



Original research

## Relationship between Academic Motivation and Educational Trajectory in Dentistry Students

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### ABSTRACT

**Introduction:** Academic motivation is an essential component in educational development, influencing the resolution of academic tasks and challenges. Academic motivation can be classified as intrinsic, extrinsic, and amotivation, each with specific subcategories that differently affect students' educational trajectories. **Objective:** To evaluate the relationship between the academic motivation of dentistry students and their educational trajectory. **Materials and Methods:** Vallerand's Academic Motivation Scale (AMS) was used to measure intrinsic motivation, extrinsic motivation, and amotivation in a sample of 225 dentistry students from the Universidad Nacional Autónoma de México (UNAM). Additionally, information on students' educational trajectory was collected through their grade records. **Results:** The results showed a positive relationship

between intrinsic motivation and educational trajectory, indicating that students with higher intrinsic motivation have better educational trajectories. Amotivation was negatively related to educational trajectory. Regarding extrinsic motivation, *identified regulation* and *introjected regulation* showed positive relationships with educational trajectory, while *external regulation* did not show a significant relationship. **Conclusions:** This study demonstrates the relationship between academic motivation and educational trajectory.

**Keywords:** Academic Motivation; Dental Education; Intrinsic Motivation; Extrinsic Motivation; Educational Trajectory; Higher Education

## INTRODUCTION

Academic motivation, considered by teachers as a fundamental pillar in educational formation, is a complex and multidimensional phenomenon that includes individuals' beliefs, goals, and emotional responses<sup>1</sup>. Furthermore, motivation plays a key role in the resolution of academic tasks and challenges<sup>2</sup> and can be classified into three main types: intrinsic, extrinsic, and amotivation. Intrinsic motivation refers to personal fulfilment and satisfaction derived from learning and growth, where the individual is driven by internal interest and a passion for knowledge, as described by Vallerand *et al.*<sup>3</sup>. On the other hand, extrinsic motivation is driven by external factors such as rewards, recognition, and social approval, guiding behaviour toward specific goals, as explained by Wolters<sup>4</sup>. Amotivation, in contrast, is characterised by apathy and lack of interest, where students find no value in academic activities and experience a lack of purpose.

Additionally, both intrinsic and extrinsic academic motivation can be classified into sub-categories, as proposed by Bruno *et al.*<sup>5</sup>. Intrinsic academic motivation is categorised into *live stimulating experiences*, *to know* and *to play roles*. The first refers to the drive to engage in activities that produce sensations of pleasure and excitement, such as participating in debates or experimental practices. Motivation *to know* refers to the innate desire to acquire knowledge and understand new concepts, driven by curiosity and the pleasure derived from learning and intellectual exploration (e.g., feeling satisfaction from solving complex problems and understanding new theories). Motivation *to play roles* refers to the desire to assume specific roles and responsibilities within an academic context, such as students feeling satisfaction from coordinating and leading activities or events, demonstrating their organizational and leadership abilities.

On the contrary, extrinsic academic motivation is classified into *identified regulation*, *introjected regulation* and *external regulation*. The *identified regulation* refers to the personal acceptance and assimilation of the values and goals of an activity, even though the original purpose of the activity is external. In this type of motivation, students recognise the importance and value of a task and adopt it as their own (e.g., studying a specific subject because its importance for a future professional career is recognised). *Introjected regulation* involves the partial internalisation of external reasons, with behaviour driven by internal pressure to avoid guilt or anxiety or to boost self-esteem. In this type of motivation, students perform activities to meet internal self-worth needs and avoid negative emotions (e.g., completing academic tasks to avoid disapproval or reproach from parents and teachers). Finally, *external regulation* is the most basic type of extrinsic motivation, where behaviour is entirely controlled by external

factors. Students get involved in activities to obtain tangible rewards or avoid punishments (e.g., participating in school activities to receive external recognition and praise).

In the university environment, particularly in the health sciences, student motivation is relevant due to the demands of academic disciplines<sup>6</sup>, and academic motivation is conceived as a key driver of educational trajectory, while amotivation is a determinant of unfavourable academic outcomes<sup>2</sup>. These academic outcomes are generally assessed by educational trajectory (students' academic records or grade histories). Although educational trajectory does not represent students' academic performance, it is known that a low educational trajectory may be due to limited study time<sup>7</sup> and academic stress<sup>8</sup>, among other factors. Likewise, a high educational trajectory is linked to the desire to excel and the influence of teachers as motivating agents<sup>9</sup>. Both academic motivation and educational trajectory are multifactorial and influenced by physiological, pedagogical, psychological, and social aspects specific to the context and the individual<sup>10,11</sup>.

This study focuses on describing the relationship between the subcategories of academic motivation and educational trajectory of dentistry students.

## MATERIALS AND METHODS

The present descriptive and cross-sectional study was conducted at the Faculty of Dentistry of the Universidad Nacional Autónoma de México (UNAM) during the second semester of 2023. A non-probabilistic convenience sample was selected, composed of first- and third-year Dentistry students. The hypothesis of this work was "There is an association between academic motivation and educational trajectory in the studied population".

The total study population consisted of 226 students, of whom 111 were first-year students and 113 were third-year students. Two students from other academic years who were taking a first- or third-year course were excluded. Only participants who voluntarily chose to be part of the research were considered, who provided their informed consent, and who were willing to complete the questionnaire. The study was approved by the research and ethics committees of the Faculty of Medicine at UNAM with registration number DIV/FM/49/2023. All participants were informed about the study's objective, the procedure, and the confidentiality of their responses. Informed consent was obtained from all participants before the administration of the questionnaire.

To evaluate academic motivation, the Spanish version of the Academic Motivation Scale (AMS) was used, a tool developed and validated by Vallerand and adapted for the Mexican population by Casanova *et al.*<sup>12</sup>. The AMS measures three main types of motivation: intrinsic, extrinsic, and amotivation, through 28 items distributed across seven subscales. Each item is scored using a Likert scale from 1 (Not at all) to 7 (Completely), with a midpoint at 4 (Moderately). Students selected the option that best reflected their level of agreement with each statement, allowing the calculation of scores corresponding to each subcategory of academic motivation according to the items related to the theoretical construct. For the subcategories *to know*, a sum of items 2, 9, 16, and 23; *to play roles* were a sum of items 6, 13, 20, and 27; and *living stimulating experiences*, a sum of items 4, 11, 18, and 25. While for *identified regulation*, a sum of items 3, 10, 17, and 24; for *introjected regulation*, items 7, 14, 21, and 28; and for *external regulation*, items 1, 8, 15, and 22; and for amotivation, items 5, 12, 19, and 26.

To evaluate students' educational trajectory, they were asked to attach their academic transcript generated by the UNAM's Integral School Administration System. Educational trajectory was considered as the overall grade point average up to the time of evaluation.

Questionnaires were applied during scheduled sessions in the classrooms of the Faculty of Dentistry, ensuring that all participating students had the same time available and controlled environment to respond. Data were collected anonymously and stored in a Microsoft® Excel (Microsoft Corporation, Redmond, USA) database for subsequent analysis.

In the data analysis, descriptive statistical techniques were used, including the arithmetic mean, standard error, and coefficient of determination ( $R^2$ ). These techniques allowed us to identify the variability explained by the regression curve for the dependent variable. To determine the relationships between the subcategories of academic motivation and educational trajectory, regression functions were fitted. In cases where linear relationships were identified, the square root of the coefficient of determination was calculated to obtain the Pearson correlation coefficient (PCC), which indicates both the magnitude and direction of the relationship between the studied variables. A statistical difference was considered significant when the  $p$  value was less than 0.05, allowing us to infer the relevance of the associations found in the analyses.

IBM® SPSS® Statistics 25 (IBM, Armonk, USA) statistical software was used for data processing and result acquisition. Graphs were created using GraphPad Prism version 5.00 (GraphPad Software Inc., San Diego, USA).

## RESULTS

The educational trajectory of students is consistent, regardless of their gender (Table 1). Furthermore, for the different subcategories of motivation, the data are consistent between men and women, with no statistically significant differences (Table 2).

**Table 1.**  
**Sociodemographic characteristics by gender of participants**

Gender	Educational trajectory mean $\pm$ standard error
Men (n= 52)	8.75 $\pm$ 0.26
Women (n= 172)	8.81 $\pm$ 0.31

The difference between males and females was significant at a  $p$ -value  $> 0.05$ .

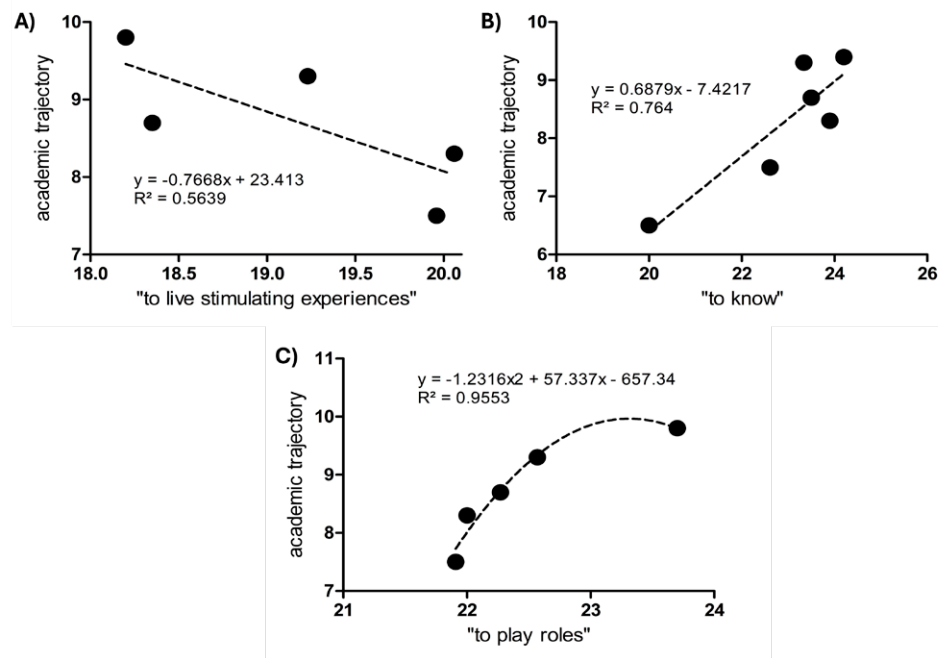
The different relationships between the subcategories of intrinsic academic motivation, extrinsic motivation, and amotivation with educational trajectory are shown in figures of 1 to 3.

Regarding the intrinsic academic motivation (figure 1), with educational trajectory, it was shown that the motivation *to play roles*, has a positive relationship with educational trajectory (Pearson correlation coefficient of 0.75). The motivation *to know* has a positive relationship with educational trajectory (Pearson correlation coefficient of 0.84). Additionally, there is a negative relationship between the motivation *live stimulating experiences* and educational trajectory (Pearson correlation coefficient of 0.75).

**Table 2.**  
**Results of academic motivation subcategories by gender of participants**

Category	Subcategory	Men Mean of the sum $\pm$ standard error	Women Mean of the sum $\pm$ standard error
Intrinsic motivation	<i>To know</i>	23.55 $\pm$ 0.539	23.25 $\pm$ 0.363
	<i>To play roles</i>	22.23 $\pm$ 0.5652	22.22 $\pm$ 0.3741
	<i>Live stimulating experiences</i>	19.17 $\pm$ 0.7609	18.98 $\pm$ 0.4071
Extrinsic motivation	<i>Identified regulation</i>	23.92 $\pm$ 0.4949	23.16 $\pm$ 0.3705
	<i>Introjected regulation</i>	22.07 $\pm$ 0.7254	22.83 $\pm$ 0.3807
	<i>External regulation</i>	22.211 $\pm$ 0.578	21.84 $\pm$ 0.3792
Amotivation	Amotivation	7.69 $\pm$ 0.7116	7.78 $\pm$ 0.3683

In all cases, when assessing the difference between men and women, a  $p$ -value  $> 0.05$  of significance was obtained.



**Figure 1. Relationship between intrinsic motivation subcategories, and educational trajectory.**

**A) Negative relationship between *live stimulating experiences* and educational trajectory.**

**B) Positive relationship between the motivation *to know* and educational trajectory.**

**C) Positive relationship between the motivation *to play roles* and educational trajectory.**

The relationship between the subcategories of extrinsic motivation and educational trajectory is represented in figure 2. There is a positive relationship between *identified regulation* and educational trajectory (determination coefficient of 0.6832 and Pearson correlation coefficient of 0.82). Additionally, a positive relationship is shown between *introjected regulation* and educational trajectory (determination coefficient of 0.4977 and Pearson correlation coefficient of 0.70). Lastly, a negative relationship is shown between *external regulation* and educational trajectory (determination coefficient of 0.1177 and Pearson correlation coefficient of 0.34).

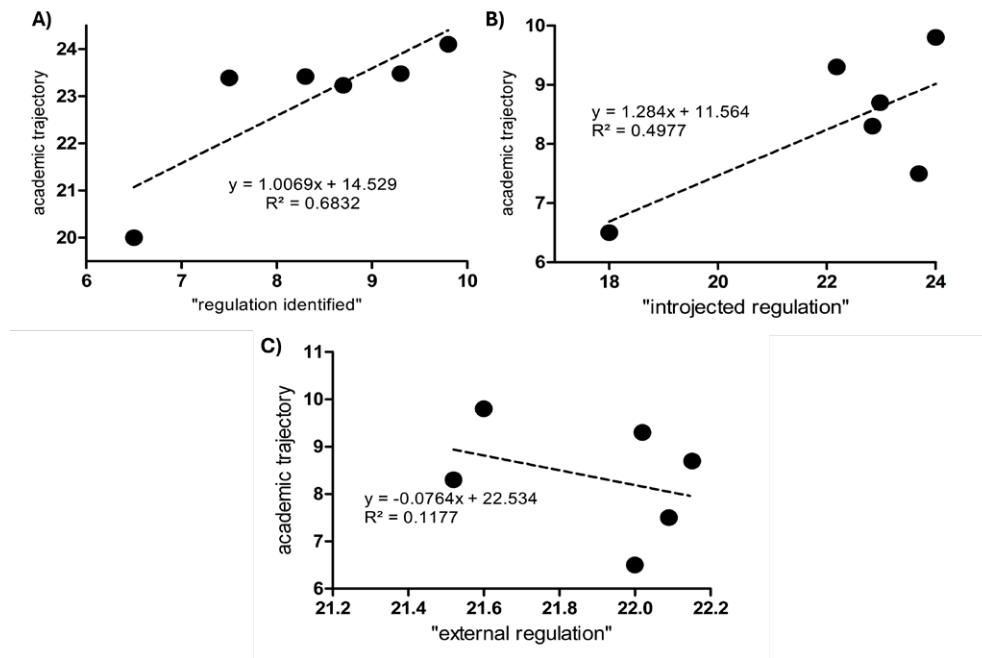


Figure 2. Relationships between extrinsic motivation subcategories and educational trajectory. A) Positive relationship between *identified regulation* and educational trajectory with a moderate coefficient of determination. B) Positive relationship between *introjected regulation* and educational trajectory. C) Negative relationship between *external regulation* and educational trajectory.

Figure 3 shows the relationship between amotivation and educational trajectory. The fitted line represents a decreasing potential function where the educational trajectory decreases as amotivation increases (determination coefficient of 0.9439).

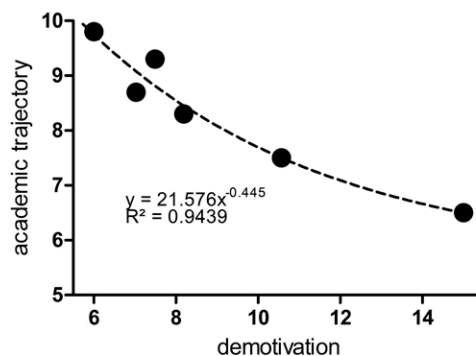


Figure 3. Relationship between amotivation and educational trajectory. The graph shows a strong inverse relationship between amotivation and educational trajectory.

## DISCUSSION

Examining the relationship between educational trajectory and intrinsic motivation, specifically in the subcategory *to know* and *to play roles*, it was found that the higher the educational trajectory, the higher the level of intrinsic motivation<sup>13</sup>. This result supports the idea that good

educational trajectory may be associated with the enjoyment and satisfaction derived from the learning process itself<sup>7</sup>. The finding aligns with previous research suggesting that intrinsic motivation is closely linked to self-efficacy and self-regulation, important factors for long-term academic success<sup>14-17</sup>.

Regarding extrinsic motivation, the results show that while *identified regulation* and *introjected regulation* have a positive relationship with academic average, *external regulation* does not show a significant relationship. This could indicate that students with better educational trajectories are those who consciously recognise and value the objectives of their academic activities, or those who seek to avoid anxiety or guilt through academic achievement, rather than being primarily motivated by external rewards or the avoidance of punishment<sup>18,19</sup>. *Identified* and *introjected regulation* may reflect a partial internalisation of academic goals, suggesting a deeper process of personal integration and commitment to studies<sup>20,21</sup>.

Concerning amotivation, an inverse relationship with educational trajectory was observed, suggesting that students with better grades tend to show less absence of motivation. The discovery is consistent with the literature associating amotivation with poorer educational outcomes<sup>22</sup>. Amotivation can be influenced by various factors, including academic stress, lack of social support, and the perception of irrelevance in the curriculum<sup>23,24</sup>. This point highlights the importance of interventions aimed at reducing amotivation through strategies such as psychological support, academic counselling, and curriculum adaptation to make it more relevant and engaging for students<sup>25</sup>.

The data collected on intrinsic motivation are consistent with studies in other Latin American countries, where high altruistic motivation has been reported among medical students with a positive vocational test<sup>26</sup>. Conversely, the items evaluating extrinsic motivation coincide with findings from other research where the main reasons for studying dentistry were linked to extrinsic factors such as patient satisfaction and social status<sup>13,27-31</sup>. Altruistic motivation and the desire to contribute to society are recurring elements in the motivations of students in health-related careers, which can positively influence their dedication and educational trajectory<sup>32,33</sup>.

Our study highlights the importance of fostering both intrinsic motivation and the deeper forms of extrinsic motivation to improve students' educational trajectory. Educational institutions should create environments that cultivate intrinsic motivation through learning experiences that are inherently rewarding and aligned with students' personal and professional interests. Such strategies could result in greater academic engagement and better long-term outcomes<sup>28,29</sup>. It is essential for educational policies to focus on developing comprehensive support programs that include academic counselling, psychological support, and professional development opportunities to maintain and enhance students' motivation<sup>34,35</sup>.

This study has several limitations that should be considered when interpreting the results. The sample used was non-probabilistic and convenient, which may limit the generalisability of the findings to other populations of dentistry students or different educational contexts. The study design prevents establishing causal relationships between academic motivation and educational trajectory; only associations can be inferred. Additionally, other contextual and personal factors, such as family support, academic load, and mental health conditions, which may influence motivation and educational trajectory, were not considered. The use of a single measurement instrument for academic motivation may not fully capture the complexity and multidimensionality of the construct. In the end, the design of this study is cross-sectional, meaning that data were collected at a single point in time, limiting our ability to establish definitive causal relationships between the variables analysed. For the comparison of variables,



such as intrinsic motivation, correlation statistical techniques were used, specifically Pearson correlation coefficient, and linear functions were adjusted to determine trends between the variables.

## CONCLUSIONS

The findings of our study indicate that there is a positive relationship between intrinsic motivation and educational trajectory in dentistry students at UNAM. Students with higher intrinsic motivation, especially in the subcategories of *to know* and *to play roles*, tend to have better educational trajectory. Additionally, *identified regulation* and *introjected regulation* were also positively related to educational trajectory, while *external regulation* did not show a significant relationship. Finally, amotivation was inversely related to educational trajectory. These results underscore the importance of promoting both intrinsic motivation and deeper forms of extrinsic motivation to improve students' educational trajectory.

## AUTHOR CONTRIBUTIONS

The authors contributed equally to the data collection, analysis of results, writing, and scientific discussion of the article, and therefore can be considered co-first authors.

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