Patterns of university progression and social inequalities: delving into complex trajectories in higher education[1]

Helena Troiano*

Group of Research Education and Work (GRET), Department of Sociology, Universitat Autònoma de Barcelona (UAB)
e-mail: helena.troiano@uab.cat
ORCID: 0000-0002-8352-2415

Albert Sánchez-Gelabert

Institute of Education Sciences, Universitat Politècnica de Catalunya (UPC)
e-mail: albert.sanchez.gelabert@upc.edu
ORCID: 0000-0002-4135-6121

Helena Troiano

Helena Troiano is an Associate Professor and researcher of the Group of Research Education and Work (GRET) in the Department of Sociology at the Universitat Autònoma de Barcelona. Her research interests include educational inequalities in higher education, access to university, university student trajectories, living and study conditions in higher education, and the labour market insertion of university graduates.

Albert Sánchez-Gelabert

Albert Sánchez-Gelabert is an Associate Professor at the Institute of Education Sciences of the Universitat Politècnica de Catalunya. His research expertise includes social and educational inequality, higher education, university dropout, online education, educational trajectories from a longitudinal perspective, and cultural consumption.

Conflict of Interest
The authors declare that there exists no competing financial interest or personal relationships that could have appeared to influence the work reported in this paper.

[1] This work was supported by Erasmus + Program. Project: Promoting students' successful trajectories in higher education institutions. (face-to-face and online) [grant number: 2020-1-ES01-KA203-082842].
This study is based on data provided by the Departament de Recerca i Universitats of the Catalan Government, from the DWH UNeix data on May 2021. The responsibility for all conclusions drawn from the data provided lies exclusively with the authors.

Patterns of university progression and social inequalities: delving into complex trajectories in higher education

Abstract

This article analyses the trajectories followed by university students throughout their degrees using longitudinal data from a cohort entering eleven on-site universities in the Catalan system in 2012-13 (n=30,392). The analysis is carried out in two steps. First, types of academic trajectories are identified and described using Group Based Trajectory Modelling, and each type is related to students' final academic outcomes over a seven-year period. Then, the probability of students belonging to each trajectory type is estimated according to academic and socio-demographic variables, disaggregated by field of study, to detect inequalities and specific patterns across disciplinary areas. The results indicate that the most frequent trajectory is stable high achievers, though trajectories marked by academic difficulties are observed. Academic variables are the strongest predictors of trajectory type, while among socio-demographic factors, age stands out, reflecting the greater time constraints often faced by older students in relation to their broader life course, which can limit ability or willingness to extend their studies when difficulties arise. Gender also has an effect, while social background has a more limited role. Patterns are most marked in STEM, where even high-entry-grade students face greater challenges, and older students show a reduced tendency towards recovery trajectories.

Keywords: complex trajectories, social inequalities, academic performance, academic outcomes, dropout, Group Based Trajectory Model.

Introduction

Since policies aimed at broadening access to university came into effect, the higher education policy agenda in many parts of the world has shifted its attention to the issue of degree completion (Orr, Usher, Haj, Atherton, & Geanta, 2017). The problem of dropout in the university sector has been a subject of research interest for many decades, with the adoption of a broader perspective on degree completion leading to the implementation of a wider range of dropout prevention and graduation support policies (Vossensteyn et al., 2015). This broadening of perspective is also reflected in the growing interest in analysing the trajectories followed by students during their university studies (see the systematised compilation by Haas and Hadjar, 2020), an interest facilitated by increasingly efficient administrative management of longitudinal student data and the development of applicable longitudinal analysis techniques.

It is worth noting that, in empirical research, trajectory analyses tend to focus on three main areas. The first set of studies explores differences in student trajectories across a variety of institutional contexts, such as different types of degrees or study programmes, countries, higher education institutions, or online versus onsite learning modalities (Boylan, 2020; Haas, 2023; Hovdhaugen, 2011; Parentelli, Cuadrado, & Martínez, 2018; Villar-Aguilés & Muñoz-Rodríguez, 2024). A second group examines how students who followed different educational tracks prior to university—namely, the academic or vocational routes—go on to experience dissimilar trajectories during their university studies (Figuera-Gazo, Torrado-Fonseca, Llanes-Ordóñez, & Romero-Rodríguez, 2020; Tieben, 2020). The third body of research addresses the issue of socio-demographic inequalities as reflected in differentiated student trajectories (Denice, 2019; Goldrick-Rab & Pfeffer, 2009; Haas & Hadjar, 2020; Lin, Fay, & Fink, 2023; Miller Flores & de Garay Sánchez, 2022; Sánchez-Gelabert, 2020).

Nevertheless, despite this classification according to the main focus of interest, it is common for the same studies to reveal interactions between two or even all three sets of these factors.

We consider it important to advance research into the analysis of university students' trajectories, as this is an area with significant potential for targeted interventions. Such research has gained relevance in recent years due to the increasing diversification of the

student population, which has led to corresponding variation in students' needs and in the ways they navigate the university experience.

In this context, the aims of this article are twofold: first, to classify and describe the types of trajectories observed within the on-campus university system in Catalonia; and second, to determine the likelihood of a student following a specific trajectory based on their individual characteristics and the field of study in which they are enrolled.

Theoretical Approach to Student Trajectories

Student trajectories are shaped by two main conditions. First, students' academic performance—whether they pass or fail their subjects—which determines their progress; and second, the decisions they make throughout their academic journey. These decisions include whether to continue, drop out, change degree (or modality, or institution), enrol in fewer subjects, take a temporary break (stop out), re-enrol, and so on. Together, these decisions form a chain of actions that constitutes an individual trajectory (Boylan, 2020; Lörz & Mühleck, 2019).

The interplay of these two conditioning factors—performance and decision-making—results in what we refer to as a trajectory. Drawing on Boudon's (1974) well-known distinction, the mechanisms influencing academic performance are referred to as *primary effects*, which are linked to cultural capital, norms, and values (Bourdieu & Passeron, 1977), while the mechanisms that influence students' decisions are considered *secondary effects* (Jackson, 2013).

Two key theoretical frameworks have been widely used to study how such decisions are made. The first is Rational Choice Theory (Breen & Goldthorpe, 1997), which explains differences in decision-making according to students' social origins, based on perceived costs, expected benefits, and likelihood of success. The second, specific to the university context, is Tinto's (1975) theory of student integration, which focuses on how academic and social integration processes influence students' commitment to their studies, thereby affecting their probability of dropping out.

The following section outlines the core elements drawn from these and other theoretical frameworks, which shed light on the mechanisms underlying the two principal factors that shape student trajectories: academic performance and decision-making.

Academic Conditions

A central element considered by Rational Choice Theory is the perceived probability of successfully completing the chosen programme of study. This probability is shaped, on the one hand, by the difficulty and intensity of academic requirements, which are often linked to the disciplinary field—rendering certain programmes riskier than others (González-Pérez, Martínez-Martínez, Rey-Paredes, & Cifre, 2022; Sáinz, 2017; Troiano, Torrents, & Daza, 2021). On the other hand, students bring with them varying levels of ability and skills, which affect their capacity to meet these demands. Most studies use prior academic performance—typically measured by grades—as a proxy for these abilities, and sometimes also take into account the type of upper secondary education completed or the educational pathway followed before entering university (Haas & Hadjar, 2020).

Living Conditions

Substantial job or family responsibilities are circumstances that can significantly affect students' academic performance. Such commitments limit the time and energy available for engagement with degree studies (Béduwé & Giret, 2021). Although these conditions may arise at a young age, Life Course Theory (Elder & Giele, 2009; Staff & Mortimer, 2007) highlights that in later stages of life, the burden of work and family responsibilities tends to be greater, making time for study a particularly scarce resource—especially for women (Lörz & Mühleck, 2019).

From this Life Course perspective, older students are also assumed to have a higher likelihood of dropping out when facing difficulties (Bozick & DeLuca, 2005), as the perceived feasibility of redirecting or postponing their academic trajectory tends to diminish with age (Hovdhaugen, 2009). Individuals who enter university later than the socially expected age—based on unwritten norms that vary across cultural contexts—

may feel they have already lost significant time. As a result, not only may the perceived benefits of completing a degree appear reduced (as posited by Rational Choice Theory), but such individuals may also feel less socially legitimised to continue *wasting time* in higher education (Langa & Río, 2013).

Available Family Resources

Within this category, both economic and cultural resources should be considered, as each can influence students' academic performance. Socialization within families that are already familiar with the university environment may facilitate students' adaptation to the informal cultural norms of higher education (Bourdieu & Passeron, 1964; Reay, Crozier, & Clayton, 2010). In addition, economic resources may be directly invested in knowledge acquisition, particularly through private tutoring or enrolment in supplementary classes (Herbaut, 2020).

Family resources also influence decisions made throughout a student's academic journey, such as whether to continue, change programmes, or reorient their studies. Financial means can enable students to prolong the time required to complete a degree, cover the additional costs resulting from academic underperformance, or redirect their trajectory. Consequently, the likelihood of continuing in higher education tends to be significantly greater among students from higher socio-economic backgrounds (Boylan, 2020; Haas & Hadjar, 2024), even in cases of poor prior academic performance—a phenomenon referred to as *compensatory advantage* (Beekhoven, De Jong, & Van Hout, 2002; Bernardi & Cebolla, 2014; Sánchez-Gelabert & Troiano, 2023).

Available Social Resources

A strong network of relationships—with both academic staff and fellow students—is identified by Tinto's (1975) influential theory as the foundation of academic and social integration. Such integration can provide crucial support for academic performance and progression (Beekhoven et al., 2002), although, as these authors also note, strong academic performance may equally foster greater integration. Integration, in turn, can influence students' decisions to persist in their studies and avoid dropping out, even in

cases of unsatisfactory academic outcomes (Deil-Amen & Goldrick-Rab, 2009; Müller & Klein, 2023).

While the direct operation of these mechanisms cannot be tested within the scope of the present study, proxy variables can be used to approximate their influence on the likelihood of following a given trajectory. In this regard, the analysis incorporates the academic context variable of field of study, alongside a set of individual-level variables—academic (entry grades and access pathway) and sociodemographic (parental education level - PEL, gender, age, and employment during studies)—all of which may provide insight into some of the mechanisms under examination. Unfortunately, no variable is available in the dataset that could serve as a direct indicator of students' academic and social integration.

The Catalan University System

The basic structure of the Catalan university system is aligned with that of the broader Spanish system. Most Bachelor's programmes have a planned duration of four years, although a limited number extend to five or six years. This implies longer study periods than those found in many European countries, which, following the implementation of the European Higher Education Area, adopted a three-year undergraduate model.

In Spain, access to higher education is granted to individuals who have completed upper secondary education—either through academic or vocational pathways. Admission to public universities operates under a *numerus clausus* system, whereby candidates are ranked according to their upper secondary school grades and performance in a national examination. In Catalonia, student placement within the public university system—which also includes some private institutions—is coordinated by the regional administration. There is also a minority access route for mature students via special entrance examinations.

In 2012, the Spanish Ministry of Universities granted regions the autonomy to set tuition fees. Catalonia subsequently introduced some of the highest enrolment fees in the country (Sacristán & França, 2013). However, a variable fee system based on household income was soon implemented, and recent years have seen reductions in standard fees. For the cohort under study, the cost of one academic year at a public university (equivalent to 60 ECTS credits) ranged from 1,300 to 1,800 euros per year.

A distinctive feature of the system is the fee increase associated with repeated course enrolments. Students who fail a subject and must retake it face a 25% increase in the cost. If failure recurs, the fee rises substantially, in some cases tripling. This mechanism places a disproportionate burden on students with limited financial resources and may amplify the *compensatory advantage* in comparison with systems where fees remain constant regardless of academic performance.

Methodological Approach

Building upon the theoretical framework and the empirical evidence previously discussed, the central research question addressed in this article is whether, across different academic contexts (i.e. fields of study), students with varying sociodemographic characteristics are more likely to follow trajectories with differing probabilities of academic success.

In response to this question, the study pursues two main objectives:

Objective 1: Construction and characterization of a typology of academic trajectories.

1.1. Construct an initial typology of academic trajectories.

1.2. Describe the identified trajectory types using selected academic and sociodemographic variables.

1.3. Associate each trajectory type with the most likely final status (based on a seven-year observation period).

1.4. Reduce the typology to a hierarchically ordered model of trajectories according to their probability of success.

Objective 2: Exploration of potential interactions between the field of study and individual-level variables.

2.1. Examine the relationship between university entrance grades and the field of study.

2.2. Investigate the interaction between parental education level (PEL) and the field of study.

2.3. Investigate the interaction between gender and the field of study.

2.4. Investigate the interaction between age and the field of study.

Data

The analysis draws on administrative registration data provided by the Department of Research and Universities of the Government of Catalonia. The dataset includes information collected during the enrolment process for a cohort of newly admitted students in the academic year 2012–2013, covering all undergraduate degree programmes offered by the 12 universities within the Catalan university system (n = 44,285). Academic records for these students are available for a seven-year period following admission, up to the 2019–2020 academic year. The dataset includes sociodemographic and educational information about the students, as well as institutional variables related to the degree programmes in which they were enrolled.

The Catalan university system comprises seven public universities (n = 32,663), four private universities (n = 4,246), and one distance-learning university (n = 7,376). For the purposes of this study, the analysis is restricted to students enrolled in on-campus universities (n = 36,909). After data cleaning and the removal of inconsistent cases, the final sample consists of 30,392 students admitted for the first time in 2012, whose academic trajectories are analysed.

Variables

For the first phase of the analysis (Objective 1), the annual performance rate from initial university admission up to seven years later is used as a measure of progress in the degree. This rate is calculated by dividing the number of credits successfully completed by the number of credits enrolled in during a given year, and multiplying the result by 100.[2] Students who have not enrolled in any credits during a particular year and have not graduated are assigned a rate of 0 for that year, indicating no academic progress during

[2] The performance rate is a relative measure and, as such, prioritizes proportional achievement. It may group together trajectories that follow similar patterns but differ somewhat in terms of absolute credit attainment. One notable consequence is that an improvement in relative performance over the course of a student's academic path may reflect either enhanced academic ability (e.g., increased success in passing exams) or a better alignment between the number of credits enrolled and the student's actual capacity. The latter suggests improved self-regulation and academic planning.

the period. Conversely, students who have already graduated are considered missing from the dataset in the years following graduation, as they have completed all applicable credits and it is therefore not relevant to calculate a performance rate for them.

In subsequent phases, a set of explanatory variables that may influence the probability of belonging to a given trajectory is included. Table 1 presents these explanatory variables, their values, and their distribution:

Table 1. Descriptive statistics of the study sample: new entrants to the Catalan university System in 2012-13 at face-to-face universities.

Gender	**n**	**%**
Women	16643	54.76
Men	13749	45.24
Total	***30392***	***100***

Age	**n**	**%**
Up to 25	28389	93.41
26 or more	2003	6.59
Total	***30392***	***100***

Access grades	**n**	**%**
Up to 5.99	2588	8.52
6-6.99	4395	14.46
7-7.99	5533	18.21
8-8.99	5496	18.08
9-9.99	4781	15.73
10-10.99	3665	12.06
11-11.99	2520	8.29
12-12.99	1231	4.05
13-14	183	0.6
Total	***30392***	***100***

Field of studies	**n**	**%**
Arts and Humanities	3693	12.15
Social and Legal sciences	12188	40.1
Health sciences	5518	18.16
Sciences	2430	8
Engineering and Architecture	6563	21.59
Total	***30392***	***100***

Parental Education Level	**n**	**%**
Non-university	17656	58.09
University studies	12736	41.91
Total	***30392***	***100***

Access route	**n**	**%**
Academic track	22180	72.98
VET track	5272	17.35
Other	2940	9.67
Total	***30392***	***100***

Working while studying[3]	**n**	**%**
Not working	20237	66.59
Up to 15 hours/week	1787	5.88
15 hours or more	8368	27.53
Total	***30392***	***100***

Source: authors' own elaboration.

[3] The cut-off points for this variable are those established by the data collection survey itself. This information is only available for the first year of study.

Methods

In terms of methodology, concerning objective 1, a Group-Based Trajectory Model (GBTM) is employed using the STATA plugin TRAJ (Jones & Nagin, 2013). The GBTM is a method for analysing developmental trajectories that clusters individual trajectories based on their similarity, thereby defining ideal types. Each group represents a distinct pattern over time, and the model assigns a probability to each individual of belonging to a given group. Based on these probabilities, individuals are allocated to the group to which they are most likely to belong. Specifically, following the guidelines outlined by Nagin (2005), the model selection process involves evaluating changes in the Bayesian Information Criterion (BIC), adjusting the shape of the trajectories, and monitoring the proportion of cases assigned to each group. In addition, the adequacy of the final model is assessed to ensure it remains within recommended thresholds.

In this study, academic trajectories are defined by the combination of two elements: the outcome variable (in this case, the annual performance rate) and a temporal variable referring to the sequence of yearly observations from university admission (2012–13) to 2018–19.

To address objective 2, four multinomial logistic regressions are conducted, with the dependent variable being the trajectory group (a simplified version of the output obtained from the GBTM). In order to examine how individuals with different characteristics (access grade, PEL, gender and age) may vary in their likelihood of following particular trajectories across various disciplinary contexts (field of study), interaction terms are included in the analytical models. For instance, the model employed for the case of PEL is as follows:

$$ln\left(\frac{P(Y=j)}{P(Y=J)}\right) = \alpha_j + \beta_{1j} \cdot FoS + \beta_{2j.}\, PEL + \beta_{3j}(FoS \cdot PEL) + \delta_{1j} Ctrl_1 + \cdots + \delta_{nj} Ctrl_n$$

In this model, the effects of field of study, PEL, and their interaction are included, while the remaining variables are introduced as controls.

Results

The University Trajectories of a Cohort of Students: a GBTM Analysis

The identification of the number of academic trajectories (Objective 1.1) follows a two-stage model selection process. The first stage involves determining the number of groups

to include in the model, while the second focuses on selecting the preferred polynomial order to specify the shape of each trajectory (Nagin, 2005). In line with this strategy, multiple models are estimated with varying group numbers, and the model with the highest Bayesian Information Criterion (BIC) score is selected. At the same time, it is ensured that each identified trajectory accounts for more than 5% of the total sample.

Given the availability of more than four temporal observations, the process begins by testing a model with a single cubic trajectory. As the cubic term is found to be significant, additional models are estimated by introducing further cubic trajectories. If a newly introduced cubic trajectory proves non-significant, the model is adjusted by fitting lower-order polynomial functions (quadratic and then linear) until all trajectories are statistically significant. This process continues until the BIC no longer increases or until one of the groups comprises less than 5% of the total sample. Table 2 presents the evolution of the relevant indicators for each of the evaluated models.

Table 2. Model selection criteria

Number of groups	Polynomic Function	Model BIC (N = 30392)	Model BIC (N = 162365)	Groups < 5%
1	3	-401065.97	-401070.16	0
2	33	-364037.35	-364045.73	0
3	333	-354612.64	-354625.21	0
4	3333	- 349633.45	- 349650.21	0
4	3233	- 349630.84	- 349646.76	0
5	32333	- 347733.81	- 347753.92	0
5	32233	- 347737.05	- 347756.32	0
5	32223	- 347731.91	- 347750.35	0
6	322233	- 346961.29	- 346983.91	0
6	222233	- 346173.57	- 346195.36	0
7	2222333	- 345294.08	- 345320.06	1

Source: authors' own elaboration.

As shown, the BIC value increases with the introduction of additional groups; however, the seven-trajectory model includes a trajectory that accounts for less than 5% of the total sample. Based on these results, the six-trajectory model is selected, comprising four trajectories of quadratic order and two of cubic order. To evaluate the robustness and quality of the selected model and its polynomial specifications, the average posterior probabilities of assignment (APPA: all trajectories > 0.7) and the odds of correct classification (OCC: all trajectories > 0.5) are examined in Table 3 (Nagin, 2005).

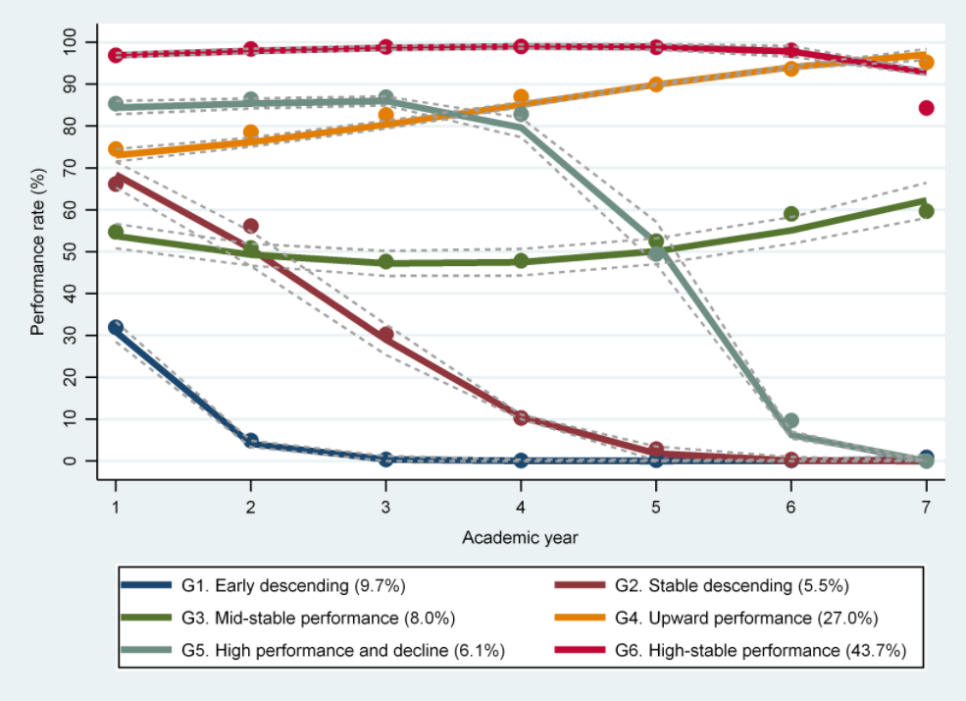
Table 3. Indicators of viability and quality of the selected model

	G1	G2	G3	G4	G5	G6
APPA	0.95	0.90	0.90	0.82	0.91	0.90
OCC	165.0	152.7	106.3	11.4	223.4	11.5

Source: authors' own elaboration.

Figure 1 provides a graphical representation of the evolution of the different academic trajectories, along with their relative prevalence. The first trajectory type, labelled *early descending*, represents approximately 10% of the total sample. Its main feature is a low performance rate in the first year, at around 30%. The second trajectory type, *stable descending* (5.6%), is characterised by a relatively high initial performance rate—close to 70% in the first year—which then progressively declines, reaching approximately 0% by the fifth year following university entry.

Figure 1. Group Based Trajectory Model



Source: authors' own elaboration.

The G3 trajectory, representing 8% of the cohort of newly admitted students, is characterised by a stable average performance rate of around 50% throughout the period analysed, with a slight increase in the later years. Another pattern identified is the G4 *upward performance* trajectory, which accounts for 27% of the cohort. This group is marked by a high initial performance rate in the first year of university and a progressive increase, reaching 100% by the final year analysed.

The G5 trajectory, *high performance with decline*, exhibits an unusual development pattern, with a performance rate close to 90% over the first four years, followed by a sharp decline from the fifth year onwards, reaching approximately 0% in the final two years. The most common trajectory is G6, *high-stable performance*, encompassing 44% of students. This group is characterised by a consistently high performance rate, close to 100%, across the entire observation period.

Importantly, these trajectories offer insight into the various ways students progress through university in terms of academic performance; however, they do not indicate final academic status at the end of the period under analysis. To gain a deeper understanding of these trajectories (Objective 1.3), the association between trajectory type and final academic status is examined (Table 4), allowing for the identification of specific patterns within the phenomenon under study.

Table 4. Final statuses for each group of trajectory. Cohort 2012. SUC – Onsite universities.

Performance Trajectories * [.713]**	**Drop out**		**Graduated on time**		**Graduated with Delay**		**Persistence**		**Total**	
	n	%	n	%	n	%	n	%	n	%
G1 - Early descending	**2906**	**97.3**	1	0	0	0	80	2.7	2987	100
G2 - Stable descending	**1581**	**96.5**	2	0.1	0	0	55	3.4	1638	100
G3 - Mid-stable performance	189	8.3	6	0.3	**392**	**17.2**	**1688**	**74.2**	2275	100
G4 - Upward performance	27	0.3	**4839**	**56.6**	**3270**	**38.3**	413	4.8	8549	100
G5 - High performance & decline	**848**	**67.1**	61	4.8	124	9.8	**230**	**18.2**	1263	100
G6 - High-stable performance	30	0.2	**12712**	**92.9**	853	6.2	85	0.6	13680	100
Total	5581	18.4	17621	58	4639	15.3	2551	8.4	30392	100

Note: *** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$ for the chi2 test
Square brackets: V Cramer as a measure of the intensity of the association between variables.
Bold: Values greater than 1.96 for standardised and corrected residuals as a measure of the intensity of positive association between categories.
Source: authors' own elaboration.

The results reveal a significant association between the trajectories marked by declining performance (G1, G2, and G5) and the failure to obtain a degree during the period analysed (i.e. cases of dropout). Regarding graduation within the theoretical time frame, the *high-stable performance* (G6) and *upward performance* (G4) trajectories are significantly associated with timely graduation. Students following the G4 trajectory, along with those in the *mid-stable performance* group (G3), also tend to obtain a university degree, though typically after the theoretical timeframe. Notably, a subset of

students in G5 (*high performance with decline*) and a majority of those in G3 exhibit a significant association with academic persistence seven years after university entry.

These findings, which clearly link trajectory type to academic status after seven years, highlight the existence of pathways more conducive to academic success (whether on time or delayed), others that involve a higher risk—particularly when enrolment is extended over a long period—and still others that carry a very high probability of dropout.

Moreover, these trajectories correspond to distinct sociodemographic and academic profiles (Objective 1.2; see Table A1 and Table A2 in the appendix). The *descending* groups (G1 and G2) are similarly overrepresented by students with low entry grades, a vocational education and training (VET) access track, aged over 26, and enrolled in humanities or engineering. G5, characterised by strong initial performance followed by a sharp decline after four years, presents a similar yet more heterogeneous profile in terms of sociodemographic, academic, and final status characteristics. The *mid-stable* trajectory group (G3) predominantly comprises men with low entry grades from the academic access track and in engineering—similar to G4, although the latter tends to have higher access grades overall. Finally, the G6 *high-stable performance* group is characterised by high entry grades, an academic access track, female students, and enrolment in health-related fields.

The next step of the analysis (Objective 2) aims to delve into individual characteristics in relation to the disciplinary context, to determine whether, for example, a student aged over 26 is more or less likely to follow a given trajectory—such as *mid-stable*—when enrolled in a particular field of study, such as humanities or engineering.

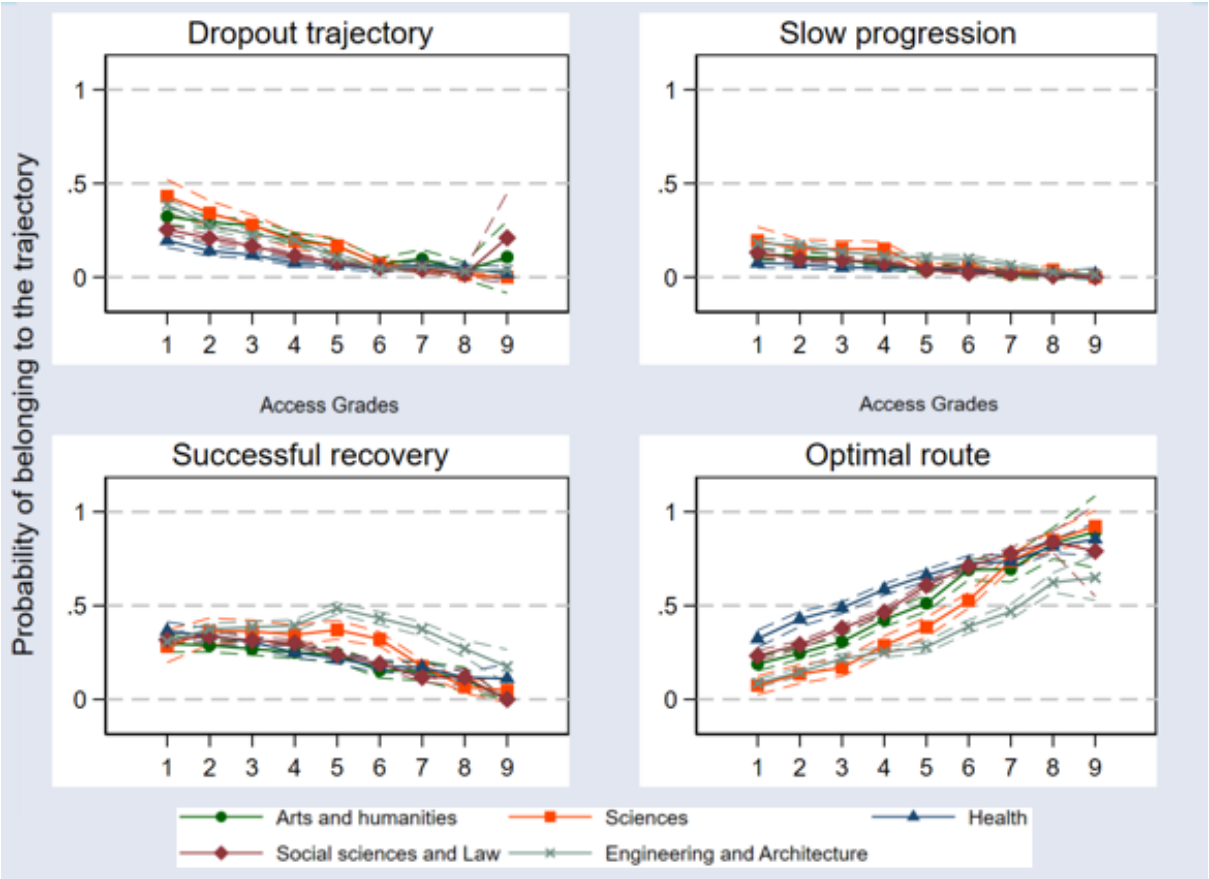
To facilitate a clearer presentation of the results, the trajectory groups have been simplified (Objective 1.4) based on both final academic status (Table 4) and socio-academic profiles (Table A1 and Table A2). Specifically, G1 and G2—*early* and *stable descending* groups—are combined into a single *dropout trajectory* group due to their similar profiles and outcomes. In addition, G5 (*high performance with decline*) is no longer considered in the second phase of the analysis due to the heterogeneity observed in both its trajectory outcomes and student characteristics. Nevertheless, it is retained in the calculations to avoid introducing bias in the estimated coefficients resulting from selection effects.

For greater clarity, the remaining trajectories are considered in a hierarchical order according to their likelihood of leading to degree completion. Accordingly: G1+G2 = Dropout trajectory; G3 = Slow progression; G4 = Successful recovery; G6 = Optimal route.

Probability of Belonging to a Group of Trajectory by Field of Study

This stage of the analysis (Objective 2) begins by examining the most evident relationship: that between access grade and the academic trajectory followed, across different fields of study (Objective 2.1). Following the recommendations of Mize (2019), the results are presented by plotting the predicted probability of belonging to each trajectory group across the distribution of the numerical independent variable (Figure 2).

Figure 2. Predicted probability of belonging to a trajectory group according to access grade and field of study.



Note: The predicted probabilities are calculated from a multinomial logistic regression with the trajectory group as the dependent variable (5 groups, only 4 are shown). The logistic model includes access grade and field of study as independent variables, and a vector of control variables: PEL, gender, age, access route, and working while studying. N = 30392. Pseudo R2 McFadden=0.1046. Confidence intervals at 95%.

Source: authors' own elaboration.

In Figure 2, the *dropout* and *optimal* trajectories appear to be most clearly associated—albeit in opposite directions—with access grade. Specifically, the lower the entry grade, the greater the probability of belonging to the *dropout trajectory* group; conversely, higher entry grades are associated with an increased probability of following the *optimal* route.

Within this latter group, however, students in engineering and architecture, as well as in sciences, consistently show a lower probability of belonging, even when entering university with high grades. This suggests that achieving academic success is particularly challenging in these fields. This pattern may also explain why students with strong entry grades in the engineering and architecture area are more likely than their peers in other areas to be assigned to the *successful recovery* trajectory group.

As for the *slow progression* group, some relationship with entry grade is also observed, although the probability of belonging to this group remains consistently low across the grade distribution.

The following analyses aim to go beyond this initial relationship by examining potential associations between sociodemographic variables and the probability of belonging to a particular trajectory group within each field of study (Objectives 2.2, 2.3, and 2.4). Table 5 begins this exploration by analysing the interaction between parental education level (PEL) and field of study.

Table 5. Predicted Probability of Belonging to a Trajectory Group According to PEL and Field of Study.

	Dropout trajectory						**Slow progression**					
	Non-university		**University**				**Non-university**		**University**			
	Prob.	**Std. Err.**	**Prob.**	**Std. Err.**	**Differ.**	**Sig.**	**Prob.**	**Std. Err.**	**Prob.**	**Std. Err.**	**Differ.**	**Sig.**
Arts & Humanitites	.208	.008	.199	.010	.009	n.s.	.068	.005	.069	.006	-.002	n.s.
Social & Law	.137	.004	.122	.005	.015	*	.063	.003	.070	.004	-.008	n.s.
Health	.096	.005	.114	.007	-.018	*	.044	.004	.059	.005	-.014	*
Sciences	.216	.012	.195	.014	.022	n.s.	.107	.009	.094	.010	.013	n.s.
Engineering & Architecture	.197	.006	.175	.007	.021	*	.113	.005	.126	.006	-.013	n.s.
Total	.156	.002	.146	.002	.011		.075	.002	.083	.002	-.008	

	Successful recovery						Optimal route					
	Non-university		University				Non-university		University			
	Prob.	Std. Err.	Prob.	Std. Err.	Differ.	Sig.	Prob.	Std. Err.	Prob.	Std. Err.	Differ.	Sig.
Arts & Humanitites	.242	.009	.221	.011	.021	n.s.	.428	.010	.464	.012	-.036	*
Social & Law	.243	.005	.286	.007	-.043	***	.512	.005	.476	.007	.036	***
Health	.239	.008	.273	.009	-.034	**	.593	.008	.532	.010	.060	***
Sciences	.292	.013	.318	.014	-.026	n.s.	.353	.012	.374	.013	-.021	n.s.
Engineering & Architecture	.367	.009	.417	.009	-.050	***	.284	.008	.249	.007	.035	**
Total	.271	.003	.305	.004	-.033		.457	.003	.430	.004	.026	

Note: The predicted probabilities are calculated from a multinomial logistic regression with the trajectory group as the dependent variable (5 groups, only 4 are shown). The logistic model includes PEL and field of study as independent variables, along with their interaction, and a vector of control variables: access grade, gender, age, access route, and working while studying. Statistics summary of the logistic regression model: N = 30392. Likelihood Ratio chi2 (64) = 7991.90. Probability > chi2 = 0.000. Pseudo R2 McFadden=0.0989. Statistical significance of the differences (Wald test p-value): *** p ≤ .001, ** p ≤ .01, * p ≤ .05

Source: authors' own elaboration.

Table 5 shows that, when controlling for other factors such as entry grades, the differences in trajectory outcomes according to PEL are not statistically significant overall. However, a disaggregated analysis by field of study reveals subtle patterns: in the areas of social sciences, health, and engineering and architecture, students whose parents do not have a university education are slightly more likely to follow the *optimal* trajectory. By contrast, students whose parents hold a university degree are somewhat more likely to follow a *successful recovery* trajectory.

Table 6. Predicted Probability of Belonging to a Trajectory Group by Gender and Field of Study.

	Dropout trajectory						Slow progression					
	Women		Men				Women		Men			
	Prob.	Std. Err.	Prob.	Std. Err.	Differ.	Sig.	Prob.	Std. Err.	Prob.	Std. Err.	Differ.	Sig.
Arts & Humanities	.191	.007	.214	.010	-.024	n.s.	.063	.005	.070	.007	-.007	n.s.
Social & Law	.112	.003	.156	.005	-.044	***	.051	.003	.084	.004	-.034	***
Health	.094	.005	.107	.007	-.013	n.s.	.042	.003	.056	.006	-.014	*
Sciences	.172	.013	.245	.013	-.073	***	.081	.009	.123	.010	-.041	***
Engineering & Architecture	.159	.010	.211	.005	-.051	***	.105	.008	.137	.005	-.032	**
Total	.132	.003	.172	.003	-.040		.065	.002	.092	.002	-.027	

	Successful recovery						Optimal route					
	Women		Men				Women		Men			
	Prob.	Std. Err.	Prob.	Std. Err.	Differ.	Sig.	Prob.	Std. Err.	Prob.	Std. Err.	Differ.	Sig.
Arts & Humanities	.240	.009	.214	.011	.027	n.s.	.457	.010	.450	.013	.007	n.s.
Social & Law	.235	.005	.300	.007	-.065	***	.564	.005	.405	.007	.159	***
Health	.232	.007	.284	.011	-.052	***	.611	.008	.522	.012	.089	***
Sciences	.319	.014	.291	.013	.028	n.s.	.402	.013	.313	.012	.089	***
Engineering & Architecture	.413	.013	.389	.007	.024	n.s.	.291	.011	.223	.006	.069	***
Total	.280	.004	.306	.004	-.026		.489	.004	.385	.004	.104	

Note: The predicted probabilities are calculated from a multinomial logistic regression with the trajectory group as the dependent variable (5 groups, only 4 are shown). The model includes gender and field of study as independent variables, as well as their interaction, and a vector of control variables: entry grades, PEL, age, access route, and working while studying. Statistics summary of the logistic regression model: N = 30392. Likelihood Ratio chi2 (64) = 8038.06. Probability > chi2 = 0.000. Pseudo R2 McFadden=0.0994. Statistical significance of the differences (Wald test p-value): *** p ≤ .001, ** p ≤ .01, * p ≤ .05

Source: authors' own elaboration.

The interaction between gender and field of study (Table 6) indicates that women tend to follow more favourable academic trajectories across all areas, including science and engineering and architecture. Specifically, they are less likely to be assigned to the *dropout* or *slow progression* trajectories and more likely to follow the *optimal route*.

Table 7. Predicted Probability of Belonging to a Trajectory Group by Age and Field of Study.

	Dropout trajectory						Slow progression					
	Up to 25		26 or more				Up to 25		26 or more			
	Prob.	Std. Err.	Prob.	Std. Err.	Differ.	Sig.	Prob.	Std. Err.	Prob.	Std. Err.	Differ.	Sig.
Arts & Humanities	.209	.007	.219	.017	-.010	n.s.	.070	.004	.046	.010	.023	*
Social & Law	.123	.003	.210	.012	-.087	***	.067	.002	.056	.009	.011	n.s.
Health	.100	.004	.128	.013	-.028	*	.049	.003	.056	.011	-.007	n.s.
Sciences	.195	.009	.323	.041	-.128	**	.103	.007	.076	.028	.028	n.s.
Engineering & Architecture	.178	.005	.280	.021	-.102	***	.120	.004	.106	.017	.015	n.s.
Total	.146	.002	.219	.009	-.073		.079	.002	.068	.007	.012	

	Successful recovery						Optimal route					
	Up to 25		26 or more				Up to 25		26 or more			
	Prob.	Std. Err.	Prob.	Std. Err.	Differ.	Sig.	Prob.	Std. Err.	Prob.	Std. Err.	Differ.	Sig.

Arts & Humanities	.237	.007	.132	.019	.105	***	.433	.008	.544	.025	-.111	***
Social & Law	.267	.004	.180	.016	.087	***	.499	.004	.506	.018	-.008	n.s.
Health	.254	.006	.251	.022	.003	n.s.	.573	.007	.530	.024	.043	n.s.
Sciences	.311	.010	.147	.043	.164	***	.363	.009	.454	.052	-.091	*
Engineering & Architecture	.402	.007	.160	.024	.242	***	.264	.006	.398	.032	-.134	***
Total	.292	.003	.178	.011	.113		.445	.003	.490	.013	-.044	

Note: The predicted probabilities are calculated from a multinomial logistic regression with the trajectory group as the dependent variable (5 groups, only 4 are shown). The model includes age and field of study as independent variables, as well as their interaction, and a vector of control variables: entry grades, PEL, gender, access route, and working while studying. Statistics summary of the logistic regression model: N = 30392. Likelihood Ratio chi2 (64) = 7994.67. Probability > chi2 = 0.000. Pseudo R2 McFadden=0.0989. Statistical significance of the differences (Wald test p-value): *** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$

Source: authors' own elaboration.

Table 7 shows that, in the fields of social sciences, sciences, and engineering and architecture, individuals who enter university over the age of 26 are more likely to follow *dropout* trajectories. Conversely, in two of these areas, as well as in humanities, they also exhibit a higher probability than younger students of following the *optimal route*. However, their likelihood of being assigned to the *successful recovery* trajectory is lower than that of younger students across all the fields except for health, and particularly in engineering and architecture.

This suggests a pattern broadly similar to that observed for PEL, albeit considerably more pronounced: older students are more polarised in their outcomes—if they do not follow an *optimal route*, they are more likely to drop out than to pursue a recovery path, especially in more demanding fields such as sciences and engineering.

Conclusion

In the first phase of the analysis, student trajectories were classified using the longitudinal method of Group-Based Trajectory Modelling. This approach made it possible to identify the typical academic trajectories and to determine the proportion of students from the 2012 cohort assigned to each trajectory group (Objective 1). The findings confirm that a very high proportion—approximately 70%—follow *high-performance* trajectories. Within this group, over 40% pursue the pathway the institution envisages for the ideal student: one characterised by continuous high performance and credit accumulation, completed within the expected timeframe. The remaining high-performing students begin

with some initial difficulties but manage to improve over time, likely through gradual adaptation to the university environment. This process, however, tends to delay their graduation.

Beyond these two successful trajectories, a considerable heterogeneity in progression patterns was also identified, highlighting the need to adopt an approach that acknowledges more complex academic trajectories (Haas & Hadjar, 2020; Troiano, Brennan, & Giret, 2024). *Dropout* trajectories, far from being homogeneous, were differentiated according to prior academic performance—whether high or low—and the timing of withdrawal. This gave rise to three distinct types of trajectories resulting in the discontinuation of studies.

The final type of trajectory identified underscores the relevance of progression time, understood as the varying temporal horizons within which academic development unfolds (Elder & Giele, 2009). In this case, *stable medium performance*—defined as earning between 50% and 60% of enrolled credits—does not merely delay graduation but, in most cases, results in persistent enrolment seven years after university entry.

The typology obtained was simplified into four clearly hierarchical types, based on two criteria, i.e., the probability of successfully completing studies and the homogeneity of the academic and sociodemographic profiles of the individuals involved. The types resulting from this simplification and used in the second part of the analysis were: dropout trajectory, slow progression, successful recovery, and optimal route.

In this second part, addressing Objective 2, the aim was to understand the influence of various variables across different contexts, represented by the fields of study. The first variable considered, access grades, proved to be a key indicator of trajectory patterns. Firstly, as expected, low entry grades were more frequently associated with complex or dropout trajectories, whereas high entry grades were linked to more linear or optimal ones (Boylan, 2020). However, secondly, the analysis also revealed that students in higher-risk fields, such as sciences, and especially engineering (González-Pérez et al., 2022; Sáinz, 2017), often struggled academically even when they entered university with high grades. These students showed the highest probability of following recovery trajectories.

The influence of parental education level on the probability of following each trajectory by field of study appeared to be weak. It is likely that differences in outcomes were mainly due to prior academic preparation, as introducing access grades into the model

significantly reduced these disparities. Significant differences are observed only in certain fields of study, and only with respect to the *optimal route* trajectories (favouring students without university-educated parents) and the *successful recovery* trajectories (favouring students with university-educated parents). The latter's greater capacity to overcome academic disadvantage aligns with the phenomenon described in the theoretical framework as compensatory advantage (Bernardi & Cebolla, 2014; Sánchez-Gelabert & Troiano, 2023).

Empirical studies cited in the introduction consistently find that, at the undergraduate level, women tend to outperform men in both academic performance and persistence. This trend is confirmed by the findings, which show that women are more likely to follow stable, high-performing trajectories. However, a specific aspect of this study is worth highlighting. While international research shows that women are underrepresented in science and engineering (STEM) fields—except for the life sciences subfield—and are more prone to dropping out (Fisher, Brookes, & Thompson, 2022; Kaganovich, Taylor, & Xiao, 2023), the Spanish and Catalan context tells a more nuanced story. Although entry patterns mirror international trends, dropout rates do not (Mateos Sillero & Gómez Hernández, 2019; Usart, Sánchez-Canut, & Lores, 2022). In this study, women in Catalan universities were found to pursue the most successful academic trajectories, not only as a global trend but also within the fields of science, engineering and architecture.

The trajectories followed by older students are particularly noteworthy. Their probability of following either the optimal or dropout trajectory is higher than that of other students, while it is lower for the slow progression and especially the successful recovery trajectories. This pattern is particularly pronounced in some fields such as sciences and engineering. These results suggest that when older students are unable to follow an optimal academic path, they are less likely to remain at university pursuing slower or more gradual trajectories. Instead, they tend to drop out at higher rates than their younger peers.

These findings are consistent with those presented in the theoretical framework, which highlight how extending the duration of studies beyond the expected timeframe is particularly problematic for older students. Unlike their younger counterparts, they may find it more difficult to accept such a prolonged academic horizon, since, at this point in

their life course, such a long academic timeframe is harder to accommodate (Langa & Río, 2013; Sánchez-Gelabert, 2024; Vossensteyn et al., 2015).

The characterization of academic trajectories in this article considers not only final outcomes but also students' progression throughout their educational pathways. In addition, the analysis of sociodemographic and academic factors associated with the likelihood of following a given trajectory provides valuable insights that can inform improvements in higher education policy.

Specifically, the early dropout group reflects the well-known challenge of the transition from secondary to higher education. This transition often requires better articulation of content, teaching approaches, and adaptation to a new academic environment. Policies aimed at strengthening coordination with secondary education institutions and supporting students during this transitional phase—especially those from vulnerable backgrounds—appear to be particularly appropriate for addressing this issue.

Stable descending trajectories often reflect a pattern of early academic difficulties, after which students remain enrolled but ultimately do not succeed. While academic support policies are commonly offered in such cases, they are often insufficient. What is rarely provided—yet appears particularly relevant—is guidance aimed at helping students reconsider or redirect their academic path. Career reorientation support could be especially beneficial for these students.

Career guidance also seems appropriate for students following a slow progression trajectory due to low performance. Adjusting course loads to align with students' realistic capacity to succeed could result in a more manageable and less stressful slow-paced path than the one these students often end up following.

As for the late dropout group, unfortunately, we do not have updated annual data on students' employment status. However, it seems reasonable to assume that, in the later stages of their academic trajectories, many students combine study and work—something that may be contributing to this pattern of dropout. This group warrants further investigation, but a potentially effective intervention would involve policies specifically aimed at supporting the combination of work and study during the final stages of their degree programs.

The scope of this work is limited, and several important constraints must be acknowledged. These can be broadly grouped into three categories. First, there are limitations related to the availability of variables that would allow for a more detailed analysis based on the theoretical framework. Second, while the use of a large-scale dataset is an advantage—offering a general overview of the experiences of a broad student population—it also presents limitations. Specifically, it precludes in-depth analysis of particularly relevant subgroups. As a result, this study could not account for distinctions between public and private universities, online students, or students enrolled in double degree programmes. These groups have grown significantly in recent years and warrant specific attention in future research.

Finally, although the quantitative approach employed here is valuable, it does not capture the motivations and reasoning behind students' decisions. As such, a significant part of the phenomenon inevitably escapes quantitative analysis, highlighting the need for complementary qualitative approaches.

References

Béduwé, C., & Giret, J. F. (2021). Student employment in France: Hindrance rather than help for higher educational success? *Journal of Education and Work*, *34*(1), 95–109. https://doi.org/10.1080/13639080.2021.1875127ï

Beekhoven, S., De Jong, U., & Van Hout, H. (2002). Explaining academic progress via combining concepts of integration theory and rational choice theory. *Research in Higher Education*, *43*(5), 577–600. https://doi.org/10.1023/A:1020166215457

Bernardi, F., & Cebolla, H. (2014). Previous school results and social background: Compensation and imperfect information in educational transitions. *European Sociological Review*, *30*(2), 207–217. https://doi.org/https://doi.org/10.1093/esr/jct029

Boudon, R. (1974). *Education, opportunity, and social inequality: Changing prospects in western society.* New York: John Wiley.

Bourdieu, P., & Passeron, J.-C. (1964). *Les héritiers. Les étudiants et la culture.* Paris: Les éditions de Minuit.

Bourdieu, P., & Passeron, J.-C. (1977). *Reproduction in education, society and culture*. London: Sage.

Boylan, R. L. (2020). Predicting Postsecondary Pathways : The Effect of Social Background and Academic Factors on Routes through School. *Socius: Sociological Research for a Dynamic World*, *6*, 1–25. https://doi.org/10.1177/2378023119895174

Bozick, R., & DeLuca, S. (2005). Better Late Than Never? Delayed Enrollment in the High School to College Transition. *Social Forces*, *84*(1), 531–554. https://doi.org/10.1353/sof.2005.0089

Breen, R., & Goldthorpe, J. H. (1997). Explaining educational differentials towards a formal rational action theory. *Rationality and Society*, *9*(3), 275–305.

Deil-Amen, R., & Goldrick-Rab, S. (2009). Institutional transfer and the management of risk in higher education. In *American Sociological Association Annual Meeting*. San Francisco, CA: WISCAPE. Retrieved from WISCAPE website: http://www.wiscape.wisc.edu/docs/wiscapedocuments/wp008.pdf?sfvrsn=2

Denice, P. (2019). Trajectories through postsecondary education and students' life course transitions. *Social Science Research*, *80*, 243–260. https://doi.org/10.1016/j.ssresearch.2019.02.005

Elder, G. H. Jr., & Giele, J. Z. (2009). "Life Course Studies. An Evolving Field." In *The craft of life course research*, edited by G. H. Elder Jr. and J. Z. Giele, 1–24. The Guilford Press.

Figuera-Gazo, P., Torrado-Fonseca, M., Llanes-Ordóñez, J., & Romero-Rodríguez, S. (2020). "Equity and Course Advancement in University Students: The Case of Business Administration and Management." In *International Perspectives on Research in Educational and Career Guidance*, edited by B. Malik-Liévano, B. Álvarez-González, M. F. Sánchez-García and B. A. Irving, 95-11. Cham: Springer. https://doi.org/10.1007/978-3-030-26135-1

Fisher, C. R., Brookes, R. H., & Thompson, C. D. (2022). 'I don't Study Physics Anymore': a Cross-Institutional Australian Study on Factors Impacting the Persistence of Undergraduate Science Students. *Research in Science Education*, *52*(5), 1565–1581. https://doi.org/10.1007/s11165-021-09995-5

Goldrick-Rab, S., & Pfeffer, F. T. (2009). Beyond access: Explaining socioeconomic differences in college transfer. *Sociology of Education*, *82*(2), 101–125.

González-Pérez, S., Martínez-Martínez, M., Rey-Paredes, V., & Cifre, E. (2022). I am done with this! Women dropping out of engineering majors. *Frontiers in Psychology*, *13, 1-20*. https://doi.org/10.3389/fpsyg.2022.918439

Haas, C. (2023). Not only enrollment and retention: comparing the study trajectories at German universities and Universities of Applied Sciences. *Studies in Higher Education*, *48*(9), 1468-1483. https://doi.org/10.1080/03075079.2023.2203163

Haas, C., & Hadjar, A. (2020). Students' trajectories through higher education: a review of quantitative research. *Higher Education*, *79*, 1099–1118. https://doi.org/10.1007/s10734-019-00458-5

Haas, C., & Hadjar, A. (2024). Social Inequalities in Study Trajectories: A Comparison of the United States and Germany. *Sociology of Education*, *97*(3), 276-296. https://doi.org/10.1177/00380407241228553

Herbaut, E. (2020). Overcoming failure in higher education: Social inequalities and compensatory advantage in dropout patterns. *Acta Sociologica (United Kingdom)*, *64*(4), 383-402. https://doi.org/10.1177/0001699320920916

Hovdhaugen, E. (2009). Transfer and dropout: different forms of student departure in Norway. *Studies in Higher Education*, *34*(1), 1–17. https://doi.org/10.1080/03075070802457009

Hovdhaugen, E. (2011). Do structured study programmes lead to lower rates of dropout and student transfer from university? *Irish Educational Studies*, *30*(2), 237–251. https://doi.org/10.1080/03323315.2011.569143

Jackson, M. (2013). *Determined to succeed?: performance versus choice in educational attainment*. Standford: Stanford University Press.

Jones, B. L., & Nagin, D. S. (2013). A note on a Stata plugin for estimating group-based trajectory models. *Sociological Methods & Research*, *42*(4), 608–613. https://doi.org/https://doi.org/10.1177/0049124113503141

Kaganovich, M., Taylor, M., & Xiao, R. (2023). Gender Differences in Persistence in a Field of Study: This Isn't All about Grades. *Journal of Human Capital*, *17*(4), 503–556. https://doi.org/10.1086/726629

Langa, D., & Río, M. Á. (2013). Los estudiantes de clases populares en la universidad y frente a la universidad de la crisis: persistencia y nuevas condiciones para la multiplicación de la desigualdad de oportunidades educativas. *Revista Témpora*, *16*, 71–96.

Lin, Y., Fay, M. P., & Fink, J. (2023). Stratified Trajectories: Charting Equity Gaps in Program Pathways Among Community College Students. *Research in Higher Education*, *64*(4), 547–573. https://doi.org/10.1007/s11162-022-09714-7

Lörz, M., & Mühleck, K. (2019). Gender differences in higher education from a life course perspective: transitions and social inequality between enrolment and first post-doc position. *Higher Education*, *77*(3), 381–402. https://doi.org/10.1007/s10734-018-0273-y

Mateos Sillero, S., & Gómez Hernández, C. (2019). *Libro Blanco de las mujeres en el ámbito tecnológico*. Madrid: Ministerio de Economía y Empresa. Gobierno de España.

Miller Flores, D., & de Garay Sánchez, A. (2022). Los recorridos escolares de una generación universitaria en la Universidad Autónoma Metropolitana, Unidad Azcapotzalco. In *Trayectorias y transiciones educativas de los estudiantes mexicanos*, edited by M. López Ramírez and S. Andrés Rodríguez, México: IISUE, UNAM. Retrieved from https://www.iisue.unam.mx/publicaciones/libros/

Mize, T. D. (2019). Best practices for estimating, interpreting, and presenting nonlinear interaction effects. *Sociological Science*, *6*:81–117. https://doi.org/10.15195/V6.A4

Müller, L., & Klein, D. (2023). Social Inequality in Dropout from Higher Education in Germany. Towards Combining the Student Integration Model and Rational Choice Theory. *Research in Higher Education*, *64*, 300-330. https://doi.org/10.1007/s11162-022-09703-w

Nagin, D. S. (2005a). *Group-based modeling of development*. Cambridge, MA.: Harvard University Press.

Nagin, D. S. (2005b). *Group-Based Modeling of Development*. Cambridge, MA.: Harvard University Press.

Orr, D., Usher, A., Haj, C., Atherton, G., & Geanta, I. (2017). *Study on the impact of admission systems on higher education outcomes*. European Comission. https://doi.org/10.2766/943076

Parentelli, V., Cuadrado, V., & Martínez, A. (2018). Las trayectorias de los primeros estudiantes de Comunicación del plan de estudios 2012. *InterCambios. Dilemas y Transiciones de La Educación Superior.*, *5*(2), 70–83.

Reay, D., Crozier, G., & Clayton, J. (2010). "Fitting in" or "standing out": Working class students in UK higher education. *British Educational Research Journal*, *36*(1), 107–124. https://doi.org/10.1080/01411920902878925

Sacristán, V., & França, J. (2013). *El preu de la carrera. Preus universitaris 2013-14 a Catalunya i anàlisi de l'evolució del preu total dels estudis.* Barcelona: Observatori Universitari. Retrieved from http://www.observatoriuniversitari.org/blog/2013/07/18/el-preu-de-la-carrera/

Sáinz, M. (coord.). (2017). *Se buscan ingenieras, físicas y tecnólogas ¿Por qué no hay más mujeres STEM?* Barcelona: Ariel.

Sánchez-Gelabert, A. (2020). Non-traditional students, university trajectories, and higher education institutions: A comparative analysis of face-to-face and online universities. *Studia Paedagogica*, *25*(4), 51–72. https://doi.org/10.5817/SP2020-4-3

Sánchez-Gelabert, A. (2024). Higher education and the life course: Exploring the interactive effects of age and employment status on university graduation. *Higher Education Quarterly*, *78*(4), e12553. https://doi.org/10.1111/hequ.12553

Sánchez-Gelabert, A., & Troiano, H. (2023). Compensatory advantage after the first year at university in the Catalan system: between continuing, transferring and dropping out. *Studies in Higher Education*, *49*(11), 1867–1883. https://doi.org/10.1080/03075079.2023.2281539

Staff, J., & Mortimer, J. T. (2007). Education and work strategies from adolescence to early adulthood: Consequences for educational attainment. *Social Forces*, *85*, 1169–1194.

Tieben, N. (2020). Non-completion, Transfer, and Dropout of Traditional and Non-traditional Students in Germany. *Research in Higher Education*, *61*(1), 117–141. https://doi.org/10.1007/s11162-019-09553-z

Tinto, V. (1975). Dropout from Higher Education: A Theoretical Synthesis of Recent Research. *Review of Educational Research*, *45*(1), 89–125. https://doi.org/10.3102/00346543045001089

Troiano, H., Brennan, J., & Giret, J.-F. (2024). From the main track to the winding path: considering the diversity of trajectories at university. *International Journal of Educational Technology in Higher Education*, *21*(1), 7. https://doi.org/10.1186/s41239-024-00441-w

Troiano, H., Torrents, D., & Daza, L. (2021). Compensation for poor performance through social background in tertiary education choices. *Studies in Higher Education*, *46*(6), 1225–1240. https://doi.org/10.1080/03075079.2019.1666262

Usart, M., Sánchez-Canut, S., & Lores, B. (2022). *The STEM field is failing to attract female talent*. Barcelona: Fundació la Caixa. Retrieved from https://elobservatoriosocial.fundacionlacaixa.org/en/-/the-stem-field-is-failing-to-attract-female-talent#

Villar-Aguilés, A., & Muñoz-Rodríguez, D. (2024). Complex trajectories in higher education students: online and face-to-face universities. *Journal of New Approaches in Educational Research*, *13*(4), 1-16. https://doi.org/10.1007/s44322-023-00006-1

Vossensteyn, H., Kottmann, A., Jongbloed, B., Kaiser, F., Cremonini, L., Stensaker, B., … Wollscheid, S. (2015). Drop-Out and Completion in Higher Education in Europe - Literature Review. In *European Commission*. https://doi.org/10.2766/023254

Table A1. Proportion of students belonging to each trajectory. Percentages.

	Early descending (9.7%)	**Stable descending (5.5%)**	**Mid-stable performance (8.0%)**	**Upward performance (27.0%)**	**High performance & decline (6.1%)**	**High stable performance (43.7%)**	**% col. (%row)**	**N**
Field of Studies* [.139]**								
Arts & Humanities	**15**	**7.74**	6.99	23.23	**5.47**	41.57	100 (12.15)	3693
Social and Law	7.88	5.46	6.21	25.78	**4.86**	**49.81**	100 (40.1)	12188
Health	5.53	3.64	4.1	22.83	2.52	**61.38**	100 (18.16)	5518
Sciences	9.67	4.86	8.23	29.09	2.55	45.6	100 (8)	2430
Engineering and Architecture	**14.22**	5.59	**12.71**	**39.34**	4.08	24.06	100 (21.59)	6563
Access Grades* [.168]**								
Up to 5.99	**23.72**	**10.39**	**13.18**	28.13	**5.76**	18.82	100 (8.52)	2588
6-6.99	**17.75**	**8.76**	**10.92**	**31.06**	**5.53**	25.98	100 (14.46)	4395
7-7.99	**13.34**	**6.98**	**9.07**	**30.47**	**4.77**	35.37	100 (18.21)	5533
8-8.99	8.08	5.35	7.66	**29.68**	4.49	44.74	100 (18.08)	5496
9-9.99	4.77	3.62	5.12	**29.22**	3.35	**53.92**	100 (15.73)	4781
10-10.99	2.51	1.91	4.88	26.6	2.62	**61.47**	100 (12.06)	3665
11-11.99	2.7	1.83	3.1	21.55	2.7	**68.13**	100 (8.29)	2520
12-12.99	1.54	1.06	2.19	16.57	2.27	**76.36**	100 (4.05)	1231
13-14	2.19	1.09	1.09	10.93	4.37	**80.33**	100 (0.60)	183
Parental Education Level* [.070]**								
Non-University	**11**	**6.02**	7.28	26.48	**4.55**	44.66	100 (58.09)	17656
University	8.2	4.51	7.77	**30.41**	3.6	45.5	100 (41.91)	12736
Gender* [.222]**								
Women	7.5	4.27	5.23	24.66	3.6	**54.74**	100 (54.76)	16643
Man	**12.65**	**6.75**	**10.21**	**32.33**	**4.83**	33.23	100 (45.24)	13749
Age* [.176]**								
Up to 25	8.65	4.96	7.56	**29.03**	4.05	**45.75**	100 (93.41)	28389
26 or more	**26.46**	**11.53**	6.44	15.33	**5.69**	34.55	100 (6.59)	2003
Access route* [.135]**								
Academic track	7.33	4.31	**7.73**	**29.99**	3.83	**46.82**	100 (72.98)	22180
VET track	**13.6**	**7.02**	6.6	25.28	**4.99**	42.51	100 (17.35)	5272
Other	**21.94**	**10.65**	7.24	19.18	**5.14**	35.85	100 (9.67)	2940
Working while studying* [.044]**								
Not working	8.8	5.03	7.25	**28.71**	3.98	**46.22**	100 (66.59)	20237

Up to 15 hours per week	**11.14**	5.76	7.67	26.92	4.64	43.87	100 (5.88)	1787
15 hours or more	**12.03**	**6.19**	**8.01**	26.97	4.47	42.33	100 (27.53)	8368

Note: *** p ≤ .001, ** p ≤ .01, * p ≤ .05 for the chi2 test
In parentheses the proportion of students classified in each group.
Square brackets: V Cramer as a measure of the intensity of the association between variables.
Bold: Values greater than 1.96 for standardised and corrected residuals as a measure of the intensity of positive association between categories.
Source: authors' own elaboration.

Table A2. Relative Risk Ratios of belonging to a Group of Trajectory. (Reference group: High stable performance)

	Early descending		**Stable descending**		**Mid-stable performance**		**Upward performance**		**High performance & decline**	
	RRR	Std. Err.	RRR	Std. Err.	RRR	Std. Err.	RRR	Std. Err.	RRR	Std. Err.
Arts & Humanities (ref.)										
Social and Law	.46***	.03	.61***	.05	.81**	.06	.96	.05	.74***	.07
Health	.29***	.02	.38***	.04	.51***	.05	.79***	.04	.34***	.04
Sciences	1.39***	.14	1.19	.15	1.96***	.21	1.68***	.11	.63**	.10
Engineering and Architecture	1.89***	.14	1.38***	.13	3.32***	.28	3.06***	.18	1.26*	.14
Up to 5.99 (ref.)										
6-6.99	.55***	.04	.61***	.06	.63***	.06	.81*	.06	.70**	.09
7-7.99	.35***	.03	.39***	.04	.42***	.04	.61***	.04	.47***	.06
8-8.99	.18***	.02	.25***	.03	.28***	.03	.46***	.03	.36***	.04
9-9.99	.09***	.01	.14***	.02	.14***	.01	.34***	.02	.22***	.03
10-10.99	.04***	.00	.06***	.01	.10***	.01	.23***	.02	.15***	.02
11-11.99	.03***	.00	.05***	.01	.05***	.01	.16***	.01	.15***	.02
12-12.99	.02***	.00	.03***	.01	.03***	.01	.10***	.01	.12***	.03
13-14	.02***	.01	.02***	.02	.01***	.01	.06***	.01	.21***	.08
Non-University (ref.)										
University	1.01	.05	.97	.06	1.2***	.06	1.21***	.04	.95	.06
Women (ref.)										
Man	1.77***	.08	1.97***	.11	2***	.10	1.49***	.05	1.79***	.12
Up to 25 (ref.)										
26 or more	1.51***	.13	1.25*	.13	.81	.10	.62***	.05	1.13	.15
Access route										
Academic track (ref.)										
VET track	1.88***	.11	1.65***	.12	.92	.06	.98	.04	1.38***	.11

Other	1.52***	.12	1.54***	.14	.77**	.07	.70***	.05	1	.12
Not working (ref.)										
Up to 15 hours per week	1.11	.10	1.01	.11	1.11	.10	1.03	.07	1.13	.14
15 hours or more	1.07	.05	1.02	.06	1.08	.09	.99	.03	1.03	.07
Constant:	1.06	.13	.45***	.07	.49***	.07	1.13	.11	.30***	.05

Notes: RRR based on Multinomial Logistic Regression with dependent variable = Group of Trajectory (6 categories); reference group = High stable performance; *** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$.

Statistics summary: N = 30392. Likelihood Ratio chi2 (95) = 8104.84. Probability > chi2 = 0.000. Log Likelihood = -39395.171. BIC = 79822.54.

Source: authors' own elaboration.