

Determinants of degree completion among Dentistry students at the University of Antofagasta, Chile

Determinantes de la titulación de estudiantes de Odontología de la Universidad de Antofagasta en Chile

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ABSTRACT

Background: Monitoring timely graduation rates allows for the design of interventions that improve student academic performance.

Objective: To identify the determinants of timely degree completion among Dentistry students at the University of Antofagasta between 2015, 2016, and 2017.

Methods: Quantitative, observational, analytical study of a historical cohort. Students who entered in 2015, 2016, and 2017 were included, and those who dropped out of the program

were excluded. Theoretical methods (analytical-synthetic and inductive-deductive) and empirical methods (documentary analysis) were used. The main variable was timely degree completion, and other sociodemographic and academic variables were analyzed. Among the mathematical-statistical methods, descriptive analysis and the Shapiro-Wilk normality test were used. For normally distributed variables, Student's t-test and ANOVA were used; for non-normally distributed variables, the Mann-Whitney and Kruskal-Wallis tests were used, and the Chi-square test was used for categorical variables, with $p < 0.05$.

Results: A total of 127 students were analyzed, with a mean age at admission of 19.1 years (SD 1.2) and a female predominance. In 2015, there was a higher proportion of students not originating from Antofagasta ($p < 0.05$). The variables high school GPA, university entrance exam score, number of failed subjects, and final degree grade showed significant differences according to timely degree completion ($p < 0.05$); no differences were found according to sex or type of admission ($p > 0.05$). The 2016 and 2017 cohorts had lower timely graduation rates ($p < 0.05$).

Conclusions: Timely degree completion is associated with better prior academic background and lower failure rates. The lower timely graduation rates in the 2016 and 2017 cohorts may be linked to curriculum changes related to the COVID-19 pandemic.

MeSH: students, dental; educational measurement; evaluation studies as topic; learning; education, medical

RESUMEN

Fundamento: el seguimiento de las tasas de titulación oportuna permite diseñar intervenciones que mejoren el rendimiento académico estudiantil.

Objetivo: identificar los determinantes de la titulación oportuna de estudiantes de Odontología de la Universidad de Antofagasta entre los años 2015, 2016 y 2017.

Métodos: estudio cuantitativo, observacional, analítico de cohorte histórica. Se incluyeron estudiantes de ingreso en 2015, 2016 y 2017 y se excluyeron quienes abandonaron la carrera. Se utilizaron métodos teóricos (analítico-sintético e inductivo-deductivo) y empíricos (análisis documental). La variable principal fue la titulación oportuna y se analizaron otras sociodemográficas y académicas. Entre los métodos matemático-estadísticos, se utilizaron el análisis descriptivo y test de normalidad Shapiro-Wilk. Para variables de distribución normal

se usó test *de Student* y ANOVA; para distribución anormal, Mann-Whitney y Kruskal-Wallis, y test Chi-cuadrado para variables categóricas, con un $p < 0,05$.

Resultados: se analizaron 127 estudiantes con edad promedio al ingreso de 19,1 años (DS 1,2) y predominio femenino. En 2015, hubo mayor proporción de alumnos no originarios de Antofagasta ($p < 0,05$). Las variables notas de enseñanza media, puntaje de la prueba de selección universitaria, número de asignaturas reprobadas y nota final de título mostraron diferencias significativas según titulación oportuna ($p < 0,05$); sin diferencias según sexo y tipo de ingreso ($p > 0,05$). Las cohortes 2016 y 2017 presentaron menor tasa de titulación oportuna ($p < 0,05$).

Conclusiones: la titulación oportuna se asocia a mejores antecedentes académicos previos y menor reprobación. Las menores tasas de titulación oportuna de las cohortes 2016 y 2017 podrían vincularse a cambios curriculares relacionados con la pandemia por COVID-19.

DeCS: estudiantes de Odontología; evaluación educacional; estudios de evaluación como asunto; aprendizaje; educación médica

Received: 03/25/2026

Accepted: 05/18/2026

INTRODUCTION

The theoretical duration of a university degree refers to the time defined in the curriculum, so that timely degree completion is that which occurs within one additional year beyond the theoretical duration.⁽¹⁾ The measurement and monitoring of degree completion rates in a program are relevant for implementing interventions that improve academic performance; however, this type of study is still scarce in Chile.^(2,3) It has been reported that less than half of the students entering a five-year university program there manage to graduate within a period comprising up to three additional years beyond the duration of said program.⁽³⁾

Hence the importance of identifying the different determinants that affect the probability of a university student completing their studies achieving timely degree completion. For example, in Chile it has been described that women have a higher probability of graduating than men, regardless of the type of degree and the length of the program, and that in long-duration programs there is a gap in graduation rates by socioeconomic status that favors students from private schools with higher income levels, and those who remain studying in their region of origin.⁽²⁾ It has also been evidenced that academic performance in secondary education and university entrance exam scores are predictors of good basic and preclinical academic performance in Chilean medical students.⁽⁴⁾

At the University of Antofagasta, the theoretical duration of the Dentistry program is six years; therefore, timely degree completion is considered to be achieved by the seventh year. In this context, there are currently no studies evaluating the timely graduation rate of these university students. At the institutional level, this indicator is monitored; however, it also includes those who have dropped out of the program (and therefore will not graduate), which reduces the timely graduation rate.⁽⁵⁾ All of this makes it difficult to monitor academic performance and make decisions to facilitate students' progress in their academic trajectory.

Therefore, the information obtained in this research will provide the basis for establishing improvements that impact the curricular progress of students in the program, thus ensuring an educational process with quality and relevance standards, in accordance with the Institutional Educational Project of the University of Antofagasta and the Development Program of the Faculty of Medicine and Dentistry for the period 2021-2030.⁽⁵⁾

The objective of this study is to identify the determinants of timely degree completion among Dentistry students at the University of Antofagasta between 2015, 2016, and 2017.

METHODS

A quantitative, observational, analytical study of a historical cohort was conducted. The study population consisted of all students who entered the Dentistry program at the

University of Antofagasta (Chile) in the academic years 2015 (66), 2016 (62), and 2017 (72). These entry years were selected based on the time of data collection (March 2024), which allowed for cohorts that had completed the timely graduation period at the time of analysis.

Convenience sampling was used. Students who withdrew early from the program for various reasons (withdrawal, resignation, dismissal, or transfer) were excluded. The sample size was 127 Dentistry students, corresponding to 42 who entered the program in 2015, 40 in 2016, and 45 in 2017.

Theoretical methods were used: analytical-synthetic to synthesize the study findings and inductive-deductive to draw conclusions based on the results achieved and contrast them with existing theory and evidence.

As an empirical method, a documentary review of the admission data records for the years studied was carried out, protecting the anonymity and confidentiality of the students.

The timely graduation rate was considered the main variable, defined as such if graduation occurs within a maximum of one additional year beyond the theoretical duration of the program (i.e., 7 years), and it was categorized (yes/no).

Other variables were also studied: sociodemographic: age at admission, sex (male and female), and place of origin (city of Antofagasta and other); academic: admission pathway to the program (categorized as "regular" if admission occurred via the university selection test; and "other" if admission occurred through a baccalaureate, transfer, or special admission), high school GPA, weighted score of the university selection test, number of failed subjects (up to two subjects and three or more subjects), and final graduation grade.

As mathematical-statistical methods, a descriptive analysis of the sample was performed using STATA 14® statistical software, with summary measures such as percentage, mean, and standard deviation. Normality analysis of continuous variables was performed using the Shapiro-Wilk test. Differences between data groups with normal distribution were assessed

using Student's t-test and ANOVA, while for non-normally distributed data, the Mann-Whitney U test and Kruskal-Wallis test were used. The Chi-square test was used to analyze differences between categorical variables. The timely graduation rate was analyzed according to the studied explanatory variables with a 95% confidence level ($p < 0.05$).

Regarding ethical aspects, this study had certification from the Scientific Research Ethics Committee of the University of Antofagasta (Folio No. 460/2023) and authorization from the Directorate of the Department of Dentistry.

RESULTS AND DISCUSSION

Table 1 shows the characteristics of the studied sample, with a mean age at admission to the program of 19.1 (SD 1.2). There was a higher proportion of female students in all years. It is noteworthy that among students who entered in 2015, there was a higher proportion of those coming from cities other than Antofagasta ($p < 0.05$).

Table 1. Students according to sociodemographic and academic variables by historical cohorts. Faculty of Dentistry. University of Antofagasta**

Sociodemographic variables	Historical cohorts						Total		p-value
	2015		2016		2017				
Sex	n	%	n	%	n	%	n	%	
Male	20	47.62	10	25	18	40	48	37.8	0.1 ^b
Female	22	52.38	30	75	27	60	79	62.2	-
Total	42	100	40	100	45	100	127	100	-
Place of origin (n=126)									
City of Antofagasta	27	64.3	36	90	37	84.1	100	79.4	0.01 ^b
Other	15	35.71	4	10	7	15.9	26	20.6	-

Total	42	100	40	100	44	100	126	100	-
Mean age at admission to the program	19.04	1.28	19.17	0.74	19.22	1.45	19.1	1.2	0.3547 ^c
Academic variables									
Admission pathway to the program	n	%	n	%	n	%	n	%	
Regular	35	83.33	33	82.5	38	84.4	106	83.5	0.971 ^b
Other	7	16.77	7	17.5	7	15.6	21	16.5	-
Total	42	100	40	100	45	100	127	100	-
High school GPA (n=125)	6.3	0.21	6.25	0.19	6.28	0.28	6.2	0.23	0.2905 ^d
Mean score on the university selection test (n=123)	665.9	28.8	657.4	31.9	666.7	40.7	663.6	34.4	0.1879 ^c
Mean number of failed subjects	2.21	2.88	2.25	2.57	2.37	2.94	2.2	2.7	0.7675 ^c
Number of failed subjects									
Up to two subjects	27	64.3+	25	62.5	28	62.2	80	62.99	0.977 ^b
Three or more	15	35.7	15	37.5	17	37.8	47	37.01	-
Total	42	100	40	100	45	100	127	100	-

a Mean (standard deviation), b Chi-square test, c Kruskal-Wallis test, d ANOVA test

Source: Admission data record.

In Table 2, it can be observed that students who entered the program in 2016 and 2017 had a lower timely graduation rate ($p < 0.05$).

Table 2. Students according to timely degree completion and historical cohorts. Faculty of Dentistry. University of Antofagasta

Timely degree completion	Historical cohorts						Total		p-value
	2015		2016		2017				
	n	%	n	%	n	%	n	%	
Sí	33	78,6	18	45	21	46,7	72	56,7	0,002 ^a
No	9	21,4	22	55	24	53,3	55	43,3	-
Total	42	100	40	100	45	100	127	100	-

aChi-square test

Source: Admission data record.

Table 3 shows that the timely graduation rate was higher in women; however, this difference is not statistically significant ($p > 0.05$). In turn, significant differences were observed in timely graduation rates according to the variables high school GPA, weighted score on the university selection test, number of failed subjects, and final degree grade. Students who graduated in a timely manner had failed an average of 0.7 (SD 1.15) subjects and had a significantly better final degree grade ($p < 0.05$).

Table 3. Students according to sociodemographic and academic variables and timely degree completion. Faculty of Dentistry. University of Antofagasta

Sociodemographic variables	Timely degree completion				Total		p-value
	Si ^a (n=72)		No ^a (n=55)				
Sex	n	%	n	%	n	%	
Male	26	54.12	22	45.83	48	100	0,654 ^b
Female	46	58.2	33	41.8	79	100	-
Total	72	56.7	55	43.3	127	100	-
Place of origin (n=126)							

City of Antofagasta	59	59	41	41	100	100	0,239 ^b
Other	12	46.15	14	53.85	26	100	-
Total	71	56.3	55	43.7	126	100	-
Academic variables							
Admission pathway	n	%	n	%	n	%	
Regular	61	57.55	45	42.45	106	100	0,662 ^b
Otra	11	52.38	10	47.62	21	100	-
Total	72	56.7	55	43.3	127	100	-
Number of failed subjects							
Up to two subjects	66	82.5	14	17.5	80	100	0,000 ^b
Three or more subjects	6	12.8	41	87.2	47	100	-
Total	72	56.7	55	43.3	127	100	-
High school GPA (n=125)	6.33	0.02	6.24	0.03	6.2	0.23	0,0208 ^c
Weighted score on the university selection test (n=123)	671.09	30.57	653.7	36.93	663.6	34.4	0,0157 ^d
Mean final degree grade (n=104)	5.81	0.14	5.66	0.22	5.8	0.18	0,0009 ^d
Mean number of failed subjects	0.7	1.15	4.34	87.23	2.2	2.7	0,000 ^d

a Mean (SD) or n (%), b Chi-square test, c Student's t-test, d Mann-Whitney U test

Source: Admission data record.

The results show that the highest timely graduation rates were observed among those who had better academic backgrounds prior to entering university. This has also been observed in most studies addressing academic success, which is why prior academic achievements are recognized as a predictive variable for university academic success.⁽⁶⁾

Another useful variable for monitoring students and being able to establish early interventions to ensure a successful curricular trajectory is the number of failed subjects. This study identified that failing up to two subjects does not appear to significantly affect timely graduation, since nearly 8 out of 10 students would achieve timely graduation. Therefore, in an effective monitoring process of the academic trajectory of students by cohort, it would be possible to identify at-risk students in order to establish interventions that favor their academic success.

This type of intervention is important, especially when the literature describes high levels of stress ⁽⁷⁾ and burnout among dental students, with evidence of an association between the presence of burnout and poorer academic outcomes.⁽⁸⁾

A higher proportion of female students and better timely graduation rates in this group were observed in all entry years studied, although the difference found was not significant. This positive gap reflects progress since the graduation of Paulina Starr, the first female dentist in Chile, in 1884⁽⁹⁾ However, although since the 1980s there has been a trend toward greater female representation in dentistry, both among enrolled students and faculty, this is not reflected in high academic positions.⁽¹⁰⁾ At the same time, there is evidence that women obtain better grades at all educational levels, but this academic advantage does not translate into higher levels of employability.⁽¹¹⁾

Although a higher proportion of students who entered in 2015 came from other cities, no significant differences in graduation rates by place of origin were found. In this regard, the literature describes that in the case of longer-duration programs, students who come from a geographic region different from that of the university institution have a lower probability of graduating compared to those who remain in their region for tertiary studies.⁽²⁾

Likewise, the type of admission pathway to the program does not seem to influence timely graduation rates in this study. The literature on this topic is scarce. At the University of Antofagasta, most students entered the program through the regular pathway, and other admission types include baccalaureate admission, transfer admission, and special admission.

The timely graduation rate of the 2015 cohort was higher than that observed in the 2016 and 2017 cohorts. It is possible that these results were influenced by the context of the COVID-19 pandemic in 2020, coinciding with the graduation process of the 2015 cohort; however, the methodological characteristics of this study do not allow causality to be determined. Even so, it is recognized that this historic event necessitated the implementation of curricular modifications to ensure the continuity of university education.^(12,13) In the case studied, for the 2015 cohort, subjects were taught in an emergency remote modality during the first semester, as well as a deferred and shorter clinical internship. These conditions could have influenced the higher timely graduation rate observed in the 2015 cohort.

In turn, the lower timely graduation rate observed in the 2016 and 2017 cohorts could be related to the curricular adjustments derived from the pandemic, although the influence of other unmeasured factors cannot be ruled out. Unlike the 2015 cohort, these students had not completed clinical subjects at the start of the pandemic in 2020, so much of their theoretical and clinical training had to be delivered in an emergency remote modality.

In the 2016 cohort, the theoretical components of the annual clinical subjects and the theoretical subjects corresponding to the following academic year were delivered remotely; they completed the practical component in 2021. Similarly, the 2017 cohort completed the theoretical components of the fourth and fifth-year clinical subjects remotely, while in-person clinical activities were carried out in a deferred manner in 2021 and 2022, respectively.

The modifications described reflect the rethinking of curricular delivery models that occurred as a result of the COVID-19 pandemic.^(12,13) There are initial reports of the effect on students; for example, among North American dental students, better academic outcomes in courses during the pandemic have been described compared to previous periods, along with experiences of uncertainty and greater mental overload.⁽¹⁴⁾

Among the limitations of this study, we note the lack of timely graduation rates for students prior to this report, since institutional indicators include those who have withdrawn from the program, and therefore the calculated rates are lower than those reported here.⁽⁵⁾ The lack of monitoring prior to this report makes it difficult to compare the results, especially considering the effect of the COVID-19 pandemic and the curricular modifications implemented in these cohorts.

There are other variables that the literature reports as possible predictors of academic success that could not be measured in the present study; for example, the type of high school of origin. In Chile, it has been described that in the case of long-duration programs such as Dentistry, students from paid private and subsidized private schools have a higher probability of timely graduation compared to those from public municipal schools.⁽²⁾

Other authors ^(15,16) have identified the need to be able to assess at what point in the academic trajectory the highest failure rates occur. In undergraduate dental education, students' academic trajectory is composed of basic, preclinical, and clinical subjects, and national reports show that academic performance in basic courses could predict students' time to graduation, so it would be relevant to study in which period of training the highest failure rate occurs, something that was not evaluated in this study.

Scientific contribution

This research is the first step toward establishing internal monitoring in the Dentistry program at the University of Antofagasta, which will lead to an improvement in educational processes with quality and relevance standards, in order to facilitate decision-making that promotes students' progress in their academic trajectory.

CONCLUSIONS

The timely graduation rate and its sociodemographic and academic determinants were analyzed in Dentistry students at the University of Antofagasta (2015, 2016, and 2017 cohorts). Establishing a systematization and monitoring of student cohorts throughout their

academic trajectory will allow the implementation of improvement actions and the analysis of the impact of curricular interventions implemented to promote student academic success, considering both the number of failed subjects, timely graduation rates, and their follow-up.

Acknowledgments

This study was developed by the Nucleus for Research in University Teaching (NIDU). Determinants of degree completion among Dentistry students at the University of Antofagasta.

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Statement of interests

The authors declare no conflicts of interest.

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