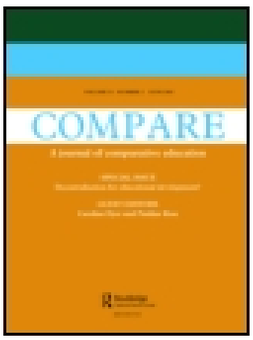

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# Vocational education and social inequalities in within- and between-school curriculum tracking

María Paola Sevilla [a] and John Polesel [b]

[a]Facultad de Educación, Universidad Alberto Hurtado, Santiago, Chile; [b]Centre for Vocational and Educational Policy, University of Melbourne, Melburne, Australia

**ABSTRACT**

Using rich administrative data from the Chilean education system, this paper looked at the link between curriculum tracking and social inequalities considering the way that tracking is organised: between- or within- schools. In particular, it examines the influence of socioeconomic status (SES) on track placement (general or vocational), and gaps in higher education access between graduates from both tracks. Result suggests that in a highly socially differentiated education system such as the Chilean one, within-school tracking diminishes SES segregation between tracks. However, the study does not provide evidence that this specific form of tracking mitigates inequalities between tracks, as measured by access to higher education. Considering only the direct effects of tracking operating through instructional and institutional mechanisms, the access gap between general and vocational tracks increases instead of narrowing. The implications for future research are discussed in light of these finding.

**KEYWORDS**

Vocational education; socioeconomic segregation; access higher education; tracking effects

## Introduction

The links between social inequalities and curriculum tracking have received considerable attention in the literature and have caused heated debates, not least due to the widespread use of tracking worldwide (Ainsworth and Roscigno 2005; Protsch and Solga 2016). Researchers have analysed the social selectivity of different curricular tracks in secondary schools and the tracking effects on students' learning outcomes and further educational opportunities. Based on these studies, tracking seems to reinforce the stratification order of the educational systems, as socioeconomically disadvantaged groups are more likely to be sorted into less academic demanding tracks that preclude higher education (HE) (Buchmann and Park 2009; Holm et al. 2013; Vanfossen, Jones, and Spade 1987).

"Tracking" is an umbrella term that refers to a broad range of practices associated with sorting students into distinct courses of study according to their interests or aptitudes. Thus, although the tracking debate is international, the forms of tracking differ among nations. In English speaking countries with comprehensive school systems, such as the United States, tracking consists of offering courses at varying levels of

**CONTACT** María Paola Sevilla msevilla@uahurtado.cl Facultad de Educación, Departamento de Política y Desarrollo Escolar, Universidad Alberto Hurtado, Almirante Barroso 10, Santiago, Chile

difficulty in one or more subjects within a school. In other countries (including continental European and Latin American nations), tracking appears in its most rigid form, which involves grouping students into overarching programmes with a general or vocational orientation. In this form of tracking, the allocation of students can occur either between or within schools. In between-school tracking (sometimes also referred to as between-school streaming) students go to entirely different schools specialising in particular tracks. Conversely, in within-school tracking (or within-school streaming), general and vocational students attend the same school but are allocated into different courses of study for all subjects. Emerging literature has shown that these two ways of delivering vocational and general education may have different effects on student outcomes, highlighting the relevance to study not only the consequences of tracking, but also the development of the educational structures and mechanisms of this practice (Van Houtte and Peter 2015; Chmielewski, Dumont, and Trautwein 2013).

In Chile, vocational education is widespread at the upper secondary level, and it is a viable path to HE and not merely a direct route to the labour market. In this country, tracking students into general and vocational education can be both between and within schools. However, this organisational difference has not been taken into account when researchers have studied the effects of vocational education on access to and persistence in HE (Farías and Sevilla 2015). The present study addresses this issue by systematically comparing the two types of curriculum tracking with respect to their effects on social selection in track placement and gaps in access to HE as between tracks. In doing so, we use a large-scale panel of administrative data that contains the postsecondary trajectories of high school graduates, as well as their academic and socioeconomic backgrounds. Our results are discussed in light of the sociological theory that characterises the effects of curriculum tracking as operating through direct and indirect mechanisms (Sorensen 1970).

Recent comparative studies indicate that Chile is one of the most socioeconomically segregated school systems in the OECD (Gutiérrez, Jerrim, and Torres 2019; Chmielewski and Savage 2014). Various market-oriented policies, such as school choice, extended private school supply, and generalised vouchers as a funding mechanism, exacerbate the magnitude of SES segregation beyond levels than would be predicted by differences in residential segregation alone (Valenzuela, Cristian, and de Los Ríos 2013). Also, studies that look at school choice and early career decisions simultaneously have shown that vocational education contributes to this school segregation, as these decisions are more strongly predicted by cultural and socioeconomic factors than by career aspirations (Farías 2013; Raczynski and Hernández 2011). Moreover, as a result of these early-career decisions, a significant gap exists in students' learning outcomes and further educational opportunities, which reinforce the stratification order of the Chilean education system (Farías 2013). In this sense, our analysis aims to identify whether incorporating vocational and general tracks in the same institution (within-school tracking) mitigates social inequalities linked to curriculum differentiation. We do so in light of the recent policy debates in Chile about how to build a more equitable secondary education system that has focused on the curricula of general and vocational education and neglected the debate about school structures that offer both tracks. Thus, even though this is a single country study presented from an international point of view, it

also can be seen as a comparative work as we analyse the differences on the different types of tracking used internationally.

## Country overview: curriculum tracking in Chile

The Chilean Education System is highly differentiated, with about 38% of students enrolled in vocational education. At the secondary level, after two years of a common core (grades 9 and 10), the curriculum splits into general and vocational education (grades 11 and 12). General education encompasses a unique programme of study focusing on academic subjects (maths, sciences, and language). Conversely, vocational education comprises a large number of programmes of study (around 35) determined nationally and clustered into economic sectors. All vocational programmes are required to dedicate at least one-third of their curricula to academic subjects, while the other two-thirds focus on specific practical subjects (Sevilla 2017).

In terms of institutional organisation, secondary schools tend to specialise in particular curricula, giving rise to general schools on the one hand and vocational schools on the other. Besides these schools, which are referred to as "categorical" in this study, there are also so-called "multilateral" schools incorporating academic and vocational tracks. Therefore, Chile is similar to some European countries such as Belgium (Flanders and French communities), Germany, Ireland, and Switzerland in which these two types of curriculum tracking exist simultaneously. Among Latin American and Caribbean countries, Colombia, Ecuador, Cuba and Paraguay also share this feature with the Chilean education system. In the other countries of the region, separating general and vocational students into different schools is the only form of curriculum tracking, as multilateral schools are not part of the organisational school landscape (Sevilla 2017).

Concerning their ownership status (private/public) and their primary source of funding (state subsidy/family payments), multilateral schools are either public or subsidised private in Chile. As in the case of categorical vocational schools, there are no non-subsidised private multilateral schools. Students attending public multilateral schools represent around 30% of the total enrolment of the sector. In contrast, in the subsidised private sector, where most schools focus on general rather than vocational education, multilateral schools enrol only 16% of the total student population.

At the HE level, there are three types of programmes: Bachelor's degree, Non-degree professional, and Technical. Only the bachelor's degree programmes delivered exclusively by universities require an entrance examination test linked to secondary academic subjects. Non-degree professional and technical programmes are provided mainly by postsecondary vocational institutions (Professional Institutes and Technical Training Centres) that have open-door admissions policy and lower tuition fees than universities. Since 2006, enrolments in non-university institutions have increased considerably due to the extension of public funding for their students, most of them graduate from the secondary vocational track (Bernasconi and Sevilla 2017). However, while vocational student enrolments have increased substantially in the last several years, graduates from this track are still far from reaching similar rates of access to HE programmes as general graduates (Farías and Sevilla 2015).

## Theoretical background and hypothesis

Curriculum tracking at the secondary level and its effect on social inequalities are well documented in a range of national contexts and over time. It is widely accepted that tracking produces a specific pattern of stratification that serves to maintain socioeconomic inequalities, even before students complete their education and enter the labour force (Buchmann and Park 2009; Alexander, Cook, and McDill 1978). This occurs because tracking reinforces the influences of family background on learning achievement as well as later postsecondary destinations. There is considerable evidence that tracking is associated with socioeconomic segregation, restricting access to university to the bourgeoisie who dominate the general track (Fritz 2000). However, studies using systematic comparative data from several countries also show that family SES exerts less influence on tracking allocation and student outcomes when tracking systems are organised less rigidly and when students are tracked at a later stage in their schooling (Buchmann and Park 2009; Chmielewski 2014).

The "life course hypothesis" (Blossfeld and Shavit 1993; Mare 1980) might give the primary explanation of why later tracking is less socially selective. In early life stages, students' preferences are not easily identified, and parents make educational decisions according to their own education and social position. As students become older and their preferences start to crystalise, they play a more central role in educational choices, while parental influence decreases. As explained previously, in the Chilean system, students in between-school tracking choose between general and vocational education after finishing primary school. Conversely, in within-school tracking, this education choice takes place two years later when the secondary curriculum divides into general and vocational education. Therefore, we postulate that social origin measured by SES exerts a weaker influence over student track placement in within-school than in between-school tracking (Hypothesis 1).

Tracking can affect learning achievement and later postsecondary destinations directly and indirectly. Direct effects may operate through instructional and institutional mechanisms. Instructional mechanisms involve differences in quantity and quality of content and teaching between tracks, while institutional mechanisms refer to how significant others, such as teachers and parents treat students depending on their track affiliation (Pallas, Alexander, and Stluka 1994). Both mechanisms are closely linked, as institutional effects of tracking lead to different instructional experiences in high- and low-tracks. Research suggests that teachers' degree of optimism regarding their students' abilities is reflected in differing modes of instruction and the content of the curriculum (Page 1991). This is mainly because teacher identification with high-track students would translate into a more coherent and academically challenging curriculum, both intertextually and culturally, for them (Caughlan and Kelly 2004). On the other hand, indirect effects operate through social mechanisms that involve differences in students' social or peer environments attributed to their track allocation. Characteristics of people with whom students engage in their daily interactions are important as they may affect students' motivation, academic self-concept and educational aspirations or expectations (Pallas, Alexander, and Stluka 1994). Critiques of tracking argue that when disadvantaged children are tracked, they lose the opportunity to benefit from positive peer effects that might be gleaned from coming into regular contact with more able students.

However, the evidence based on quantitative data is not conclusive in this respect. Some studies show that tracking diminishes the impact peers have on student achievement for low- and average-ability students (Zimmer 2003), while others provide no evidence that tracking harms this group of students (Figlio and Page 2002).

The way that curriculum tracking is organised leads to different direct and indirect effects. In his seminal work, Sorensen (1970) predicted how different patterns of organisational differentiation to which students are exposed might affect their behaviour directly in a way relevant to their academic performance, but also indirectly by determining the student's social environment. Each pattern of differentiation then has its own set of direct and indirect effects on individual-level characteristics relevant to learning. Chmielewski (2017) systematises evidence that partly supports Sorensen's predictions by comparing the effects of different types of curricular differentiation on various student outcomes which are organised according to the three mechanisms through which tracking operates. Results of the systematic comparison between course-by-course tracking and academic and vocational streaming show that achievement gaps linked to instructional mechanisms are similar in both types of curricular differentiation. Conversely, social effects analysed in terms of academic self-concept gaps are more extensive in course-by-course tracking than in academic/vocational streaming. Institutional mechanisms are related to linkages between tracks and HE, as they concern the formal recognition of tracks in the broader society outside of the school. However, as evidence comparing the effects of both types of curriculum differentiation in accessing HE is sparse and does not use student-level track information, the findings concerning these mechanisms are inconclusive.

Based on the literature reviewed above, we assume that the way that curriculum tracking is organised in the Chilean education system (between or within schools) is not neutral in the effects of tracking on access to HE. However, in contrast to Chmielewski (2017), we believe that the effect of different patterns of tracking on this particular outcome operates not only through institutional, but also instructional and social, mechanisms. Rigour in contents and teaching of academic subjects during secondary level may affect students' intentions to continue studying, as well as school social composition. Accordingly, we expect that direct and indirect effects of the patterns of curriculum differentiation (Sorensen 1970) are in play in the impact of tracking on HE transitions. More specifically, we presume that in multilateral schools, vocational students might be exposed to the more academically challenging curriculum than vocational students in categorical schools as this curriculum also needs to be suitable for general students. Besides, vocational students in multilateral schools may frequently engage in social interactions with general students that influence their aspiration or intentions to continue studying in a positive way. Although it is possible that, in within-school tracking, vocational students suffer the consequences of frequent comparison between tracks and the tailoring of teaching to each particular track, we expect the effects of these practices not to be as strong as the positive effects, both instructional and social, linked to this specific type of tracking. Therefore, we hypothesise that within-school tracking narrows the access gap to HE as between general and vocational graduates (Hypothesis 2).

The emerging literature comparing between- and within-school tracking mostly comes from Flanders (Belgium), another educational system where general and

vocational education is provided in the same or separate schools. Nevertheless, this literature, based on the assumption that different types of tracking may create different reference groups for social comparison, exclusively focusses on non-cognitive student outcomes, such as study-involvement (Van Houtte and Stevens 2009) and sense of futility (Van Houtte and Peter 2015). In an international comparative framework, using PISA data, Chmielewski, Dumont, and Trautwein (2013) also contrast between- and within-school streaming, as well as course-by-course tracking, but only in terms of mathematics self-concept. Our paper is the first to provide insights regarding the link between a long-term student outcome – access to HE – and the way that curriculum tracking is organised in a single high-stratified educational system, filling an essential gap in the tracking literature.

## Empirical approach

### *Data*

The panel data we use to test our hypothesis about the effect of the type of curriculum tracking on SES segregation and access to HE is unique. It comes from four different sources of administrative records from the Chilean Ministry of Education. The first source is the 2008 school administrative 12th-grade records that allow us to identify graduates from either general or vocational education. These data also yielded information about the specific system of tracking in which students were involved -between or within school tracking- as well as other school features. The second data source is Chile's national standardised test (SIMCE), which assesses students in different grades, mainly in language and mathematics subjects. We used the 8th grade (2004) SIMCE test to control for student academic performance before upper secondary track placement (general or vocational). The third source is the parent survey of those students assessed by the SIMCE test at the end of the primary level. This survey provided information on the socioeconomic characteristics of students,[1] as well as the educational expectations of parents. The last source encompasses the administrative records of the entire student population in HE institutions, both universities and vocational, from 2009 to 2011. This dataset is vital to the goal of our study as it allows us to identify those students who enrolled in any type of HE in the first three years after finishing secondary school.

### *Samples and possible bias*

The sample on which we based our analysis encompasses secondary graduates in 2008 from public and private subsidised schools, totalling 189,967 individuals. We did not include graduates from private non-subsidised schools where vocational education is almost non-existent. Students in the initial sample without an 8th-grade SIMCE score or parent survey data were dropped (43,889 individuals). The exclusion of observations with missing data produces a potential selection bias as it is not random, especially as missing data is mainly from small rural schools or students who repeated a grade and therefore did not take the SIMCE test in the 8th grade in 2004. Besides, recent studies have shown that low-achieving students (low GPA) are also more likely to miss the SIMCE test (Hofflinger and von Hippel 2018). This is a limitation in our study since it reduces the

external validity to a specific group of students who are able to continue from 8th to 12th grade, who are not from small rural schools, and who are not low-achieving.

A second potential source of selection bias in our analysis is student self-selection into general or vocational education. This selection bias is the main barrier in estimating the causal effects of treatments based on personal decision-making. Self-selection occurs because curriculum track choices can be made not only due to observable variables -SES, academic performance, or gender- but also due to unobservable variables -motivations, cultural values, perceived abilities. This last set of variables is not captured in our available data, but may also affect access to HE. If this is the case, HE access gaps between general and vocational students would be explained not only by differences in the curriculum type choice but also by differences in each group composition in respect of these unobserved variables. To address the selection bias, we split our sample into two sets. The first one comprises all the students whose parents affirmed they had confidence their children would complete HE, either at university or other non-university institutions. The second set includes those students whose parents did not believe their children would obtain a HE diploma or degree because they did not complete the secondary level or only attended this level as a final level of their education. Our rationale is that the educational expectations of parents comprised information about non-observable characteristics of students and their context, which might affect access to HE. Then, splitting the sample by this variable allows us to minimise in each subsample the divergences in aspects that are not directly captured by the dataset.

Table A1 in the Annexe provides basic statistics for the total sample and differentiating by tracks. Graduates from vocational education that represent 47% of the sample, exhibit lower SES and academic performance than general graduates. Also, they are less likely to enter HE (43% vs 82%). Moreover, consistent with their characteristics, general and vocational graduates came from secondary schools with very different profiles in terms of SES, previous academic performance and parental expectations. However, further sample desegregation by the type of tracking, shows that the disparities between tracks diminish in multilateral schools, in terms of individual characteristics and school composition. These descriptive statistics give a first impression of the potential effect of within-school tracking on SES segregation between tracks.

## Estimations

To compare between-school and within-school tracking, in terms of the influence of SES on track placement and to test our first hypothesis, we conducted two different analyses. First, we estimated separate logistic regression models for students in categorical and multilateral schools to predict graduation from the vocational track. Second, we pooled all schools to test for significant differences between the two types of tracking, after adding control variables. The individual tracking type model used is the following:

$$\ln(\mathrm{VE_i}/(1-\mathrm{VE_i})) = ß_0 + ß_1\mathrm{SES_i} + \mathrm{X'}\Omega\mathrm{x} + \varepsilon_i r \qquad (4.1)$$

where VE is the probability of student i to graduate from a vocational track, SES is the index of student socioeconomic status, and X' is a vector of control variables such as gender, ethnicity, previous test scores, parent educational expectations, as well as primary school characteristics such as whether the school is rural or whether it is private subsidised. The pooled model was conceptually similar to individual tracking type

model "4.1" but added a dummy variable for students in multilateral schools and an interaction term between this variable and student socioeconomic status index (MULTI x SES). If within-school tracking is less segregated than between-school curriculum tracking as we expect, then the MULTI x SES interaction coefficient should be positive when predicting vocational track.

For testing our second hypothesis, we started from a simple logistic regression model to verify whether track position and access to HE are related, by comparing the likelihood of graduates from general and vocational tracks attending this educational level independently of their type of tracking. In the analysis, we included an interactive term between student track position and SES index (VE x SES), because we hypothesised that the effect of curriculum tracking on accessing HE might vary by student SES. The model used is the following:

$$\ln(M_i/(1 - M_i)) = ß_0 + ß_1 VE + \beta_\varepsilon(VE_i x SES_i) + X'\Omega x + \varepsilon_i \quad (4.2)$$

where Mi is the likelihood of student i accessing HE either at university or postsecondary vocational institution, VE is a dummy for students graduating from a vocational track, VE x SES is the interactive term between student track position and SES, and X' is a vector of control variables. This vector, in its restricted form (Specification A) includes identical variables to "4.1", while in its long-form (Specification B) also comprises measures of school context related to the characteristics of persons with whom students interact daily. Three measures of social context were included: school mean test score, school mean SES index and school proportion of students whose parents expected them to attend HE. The model was run for the total sample, as well as for the split samples. As previously noted, splitting the sample by previous educational expectations of parents allowed us to moderate non-observable differences between general and vocational graduates in each subsample.

In the next step, we incorporated in "4.1" the pattern of curriculum differentiation by considering the type of tracking – between or within schools – in which general and vocational graduates were involved. The model used is the following:

$$\begin{aligned}\ln(M_i/(1 - M_i)) = {} & ß_0 + ß_1 VE + \beta_\varepsilon(SES_i x VE_i) + ß_3 MULTI + ß_4(MULTI_i x VE_i) \\ & + ß_5(MULTI_i x SES_i) + ß_6(VE_i x MULTI_i x SES_i) + X'\Omega x + \varepsilon_i\end{aligned} \quad (4.3)$$

where MULTI is a dummy variable for students graduating from within-tracking schools, VE x MULTI is the interaction of this variable with student track position, allowing us to capture the effect of the type of curriculum tracking on the gap in HE access between general and vocational graduates. If within tracking reduces this gap, then the coefficient of this interaction should be positive and statistically significant when the probability of accessing HE is predicted. As in the above model, in "4.3" we also considered the interaction of SES index with student track position (SES x VE), and additionally with the type of tracking (SES x MULTI) and with these two variables simultaneously (SES x VE x MULTI). Similarly, we included X' in its restricted (Specification A) and extensive (Specification B) forms. Both specifications were run for the total and split graduate samples. Here, Specification B that controls by variables of social school context cancels the within-tracking indirect effect on accessing HE gap between tracks, persisting only in

the direct effect of the pattern of curriculum differentiation. Conversely, in Specification A, the coefficient of the interaction VE x MULTI incorporates both effects.

As a complement, to examine if our analysis differs depending on the type of HE institution, we replicate the estimation of "4.3" for the total sample using multinomial logistic model. In this model, enrolment in HE has three possible pathways: enrolled at university, enrolment at the postsecondary vocational institution, and non-enrolled.

## Results

### *Socioeconomic segregation in within- and between-school tracking*

Table A2 in the appendix displays the results of our estimations predicting a vocational track for students in the two types of curriculum differentiation analysed: between- and within-school tracking. For facilitating interpretation, coefficients of SES are presented in terms of Odds Ratios (OR), in which values between zero and one represent negative relationships and values greater than one represent positive relationships. In both types of curriculum differentiation, OR are less than one and statistically significant at 0.01, clearly suggesting that students from more affluent families are less likely to enter vocational tracks. However, the OR obtained from logistic regression models for multilateral schools (within tracking) is larger in magnitude than the OR for categorical schools (between tracking) (0.54 vs 0.25). Thus, even though results indicate that in both types of curriculum differentiation, track placement is highly related to student SES, within-school tracking tends to generate lower SES segregation between vocational and general tracks than between-school tracking. Figure 1 illustrates this by plotting predicted probabilities of being placed in a vocational track against SES distribution.

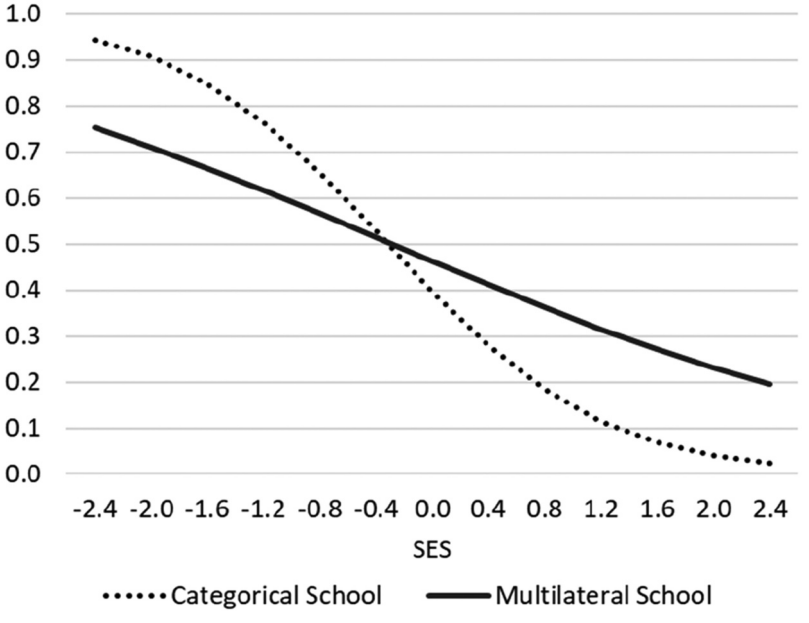


**Figure 1.** Predicted probabilities of being placed in vocational track by SES. Total student sample in categorical and multilateral schools.

To compare the effect of SES on track placement between the two types of curriculum differentiation, Table A3 also presents the result of the pooled logistic regression model predicting a vocational track. The full model shows that the interaction between SES and the track dummy (SES x MULTI) is positive and statistically significant at 0.01, meaning that the difference of the effect of SES on track placement in multilateral and categorical schools is significant. Translated into OR, the coefficient of the interaction indicates that in within-school tracking the likelihood of entering vocational education for a high SES student is on average 2.3 times more than in between-school tracking. Socioeconomic profile of students by type of tracking presented in Table A2 suggests that the lower influence of SES on track placement in within-school tracking could be partially explained by the more homogenous social composition of multilateral schools (in terms of standard deviation 0.62 vs 0.80 that exhibit categorical schools as a whole). Indeed, the difference in SES mean between general and vocational categorical schools (0.19 vs −0.50) is much higher than the difference between tracks in multilateral schools (−0.33 vs −0.58), which goes in line with our findings.

Moreover, variations in SES segregation between tracks in both types of curriculum differentiation might also be associated with the high level of school SES segregation observed in the Chilean education system (Valenzuela, Cristian, and de Los Ríos 2013). High levels of school SES segregation imply high levels of SES homogeneity within schools, which in turn, in the case of multilateral schools, may reduce the influence of SES on track placement concerning other factors such as previous academic performance. In contrast, among categorical schools, SES segregation between general and vocational tracks overlaps with school SES segregation, reaching exceptionally high levels

## *Curriculum tracking effect on accessing HE*

Table 1 summarises results from the different specifications (A and B) estimated to measure the effect of curriculum tracking on enrolment into HE programmes (offered either at university or postsecondary vocational education). Odds Ratios (OR) of graduating from vocational vs general education and the interaction between the track dummy and SES (VE x SES) are displayed for the full sample and split samples by educational expectations of students' parents. Table B1, in the supplemental files, contains details of the estimations in terms of logit coefficients.

**Table 1.** Track coefficients predicting access to HE.

| | | | Split Sample | |
|---|---|---|---|---|
| Specification | Treatment | Full Sample | Expected HE | Non expected HE |
| A | VE vs GE | 0.29** | 0.28** | 0.30** |
| | VE vs GE x SES | 1.17** | 1.27** | 1.00 |
| | Pseudo R2 | 0.23 | 0 .19 | 0.17 |
| B | VE vs GE | 0.37** | 0.35** | 0.40** |
| | VE vs GE x SES | 1.29** | 1.37** | 1.18** |
| | Pseudo R2 | 0.25 | 0.20 | 0.19 |
| Observations | | 141,078 | 107,322 | 33,756 |

VE = Vocational Education; GE = General Education SES = socioeconomic status; HE = Higher Education.
OR odds ratio, as coefficients, significant differences between groups: + p < 0.10, * p < 0.05, ** p < 0.01.

Consistent with the evidence in previous studies, we find that students who graduated from the vocational track are less likely than general graduates to access any type of HE. In all cases, the ORs of VE are lower than one and statistically significant at 0.01. More specifically, estimations under Specification A indicate that vocational graduates have less than a 1 in 3 probability compared with those from the general track of entering postsecondary education. However, when we consider the social context of the schools from which graduates came (Specification B), the chances of vocational graduates accessing HE, compared with general graduates, increase to 0.35 in the "expected HE" subsample and to 0.40 in the "non-expected HE" subsample. Besides, greater than one OR of the interaction term VE x SES suggests that the gap in accessing HE between tracks diminishes as student SES increases.

## *Types of curriculum tracking and access to HE*

If within school tracking narrows the gap in attending HE between graduates from vocational and general tracks, then the coefficient of VE x MULTI interaction should be positive and statistically significant. Our results show that the effects of the way that tracking is organised differ depending on the specification used, restricted (A) or extensive (B).

Analysis using Specification A reveals a reduction of the gap between tracks in multilateral schools when we consider access to HE as a whole. In the full and split samples, coefficients of VE x MULTI interactions are positive and statistically significant (Table B2 in the supplemental files). Therefore, as can be appreciated in Table 2 that summarises our estimates, the OR of VE in within-school tracking is larger in all cases than the corresponding OR in between-school tracking. Also, a significant and greater than one OR of the interaction term VE x SES suggests that the gap between tracks tends to narrow as SES increases, excluding the case of graduates in categorical schools (between-school tracking) from the "non-expected HE" subsample. However, when HE access is differentiated by type of institution, coefficients of VE x MULTI interactions, for both university and vocational enrolments, are not statistically significant (Table B3 in the appendix), suggesting that within school tracking does not impact on the gap between tracks.

When we run our analysis using Specification B, the way that curriculum tracking is organised in the Chilean educational system appears only relevant for the "expected HE" subsample. In the "non-expected" subsample, coefficients linked to dummy variables for type of tracking are not statistically significant. Thus, we recap in Table 2 only the results

**Table 2.** Track coefficients predicting access to HE by type of tracking.

| | | Specification A | | | Specification B | |
|---|---|---|---|---|---|---|
| | | | Split Sample | | | Split Sample |
| Treatment | | Full Sample | Expected HE | Non expected HE | Full Sample | Expected HE |
| BetweenTracking | VE vs GE | 0.28** | 0.27** | 0.28** | 0.40** | 0.37** |
| | VE vs GE x SES | 1.19** | 1.33** | 0.91 | 1.32** | 1.42** |
| Within Tracking | VE vs GE | 0.32* | 0.30+ | 0.42** | 0.31** | 0.29** |
| | VE vs GE x SES | 1.13 | 1.08* | 1.42** | 1.12+ | 1.07** |
| Pseudo R2 | | 0.235 | 0.192 | 0.173 | 0.246 | 0.192 |
| Observations | | 141,078 | 107,322 | 33,756 | 141,078 | 107,322 |

VE = Vocational Education; GE = General Education; SES = socioeconomic status; HE = Higher Education
OR odds ratio, as coefficients, significant differences between groups: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

of the specification that controls the school social context for the full sample and "expected HE" subsample. In both cases, we find that the coefficients of VE x MULTI interaction are negative and statistically significant, suggesting that within-school tracking expands the gap between tracks, instead of narrowing it. The ORs of the VE dummy are smaller in the case of multilateral than in categorical schools. Moreover, greater than one OR of the interaction term VE x SES indicates that the HE access gap between tracks diminishes as student SES increases, especially when curriculum tracking is between categorical schools. Multinomial logistic estimations, run to examine if our analysis differs depending on the type of HE institution, confirm these findings. The coefficients of VE x MULTI interaction are negative and statistically significant for accessing both university and postsecondary vocational institutions. Table 3 recaps these finding, as well as those of Specification A. Notably, within-school tracking enlarges the gap between tracks in the case of the more academic HE sector (0.18 vs 0.53).

To strengthen the understanding of our results, Figure 2 provides a graphical representation of gaps between tracks in multilateral and categorical schools in terms of HE access as a whole considering student SES. The predicted probabilities are plotted for the "Expected HE" subsample only. The graph corresponding to Specification A shows that the overall gap reduction between tracks in within-school tracking can be explained by two events. First, by the slightly higher access probabilities that vocational graduates from multilateral schools have compared with those graduates from the same track in categorical schools, along the entire SES distribution. Second, by the substantially lower chances of accessing HE that low-SES vocational graduates have in multilateral schools. On the other hand, the graph of Specification B exhibits that the overall gap increases between tracks in within-school tracking as a result of the increased chances of accessing HE that general graduates from high-SES have in multilateral schools, while the chances of vocational graduates remain static.

## Discussion

For the first hypothesis regarding social selection, our results support the view that tracking systems organised less rigidly and later onset (as within-school tracking in the case of Chile), are associated with lower SES segregation between general and vocational education (Chmielewski 2014; Buchmann and Park 2009). If the "life course hypothesis" (Blossfeld and Shavit 1993; Mare 1980) is behind our findings, the explanation is that, in

**Table 3.** Track coefficients predicting access to different types of HE by type of tracking. Full sample.

| | | Specification A | | Specification B | |
|---|---|---|---|---|---|
| Treatment | | University | Postsecondary VE | University | Postsecondary VE |
| | VE vs GE | 0.18** | 0.59** | 0.33** | 0.69** |
| | VE vs GE x SES | 1.38** | 1.66** | 1.48** | 1.65** |
| Within Tracking | VE vs GE | 0.19 | 0.55 | 0.18** | 0.53** |
| | VE vs GE x SES | 1.17 | 1.37 | 1.35** | 1.35** |
| Pseudo R2 | | 0.224 | | 0.234 | |
| Observations | | 141,078 | | 141,078 | |

VE = Vocational Education; GE = General Education; SES = socioeconomic status; HE = Higher Education
RRR riks ratio, as coefficients, significant differences between groups: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.
Table B3, in the supplemental files, contains details of the estimations in terms of logit coefficients.

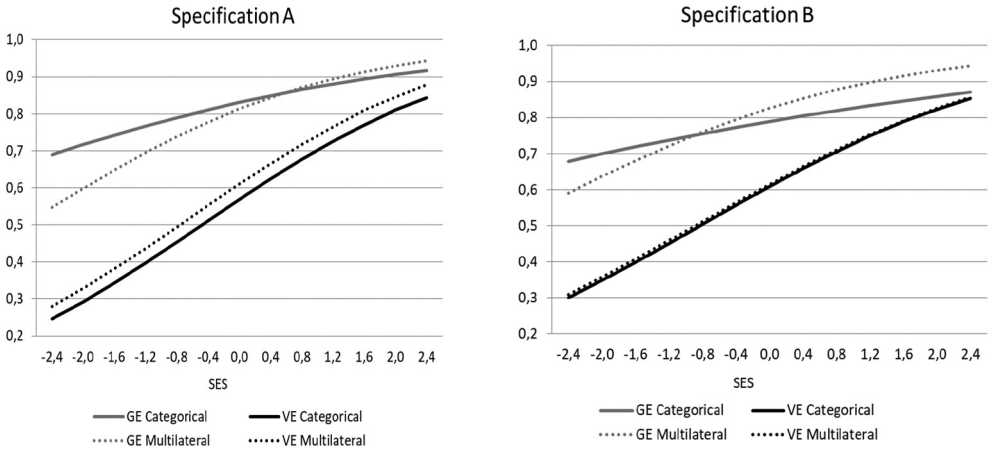


**Figure 2.** Predicted probabilities of access to HE by GE/VE track and type of school tracking. Previous parents HE expectation sample.

within-school tracking, parents exert a more substantial influence on selecting secondary schools, but a weaker influence when students choose between general and vocational tracks within their schools two years later. However, variations in SES segregation between tracks in both types of tracking might also be associated with the high level of school SES segregation observed in the Chilean education system (Valenzuela, Cristian, and de Los Ríos 2013). High levels of school SES segregation imply high levels of SES homogeneity within schools, which in turn, in the case of multilateral schools, may reduce the influence of SES on track placement concerning other factors such as previous academic performance. In contrast, among categorical schools, SES segregation between tracks overlaps with school segregation, reaching exceptionally high levels. We support this alternative explanation in the descriptive statistics analysis of the different socio-economic profile of students in categorical and multilateral schools performed as a complement of the association analysis.

Moving towards the second hypothesis about gaps in access to HE between tracks, our results suggest that when we consider direct and indirect effects of curriculum differentiation, these gaps tend to narrow or at least are maintained in multilateral schools (within tracking). However, when our estimations control for the school social composition and cancel the indirect effects of tracking, access gaps between tracks tend to amplify rather than narrow, both when HE access is considered in aggregate terms or is differentiated by type of institution. Gap amplification in within-school tracking is mainly the result of the increased chances of making this postsecondary transition for high-SES general students, while the chances of vocational students are similar in the two types of tracking. The situation is different for low-SES students as their options to access HE decrease when they share the same educational environment as vocational students. In the case of this specific group, the reduction of the options to access HE is even worse when we take into account both the direct and indirect effects of curriculum tracking. These findings, as far as we know, are the earliest evidence directly comparing HE access gaps between tracks in between-school and within-school tracking, and they support the

notion that the way that curriculum differentiation is organised leads to different direct and indirect effects on future student educational opportunities (Sorensen 1970).

In particular, we attributed to indirect effects operating through social mechanisms, the access gap reduction in within-school tracking, that results from the slightly increased access chances for vocational students and the deterioration of the chances for low-SES general students. In the case of vocational students, we believe that daily social interactions with general students reinforce their aspirations or intentions to access HE. This assumption is consistent with the existence of a positive peer effect in the more heterogeneous context that benefits low ability students as they take more-able students as their normative reference group (Figlio and Page 2002; Zimmer 2003). However, in the case of low-SES general students, the more heterogeneous environment that within-school tracking generates appears to act in reverse, diminishing their chances to continue studying. It is possible that in multilateral schools, rather than considering the high-track as the norm, low-SES general students take vocational students as their reference group and assimilate their interests and future plans, neglecting their initial intentions to continue HE. These findings differ from previous studies that emphasise social mechanisms by comparing different types of tracking regarding non-cognitive outcomes (Van Houtte and Stevens 2009, 2015), suggesting that within-school tracking intensifies the differences between tracks, harming vocational students and not making any significant difference for general students.

The most salient finding that we exclusively attach to the direct effect of within-school tracking is the significant increase in the chances of enrolling in postsecondary programmes that high-SES general students have in this specific system of curriculum differentiation. Our interpretation is that, here, instructional and institutional mechanisms could be operated in combination, signalling students from the general track as part of an elite selected to access HE that receives the most academically challenging instruction. It is possible that given the high levels of school SES segregation in the Chilean educational system, high-SES general students came from high-SES schools, where the general track is in high demand. If there are insufficient available places in this track in their multilateral schools, track assignment procedures could be primarily mediated by academic criteria and not only by student preferences, resulting in an extreme hierarchy between tracks that magnify gaps in terms of student outcomes. In contrast, high-SES general students in categorical schools are not daily compared to the other group of students, those in vocational tracks, who were not eligible to take the more suitable path to access HE. Findings of ethnographic research that focus on the mechanisms through which the effects of tracking occur in comprehensive schools offering vocational tracks support this interpretation of this unexpected result (Oakes and Guiton 1995).

Taken together, our results concerning access to HE indicate that within-school tracking seems to create a school environment that narrows gaps between tracks, by helping slightly vocational students, but also by hindering general students, mainly those from less affluent families. However, these indirect effects are offset by direct effects that, through instructional and institutional mechanisms operating simultaneously, increase the access gap between tracks, by empowering general students to continue studying and, in the end, not making any difference concerning between-school tracking in the case of vocational students. Thus, based on the evidence produced, we cannot confirm our assumption that HE access gaps in within-school

tracking diminish as a result of the positive social and instructional effect for vocational students.

## Conclusion

In sum, our results have shown that the way that curriculum tracking is organised impacts the magnitude of social inequalities linked to vocational education. First, lower levels of SES segregation between tracks were observed in within-school than in between-school tracking, confirming our hypothesis that later tracking reduces the influences of social origin on track placement. Second, in contrast to what we predicted, the HE access gap enlarges in within-school tracking considering only direct effects operating through instructional and institutional mechanisms.

Several important questions for future research emerge from our results. For instance, the effect of within-school tracking on other long term outcomes is relevant for vocational education, such as wages and employment rates. Equally relevant is to ask how students in Chilean multilateral schools choose between general and vocational tracks, considering different socioeconomic contexts. Future research also needs to examine how teachers deal with their students in different tracks within schools. Teachers in multilateral schools may be expected to instruct students of different abilities, and certain instructional practices might amplify learning achievement gaps. Research suggests that early tracking into vocational and general secondary schools is likely to lead to more significant social inequalities. However, if within-school tracking, as practised in Chilean multilateral schools, makes a difference in a positive way, this needs to be supported by clear evidence, both quantitative and qualitative. This is particularly important in countries where schools incorporating both general and vocational tracks are promoted, hoping to build more comprehensive secondary education provision while preserving vocational pathways.

## Note

1. Using this information, we created two variables. The first, 'SES-index', encompasses three student-level variables (mother's education, father's education, and family per-capita income) that were linearly combined by implementing a principal component analysis. The second, the dummy variable 'indigenous', takes on a value of one when the student´s father or mother is declared to be indigenous.

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## ORCID

María Paola Sevilla http://orcid.org/0000-0001-6418-0272
John Polesel http://orcid.org/0000-0003-1752-0849

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## Appendix

**Table A1.** Descriptive statistic by track and type of tracking full sample.

| | Full Sample | | | Type of tracking | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Between-tracking | | | Within-Tracking | | |
| | Total | GE | VE | Total | GE | VE | Total | GE | VE |
| **Students characteristics** | | | | | | | | | |
| % GE track | 0.53 | | | 0.54 | | | 0.47 | | |
| % VE track | 0.47 | | | 0.46 | | | 0.53 | | |
| Age mean (std) | −0.21 | −0.23 | −0.17 | −0.21 | −0.24 | −0.18 | −0.17 | −0.20 | −0.14 |
| % Male | 0.46 | 0.43 | 0.50 | 0.47 | 0.43 | 0.51 | 0.44 | 0.42 | 0.46 |
| SES mean (std) | −0.19 | 0.10 | −0.52 | −0.13 | 0.19 | −0.50 | −0.46 | −0.33 | −0.58 |
| SIMCE mean (std) | 0.22 | 0.46 | −0.05 | 0.80 | 0.82 | 0.57 | 0.62 | 0.67 | 0.57 |
| % Expected HE | 0.76 | 0.85 | 0.66 | 0.27 | 0.51 | −0.01 | −0.03 | 0.15 | −0.18 |
| % Access HE | 0.63 | 0.82 | 0.43 | 0.78 | 0.87 | 0.67 | 0.68 | 0.75 | 0.62 |
| **School characteristics** | | | | | | | | | |
| % Categorical | 0.82 | 0.84 | 0.79 | 0.39 | 0.38 | 0.40 | 0.62 | 0.66 | 0.59 |
| % Multilateral | 0.18 | 0.16 | 0.21 | 0.61 | 0.62 | 0.60 | 0.38 | 0.34 | 0.41 |
| % Public | 0.43 | 0.43 | 0.44 | 0.04 | 0.02 | 0.06 | 0.04 | 0.03 | 0.05 |
| % Subsidised private | 0.57 | 0.57 | 0.56 | −0.12 | 0.27 | −0.60 | −0.55 | −0.52 | −0.57 |
| % Rural school | 0.04 | 0.02 | 0.06 | 0.04 | 0.49 | −0.51 | −0.54 | −0.47 | −0.60 |
| N (students) | 141,078 | 74,773 | 66,305 | 115,127 | 62,674 | 52,453 | 25,951 | 13,852 | 12,099 |

VE = Vocational Education; GE = General Education; SES = socioeconomic status; HE = higher education.

**Table A2.** Logit regression of being placed in VE track by school type.

| | Categorical | | Multilateral | | All schools | |
|---|---|---|---|---|---|---|
| | OR | SD | OR | SD | OR | SD |
| SES | 0.25 | 0.05** | 0.54 | 0.06** | 0.24 | 0.05** |
| Age | 0.98 | 0.01+ | 1.01 | 0.02 | 0.98 | 0.01+ |
| Male=1 | 1.54 | 0.08** | 1.28 | 0.07* | 1.48 | 0.06** |
| Indigenous=1 | 1.25 | 0.08* | 1.06 | 0.09 | 1.20 | 0.07* |
| SIMCE | 0.63 | 0.04** | 0.62 | 0.04** | 0.63 | 0.03** |
| Exp. HE=Yes | 0.66 | 0.04** | 0.69 | 0.05** | 0.67 | 0.03** |
| Subsidized private | 1.60 | 0.17** | 2.16 | 0.16** | 1.70 | 0.14** |
| Rural school | 1.51 | 0.27 | 1.25 | 0.21 | 1.45 | 0.21+ |
| Multilateral | | | | | 1.34 | 0.12** |
| Multilateral*SES | | | | | 2.34 | 0.09** |
| Intercept | 0.59 | 0.15** | 0.73 | 0.11* | 0.58 | 0.13** |
| Wald chi | 891.4 | | 284.7 | | 9,502 | |
| Pseudo R2 | 0.204 | | 0.073 | | 0.234 | |
| N (students) | 109,464 | | 24,767 | | 134,231 | |

VE = Vocational Education; HE = higher education, SES = socioeconomic status SE standard error. OR odds ratio, as coefficients Significant differences between groups: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.