted to first choice	268	7.98 (1.21)	0.84 (1.36)
Housing situation			
Rented accommodation	407	8.08 (1.13)	0.63 (1.11)
Student dormitory	367	8.24 (1.13)	0.57 (1.13)
With family / relatives	281	8.17 (1.08)	0.81 (1.45)
Own property	80	8.33 (1.04)	0.54 (1.27)
Other	16	7.84 (1.15)	1.06 (1.48)
Employment status			
Employed	198	8.10 (1.13)	0.81 (1.32)
Not employed	953	8.18 (1.11)	0.62 (1.21)

Note. Group comparisons used Welch tests (two groups) or Welch ANOVA (more than two groups) for semester grades, and Mann-Whitney U or Kruskal-Wallis tests for failed exams; p values below are uncorrected, and significance reflects a Holm–Bonferroni-adjusted threshold across 13 comparisons per criterion. Gender: $t(628.3) = 6.31$, $p < .001$, $g = 0.42$ (grades); $U = 166670$, $z = 4.05$, $p < 0.001$, $r = 0.12$ (failed exams). High school track: Welch $F(3, 362.3) = 23.82$, $p < .001$, $\eta^2 = .064$; $H(3) = 64.59$, $p <0 .001$, $\varepsilon^2 = .054$. Field of study: Welch $F(4, 313.7) = 10.07$, $p < .001$, $\eta^2 = .039$; $H(4) = 15.81$, $p =0 .003$, $\varepsilon^2 = .010$. State funding: $t(713.4) = 3.50$, $p < 0.001$, $g = 0.22$; $U = 158744$, $z = 3.58$, $p < .001$,

r =0 .11. Extracurricular activities: t(884.4) = 4.49, p < .001, g = 0.28; U = 175655, z = 3.41, p < .001, r = 0.10. University: t(1031.6) = 5.32, p < 0.001, g = 0.31; U = 142547, z = 2.86, p < 0.001, r = .08. Parental education: t(1141.2) = 4.04, p < 0.001, g = 0.24 (grades); not significant for failed exams after correction (raw p = .024). Admission to first choice: t(406.4) = 2.95, p = .003, g = 0.22; U = 131528, z = 2.77, p =0.001, r =.08. Housing situation: Welch F(4, 100.0) = 1.84, p 0.127; H(4) = 7.81, p = 0.099 (neither significant). Employment status: t(282.1) = 0.93, p = .355 (grades); not significant for failed exams after correction (raw p = 0.017).

PREDICTORS OF FIRST-SEMESTER GRADES

The hierarchical model explained 22.4% of the variance in grades, $F(12, 1138) = 27.41$, $p < 0.001$. Socio-demographic characteristics explained 5.6%, $\Delta F(4, 1146) = 16.98$, the educational trajectory added 14.4%, $\Delta F(4, 1142) = 51.51$, and university context added 2.4%, $\Delta F(4, 1138) = 8.79$ (all $p < 0.001$). Entered on its own afterward, high school track added a further 1.6%, $\Delta F(3, 1135) = 8.19$, $p < .001$, before field of study and housing situation were added together in the extended model below. The baccalaureate grade made the largest unique contribution ($\beta = 0.37$, B = 0.45, 95% BCa CI [0.37, 0.53], $sr^2 = 0.115$). Age ($\beta = 0.14$), female gender (β = 0.10), state funding ($\beta = 0.10$), extracurricular activities ($\beta = 0.08$), and parental education ($\beta = 0.06$) were positively associated with grades, while enrollment at Transilvania University was negatively associated ($\beta = -0.08$). (These β values are standardized coefficients from the hierarchical model; Table 3 reports unstandardized B from the extended model, so age's B = 0.04 there is a different metric, not a discrepant result.) Age's pattern is consistent with statistical suppression rather than an absence of association: its zero-order correlation with grades was near zero ($r = 0.047$, ns), but age correlated negatively with the baccalaureate grade ($r = -0.19$) and with holding a state-funded place ($r = -0.18$), two of the strongest positive predictors; once these confounds were held constant, the positive association between age and grades emerged.

On this same common sample of 1147 cases, the hierarchical model's R^2 was likewise 22.4%, confirming the comparison below is unaffected by the small sample-size difference. The extended model explained 26.6% of the variance, $F(23, 1123) = 17.65$, $p < 0.001$ (Table 3). High school track ($\eta^2p = .033$) and field of study ($\eta^2p = 0.029$) had significant effects, whereas housing situation did not, $F(4, 1123) = 1.31$, $p = 0.264$. Holding the other predictors constant, technological-track graduates had grades 0.50 points lower than theoretical–science-track graduates, and theoretical–humanities-track graduates 0.34 points lower; the vocational-track difference was not significant. After these variables were added, the gender coefficient decreased by 55% (from $B = 0.23$ to 0.10; difference = 0.13, 95% CI [0.06, 0.20]) and parental education by 31% (from 0.13 to 0.09; difference = 0.04, 95% CI [0.001, 0.080]); neither remained significant in the extended model. An exploratory analysis found the parental education × employment status interaction non-significant, $F(1, 1146) = 0.05$, $p = 0.821$.

Table 3

Predictors of first-semester grades and failed exams: full models (N = 1147)

	Semester grades		Failed exams
Predictor	***B* [95% CI]**	**η^2p**	**IRR [95% CI]**
Gender (female)	0.10 [−0.04, 0.24]	.002	0.77 [0.60, 0.98]*
Age	0.04 [0.02, 0.06]***	.018	0.96 [0.93, 0.99]*
≥ 1 parent with higher education	0.09 [−0.03, 0.21]	.002	0.96 [0.78, 1.18]
Vulnerable status	0.02 [−0.14, 0.18]	.000	1.13 [0.86, 1.47]
Baccalaureate grade	0.41 [0.34, 0.48]***	.103	0.70 [0.63, 0.78]***
Admitted to first choice	0.06 [−0.07, 0.20]	.001	0.84 [0.67, 1.06]
Previous uncompleted degree	0.05 [−0.20, 0.30]	.000	0.88 [0.58, 1.35]
No. of admission applications	−0.06 [−0.10, −0.01]*	.005	1.02 [0.94, 1.10]
Track (ref. theoretical–science)		.033***	$\chi^2(3) = 21.30$***
Theoretical–humanities	−0.34 [−0.50, −0.17]***		1.51 [1.12, 2.05]**
Technological	−0.50 [−0.68, −0.33]***		1.79 [1.37, 2.35]***
Vocational	−0.22 [−0.45, 0.01]		1.76 [1.18, 2.65]**
State-funded (versus tuition)	0.36 [0.22, 0.51]***	.021	0.56 [0.43, 0.71]***
Employed	−0.02 [−0.19, 0.14]	.000	1.17 [0.90, 1.52]
Extracurricular activities	0.14 [0.02, 0.26]*	.005	0.75 [0.61, 0.93]**
Transilvania Univ. (vs. other)	−0.15 [−0.27, −0.02]*	.005	1.08 [0.86, 1.35]
Field (ref. social sciences)		.029***	$\chi^2(4) = 30.95$***
Economics	−0.17 [−0.39, 0.04]		1.08 [0.73, 1.61]
Engineering and sciences	−0.48 [−0.67, −0.29]***		1.88 [1.33, 2.66]***
Medicine and health	−0.43 [−0.68, −0.17]**		2.90 [1.85, 4.54]***
Humanities and arts	0.12 [−0.10, 0.35]		1.71 [1.17, 2.49]**
Housing (4 contrasts)	n.s.	.005	$\chi^2(4) = 5.16$
R^2 (adjusted) / omnibus test	.266 (.250)		$\chi^2(23) = 173.72$***

Note. Grades: linear model, unstandardized coefficients. Failed exams: negative binomial regression; IRR = incidence rate ratio (values below 1 indicate fewer failed exams). *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

PREDICTORS OF FAILED EXAMS

The negative binomial model fitted better than the Poisson model (*AIC* = 2389.8 versus 2543.0; $\alpha = 0.98$, 95% CI [0.75, 1.28]) and was significant, $\chi^2(23) = 173.72$, $p < 0.001$. The baccalaureate grade had the largest Wald statistic among individual predictors ($\chi^2(1) = 39.26$, $p < 0.001$): each additional point was associated with a 30% lower expected number of failed exams (IRR = 0.70). State funding (IRR = 0.56), extracurricular activities (IRR = 0.75), female gender (IRR = 0.77), and age (IRR = 0.96) were associated with fewer failed exams. Field of study, $\chi^2(4) = 30.95$, and track, $\chi^2(3) = 21.30$, were significant ($p < .001$): failed exams were more frequent

in medicine and health (IRR = 2.90), engineering (IRR = 1.88), and the humanities *(IRR* = 1.71), and in all tracks versus the theoretical–science track (*IRR* = 1.51–1.79). Unlike for grades, the gender coefficient did not decrease significantly after track and field of study were added (IRR = 0.71 and 0.77; 95% CI of the log-IRR difference [−0.23, 0.07]), and parental education was unrelated to failed exams in either model.

DISCUSSION

The results supported H1, H2, H3, and H5. H4a was partially supported: female gender predicted higher grades and fewer failed exams as expected, but parental education's association with grades did not hold in the extended model and showed no association with failed exams; H4b held for grades but not failed exams. That prior preparation would be the most consistent predictor matched expectations from the literature (Richardson *et al.,* 2012; Schneider & Preckel, 2017; McKenzie & Schweitzer, 2001; Mills *et al*., 2009). More distinctively, high school track added explanatory value beyond the baccalaureate grade rather than being redundant with it, and grades and failed exams, while sharing a common core of predictors, diverged in interpretable ways (see Q2). The educational block's contribution (14.4%) exceeded the socio-demographic block's (5.6%), though this depends on block entry order.

High school track remained associated with performance after adjusting for the baccalaureate grade, suggesting it captures educational differences not fully reflected in the final examination (Giersch, 2018). The vocational track was associated only with more failed exams, not lower grades. The data cannot separate the curriculum's contribution from student selection into tracks or from unmeasured characteristics.

The significant reduction of the gender and parental-education coefficients for grades indicates statistical overlap between these characteristics and the educational trajectory, consistent with first-generation students' disadvantage operating largely through pre-university achievement (Wilbur & Roscigno, 2016) and with the modest post-admission differences reported by Douglass and Thomson (2012). This is consistent with, but does not establish, a mediational pathway through high school track and field of study; absent a formal mediation test, the reduction is better read as shared variance than a tested causal mechanism. For failed exams, female gender remained significant after adjustment, while parental education - significant for grades in the hierarchical model – was no longer significant in the extended model and showed no association with failed exams in either.

Regarding Q1, state funding was associated with better results on both criteria, likely reflecting admission selection, financial resources, and incentives to retain a funded place – not equivalent to financial aid in other systems (Stater, 2009). Employment status was unrelated to either criterion, consistent with literature emphasizing work intensity over mere employment (Body *et al*., 2014;

Pike *et al*., 2008; Thies, 2023); age was associated with better outcomes only after adjustment. Extracurricular participation was associated with both criteria, though the dichotomous indicator does not support a causal interpretation.

Regarding Q2, the criteria shared a common core of predictors but also differed: gender remained associated only with failed exams, enrollment at Transilvania University only with grades, and medicine combined high raw grades and few raw failed exams with lower adjusted grades and a higher adjusted risk of failed exams than the social-sciences reference group. This reversal is consistent with selective admission on the baccalaureate grade: medicine students enter with markedly higher bac grades, inflating their raw performance; once this advantage is held constant, their adjusted risk of failed exams is elevated relative to the reference group, possibly reflecting a more demanding curriculum, a heavier exam load, or both - the number of exams taken was not recorded, so these cannot be distinguished, nor can the cross-sectional design test either directly. Grades and failed exams are therefore related but partly distinct indicators of early academic success (Thies, 2023). Given that dropout is concentrated in the first year (OECD, 2025) and early failure has prognostic value (Winston *et al*., 2014), the results support monitoring both grades and exam completion as markers of student progress, not as a validated risk-classification tool for individual students.

LIMITATIONS

The cross-sectional design precludes causal inferences, and grades were self-reported. The number of exams taken was not recorded, so failed-exam counts could not be adjusted for differences in assessment load across programmes; clustering within institutions was not modelled, and the volunteer sample is not representative. Extracurricular participation and employment were measured dichotomously, and the models – describing group-level associations, not validated for individual-level prediction (*e.g.*, via cross-validation or an independent sample) - should not be used to classify or screen individual students by risk. Future research could use longitudinal and administrative data, multilevel models, and out-of-sample validation.

CONCLUSIONS

First-semester academic performance is associated primarily with prior preparation, but high school track adds explanatory value beyond the baccalaureate grade, with funding status, extracurricular involvement, and field of study contributing further. The parallel analysis of grades and failed exams revealed a common core of predictors alongside relevant differences - notably a field-of-study pattern that raw grades alone would not reveal - supporting a multidimensional view of early academic success in which both preparation and programme characteristics inform where support is most useful, rather than serving as a validated risk-identification tool.

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