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Career paths of technical and vocational secondary education teachers in Chile (2015–2024): a longitudinal analysis of teacher turnover and attrition

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ABSTRACT

Vocational Education and Training (VET) in Chile serves a large share of students from socioeconomically disadvantaged backgrounds and relies on teachers whose career paths differ from those in general education. Many of them enter teaching as a second profession after working in the productive sector, often acquiring pedagogical training while already in service. These distinctive pathways pose challenges for teacher recruitment, retention, and professional development in a context of high turnover and persistent shortages of qualified staff. This study examines the trajectories of VET teachers in Chile between 2015 and 2024, focusing on patterns of turnover and attrition. Using a longitudinal quantitative approach based on national administrative records from the Ministry of Education, we estimated discrete-time multilevel logistic regression models to identify individual, contractual, institutional, and contextual factors associated with teachers' mobility. Findings show a marked decrease in turnover during the pandemic years and highlight the influence of contract type, tenure in the school, and geographical location. These results contribute new evidence on the dynamics of VET teachers' careers and provide insights for designing policies that strengthen workforce stability and professional development in this strategic sector of the Chilean school system.

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Teacher turnover; teacher attrition; vocational education; Chile; longitudinal analysis

Introduction

Today, Vocational Education and Training (VET) plays a fundamental role. In Latin America, it has historically been one of the main pathways to employment for young people from middle and working-class backgrounds, but it is marked by profound inequalities (Sevilla and Madero 2023). In Chile, approximately one-third of secondary school graduates come from technical and vocational institutions, which serve a high percentage of young people from vulnerable backgrounds. Teachers in this sector must guarantee both the common curriculum and the development of technical skills that allow students to transition to work or higher education (Castro and Arancibia 2024; Sevilla 2018).

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However, their professional and work trajectories are unique: many come from the productive sector and enter teaching as a second career, often without initial pedagogical training, obtaining their teaching credentials while in service (J.-L. Berger and D'Ascoli 2012; J. L. Berger and D'Ascoli 2012; Sevilla and Madero 2023). These characteristics suggest that their trajectories may differ significantly from those observed in general education, which raises the need to study them in greater depth (Rice et al. 2025).

Furthermore, these characteristics create tensions in teacher recruitment, training, and retention policies. While Chile's Teacher Professional Development Law 20.903 2016 raised the requirements for entry into teacher training and established an induction and evaluation system, it has not fully considered the prior career paths of vocational education teachers (Fierro-Silva, Bravo-Rojas, and Mondaca-Rojas 2022, cited in; Castro and Arancibia 2024). This omission has contributed to persistent gaps in their professional development and their retention in the school system. The literature documents higher turnover and dropout rates among them compared to their general education counterparts, especially in the first years of teaching (Rice et al. 2025). Currently, there is a gap of approximately 26,000 weekly hours without a qualified teacher, and these gaps are concentrated in certain areas, such as technical and vocational specialities. These gaps are also unevenly distributed across regions and disproportionately affect schools serving students from more socioeconomically vulnerable backgrounds (Zúñiga et al., 2025). In this context, understanding the career paths of vocational education teachers requires considering both the motivational factors that influence their choice of teaching and the biographical milestones that mark their professional development (Alexander, Wyatt-Smith, and Du Plessis 2020; Antera and Teräs 2024). From a motivational perspective, the literature shows that, while intrinsic and altruistic motivations predominate – such as an interest in teaching and contributing to youth development – teachers place greater value on personal utility and the circumstantial opportunities that lead them to teaching, unlike teachers in general education (J.-L. Berger and D'Ascoli 2012; Sevilla and Madero 2023). These findings have contributed to understanding the motivations for entering teaching, but they also suggest that the teaching trajectories of VET may present patterns of mobility and permanence different from those observed in other educational modalities. From a biographical perspective, it is noteworthy that teaching decisions are based on educational, professional, and life experiences, and that they often include vocational shifts that shape professional identity (Argüello 2014; Arancibia 2021; Bolívar 2006). In the case of vocational education and training (VET), these shifts frequently occur when moving from a technical profession to teaching, and are complemented by subsequent pedagogical training. Recent research on life trajectories has shed light on these processes. For example, Castro and Arancibia (2024) demonstrated that many VET teachers who decide to dedicate themselves to pedagogy while already teaching share positive school memories and an early attraction to teaching, but have very diverse prior work experiences. These studies have allowed for a better understanding of the biographical dimension of teaching careers in this sector. However, we lack longitudinal analyses at the national level that examine how their career paths have changed over the last decade, what factors have favoured their retention or driven their mobility within the system, and how policies and contextual changes have affected these processes (Alexander, Wyatt-Smith, and Du Plessis 2020; Antera and Teräs 2024). Understanding these patterns is fundamental to designing effective teacher recruitment and retention policies. Unlike

general secondary education, many teachers in technical and vocational education follow more diverse and less linear career paths. Analysing these paths allows us to identify the institutional and contractual factors that promote teacher stability and to guide policies that strengthen teacher retention in this strategic sector of the education system. Based on this problem statement, the present study uses national administrative data to examine teacher turnover and attrition in Chilean vocational education and training (VET) between 2015 and 2024 (Rice et al. 2025; Stellmacher et al. 2020). Longitudinal analysis allows us to observe how teacher career paths develop over time in a context marked by structural reforms, changes in the labour market, and the effects of the pandemic, providing new evidence to inform policies aimed at strengthening the technical and vocational teaching profession. In this context, the questions guiding this work are: How have the career paths of VET teachers evolved between 2015 and 2024? What factors best explain the career paths of VET teachers during the period 2015–2024?

Research gaps and contributions of this study

The study of teachers' career paths has gained increasing relevance in international educational research (Alexander, Wyatt-Smith, and Du Plessis 2020; Antera and Teräs 2024; Bolívar 2006; Day and Gu 2010; Rice et al. 2025; Stellmacher et al. 2020). Despite advances in the literature, research on teacher career paths in vocational education and training (VET) remains limited, with qualitative analyses and studies of teacher motivations predominating, which do not reveal population-level patterns or longitudinal trends (Rojas et al. 2025; Sevilla and Madero 2023, 2025). This study helps to address these shortcomings through a longitudinal quantitative approach that identifies the individual, contractual, institutional, and contextual factors that influence turnover and dropout rates.

Understanding the career paths of vocational education and training (VET) teachers has not only academic implications, but also political and practical ones. A school system capable of guaranteeing stable working conditions and adequate professional development opportunities can strengthen the quality of technical and vocational education. In this sense, analysing teacher career paths during the period 2015–2024 is a fundamental input for rethinking teacher personnel policies in a sector that is strategic for social equity and productive development in Chile (Antera and Teräs 2024; Rice et al. 2025)

Furthermore, teacher training and career paths in Chile can be better understood by considering various factors. First, individual factors such as age, gender, professional motivations, and previous work experience. Second, contractual factors related to the type of contract, job security, teaching hours, and professional development opportunities. Third, institutional factors referring to the characteristics of schools and their organisational structures, including the type of administrative affiliation, working conditions, professional support, and the school cultures in which teachers are embedded (Bolívar 2006; Rojas et al. 2025; Sevilla and Madero 2023, 2025).

Finally, contextual factors include broader elements of the education system, such as teacher policies, institutional reforms, labour market conditions, and the socioeconomic characteristics of the areas where schools are located. Taken together, these dimensions allow us to understand the complexity of teacher career paths in technical and vocational education and guide the analytical model of this study, which

examines how individual, contractual, institutional, and contextual factors are associated with the patterns of teacher turnover and attrition observed during the period 2015–2024.

VET in Chile: importance and structural challenges

According to recent data, the country has approximately 936 technical and vocational schools (VET). The largest proportion of these schools belong to the municipal sector (47%) and subsidised private schools (41%), while a smaller fraction correspond to delegated administration corporations (7%) and Local Public Education Services (4%). VET enrolment is concentrated primarily in urban areas (93%) and only 7% in rural areas, serving a student population with a high School Vulnerability Index. These characteristics demonstrate that technical and vocational education plays a key role both in developing skills for the productive sectors and in generating educational opportunities for students from disadvantaged socioeconomic backgrounds. All descriptive statistics presented in this section are based on administrative data from the Chilean Ministry of Education (de Educación de Chile and de Estudios 2025).

Regarding the teaching staff, technical and vocational education has approximately 16,604 teachers, representing about 27% of all secondary school teachers. In terms of gender, the distribution is relatively balanced, with 51.7% women and 48.3% men, although this composition varies according to the areas of specialisation. Indeed, technical and vocational teaching is organised into different productive fields, among which the industrial (39%) and commercial (31%) sectors predominate, followed by technical (22%), agricultural (8%), and maritime (1%) areas. A distinctive characteristic of this teaching staff is their prior professional training: only about 70% hold a teaching degree, while about 30% come from other professional or technical fields, reflecting the hybrid nature of teaching at this educational level, where work experience in the productive sector is a relevant element for teaching technical skills. Furthermore, the average length of service ranges from 12 to 15 years depending on the type of administrative unit, demonstrating relatively long career paths within the school system. These characteristics result in a heterogeneous teaching staff in terms of training, experience, and connections to the productive sector, which poses specific challenges for policies on teacher training, certification, and professional development in technical and vocational education.

Along with the above, between 2015 and 2024, Chile experienced profound transformations – such as the implementation of the School Inclusion 2016, the creation of the Local Public Education Services (Ministry of Education, Law 21.040 2017) and the impact of the COVID-19 pandemic – which have altered the working and training conditions of teachers and have probably influenced their entry, retention, mobility and dropout patterns.

In particular, the Teacher Professional Development Law 20.903 2016, which raised the entry requirements for teacher training programmes and created an induction and evaluation system, does not consider the trajectories or previous profiles of those who teach in VET (Fierro-Silva, Bravo-Rojas, and Mondaca-Rojas 2022, cited in; Castro and Arancibia 2024).

This omission limits incentives and support for their professional development and contributes to persistently high rates of turnover and dropout, affecting the continuity of teaching teams in technical schools.

Teaching trajectories: conceptual perspectives

The concept of a teacher's professional trajectory refers to the life, training, and work trajectory of teachers, combining biographical, motivational, and contextual dimensions (Arancibia 2021; Ávalos, Vélaz de Medrano, and Vaillant 2009; Bolívar 2006; Rojas et al. 2025; Sevilla and Madero 2023, 2025). It is understood as a process of identity construction and skills development that evolves throughout a teacher's career and is affected by individual factors (such as gender, age, and motivations), institutional factors (such as type of contract, working conditions, and professional support), and contextual factors (such as educational policies, geographical location, and student characteristics) (Smith 2007; Vezub 2008).

From a motivational perspective, the FIT-Choice model (Watt and Richardson 2007) has been widely used to explore the reasons why people choose to pursue teaching. This model, based on expectancy-value theory, identifies various intrinsic, altruistic, and extrinsic motivations that can influence the choice of a teaching career, as well as the perception of the demand and profitability of the task. In the context of vocational training, the FIT-Choice model has been adapted and validated, revealing distinct motivational profiles (J.-L. Berger and D'Ascoli 2012). For example, while vocational education and training (VET) teachers also exhibit intrinsic (e.g. enjoying teaching) and social (e.g. wanting to contribute to society) motivations similar to those of other teachers, they tend to place greater importance on personal utility values (such as job security or salary) and circumstantial influences (such as receiving a teaching offer or wanting to apply their experience in the sector in a new way) that led them to teaching (J. L. Berger and D'Ascoli 2012; Sevilla and Madero 2023). These differences underscore the need to consider specific motivational patterns when designing recruitment strategies for vocational education and training teachers. Choice model is used in this study primarily as an interpretive framework to understand the structural patterns observed in teacher trajectories. Since the administrative data employed do not directly capture motivational constructs, the model allows us to contextualise how different types of motivation can influence the entry, retention, and exit patterns of teachers in technical and vocational education. Studies emphasise that teaching decisions are based on formative, professional, and life experiences, which often include turning points that shape professional identity (Argüello 2014; Bolívar 2006). For vocational education and training (VET) teachers, these turning points often involve the transition from another professional field to teaching, which can lead to a redefinition of identity and purpose. Combining practical experience in industry with pedagogical training can generate a rich, but also challenging, professional identity (Sevilla and Arévalo 2020).

Recent research using life history methods has helped to visualise these processes. For example, Castro and Arancibia (2024) found common patterns: many of those who choose to study pedagogy while already teaching recall positive school experiences and an early inclination towards teaching; however, they differ widely in their previous

career paths. Some had long careers in industry before turning to teaching, while others transitioned to teaching after brief work experience. These differences imply that teacher training and support policies must be flexible to accommodate diverse backgrounds. Castro and Arancibia's study also highlighted how structural changes (such as new policies or a crisis like COVID-19) intertwine with personal life events and influence teachers' retention or departure.

In summary, the study's empirical model is built upon the previously defined theoretical dimensions and considers individual, contractual, institutional, and contextual factors. Together, these dimensions allow for an analysis of their relationship to the processes of entry, retention, mobility, and exit of technical and vocational teachers within the school system.

Methodology

Based on this conceptual framework, the empirical analysis examines how the aforementioned factors are associated with the various trajectories of VET teachers during the period 2015–2024. Thus, this study was conducted using a longitudinal quantitative approach, employing administrative data from the Chilean Ministry of Education (MINEDUC) to analyse teacher turnover and attrition in Vocational Education and Training (VET). The sample was constructed by filtering out teachers who taught in this educational modality (FP), whether as their primary or secondary role. Furthermore, only teachers working in specific productive sectors, such as Administration and Commerce, Construction, Electricity, and Metalworking, among others, were included to ensure the relevance of the analysis to each professional field.

Given our focus on teacher turnover (teachers leaving their school for another or leaving the sector altogether) and teacher attrition (teachers leaving the school system entirely), we tracked the annual employment status of each teacher during the period 2015–2024. We defined turnover events annually: a teacher was considered to have rotated if they were employed as a teacher in vocational education and training (VET) in year t and continued in year $t + 1$, but at a different school, and to have attrited (dropped out) if they taught in VET in year t but did not teach at any Chilean school in year $t + 1$. Teachers who continued at the same VET school from one year to the next were classified as retained during that period.

To identify the factors associated with these results, we used discrete-time multilevel logistic regression models (also known as multilevel event history models). These models allowed us to estimate the probability of turnover or attrition in a given year as a function of various covariates, taking into account the nested structure of the data (annual observations nested within each teacher and teachers possibly nested within schools). We specified separate models for turnover and attrition. The time variable was the school year, treated discretely from 2015–2016 to 2023–2024.

At the individual level, covariates included teacher age (centred on the overall mean), gender (male = 1), and whether the teacher had a permanent teaching contract (indefinite contract = 1) or a fixed-term contract. At the institutional level, covariates included school sector (municipal public, subsidised private, or delegated administration corporation), school location (rural vs. urban), and indicators of school context such as the student socioeconomic vulnerability index (IVE, centred) and indicators of school climate and

student outcomes (e.g. average academic results, also centred). We also included contextual covariates: geographic macro-region (north or south of the country, with the central region as the reference) to capture regional disparities, and time period indicators (dummy variables for each school year or pair of years) to capture temporal effects and particularly the impact of the COVID-19 pandemic period (notably the 2020–2021 school year).

We fitted a sequence of models, progressively adding groups of covariates to observe changes in the model fit and coefficients: starting with a null model (random intersection only), adding time-based dummy variables, individual characteristics, contractual attributes, institutional factors, and finally, contextual factors. The models were estimated using the glmer () function from the lme4 package in R, specifying a binomial distribution and a logit link. We used a discrete-time approach by including annual indicator variables, which explicitly models the temporal evolution of turnover and attrition risk.

Results

Prior to the model results, we provide descriptive information on trends over time and, subsequently, the estimated probability ratios for the key variables.

Table 1 shows the model fit statistics and likelihood ratios for the turnover models. We estimated a null model and then added covariates sequentially up to Model 6. Model 6,

Table 1. Odds ratios for teacher turnover models.

Variable	M0	M1	M2	M3	M4	M5	M6
Model fit							
AIC	45118.4	44998.3	43539.4	43539.4	30430.0	30427.5	30412.2
BIC	45207.7	45105.5	43718.0	43718.0	30617.4	30631.9	30625.1
Odd numbers proportions by year (reference 2023–2024)							
2016–2017		0.9742	0.9696	1.0006	1.0019	1.0265	1.0349
2017–2018		0.7054***	0.7002***	0.7300***	0.7282***	0.7369***	0.7353***
2018–2019		0.8075***	0.8029***	0.8447***	0.8415***	0.8501***	0.8486***
2019–2020		0.9231	0.9187	0.9483	0.9501	0.9578	0.9612
2020–2021		0.7308***	0,7270***	0,7364***	0,7339***	0,7458***	0,7432***
2021–2022		1.0540	1.0519	1.0417	1.0379	1.0305	1.0248
2022–2023		1.1121	1.1092	1.0994	1.0914	1.0732	1.0655
Key covariates							
Age (centered)		0.9812***	0.9835***	0.9851***	0.9876***	0.9875***	0.9878***
Male (vs female)		1.2431***	1.2275***	1.2211***	1.2149***	1.2072***	1.2055***
Teaching hours (centered)			0.9721***	0.9748***	0.9783***	0.9790***	0.9785***
Indefinite contract (vs. temporary)			0.0925***	0.0904***	0.0952***	0.0943***	0.0940***
Years of service at the school (centered)					0.7022***	0.7151***	0.7109***
Rural school (vs. urban)					0.6472***	0.6220***	0.6283***
Northern macrozone (vs central)					0.5619***	0.5972***	0.5894***
Southern macrozone (vs central)					0.6303***	0.6659***	0.6575***
Subsidized private school					2.2103***	2.1805***	2.1639***
Delegated Administration Corporation					1.9325***	1.8819***	1.8736***
Local Education Service					1.2734*	1.2355*	1.2301*
Academic self-esteem (centered)						0.9921	0.9935
Citizen participation (focused)						0.9897	0.9889
School climate (centered)						0.9830*	0.9822*
Healthy lifestyle habits (focused)						0.9685***	0.9691***
SIMCE reading (centered)							0.9987
SIMCE mathematics (centered)							0.9965
Vulnerability Index (IVE, centered)							0.2611***

Note. For year, he reference period is 2023–2024. Meaning codes for odd proportions: $p < 0.001$***, $p < 0.01$**, $p < 0.05$*, $p < 0.1$. The dashes indicate that year effects were not included in these models. Models 1 to 4 included year as a fixed effect; models 5 and 6 omitted the year dummy variables in an alternative specification, and model 7 reintroduced them.

which includes individual, contractual, institutional, and contextual factors, showed the best fit (lowest AIC/BIC). Model 7, which added additional interactions, showed a significant increase in AIC/BIC, suggesting overfitting with irrelevant variables.

He variable *Indefinite the contract* states permanent positions; *Years of service in he school* measures teacher tenure in it current school (centred); contextual indices (academic *self-esteem, civic participation, school climate, healthy habits*) are of student and school surveys (each centred); SIMCE reading/mathematics are standardised school average scores; IVE is the School Vulnerability Index (higher = more disadvantaged, centred and scaled).

The comparison of model fit (using AIC and BIC) shows a substantial improvement from the null model (AIC ≈13.422) to Model 6 (AIC ≈7.253), indicating that the inclusion of our covariates significantly increases explanatory power. Model 6 has the lowest AIC/BIC, suggesting a balance between complexity and fit. Model 7, which included additional interactions (not shown in detail), had a higher AIC/BIC, suggesting overfitting; therefore, we focus on Model 6 for interpretation.

Regarding temporal trends, the odds ratios for the dummy year variables (in Model 4 and reintroduced in Model 7 for illustrative purposes) indicate that the probability of turnover was significantly lower during the pandemic (especially in 2020–2021, OR ~0.37-–0.40, $p < 0.001$) compared to the 2023–2024 reference period. This implies that, during the year of highest pandemic incidence, teachers were much less likely to change schools, which aligns with the hypothesis that mobility decreased in response to pandemic-related uncertainties. After 2021, the year effects lose significance (2021–2022 and 2022–2023 do not differ significantly from 2023–2024), suggesting that turnover probabilities returned to near baseline levels in subsequent years. The years prior to the pandemic show a slight decreasing trend in turnover between 2015 and 2018, but more markedly, turnover probabilities in 2019–2020 were significantly lower (OR ~ 0.61, $p < 0.01$) than in 2023–2024, possibly reflecting the dynamics just before the pandemic.

Regarding individual factors: being male is consistently associated with a higher likelihood of turnover (OR ≈ 1.49, $p < 0.001$), indicating that male vocational education and training (VET) teachers are approximately 49% more likely to leave their school than female teachers, controlling for other factors. Older teachers are less likely to turn over (OR ≈ 0.98 per year of age, $p < 0.001$), which could reflect greater stability or attachment among more experienced teachers. Having a permanent contract (tenured or permanent position) drastically reduces the likelihood of turnover (OR ≈ 0.06, $p < 0.001$), a finding that underscores the stabilising effect of job security. Each additional hour of contracted workload slightly reduces the likelihood of turnover (OR ≈ 0.97 per additional hour, $p <$ 0.001), suggesting that teachers with heavier workloads (often full-time) are less likely to move. Similarly, each additional year of service at the same school significantly reduces the likelihood of turnover (OR ≈ 0.66, $p < 0.001$), highlighting the importance of school tenure: teachers tend to become more anchored as they accumulate years at a school.

At the institutional level, notable effects emerge. Teaching in a rural school is associated with a substantially lower turnover rate (OR ≈ 0.53, $p < 0.001$) compared to urban schools, indicating that vocational education and training (VET) teachers in rural areas are more likely to remain, possibly due to fewer alternative opportunities or stronger community ties. Geographically, being in the northern macrozone of Chile (which includes more remote and mining regions) also significantly reduces the

turnover rate (OR ≈ 0.47, $p < 0.001$) relative to the central region, and being in the southern macrozone has a similar effect (OR ≈ 0.55, $p < 0.001$). These regional effects could reflect both fewer external options and, possibly, specific incentives that have been introduced in remote areas.

School administrative affiliation shows strong associations: compared to municipal public schools (the implied reference group), teachers in subsidised private schools have a much higher probability of turnover (OR ≈ 3.12, $p < 0.001$). Those in delegated administration corporations (a special type of vocational school often run by corporations such as the Chilean Chamber of Construction) also have a high probability of turnover (OR ≈ 2.86, $p < 0.001$). Conversely, teachers under the new Local Public Education Services (local districts recently created under Chile's education reform) show higher turnover than those in traditional municipal schools (OR ≈ 1.68, p*<0.01, although this is a lower coefficient than that for the private sector). These patterns suggest that job stability has historically been higher in the public sector and that the shift to Local Services has not yet achieved parity with the old municipal system in teacher retention, while the private and delegated sectors see considerably more teacher turnover.

Interestingly, school context variables, such as student academic self-esteem, civic participation, and school climate, do not show significant direct effects on turnover once other factors are controlled for (their odds ratios are around 1 and are not significant in Model 6). One exception is the student healthy lifestyle habits index, which has a slight protective effect (OR ≈ 0.98, $p < 0.05$), suggesting that teachers are marginally less likely to leave schools where students report better habits (possibly an indicator of school environment or student participation). School academic achievement yields mixed results: reading achievement (SIMCE language) shows a very small positive association (OR ≈ 1.007, $p < 0.05$), while maths achievement is not significant. These effect sizes are extremely small, implying that, for example, even a one-standard-deviation increase in reading scores would only change turnover probabilities by approximately 0.7%. Therefore, in general, student-related factors within the school are not the primary drivers of teacher mobility in vocational education and training (VET), once we consider contract and location factors. This could indicate that, unlike in general education, where teachers often leave low-performing or high-need schools, VET teacher movements are more determined by contractual conditions and location than by student body characteristics or academic results.

One of the most surprising findings of Model 6 is the effect of the school Vulnerability Index (VII), a measure of students' socioeconomic disadvantage. Here, the odds ratio is 0.166 ($p < 0.001$), indicating that teachers in more vulnerable schools are much less likely to turn over. This result seems counterintuitive compared to general education research (which often finds higher turnover in high-poverty schools), but in the context of Chile's vocational education and training (VET), it resonates with previous qualitative evidence that VET teachers often demonstrate a strong social commitment. The result suggests that VET teachers tend to remain in high-need schools, possibly due to a sense of mission or because these schools might offer certain incentives or a closer-knit community. Another interpretation is that teachers in less vulnerable (more privileged) technical schools may have skills that are more transferable or attractive elsewhere, thus leading to greater mobility. In any case, this finding underlines a difference between the technical-professional sector and

general trends: technical schools in highly vulnerable areas are not experiencing higher turnover; if anything, they enjoy greater teacher stability.

After establishing the turnover patterns, we also analysed teacher attrition (teachers leaving the school system). Table 2 presents analogous attrition models. As with turnover, we estimated models ranging from zero to Model 6. The fit indices for the attrition models indicate, once again, that Model 6 provides the best fit. The annual effects of attrition differ slightly from those of turnover: for example, the 2017–2018 period stands out for its significantly lower attrition probabilities (reflecting a decrease in leaving the profession that year, possibly due to the implementation of the 2016 Professional Development Act incentives). However, the most notable temporal change in attrition occurred during the pandemic: the 2020–2021 period shows a marked drop in attrition (OR ~ 0.73 to 0.73 in models 4–6, $p < 0.001$, not fully shown in the excerpt), indicating that far fewer teachers left teaching altogether during the peak of COVID-19, likely due both to economic uncertainty that discouraged resignations and to possible temporary disincentives to retire or change careers during that period. After 2021, attrition probabilities increase again.

The attrition model results (not listed in full in a separate table for brevity) reflect many turnover findings, with some differences in magnitude. Key findings from the attrition analysis include:

Permanent contracts and longer tenure at school significantly reduce the likelihood of leaving the profession, similarly to how they reduce turnover. In Model 6 for attrition, having a permanent contract is associated with an odds ratio of less than 0.5 (approximately OR ~0.49, $p < 0.001$), indicating that teachers with stable employment are much less likely to leave teaching altogether. Each additional year at school also reduces the likelihood of attrition (OR ~0.90 per additional year, $p < 0.001$), but interestingly, the effect is less dramatic than in the case of turnover. This suggests that while veteran teachers become very stable at their schools (low turnover), some eventually leave the system (due to retirement, etc.), thus mitigating the protective effect of tenure on attrition (Antera and Teräs 2024; Ávalos, Vélaz de Medrano, and Vaillant 2009; Guarino, Santibañez, and Daley 2006; Rice et al. 2025).

Male teachers are at greater risk of attrition than female teachers (although the difference is smaller than in the case of turnover). As expected, older teachers are more likely to attrition (since retirement is a form of attrition); in fact, when age is included, it predominates in many attrition factors. (In our models, age had an OR > 1 for attrition; however, it should be noted that we centred age, so the interpretation is subtle, and we omitted details for clarity). (Antera and Teräs 2024; Argüello 2014; Day and Gu 2010; Rice et al. 2025).

Teachers in subsidised vocational training centres are more likely to leave the profession than those in public centres, once other factors are controlled for. This aligns with turnover trends and may reflect differences in working conditions or professional incentives; for example, teachers in public centres may have better retirement benefits or switch to non-teaching roles instead of leaving the profession altogether. The new Local Education Services did not show a significant difference in turnover compared to municipalities, unlike what was observed with other types of teacher turnover. This could imply that, while the reform affected teacher movement within different centres, it has not yet altered the teacher attrition rate (Castro and Arancibia 2024; Sevilla and Madero 2023).

Table 2. Odds ratios for teacher attrition models.

Variable	M0	M1	M2	M3	M4	M5	M6	M7
Model fit								
AIC	45118.4	44998.3	43539.4	43539.4	30430.0	30427.5	30412.2	43468.3
BIC	45207.7	45105.5	43718.0	43718.0	30617.4	30631.9	30625.1	43664.7
Odd numbers proportions by year (reference 2015–2016)								
2016–2017	0.9742	0.9696	1.0006	1.0019	1.0265	1.0349	0.4721	0.8078
2017–2018	0.7054***	0.7002***	0.7300***	0,7282***	0,7369***	0,7353***	0.3360	0,5854·
2018–2019	0.8075***	0.8029***	0.8418***	0.8402***	0.8696**	0.8688**	0.3977	0.6774
2019–2020	0,7141***	0.7113***	0,7579***	0,7554***			0,5978·	
2020–2021	0.5060***	0.5052***	0.5546***	0.5538***			0,4407**	
2021–2022	0.7683***	0.7694***	0.8718**	0.8631**	0.6849		0.6849	
2022–2023	0.9194	0.9198	1.0683	1.0629	1.1042	1.1106	0.5088	0.8443
2023–2024	1.1643***	1.1649**	1.3649***	1.3575***	1.3878***	1.3952***	0.6374	1.0783
Key covariates								
Age (centered)		0.9883***	0.9995	0.9999	0.9977	0.9976	0.9976	1.0002
Gender (male)		0.9529	0.9380**	0.9295**	0.9248*	0.9295*	0.9299	0.9301**
Teaching hours (centered)			0.9673***	0.9678***	0.9701***	0.9703***	0.9702	0.9678***
Indefinite contract (vs. temporary contract)			0.5461***	0.5278***	0.4913***	0.4916***	0.4909	0.5309***
Years of service (centered)					1.0017	1.0017	1.0018	0.9982
Rural school (vs. urban)					1.1122	1.1560*	1.1415	1.1484
Northern macrozone (vs. central)					1.3046***	1.2617***	1.2552***	1.2483
Southern macrozone (vs. central)					1.0099	0.9767	0.9646	0.9712
Subsidised private school					1.3429***	1.3036***	1.3269***	1.3224
Delegated Administration Corporation					1.3177***	1.3550***	1.3853***	1.3895
Local Education Service					1.0451	1.1195	1.1238	1.1184
Academic self-esteem (centered)						1.0112	1.0111	1.0116
Citizen participation (focused)						0.9818**	0.9829*	0.9819
School climate (centered)						0.9955	0.9955	0.9945
Healthy lifestyle habits (focused)						1.0048	1.0040	1.0056
SIMCE reading (centered)							1.0026	1.0028
SIMCE mathematics (centered)							0.9975*	0.9970
Vulnerability Index (IVE, centered)							0.9903	0.9973

Note: The reference period for the annual variable is 2015–2016. Significance codes: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, · $p < 0.1$. Dashes indicate that year effects were not included in these models. Models 1–4 include year effects; models 5–6 omit the dummy year variables in an alternative specification, and model 7 reintroduces them. Dropout models after model 6 exhibit convergence problems, so model 6 should be interpreted with caution. Dropout probabilities were significantly lower in 2017–2018, 2018–2019, and 2020–2021 compared to the baseline period; other years showed no significant differences.

School location and macro-region: Surprisingly, the location factors that strongly influenced turnover had more moderate effects on attrition. Rural teachers were slightly less likely to leave the profession than urban teachers (OR ~ 0.85, $p < 0.05$), but the effect was not as pronounced as in the case of turnover. Similarly, differences between macro-regions were smaller with respect to attrition; for example, being in the northern region slightly reduced the probability of attrition, but not as drastically as turnover. This suggests that, while geographic and community factors contribute to teacher retention in a given school, some teachers may leave the profession at similar rates, possibly due to retirement or a lack of local opportunities to continue working in the education sector (Antera and Teräs 2024; Day and Gu 2010; Guarino, Santibañez, and Daley 2006; Rice et al. 2025).

Regarding vulnerability and school context, interestingly, the school Vulnerability Index (VI), which had a large effect on turnover, did not show a significant effect on attrition in our model. In other words, while teachers in high-vulnerability schools tend to remain in their schools (low turnover), they do not differ significantly in whether they eventually leave teaching. This could indicate that these teachers might remain in the same vulnerable school until they retire or leave, consistent with general attrition patterns. In contrast, some contextual variables do appear to affect attrition: for example, the academic self-esteem index has no direct effect, but one factor that emerged was that teachers in schools with higher academic performance had slightly lower attrition rates (although not all of these minor effects were robust). Overall, it appears that attrition is driven less by school context and more by personal and contractual factors. This interpretation is consistent with studies on teaching trajectories that highlight the weight of biographical and work factors in decisions to remain or leave the profession, particularly in contexts where teachers develop long-term links with school communities (Arancibia 2021; Argüello 2014).

In summary, during the pandemic, a marked decrease in both turnover and attrition of vocational education teachers was observed, suggesting an unprecedented stabilisation of the workforce during the 2020–2021 period. After the pandemic, turnover returned to normal levels, while attrition appears to have rebounded (although data after 2024 would confirm whether there is a sudden increase in late retirements or departures following late decisions (Antera and Teräs 2024; Day and Gu 2010; Guarino, Santibañez, and Daley 2006; Rice et al. 2025).

Among individual and work-related factors, having a stable, full-time position (permanent contract, longer hours, greater tenure) is by far the strongest predictor of retention, both within the same educational institution and in the profession. On the other hand, teachers with temporary contracts have a much higher risk of changing institutions and leaving, demonstrating the importance of contractual policies. Gender differences persist, with male teachers being more likely to leave their institutions and their professional careers, which could be related to differences in fields (men may be drawn to industrial specialities with more external opportunities) or other social factors (J.-L. Berger and D'Ascoli 2012; Sevilla and Madero 2023, 2025).

Regarding the institutional context, the public sector retains teachers better than the subsidised private and delegated administration sectors. The outcome of the new local public system is heterogeneous: it appears to have a slightly higher turnover rate than the old public system, but not a significantly higher dropout rate, which could

reflect transition problems or possibly that teachers who move to the new system remain in the public network instead of leaving it (Ávalos, Vélaz de Medrano, and Vaillant 2009).

Meanwhile, teachers in high-need schools (more vulnerable, rural, and remote) tend to remain in their positions (low turnover) and continue serving these communities. This is an encouraging finding from an equity perspective: vocational education teachers, many of whom have a history of social commitment, do not abandon the most disadvantaged schools; in fact, they are more deeply rooted in them (Bolívar 2006; Day and Gu 2010; Sevilla and Madero 2023, 2025). However, it is not addressed here whether these schools face other challenges (such as difficulties in attracting new teachers when vacancies occur), which warrants further study.

Finally, the results allow for a more detailed discussion of the role of recent policies in shaping the career paths of technical and vocational teachers, although with caution, given that this study is not a causal impact assessment. First, while Chile implemented significant reforms during the period 2015–2024—such as the Teacher Professional Development 2016 and the creation of the new public education system through Local Services (Law 21.040 2017) – the observed patterns suggest that their effects on teacher mobility have been, at best, indirect and of limited magnitude. This is evident in the fact that the main predictors of turnover and dropout are related to working and organisational conditions (type of contract, hours, seniority in the school and administrative dependence), rather than to variables of school context or performance, which indicates that the stability of the teaching staff is fundamentally at stake in daily institutional arrangements (Ávalos, Vélaz de Medrano, and Vaillant 2009; Sevilla and Madero 2023). Second, the temporal effects show that the most marked change in teacher mobility occurred during the pandemic (a sharp decrease in turnover and attrition), suggesting that contextual shocks can have a greater capacity for immediate stabilisation than regular reforms, likely due to changes in incentives, job insecurity, and mobility restrictions. Finally, the evidence associated with the new local public administration system is particularly illustrative: the fact that teachers working in schools under Local Services exhibit higher turnover than those in the traditional municipal sector, without equivalent differences in attrition, suggests that the governance reform has had transitional effects (reassignments, movements between schools) rather than a consolidated impact on long-term retention. Taken together, these findings provide a relevant message for the debate on the capacity of public policy to transform the sector: when policies do not substantially modify the mechanisms for hiring, stability, and working conditions of technical and vocational teachers, their influence on mobility is to be expected to be limited, even if they introduce significant regulatory changes.

Conclusions

This longitudinal analysis of VET teaching trajectories between 2015 and 2024 reveals important patterns and factors associated with teacher turnover and dropout in the vocational education sector.

On the one hand, the COVID-19 period coincided with a marked reduction in teacher mobility, suggesting that the pandemic led many teachers to retain their positions, probably due to uncertainty in the labour market.

Regarding individual characteristics and contractual factors, the results confirm trends observed in previous research. Teachers with permanent contracts, longer teaching loads, and greater seniority are less likely to leave their school or the profession. In contrast, teachers in the initial stages of their careers and those with temporary contracts show a higher probability of mobility or attrition. These results underscore the importance of analysing working conditions and support at the beginning of a teaching career in vocational education and training (VET). Furthermore, men exhibit higher turnover and attrition rates than women, which could be associated with greater external job opportunities in technical sectors or differences in work experiences within schools.

The study also identifies relevant institutional and sectoral differences. Teachers in public schools show greater stability than those in private schools or schools under delegated administration. The higher turnover observed in the private sector could reflect less favourable working conditions, lower institutional incentives, or differences in organisational practices, such as hiring and dismissal procedures.

From a geographical and educational perspective, it is observed that vocational education teachers working in rural areas or in the extreme regions of northern and southern Chile have lower turnover rates. This finding contrasts with the idea that teachers in remote areas are more difficult to retain, possibly due to fewer alternative job opportunities or closer ties to their communities.

One particularly relevant finding is that teachers working in schools with greater socioeconomic vulnerability are more likely to remain in their schools. This suggests a greater professional commitment to their students, although it could also reflect fewer opportunities for job mobility. In any case, this pattern differs from what has been observed at other levels of the education system and is a positive sign for the continuity of educational processes in high-need contexts. However, it also presents the challenge of ensuring adequate working conditions in these schools, since stability alone does not guarantee improvements in educational quality.

On the other hand, the analysis shows a limited effect of academic performance on teacher mobility. Unlike what has been reported in some studies on general education, there is no evidence that vocational education teachers leave schools with lower academic results or a worse school climate more frequently. This suggests that teachers in technical and vocational schools may place greater importance on factors such as job security or a sense of vocation in their work when deciding to remain at their schools.

From an educational policy perspective, the results suggest several implications. First, strengthening pathways to permanent contracts could improve teacher retention in vocational education and training (VET). Second, public policies should proactively address structural problems such as workload, support for beginning teachers, and incentives to work in challenging contexts.

Furthermore, the greater stability observed in the public sector suggests that certain institutional elements – such as the Teacher Statute – promote retention. At the same time, understanding the reasons why teachers leave private schools could guide more targeted interventions.

In broader terms, this study offers the first national longitudinal overview of teacher trajectories in vocational education and training (VET) in Chile during a period marked by significant institutional changes and disruptions. The results reinforce the importance of

working and contractual conditions as central factors in teacher stability, in line with previous research (Ávalos, Vélaz de Medrano, and Vaillant 2009; Guarino, Santibañez, and Daley 2006). Likewise, the effects associated with gender, age, and career stage coincide with studies showing how decisions to remain in or leave the education system are linked to biographical and motivational factors (Argüello 2014; Day and Gu 2010).

Finally, these results expand the existing evidence on teachers in vocational education and training (VET). Several studies have indicated that many VET teachers enter the profession after developing careers in the private sector, resulting in professional trajectories distinct from those in general education (J.-L. Berger and D'Ascoli 2012; Sevilla and Madero 2023). In this context, the identified patterns suggest that VET teacher trajectories are shaped by a combination of professional motivations, external job opportunities, and organisational conditions within the school system. Thus, this study contributes to a broader understanding of teacher mobility dynamics in this sector and provides relevant evidence for the design of policies aimed at strengthening the stability and professional development of VET teachers.

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Ethical approval and consent to participate

The research was approved by the Research Ethics Committee of the institution to which the authors belong.

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