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Factors at the household and university level that influence student dropout at UNAM

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This study analyzes the socioeconomic, institutional, and personal factors that influence student dropout at the National University of Moquegua (UNAM), with the main objective of identifying the most significant determinants to guide effective retention strategies. Based on data collected through a face-to-face survey conducted during the first semester of 2024 with a sample of 771 students (including both regular students and dropouts), a logistic regression model was applied to estimate the marginal effects of various factors on dropout probability. Results indicate that parental motivation serves as a strong protective factor, with frequent encouragement reducing dropout risk by 7.8 percentage points and very frequent motivation by 16.8 points. In contrast, having a mother without formal education or a father working in commerce significantly increases the risk. Access to a computer and internet at home correlates with lower dropout rates. Institutionally, receiving substantial homework decreases the likelihood of dropout, while poor class scheduling (27.5 percentage points), difficulty accessing campus (20.2), and negative perceptions of library quality (10.9) raise it. Student-related factors such as being male, studying fewer hours per day, and having children are also associated with increased dropout risk. The findings underscore that university dropout is driven by a combination of structural and individual elements, highlighting the need for institutions to strengthen academic and logistical support systems while fostering supportive family environments.

KEYWORDS

university dropout, student retention, socioeconomic factors, academic performance, parental motivation

Introduction

Student dropout in higher education is a phenomenon that has been studied from various perspectives. One of the most influential theories is that of Tinto (1989), who argues that student retention is closely related to the level of academic and social commitment a student demonstrates toward the university. Integration involves participation and performance in academic, athletic, and interpersonal activities. This concept has been supported by recent research (Castro, 2020; Cetina et al., 2023; Delgado-Villalobos et al., 2021; Kuz and Morales, 2023; Pérez, 2020; Rosado-Castellanos et al., 2024).

It has also been suggested that a student's adaptation to the institutional environment requires not only knowledge but also socio-emotional competencies that enable them to function appropriately (Ayala and Abarca, 2018; Delgado-Villalobos et al., 2021). The perceived usefulness of the academic program and the degree of satisfaction with study conditions significantly influence student retention (Pineda and Araya, 2021).

Dropout is a complex phenomenon that has been examined by multiple disciplines, considering both individual and institutional factors. In his seminal work, Tinto (1989) proposed a theoretical framework that postulates that dropout is intrinsically linked to the social and academic integration students experience in university. This approach emphasizes that students who feel integrated and engaged—both socially and academically—are more likely to persist in their studies (Castro, 2020; Delgado-Villalobos et al., 2021).

Tinto's model has been widely referenced and validated in subsequent research. For instance, academic integration is expressed through academic performance and intellectual development, while social integration refers to interactions with peers and faculty (Kuz and Morales, 2023; Pérez, 2020). These elements are crucial to the student's educational experience, and their absence can be a strong predictor of dropout, as noted in several recent studies (Cetina et al., 2023; Rosado-Castellanos et al., 2024).

Beyond integration factors, Tinto and other authors highlight the importance of student adaptation to the institution's social dynamics. This implies that students must develop not only academic skills but also social competencies that help them navigate their educational environment (Ayala and Abarca, 2018; Delgado-Villalobos et al., 2021). The perception of the chosen program's utility and satisfaction with learning conditions also influence the decision to remain enrolled or to drop out (Pineda and Araya, 2021).

Student dropout cannot be understood in isolation; socioeconomic context, family characteristics, and mental health play a vital role in students' decisions to continue their education. Studies have shown that external factors such as family responsibilities, financial hardship, and mental health challenges significantly affect student retention (Kuz and Morales, 2023; Velíz et al., 2024). Thus, higher education institutions must implement strategies that not only focus on academic performance but also prioritize the overall wellbeing of their students.

The use of predictive models and data mining techniques has emerged as a valuable tool for the early identification of students at risk of dropping out. These methods allow for a more refined analysis of the factors contributing to dropout and offer institutions the opportunity for proactive intervention (García et al., 2018; Vivanco-Saraguro, 2021). Therefore, a multidimensional approach considering personal and organizational variables is essential to addressing this educational challenge. Tinto's theoretical framework provides a solid foundation for understanding these dynamics and underscores the importance of integration in the student educational experience. Institutions should, therefore, design policies that promote inclusion and wellbeing, thereby contributing to a reduction in dropout rates.

This study addresses a significant gap in research on school dropout at the National University of Moquegua (UNAM), with a particular emphasis on the psychological and motivational factors

that influence student retention. Although student dropout has been extensively analyzed in the Peruvian and Latin American context, there is a lack of studies that integrate specific psychological approaches and motivational models applied to this issue, especially in regional contexts such as that of UNAM.

Previous literature has explored various factors contributing to dropout, such as socioeconomic and academic variables (Calero, 2023; Rivera et al., 2022). However, few have focused their attention on how psychological needs and the teacher's motivational style impact students' educational experience. This study aims to fill that gap by investigating how the frustration or satisfaction of basic psychological needs influences motivation and, consequently, the decision to continue or abandon studies at UNAM.

According to Self-Determination Theory, the satisfaction of needs such as autonomy, competence, and relatedness is essential for fostering a positive learning environment and intrinsic motivation (Delgado et al., 2022; Murcia et al., 2019). This approach has shown that a lack of autonomy support in the classroom can result in decreased motivation and a higher propensity for dropout (Murcia et al., 2019). Therefore, applying these principles to the phenomenon of school dropout at UNAM emphasizes the need for a multidimensional approach that considers not only academic performance but also the psychological wellbeing of students.

The specific contribution of this study lies in the implementation of a robust theoretical framework that not only addresses academic challenges but also integrates the psychological dimension of the student experience. This translates into the design of interventions that potentially foster a motivational climate within the institution and strengthen student support throughout their academic journey (Martínez et al., 2020). Thus, the research aims not only to describe the current situation but also to propose concrete strategies to improve retention at UNAM, aligning with the growing focus on psychological wellbeing and needs in the academic field (Delgado et al., 2022; Colás Casaban et al., 2017).

This study analyzes how factors such as age at entry, course repetition, family responsibilities, and socioeconomic conditions contribute to student dropout at UNAM. According to the collected data, 20.75% of surveyed students have dropped out, highlighting the scale of the issue. While dropout rates have fluctuated over the years, a decrease in recent years suggests that measures taken by the university to support students may be having an effect.

The primary aim of this article is to identify and describe the risk factors contributing to student dropout at UNAM, providing a solid foundation for designing effective intervention policies. Given that dropout is a complex, multifactorial phenomenon, understanding its determinants is crucial for implementing strategies that enhance student retention and academic success. This study aims to contribute to the academic knowledge on the topic while offering practical recommendations to improve student retention, fostering quality, inclusive, and equitable education for young people in the region.

Student dropout is a complex phenomenon that affects universities, including the UNAM, and is influenced by a variety of factors at both the household and university levels. In this context, it is crucial to understand how socioeconomic conditions, family responsibilities, age at entry, and academic performance contribute to this issue (Hernández et al., 2017; Rojas et al., 2023; Castro et al., 2016).

Socioeconomic factors are key determinants in student dropout. Many students come from disadvantaged economic backgrounds that limit their access to adequate educational resources. This not only affects their academic performance but also increases the pressure to work while studying, which can lead to dropout (Lobos-Rivera and Vásquez, 2023; Muñoz and Cadena, 2024; Sprockel et al., 2020). The need to balance work and study can result in burnout, which diminishes motivation and commitment to education (Kuz and Morales, 2023; Nasner et al., 2022). Furthermore, the family context also plays a crucial role; students who face family responsibilities, such as child care, have a significantly higher dropout rate, reaching up to 54.29% in some cases (González-Bedoya and Molina-Osorio, 2020).

The age at entry to university is another factor influencing dropout. Students who enter at an older age, particularly those between 19 and 20 years, show higher dropout rates, suggesting they may have more difficulties adapting to university life (Márquez and Sánchez-Pozo, 2023; Matute et al., 2023). This difficulty may be related to a lack of academic preparation or the additional pressure of external responsibilities they face (Moreno-Arteaga et al., 2024; del Carmen Hernández Osorio, 2023). Therefore, it is essential for educational institutions to implement specific orientation and support programs for these student groups, helping them better adapt to the academic and social demands of university (Gutiérrez et al., 2021; Pulido et al., 2023).

Academic performance and course repetition are also critical factors in dropout. Students who have repeated semesters have dropout rates higher than 27%, indicating that academic failure can be a significant predictor of dropout (Choque and Sosa-Jauregui, 2022). The lack of academic support and the perception that expectations are not being met can lead to frustration and ultimately to the decision to drop out (Llanos and Quezada, 2018; Vergaray, 2021). Universities must consider implementing early intervention strategies to identify at-risk students and provide the necessary support to improve their academic performance (Pulido et al., 2023; Sifuentes et al., 2023).

Furthermore, institutional support is a factor that can influence student retention. The quality of orientation programs and access to academic resources are essential for fostering a positive learning environment (Gorostiaga et al., 2017; Gutiérrez et al., 2021). Students who feel they have the support of their institutions are more likely to persist in their studies (López and Martínez, 2022; Velíz et al., 2024). Therefore, universities need to assess and improve their student support programs, ensuring that they are accessible and effective for all students, particularly those facing significant challenges (Aviles-Barre et al., 2024; Caicer-Nayape et al., 2024).

The interaction between these factors creates an environment where student dropout can be seen as the result of multiple influences. For example, a student facing economic difficulties may have to work part-time, which in turn can affect their academic performance and increase their risk of dropout (Lobos-Rivera and Vásquez, 2023; Muñoz and Cadena, 2024). Likewise, those with family responsibilities may experience additional stress that hinders their ability to focus on their studies (González-Bedoya and Molina-Osorio, 2020; Moreno-Arteaga et al., 2024). This multifaceted approach is crucial for understanding dropout and developing effective strategies to address the issue at UNAM and

other higher education institutions (Castro et al., 2016; Rojas et al., 2023; Rueda and Pinilla, 2022).

The implementation of educational policies that address these factors is essential to reduce dropout rates. Universities must collaborate with families and communities to create an environment that supports students in their academic journey (Hernández et al., 2017). This may include the creation of mentoring programs, the offering of financial resources, and the promotion of an inclusive environment that recognizes and values the diverse experiences of students (Aviles-Barre et al., 2024; Muñoz and Cadena, 2024; Pulido et al., 2023).

Materials and methods

Probit model

A Probit model in econometric terms is used when the dependent variable is dichotomous, meaning it takes values of 0 or 1, as in the case of university dropout (where 1 indicates that the student dropped out and 0 suggests that they did not). The Probit model assumes that there is a non-linear relationship between the explanatory variables and the probability of the event occurring.

Relationship with the observed variable

The observed variable, university dropout y_i , is defined as:

$$y_i = \begin{cases} 1 & \text{si } y_i^* > 0 \text{ (student dropout : yes)} \\ 0 & \text{si } y_i^* \leq 0 \text{ (student dropout : no)} \end{cases}$$

That is, we observe that a student drops out if the latent variable y_i^* exceeds a threshold (in this case, 0).

The Probit model estimates the probability that $y_i = 1$ (dropout) based on the explanatory variables. The probability that a student drops out is given by:

$$P(y_i = 1) = \Phi(\beta_0 + \beta_1 \cdot \text{Parental motivation (frequent)}_i + \beta_2 \cdot \text{Parental motivation (very frequent)}_i + \beta_3 \cdot \text{Mother without education}_i + \beta_4 \cdot \text{Father works in commerce}_i + \beta_5 \cdot \text{Computer at home}_i + \beta_6 \cdot \text{Internet at home}_i + \beta_7 \cdot \text{Homework : a lot}_i + \beta_8 \cdot \text{Homework : quite a bit}_i + \beta_9 \cdot \text{Inadequate scheduling}_i + \beta_{10} \cdot \text{Difficult access to university}_i + \beta_{11} \cdot \text{Poor library quality}_i + \beta_{12} \cdot \text{Sex (male)}_i + \beta_{13} \cdot \text{Study 1} - 5 \text{ hours}_i + \beta_{14} \cdot \text{Low grade (8} - 10)_i + \beta_{15} \cdot \text{No children}_i)$$

Where: *Parental motivation (frequent or very frequent)* refers to students whose parents show consistent interest in their education, with the reference category being low or no motivation. *Mother without education* equals 1 if the mother has no formal schooling. *Father works in commerce* equals 1 if the father is employed in the commercial sector. *Computer at home* and *Internet at home* equal 1 if the household has access to these resources. *Homework amount*

includes the categories “a lot” and “quite a bit,” compared to the reference group “little or none.” *Inadequate scheduling* equals 1 if class schedules are perceived as poorly organized, while *difficult access to university* equals 1 if transportation or location hinders attendance. *Poor library quality* equals 1 if the student rates the university library negatively. *Sex (male)* equals 1 for male students and 0 for female. *Study 1–5 hours* equals 1 if the student studies between 1 and 5 h daily. *Low grade (8–10 out of 20)* equals 1 for students with a low academic average. Finally, *no children* equals 1 if the student does not have children.

Marginal effects

In a Probit model, marginal effects represent the change in the probability of the outcome occurring (in this case, university dropout) associated with a one-unit change in an explanatory variable, holding all other variables constant. For binary variables—which make up most of this model—the marginal effect indicates how the probability of dropout changes when a characteristic is present (i.e., the variable goes from 0 to 1).

The interpretation of these effects is straightforward: a negative marginal effect implies that the variable reduces the likelihood of dropout, while a positive effect means it increases the probability of dropping out. For instance, very frequent parental motivation reduces the dropout risk by 16.8% points, highlighting the protective role of family support. Conversely, poor institutional conditions—like inadequate class scheduling or difficult access to university—substantially increase dropout likelihood.

These effects offer more intuitive insights than raw Probit coefficients, as they directly quantify how much each factor increases or decreases dropout probability, making them especially useful for policy, program design, and educational interventions. The marginal effects measure how a change in an explanatory variable affects the probability of dropout:

$$\frac{\partial P(y_i=1|X_i)}{\partial X_{ji}} = \Phi(\beta_0 + \beta_1 \cdot \text{Parental motivation (frequent)}_i +$$

$$\beta_2 \cdot \text{Parental motivation (very frequent)}_i +$$
$$\beta_3 \cdot \text{Mother without education}_i +$$
$$\beta_4 \cdot \text{Father works in commerce}_i +$$
$$\beta_5 \cdot \text{Computer at home}_i +$$
$$\beta_6 \cdot \text{Internet at home}_i +$$
$$\beta_7 \cdot \text{Homework : a lot}_i +$$
$$\beta_8 \cdot \text{Homework : quite a bit}_i +$$
$$\beta_9 \cdot \text{Inadequate scheduling}_i +$$
$$\beta_{10} \cdot \text{Difficult access to university}_i +$$
$$\beta_{11} \cdot \text{Poor library quality}_i +$$
$$\beta_{12} \cdot \text{Sex (male)}_i +$$
$$\beta_{13} \cdot \text{Study 1 – 5 hours}_i +$$
$$\beta_{14} \cdot \text{Low grade (8 – 10)}_i +$$
$$\beta_{15} \cdot \text{No children}_i) \beta_j$$

Statistical significance

In assessing the statistical significance of the model estimates, a common threshold utilized is the *p*-value. Typically, a *p*-value of less than 0.05 is deemed statistically significant, indicating

strong evidence against the null hypothesis. In analytical contexts such as Probit modeling, this threshold signals that changes in explanatory variables have a substantive impact on the probability of the dependent variable achieving specific outcomes, such as a student’s dropout status. Additionally, adjustments for multiple testing using methods like Bonferroni correction are crucial to avoid Type I errors, especially in models with numerous predictors (Teshome and Anshiso, 2019).

Pseudo *R*² and goodness-of-fit measures

The Pseudo *R*² provides a comparative metric that reflects model fit but operates differently from *R*² in Ordinary Least Squares (OLS) regression. With Probit models, several Pseudo *R*² variants exist, including Nagelkerke’s *R*² and McFadden’s *R*², which are often reported to gauge improvements in model likelihood relative to a null model. These metrics are not simply percentage indicators of explained variance but rather improvements over a baseline model (Hemmert et al., 2016). A Pseudo *R*² value closer to 1 is typically desired, suggesting that the model accounts for a significant proportion of variation in the outcome variable.

Goodness-of-fit tests, such as the likelihood-ratio test, serve to compare the fitted model against the null model, revealing whether the inclusion of predictors substantially enhances explanatory power (Hemmert et al., 2016). Chi-squared tests can also be employed to assess the fit of categorical data to the expected frequencies generated by the model.

Data

The data comes from a survey conducted on students in regular conditions and those who drop out of the UNAM.

Table 1 represents a sample of 771 surveyed students from the UNAM, categorized by their professional school.

TABLE 1 Sample size by professional schools.

Professional school	Frequency	Percentage	Cumulative
Public management and social development	140	18.16	18.16
Administration	47	6.1	24.25
Accounting	25	3.24	27.5
Mining engineering	88	11.41	38.91
Civil engineering	83	10.77	49.68
Agro-industrial engineering	52	6.74	56.42
Systems and informatics engineering	130	16.86	73.28
Environmental engineering	152	19.71	93
Fisheries engineering	54	7	100
Total	771	100	

The frequency column shows the number of students in each program, while the percentage indicates their proportion within the total sample. The cumulative percentage helps track the accumulated total as categories are added. The most represented program is Environmental Engineering with 152 students (19.71%), followed by Public Management and Social Development (18.16%) and Systems and Informatics Engineering (16.86%). The least represented program is Accounting with 25 students (3.24%). The cumulative percentage shows, for example, that up to Mining Engineering, 38.91% of the total sample is covered. The total sum of frequencies confirms that the full sample is accounted for, providing a clear overview of the distribution of students across different professional schools at the university.

To analyze university dropout at the UNAM, a sample of 771 students—equivalent to approximately 40% of the total student population—was surveyed. This sample included 612 currently enrolled students (referred to as “regular students”) and 159 students identified as dropouts.

The sampling method used was convenience sampling. Students were selected based on their accessibility and willingness to participate in the study, rather than through a probabilistic or systematic approach. While this method facilitated rapid data collection and broad coverage, it may introduce limitations in terms of representativeness and potential sampling bias.

The sample was intended to be representative at the level of academic programs (schools) and by academic cycle (semester of study). The goal was to ensure that both the diversity of academic disciplines and the progression stages of students were adequately reflected in the analysis, allowing for more nuanced insights into patterns of dropout across different contexts within the university.

The survey was conducted in person. Students were approached directly on campus, allowing researchers to ensure participation, clarify any doubts in real time, and improve the accuracy and completeness of responses.

The response rate was approximately over 80%, with the survey reaching around 50% of the total student population. This high response rate strengthens the reliability of the data collected and suggests a strong level of engagement from the student body, enhancing the credibility of the findings.

The sample is considered representative, as the actual sample size is significantly larger than the statistically required optimal sample size. This enhances the robustness of the findings and increases the potential for generalizing the results to the broader student population at UNAM. Despite the use of convenience sampling, the large and diverse sample helps mitigate concerns related to sampling bias and strengthens the overall credibility of the study.

The sampling frame consisted of all students enrolled at UNAM during the academic year in which the survey was conducted. The sampling method employed was stratified sampling, with strata based on academic status (regular students vs. dropouts) and academic cycle (semester). This approach was intended to ensure adequate representation across different stages of the academic journey and among those who had discontinued their studies.

The distribution of surveyed regular students by academic cycle reveals a concentration in the mid-to-late stages of the programs: the 7th and 9th cycles had the highest number of respondents (81 students each, or 13.24%), followed by the 1st cycle (79 students,

12.91%), the 3rd cycle (72 students, 11.76%), the 6th and 8th cycles (68 students each, 11.11%), and the 5th cycle (63 students, 10.29%). Fewer students were surveyed from the 2nd (61 students, 9.97%), 10th (25 students, 4.08%), and 4th cycles (14 students, 2.29%).

Students were approached both in person and via institutional communication channels, including email and virtual platforms, ensuring broad accessibility. Although the exact response rate is not documented, the resulting sample size (771 students) is substantial and was designed to be broadly representative of the UNAM student body, encompassing both active and former students.

However, potential sampling biases—such as voluntary response bias or underrepresentation of certain cycles (e.g., 4th and 10th)—should be acknowledged. Despite these limitations, the sampling strategy was designed to yield meaningful and generalizable insights into the patterns and determinants of student dropout at UNAM.

The selection of explanatory variables in this study is grounded in well-established theories from the economics of education and multidisciplinary approaches that understand university dropout as a complex phenomenon influenced by individual, family, and institutional factors. First, human capital theory argues that education is an investment made by individuals to improve their future income and living conditions. From this perspective, variables such as the mother’s level of education, the father’s occupation, and the student’s academic performance reflect both household human capital and individual accumulation. For example, parents with higher education levels or more stable jobs tend to value and support their children’s education more, resulting in lower dropout rates.

Likewise, household ownership of a computer and access to the internet are considered forms of technological capital that complement human capital and facilitate academic development, especially in virtual or hybrid learning contexts. The absence of these resources represents a significant structural barrier to educational continuity, particularly in regions with limited digital infrastructure such as Moquegua.

From the social capital theory perspective, parental motivation toward their children’s education is understood as emotional support and family expectations, which directly influence academic persistence. In addition, a student’s family responsibilities, as reflected by the number of children, can limit the time and energy available to meet academic demands, negatively affecting performance and increasing the likelihood of dropping out.

The capability approach emphasizes that formal access to education is insufficient if students do not possess the real conditions to exercise that right. Therefore, variables such as the distance to the university, the perceived quality of academic services (such as the library), and class schedule organization capture constraints that affect students’ effective opportunities to remain in the higher education system. In contexts with weak infrastructure or limited transportation, as is the case in many areas of Moquegua, these factors are particularly relevant.

Finally, institutional theory highlights the importance of academic and social integration within the university as a mechanism for reducing dropout. In this regard, variables such as the amount of assigned homework, perceptions of academic workload, and the quality of the institutional environment help assess the student’s level of engagement with the university. An

overloaded, disorganized, or poorly perceived environment can generate stress, demotivation, and ultimately, lead to dropout.

Together, incorporating these variables into a Probit econometric model allows for precise estimation of dropout probabilities by capturing both the structural and individual conditions affecting students at the Universidad Nacional de Moquegua. This theoretical justification strengthens the methodological approach and supports the relevance of the analysis.

First, variables related to household socioeconomic characteristics were included, since multiple studies have highlighted the influence of the family environment on the continuity of university studies. For example, the parents' motivation toward their children's education was considered, as emotional support and family expectations play a decisive role in academic persistence. Additionally, mother's education was operationalized as a dichotomous variable (no education vs. some level of education), based on evidence showing that higher parental education levels are associated with better academic outcomes for children. Variables such as the economic sector in which the father works were also included and coded into occupational categories to capture differences in income and job stability, factors that may influence the decision to continue or drop out. Lastly, computer ownership and internet access at home were included as proxies for household technological capital, whose absence presents a critical barrier to independent study, especially in hybrid or virtual learning environments.

Second, variables related to institutional and academic characteristics of the university were considered, as these reflect structural conditions that can affect the student experience. Variables such as the amount of assigned homework (operationalized into categories: none, quite a bit, and a lot), the perception of class scheduling (adequate/inadequate), and the perceived quality of the university library (good/poor) aim to capture aspects of the academic environment that may cause overload, stress, or demotivation, thus contributing to dropout. The commuting time to the university (less than 30 min vs. more than 30 min) was also considered, as distance is a recurring limitation in a region with limited transportation infrastructure, such as Puno.

Finally, variables related to individual student characteristics were integrated, as academic performance and personal conditions have been identified as key predictors of dropout. These include the number of study hours per week (1–5 h), the grade obtained in the last academic term (as a performance indicator), and the number of children, which captures family responsibilities that may compete with academic demands. These variables were selected not only for their theoretical relevance but also for their availability in institutional records and their recognition in previous exploratory studies conducted at UNAM.

Taken together, the operationalization of these variables through dichotomous or categorical classifications facilitates their inclusion in a Probit econometric model, allowing for more precise estimation of dropout probabilities based on the identified factors. This methodological approach ensures an adequate representation of the university reality at UNAM and contributes to the design of targeted policies to reduce dropout rates.

Results

Description of the data on student dropout

The Table 2 show the academic program a student enrolls in profoundly impacts their likelihood of dropout, reflecting not only the intellectual demands of the curriculum but also external factors such as career prospects and program support. At UNAM, programs like Business Administration, Fisheries Engineering, and Agro-industrial Engineering show alarmingly high dropout rates—above 38%—which could indicate significant challenges related to rigorous coursework, insufficient academic advising, or misalignment between student expectations and job market realities. These elevated rates may also reveal underlying structural issues, such as outdated curricula or lack of practical training, causing students to disengage. Conversely, programs such as Accounting demonstrate exceptional retention with a 0% dropout

TABLE 2 Student dropout rates by academic program, gender, marital status, age at admission, and academic repetition at the National University of Moquegua (UNAM).

Category	Subcategory	Dropout rate (%)
Overall total	UNAM	20.75
Academic program	Business administration	42.55
	Accounting	0
	Fisheries engineering	40.74
	Agro-industrial engineering	38.46
	Civil engineering	24.1
	Mining engineering	22.73
	Systems engineering	14.62
	Public management and social development	14.29
	Environmental engineering	12.5
Gender	Male	27.01
	Female	13.57
Marital status	Married	85.71
	Cohabiting	57.89
	Does not know/no response	25
	Single	19.16
Age at admission	26 years or older	34.62
	19–20 years	30.32
	21–25 years	21.43
	Does not know/Does not remember	33.33
	16–18 years	16.03
Academic repetition	Repeated two semesters	43.18
	Repeated one semester	32.1
	Did not repeat but failed courses	19.92
	Did not repeat any semester	11.75

rate, likely due to clearly defined career paths, effective faculty mentorship, and strong industry linkages that motivate students to persist. Meanwhile, lower dropout rates in Systems Engineering, Public Management, and Environmental Engineering suggest that these fields may offer more engaging content, better alignment with emerging job sectors, and perhaps more supportive learning environments, all contributing to enhanced student commitment and success.

Gender

Gender differences reveal important dynamics in educational persistence, highlighting how societal roles, expectations, and pressures shape student experiences. In UNAM's case, male students exhibit a dropout rate nearly twice that of female students (27.01% vs. 13.57%), pointing toward potentially greater vulnerabilities faced by men in sustaining their university education. This disparity might be explained by traditional gender roles that push men toward early labor market entry or familial economic responsibilities, distracting them from academic commitments. Additionally, males may be less likely to seek or receive social and academic support, leading to higher disengagement. On the other hand, female students often demonstrate stronger perseverance, possibly driven by clearer educational goals, greater resilience, or more robust support networks within and outside the university. These gendered patterns underscore the need for targeted interventions to address specific barriers faced by male students and promote equity in academic retention.

Marital status

Marital status emerges as one of the most significant personal factors influencing dropout, emphasizing the profound impact of life circumstances on educational trajectories. At UNAM, students who are married show a staggering 85.71% dropout rate, with cohabiting students also experiencing an exceptionally high 57.89% rate. These figures strongly suggest that the responsibilities and demands associated with partnership and family life—such as childcare, household management, and financial pressures—create substantial obstacles to academic persistence. Balancing family commitments with rigorous university workloads often results in overwhelming stress and limited time for study, pushing students toward discontinuation. In contrast, single students, who presumably face fewer domestic obligations, display much lower dropout rates (19.16%), highlighting how marital status indirectly affects students' ability to prioritize and succeed academically. This disparity signals the importance of providing flexible academic options and support services for students with family responsibilities to reduce dropout risks.

Age at admission

The age at which students enter university is a critical factor influencing their likelihood of completing their studies, with older entrants facing higher dropout risks. UNAM's data shows that students admitted at age 26 or older have a dropout rate of 34.62%, substantially higher than the youngest cohort (16–18 years) at only 16.03%. Older students often juggle multiple roles, including work, family care, and other social responsibilities, which can limit their capacity to engage fully with academic demands. Additionally,

older students may struggle with adapting to university culture and learning methods after prolonged time away from formal education. The increased dropout rates for ages 19–20 and 21–25 suggest that delayed university entry—even by a few years—can exacerbate these challenges. In contrast, younger students who transition directly from secondary education tend to benefit from academic momentum and peer support networks, which promote persistence. These insights highlight the need for tailored support mechanisms for mature students to ensure equitable educational outcomes.

Academic repetition

Academic repetition is a robust predictor of dropout, reflecting the cumulative effect of academic difficulties on student morale and persistence. UNAM's figures reveal that students who have repeated two semesters have an alarmingly high dropout rate of 43.18%, with those repeating one semester also at elevated risk (32.1%). Repeating semesters often results from failing key courses, which can undermine students' confidence, increase financial and time costs, and contribute to frustration and disengagement. This academic stagnation may signal underlying gaps in foundational knowledge, study skills, or external stressors impacting performance. In contrast, students who did not repeat any semester or only failed individual courses show considerably lower dropout rates (11.75% and 19.92%, respectively), illustrating how steady academic progress is vital for sustaining motivation and university commitment. These patterns emphasize the importance of early academic interventions, tutoring, and counseling services to help struggling students overcome hurdles and reduce dropout risk.

Factors influencing university student dropout

The results the [Table 3](#) show that both household characteristics (like parental motivation and educational background), university factors (such as scheduling and library quality), and student attributes (gender, responsibilities, and study habits) significantly affect university dropout. These findings can inform targeted interventions to improve student retention, focusing on both institutional reforms and supportive environments at home.

Socioeconomic characteristics of the household

Parental motivation plays a highly significant role in reducing the likelihood of university dropout. When parents motivate their children frequently, the probability of dropping out decreases by 7.8% points ($p = 0.005$). This effect becomes even stronger when the motivation is very frequent, reducing the dropout probability by 16.8% points ($p < 0.001$). These results indicate that emotional and motivational support from parents is a strong protective factor against academic abandonment.

Having a mother with no education is associated with a 17.4% point increase in the likelihood of dropout ($p = 0.087$), which is statistically significant at the 10% level. This may reflect the influence of the mother's educational attainment as a proxy for cultural capital or academic support at home. A lack of education may translate into limited guidance or value placed on higher education.

TABLE 3 Factors influencing university student dropout.

Variables	Coefficient	p-Value	dy/dx	p > z	Significant
I. Socioeconomic characteristics of the household					
Parents' motivation toward their children					
Frequency	−0.475	0.0040	−0.078	0.0050	***
Very frequency	−1.031	0.0000	−0.168	0.0000	***
Mothers without education ($D = 1$)	0.684	0.0900	0.174	0.0870	*
Sector in which the father works: commerce ($D = 1$)	0.547	0.0010	0.121	0.0140	***
Ownership of a computer at home ($D = 1$)	−0.405	0.0400	−0.079	0.0770	**
Access to the internet at home ($D = 1$)	−0.326	0.0800	−0.051	0.0930	*
II. University characteristics					
Amount of homework					
A lot ($D = 1$)	−0.432	0.0120	−0.069	0.0030	**
Quite a bit ($D = 1$)	−0.479	0.0650	−0.067	0.0130	*
Inadequate scheduling of classes ($D = 1$)	1.11	0.0000	0.275	0.0000	***
Make it difficult to get to the university	0.786	0.0010	0.202	0.0310	***
Poor perceived quality of the library ($D = 1$)	0.493	0.0080	0.109	0.0260	***
III. Student characteristics					
Sex (man)	0.461	0.0010	0.08	0.0020	***
Study hours between 1 and 5 h ($D = 1$)	0.45	0.0030	0.072	0.0020	***
Poor grade: 8–10	0.867	0.0650	0.237	0.2290	*
Student without children	−1.118	0.0000	−0.32	0.0030	***
Constant	−0.125	0.6900			
Number of obs = 736					
Wald $\chi^2(15) = 167.55$					
Prob > $\chi^2 = 0.0000$					
Pseudo $R^2 = 0.3617$					
Log pseudolikelihood = −224.84299					

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

When the father works in the commerce sector, the probability of dropout increases by 12.1% points ($p = 0.014$), which is highly significant. This could be linked to job instability, long working hours, or the inability to support the student academically or economically.

Ownership of a computer at home reduces the dropout probability by 7.9% points ($p = 0.077$), while internet access reduces it by 5.1% points ($p = 0.093$). Both effects are significant, especially the former. These findings underscore the importance of digital inclusion and access to educational technologies in supporting student retention.

University characteristics

Receiving a large amount of homework reduces the probability of dropout by 6.9% points ($p = 0.003$), while receiving quite a bit of homework reduces it by 6.7% points ($p = 0.013$). These significant effects suggest that academic engagement and structure may contribute to better student persistence. A rigorous academic environment may foster discipline and commitment.

On the contrary, certain institutional factors increase the dropout risk substantially. Inadequate scheduling of classes has

a very strong effect, raising the probability of dropout by 27.5% points ($p < 0.001$). This highlights how poorly organized timetables may interfere with students' ability to balance study with work or personal obligations.

Students who find it difficult to get to the university are 20.2% points more likely to drop out ($p = 0.031$). Accessibility issues, whether due to transportation costs, long distances, or poor infrastructure, are clearly linked to lower retention rates.

A poor perception of the library's quality increases the probability of dropout by 10.9% points ($p = 0.026$). As the library serves as a key academic support resource, dissatisfaction with its quality may reduce students' academic engagement and success.

Student characteristics

Male students are 8% points more likely to drop out compared to female students ($p = 0.002$). This statistically significant difference may reflect gender-related factors such as greater economic pressures, social expectations, or different levels of academic commitment.

Students who study between 1 and 5 h per day have a 7.2% point higher probability of dropping out ($p = 0.002$). While some study

time is dedicated, it may not be enough to succeed, or these students may struggle with learning despite their efforts.

Having a low academic grade (8–10 out of 20) is associated with a 23.7% point increase in dropout probability, but this result is not statistically significant ($p = 0.229$). Although it aligns with the idea that poor performance predicts dropout, the result should be interpreted with caution.

Lastly, students without children are 32% points less likely to drop out ($p = 0.003$). This strong and highly significant effect suggests that students with children may face competing responsibilities and financial or time constraints, which increase their risk of discontinuing their studies.

Discussion

The issue of school dropout rates has garnered significant attention in educational research, with various studies elucidating the multifaceted causes influencing students' decisions to leave school prematurely. Among these factors, the role of parental involvement, socioeconomic characteristics, and student engagement emerge as critical determinants. This discussion synthesizes findings from key studies to explore the interplay of these variables and their implications for dropout prevention efforts.

Parental involvement has consistently demonstrated a strong correlation with student retention in educational settings. According to the findings by [Blöndal and Aðalbjarnardóttir \(2014\)](#), the multidimensional aspects of parenting—including emotional and behavioral support—greatly enhance student engagement, thereby reducing dropout rates. Their longitudinal study highlights that when parents actively participate in their children's educational activities, it fosters a conducive environment for academic achievement. Consistent with this, [Paul et al. \(2021\)](#) noted that adolescents whose parents engage in school-related discussions and activities tend to have lower dropout rates. This indicates that active parental involvement is not merely beneficial but essential for fostering an educational commitment in youth.

Furthermore, [Khurram et al. \(2023\)](#) emphasize the importance of extracurricular activities, noting that students engaged in such activities are indeed more likely to remain in school compared to their peers. This finding suggests that parental support for extracurricular engagement may serve as an additional protective factor against dropout, aligning with Tinto's theory of social integration, which posits that student involvement in school life is crucial for retention ([O'Neill et al., 2011](#)).

On the socioeconomic front, [Doll et al. \(2013\)](#) underline that various environmental influences, including parental education levels and job stability, profoundly impact students' educational trajectories. For instance, [Gubbels et al. \(2019\)](#) conducted a meta-analysis that revealed multiple child, family, and school-related risk factors contribute to both absenteeism and dropout, linking family circumstances, including parental education and socioeconomic status, to these outcomes. Higher parental education levels emerge consistently as a protective factor against school dropout, as families with educated parents are better equipped to provide academic support.

Moreover, the findings from [Rokhmaniyah et al. \(2021\)](#) further reinforce the critical relationship between family dynamics and school dropout rates. Their study asserts that parental factors, including educational attainment and involvement in children's schooling, significantly impact retention rates. This relationship aligns with [Ngamaba et al. \(2021\)](#), who highlighted that school climate and peer interactions also play a crucial role, especially for students facing bullying or harassment.

The risk of dropout extends beyond individual and family factors, as demonstrated by [Melville et al. \(2010\)](#), who argue that lack of motivation significantly contributes to attrition in educational settings. The study indicates that students who feel unmotivated are less likely to identify with their academic goals, thus prompting higher dropout rates. This notion echoes the points raised by [Ridder et al. \(2013\)](#), who found strong correlations between high school dropout and long-term socioeconomic disadvantages, highlighting the pressing need for interventions that address both academic engagement and motivational support systems.

It is also worth noting that systemic issues, such as the quality of the educational environment, significantly influence dropout rates. Improvements in teaching staff qualifications and classroom sizes have been linked to better student retention outcomes ([Permatasari and Artha, 2023](#)). Enhancing these aspects and fostering a supportive home environment can create a more holistic strategy for reducing dropout rates.

Research indicates that a significant homework load can influence student dropout rates. Specifically, assigning a substantial amount of homework can correlate with decreased dropout probability. This finding aligns with [Tinto \(2012\)](#) student integration theory, which suggests that structured academic environments enhance student engagement and commitment, thus improving retention rates. Furthermore ([Chrysikos et al., 2017](#)), support this idea, showing that engagement in rigorous academic work positively influences student persistence. The initial academic challenges presented by homework can facilitate cognitive engagement, which is important for student success.

Contrasting views emphasize the necessity of a supportive framework in managing homework load. [Kern \(2014\)](#) discusses various factors that impact retention, noting that while engagement through homework can benefit students, it must be complemented by effective management of these academic demands. [Tzafea and Sianou \(2018\)](#) elaborate on the role of socioeconomic factors in student retention, indicating that workload alone may not suffice for sustaining persistence, especially among marginalized groups.

Inadequately scheduled classes are a significant risk factor for dropout, with evidence indicating a considerable increase in dropout probability due to scheduling inefficiencies. This supports [Bean and Eaton \(2001\)](#) model, which emphasizes that such inefficiencies can hinder students' ability to balance academic and personal responsibilities, thus increasing the risk of attrition highlights that institutional commitments significantly shape students' social and academic adaptation, affecting their retention rates as well ([Friðriksdóttir and Arnþjórnisdóttir, 2017](#); [Montalvo, 2013](#)).

Poor scheduling that creates conflicts with students' work or personal commitments can deteriorate overall satisfaction, leading to lower engagement and higher dropout rates.

Daniels and Brooker (2014) assert that a well-organized curriculum is vital for student engagement and success, demonstrating the link between institutional practices and student outcomes.

Accessibility issues are critical determinants of student dropout rates, with students facing transportation challenges showing a higher likelihood to leave their programs. This is supported by research from the Community College Research Center, which emphasizes the impact of geographical location and transportation on students' ability to engage meaningfully with their educational environment Rankin et al. (2010) and Tinto (2012) also highlights that institutional efforts to address accessibility barriers are fundamental for promoting student retention. Systemic infrastructural issues particularly affect students from lower socioeconomic backgrounds, exacerbating dropout trends (Norhailawati et al., 2019). Hence, institutions should prioritize accessibility in their retention strategies.

Library quality plays an essential role in student retention, with dissatisfaction reported to increase dropout probabilities. Academic support through libraries significantly contributes to student achievement. Highlights that the quality of library resources correlates positively with student engagement and success, supporting the notion that students need access to robust academic support to thrive (Schreiber and Yu, 2016). When library resources fail to meet academic needs, engagement can decline, as noted by Kern (2014), indicating that perceptions of institutional resources are critical for student success. The link between engaged academic environments and improved student performance reinforcing the need for investments in library resources as a retention strategy (Schreiber and Yu, 2016).

The observed gender disparities in dropout rates indicate that male students are statistically more likely to drop out than their female counterparts, suggesting underlying societal and psychological factors contribute to these trends. Research indicates that societal norms and expectations create unique pressures for male students, potentially interfering with their academic engagement and persistence. A study by Salmela-Aro and Tynkkynen (2012) provides insight into the connection between school burnout and gender, highlighting that male students often report higher levels of stress in educational environments, which could lead to increased dropout rates due to burnout. Furthermore, the role of protective factors such as social support and mental health is emphasized in discussions around academic persistence, indicating that addressing mental wellness could mitigate some dropout risks associated with gender disparities (Benito-Gomez et al., 2021).

In addition to gender effects, the impact of study habits on retention is critical. Students who study fewer hours, specifically between 1 and 5 h per day, have been associated with higher dropout risks, underscoring the importance of both the quality and quantity of study habits. Ramsden and Entwistle assert that enhancing the quality of study practices, rather than merely increasing study hours, is essential for academic success, which in turn contributes to better retention rates (Zhai and Carney, 2024). This highlights the need for institutions, such as UNAM, to prioritize effective study strategies alongside time management workshops to support student engagement and retention.

Moreover, the correlation between academic performance and dropout rates is notable, with findings suggesting that low

grades can significantly increase the probability of dropout, although the strength of this relationship varies across studies. For instance, it has been reported that students with lower academic performance may be more inclined to leave educational institutions, implicating the necessity of integrating social support and institutional resources to improve overall student performance. As noted, academic difficulties are often intertwined with social integration and student support systems, emphasizing the necessity of comprehensive interventions that target both academic skills and holistic student experiences (Holopainen et al., 2016).

The impact of parenthood on educational persistence is a significant finding, where students without children reportedly have a lower likelihood of dropping out. Balancing parenting responsibilities with academic commitments can significantly affect a student's academic performance and retention. Discussions in the literature emphasize how support measures, such as childcare services and flexible scheduling, could help accommodate the needs of student parents, ultimately promoting a more inclusive academic environment that enhances retention rates (Sparks, 2024).

This study presents several important limitations. First, it is based on cross-sectional data, which prevents establishing causal relationships between the variables. The results show associations but do not allow for the assertion that a given variable directly causes university dropout.

Second, there may be omitted variables that were not included in the model, such as the student's emotional state, the quality of the family environment, or institutional support, which could significantly influence the decision to drop out.

Additionally, since the study relies on self-administered surveys, the results are subject to self-report bias, as students may have responded in a socially desirable manner or made memory-related errors.

Another important limitation is the limited generalizability of the findings. The sample includes only regular and dropout students from the UNAM during the first semester of 2024, so the results cannot be generalized to other universities or educational contexts.

Conclusion

The study shows that parental support, particularly in the form of frequent motivation, is a key protective factor against university dropout. Students whose parents regularly encourage them are significantly less likely to leave their studies. This finding highlights the importance of strengthening family ties and promoting parental involvement in students' academic paths, even at the university level.

Institutional conditions within the university have a strong impact on student retention. Factors such as poor class scheduling, difficulties in accessing the campus, and negative perceptions of library quality significantly increase the risk of dropout. These results indicate that addressing student characteristics alone is not enough; structural reforms are essential to help students balance academic and personal life and to improve academic support services.

Personal characteristics of the student—such as gender, family responsibilities, and study habits—directly influence their likelihood of dropping out. Being male, studying only a few hours a day, or having children are all associated with a higher dropout risk. These factors underscore the need for targeted academic support programs, psychosocial assistance, and specific services (such as childcare or flexible schedules) for students with greater personal responsibilities.

Based on the findings and limitations of the current study on university dropout at the UNAM, it is recommended that future research adopt a longitudinal approach to establish causal relationships between the identified factors. Additionally, mixed-methods designs combining quantitative and qualitative approaches should be used to explore in depth students' experiences and the underlying mechanisms of dropout. It would also be valuable to implement experimental or quasi-experimental studies to evaluate the effectiveness of interventions such as academic tutoring, mental health services, support for student parents, or study skills workshops. Furthermore, it is suggested to apply multilevel models that integrate variables at the individual, family, and institutional levels, as well as to conduct comparative analyses between different universities or regions of the country to identify common and differential patterns that would allow for the design of more effective and context-sensitive retention policies.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The manuscript presents research on animals that do not require ethical approval for their study.

Author contributions

HM: Writing – original draft, Formal Analysis. MC: Writing – review & editing, Conceptualization. RP: Writing – review & editing, Formal Analysis, Methodology, Validation.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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