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How Does Knowledge About Higher Education Develop at the End of High School: A Longitudinal Analysis of 11th and 12th Graders

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The information and guidance available to secondary education students are positively related to access to higher education. Information level, however, has been described as low, especially for students from low socioeconomic status, whose parents have not attended higher education. We explore how the knowledge about higher education changes between 11th and 12th grade, identifying possible differences between students by socio-demographic groups and as possible consequences of school activities. We use a complex multidimensional measure to capture *Knowledge and Perception of Knowledge about Higher Education*. Results from our study show that students exhibit low levels of information in both knowledge sub-dimensions. Despite positive variations observed from 11th to 12th grade, the low level of information remains in the last year of high school.

Keywords: Information, transition to higher education, multidimensional model

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Despite the massification of higher education observed in Chile in recent decades (UNESCO Institute for Statistics [UIS], 2022), significant differences persist between students from different socioeconomic statuses (Financial Aid Committee Report, 2012). International literature shows that access to higher education is positively related to the amount of information and guidance available to secondary education students (Bell et al., 2009; Peter & Zambre, 2017). This literature describes students' information level as scarce, especially that of students from low socioeconomic status whose parents have not attended higher education (Bell et al., 2009; McDonough, 2005; Perna, 2006).

In this study, we seek to explore how the knowledge about higher education changes between 11th and 12th grade, identifying possible differences between students from different socio-demographic groups. We focus on exploring how schools contribute to increasing or decreasing possible gaps in knowledge about higher education through the offer of deliberate support initiatives. In this study, higher education knowledge is conceptualized as comprised of two subdimensions: (1) knowledge about higher education programs and institutions, and (2) knowledge about higher education costs and funding alternatives, including aid and national access programs.

This research makes use of the multidimensional random coefficient multinomial logistic (MRCML) model, which Dr. W. C. Wang helped to develop (Adams et al., 1997). The research places special importance on the multidimensional nature of the construct under study, the correlation among dimensions, and the more precise estimation of ability achieved through a multidimensional item response model (Wang et al., 2004). Up to now, research on college information has assumed that information is an observed variable, or at best, a unidimensional trait (Peter & Zambre, 2017). Studies have attempted to establish the effect of interventions aiming to increase the unidimensional information level. Our research will allow exploring more in-depth how students learn about two different dimensions of higher education knowledge and how vocational and guidance interventions may have a differential impact on the two subdimensions under study.

Chilean Higher Education Context

In 2023, Chile's higher education system included 153 institutions within three main tertiary sectors: 55 universities, 43 professional institutes (PIs), and 33 technical education centers (TECs). In 2023, universities enrolled 56% of undergraduate students, PIs enrolled 31%, and TECs enrolled 10% (SIES, 2023). TECs and PIs offer short-cycle tertiary education programs focused on building practical and vocational skills to prepare individuals for immediate entry into the workforce or for higher levels of education (level 5 ISCED). Universities provide mainly level 6 ISCED programs and higher (8 semesters or longer).

Chile is a highly centralized country, with about 42% of the total population (estimated at 19,960,889 for 2023) living in the Metropolitan Region of Santiago. The higher education supply in the country resembles the population distribution. Out of around 20,000 undergraduate programs offered at the tertiary level, 35% are offered in the Metropolitan region. Most universities (45 out of 55) participate in the Chilean centralized admission system. This system uses standardized test scores and different measures of high school achievement (GPA) to allocate the slots. On the other hand, each PI or TEC conducts its own admission procedure, most of the time requiring just the high school graduation certificate.

The Chilean higher education system enrollment has a high proportion of low-income students enrolling in technical and vocational higher education institutions. Most students from vocational-track high schools do not enroll in a higher education institution immediately after high school graduation (only 39% enroll), and among those who do enroll, they do it in open-access, technical, and vocational institutions (66%).

The opposite trend is observed for students from the academic-track high schools. Students from academic-track high schools are more likely to go to higher education after graduating (58% enrolled in a higher education institution using data from 2020), and among the group enrolling in higher education, about 76% enroll in universities.[1] Approximately 60% of low-income students graduated from technical and vocational track high schools, compared to 12% in the richest quintile (Centro de Estudios Mineduc, 2020; Larrañaga et al., 2013).

Literature Review

Information about higher education is crucial for students to navigate the tertiary system, given the diversity of programs, institutions, and financial aid available in higher education systems, in which students graduating from high school face numerous programs and institutions, as is the case in Chile. This information helps students to consider and weigh different programs and choose an option that aligns with their interests. The match between the final choice and the students' preferences could contribute to positive outcomes such as persistence and completion in higher education. According to Long and Riley (2007), barriers to higher education include financial, informational/behavioral, and academic constraints. These constraints are conceived as not mutually exclusive and may be more acute for students who experience multiple types of disadvantages at the time.

The transition to college and the associated college choice have been studied by different disciplines, including economics and sociology. Both perspectives have highlighted the relevance of individual characteristics in the process. According to Nora (2004), some of the most important individual characteristics involved in this process refer to self-esteem (or academic confidence), how supported students feel in their decisions, and students' expectations regarding higher education returns, along with the influence from friends and family who have already attended higher education. DesJardins et al. (2019) report that college aspirations are not static and may change as a result of how students perceive their college opportunities (i.e., changes in GPA), suggesting that students are aware of their chances of admission when building college aspirations.

Sociological models have also stressed the role of students' context, including families and schools, along with differences by socio-economic, educational, and racial/ethnic backgrounds. Perna (2006) proposes a comprehensive model including individual variables and multiple layers of influence over students' decisions. Those layers include family, school community, higher education, as well as the social, economic, and policy context. All these layers are interconnected and influence students' decision-making process.

More specifically on the issue of information, previous research suggests that the type of sources students use to obtain information influences students' knowledge levels and that different types of information sources (Koenings et al., 2020; Ostrow-Michel & Zwickle, 2021), as well as the narrative that frames the information, impacts students' decision-making processes. Students are influenced by the information and knowledge they get from friends, parents, counselors, university students, teachers, and on their own (Guzmán et al., 2021; Mwantimwa, 2021). Findings suggest that friends and family members are the primary information sources.

Another strand of research, predominantly led by economists, has focused on examining the impact of college information campaigns on students' knowledge and trajectories, including outcomes at the high school and tertiary education levels (Avitabile & Hoyos, 2018; Bettinger et al., 2012; Bonilla et al., 2017; Dinkelman & Martínez, 2011; Hastings et al.,

1 Percentages based on administrative data from the Ministry of Education (https://datosabiertos.mineduc.cl/).

2015; Jensen, 2010; Neilson et al., 2017). Some of this research used experimental designs to assess the educational effects of various informational treatments, targeting both students and their families. These treatments addressed topics such as the economic returns associated with different levels of education, variations among different types of higher education programs, and financial aid opportunities. The results showed heterogeneous effects depending on the treatment and outcome measures, as well as the individual characteristics of students. For instance, Bettinger et al. (2012) found that providing more guided help, rather than just information, is more effective in promoting college participation. Additionally, studies have demonstrated greater effects of informational campaigns on students who are more academically motivated (Jensen, 2010; Neilson et al., 2017), or from higher socioeconomic contexts (Avitabile & Hoyos, 2018; Jensen, 2010).

Some of these studies addressing the effect of informational treatments do not assess participants' knowledge about higher education before treatment as they rely on random assignments to make treatment and non-treatment groups equivalent. Outcome measures post-treatment include observable outcomes such as details from student financial aid applications, college admissions indicators, or retention variables (Bettinger et al., 2012). Other studies (Peter & Zambre, 2017) measure non-observable traits from participants but assume observed responses represent the variable of interest as a manifest variable and not as a latent variable. In addition, Peter and Zambre (2017) only use one dimension from the data collected. Although in the study, the pre-treatment survey included the dimensions of *perception of knowledge about information sources, college costs, and perceived returns*, only the last one was compared with pre- and post-treatment. The last dimension included the subjective unemployment risk, the subjective prospects of finding a well-paid job, and the subjective income premium of a university education.

Theoretical Framework

We conceptualize the acquiring and development of college information as a multidimensional, multilayer phenomenon, comprising different topics and influenced by different contexts. Students seek advice and information about different topics of higher education from multiple sources and from their social networks, including parents and siblings, friends/acquaintances, high school teachers, and counselors, as well as college admissions personnel, college fairs, recruitment materials, and college guidebooks (DesJardins et al., 2019, p. 269).

The context of each student plays a role in the amount and quality of information students have about HE's benefits, costs, and opportunities (Perna, 2006). For example, schools could play a role that could be crucial for low-income students, as they often lack direct access to college information through their families. However, Holland (2015) refers to schools as "clearinghouses," as they focus mainly on providing information. McDonough (1997) reports that schools' information and vocational guidance activities, higher college-going culture and disposition, are highly correlated with socioeconomic status. Also, as suggested by DesJardins et al. (2019), when studying the relevance of information in the decision-making process of students, we must also use a longitudinal perspective that considers the students' acquisition and gathering of college information during high school. According to the authors, information may include the self-awareness of academic achievement over time and higher education topics, like financial aid conditions. Accessing and processing new information would lead to changes in how the costs and benefits of attending higher education are estimated by students.

Research Results About College-Choice in Chile

Research on college access in Chile was dominated until recently by the economics discipline. These studies have explored the role of financial aid in academic achievement and college persistence (e.g., Acuña et al., 2010; Barrios et al., 2011; Centro de Estudios Mineduc, 2012; Intelis & Verde, 2012). Some of these studies have also investigated the importance of academic preparation for college academic success and the role of students' socio-demographic variables, such as family income level, parents' education, and the type of school students attended.

A different line of research has examined students' perspectives on the college-choice process once students enrolled in higher education (Cox et al., 2017; Leyton et al., 2012; Orellana et al., 2017; Paulus et al., 2010; Zúñiga et al., 2013). For example, Orellana et al. (2017) explored the type of institutions students enroll in based on students' social class. This research offers a partial picture of the phenomenon since it refers to students who enroll in higher education, excluding those who were not able or willing to enroll. More recently, Espinoza et al. (2021) showed that students whose parents have not completed higher education (first-generation students), which represents most students enrolled in technical and vocational education and training (TVET) in Chile, enroll in selective universities at a lower rate than do students with college background in the family. Only small increases are observed in the period following the implementation of free tuition (González, 2016).

A reduced group of studies explores the students' decision-making process during secondary education, examining the role of school and socioeconomic contexts. The research González (2016) conducted supports the theory that institutional habitus is a mediator through which socioeconomic origin and class consciousness influence the process of choice of studies and contribute to social reproduction. He observes that students who attend low socioeconomic status schools are exposed to a less favorable habitus regarding the aspiration of going to college. School strategies implemented by schools would be especially important for more disadvantaged students (González, 2016, pp. 188–189). The study by Fawaz-Yissi and Vallejos-Cartes (2020) shows that TVET students attribute difficulties in accessing higher education to a lack of academic-oriented training, including deficient school support. However, despite these challenges, most students expressed their interest in continuing studies in higher education. Aldinucci et al. (2021) reported high aspirations for higher education in the case of TVET students, something that they associate to two potential variables: (1) the poor working conditions available to students graduating with just a secondary technical degree and (2) the national meritocratic discourse associated to accessing higher education, especially to universities, which may artificially raise students' aspirations.

Previous work from Santelices et al. (2020) showed that students feel more informed about higher education programs and curricula but less informed about admissions and financial policies, tuition costs, and labor outcomes of alternative programs. Students report using multiple sources of information at the same time (websites, family, college fairs, and talks offered at school). Students from college-oriented high schools start with the decision of high school electives in 11th grade. However, the more intensive search phase starts during senior year, and decisions are seriously revisited once students receive their admission test scores and final high school GPA (only about a month before the enrollment process). No further exploration was made regarding differences in the information development and college choice process during the last two years of college.

Regarding information sources, internet resources are reported to be important, especially those provided by higher education institutions on their websites (Simões & Soares, 2010). However, other national web pages intended to help students during the transition to college, which could potentially help to reduce the asymmetry of information among different socioeconomic groups, are not used by students

as expected (Slack et al., 2012). Teachers play a role in helping students, although they receive little training for vocational guidance. Despite school counselors' efforts, students perceive them as less helpful (Santelices et al., 2020).

Research Goal

Given the late development of the search phase reported by students attending college-track high schools and the reported use of multiple information sources at the same time, we set out to explore more in-depth the actual differences in knowledge and perception of knowledge reported by students in their junior and senior years of high school. The potential association we may observe between these differences in knowledge and perception of knowledge and informational activities will shed light on how to go about designing interventions to help students transition to higher education. Additionally, the findings will contribute to a clearer understanding of the role of schools in providing information and support to high school students during the different phases of the transition to higher education. This understanding can be valuable in enhancing the strategies that schools use to guide students throughout this process.

Methodology

Data from a specially designed instrument responded to by secondary education students were analyzed using the multidimensional random coefficient multinomial logit (MRCML) model to develop a quantitative measure of college knowledge about higher education distinguishing two subdimensions. Descriptive statistics and t-tests were implemented to explore differences in knowledge and perception of knowledge about higher education in different groups of students. Hierarchical regression models were used to identify relevant predictors of the construct level, including school activities, actors, and other sources of information. Details on the sample, instrument, items, measurement strategy, and analyses are provided below.

Sample

The sample includes 533 high-school students who completed an identical survey twice, once in 11th grade in 2017 and again in 12th grade in 2018. Students in the sample attended nine high schools offering a college-track curriculum in the Metropolitan Region of Santiago and represent 63% of the initial sample of 11th graders who completed the survey. The sample captures the diversity of experiences of students from different socioeconomic groups (19% of the student sample enrolled in schools of low socioeconomic status, 23% are enrolled in schools of middle-low socioeconomic status, 36% are enrolled in schools of middle-high socioeconomic status, and 22% are enrolled in schools of high socioeconomic status) and aims to represent the population attending different private, public and privately subsidized schools in the Metropolitan Region of Santiago. Of the student sample, 47% of them were girls, and 76% had mothers who completed high school or a few years of higher education.

Instruments

Participants responded to an instrument specially designed to characterize the sources they use to obtain information about higher education, their knowledge, and perception of admission processes, costs, financial aid, and labor market conditions of the programs of their interest. The instrument administered to the sample in 2017 and 2018 is the same. For more details about the instrument design and validity evidence for the score interpretation, see Santelices et al., 2020.

Measurement Strategy

Questions about perception were combined with items that asked about factual knowledge to measure knowledge and perception of knowledge about higher education (Santelices et al., 2020). The first dimension of the construct, *Knowledge and Perception of Knowledge about Financial Cost and Access Policies*, focuses on the actual tuition cost, fees, and knowledge of available sources of funding and financial aid alternatives (Table A1). The second dimension, *Knowledge and Perception of Knowledge about Programs/Institutions* (Table A2), deals with the perception and knowledge students have about programs and higher education institutions that match their career interests. No alignment of dimensions was undertaken; therefore, they should not be compared directly.

We used the multidimensional random coefficient multinomial logit model (MRCML) to model the responses to items that aim to measure the *Knowledge and Perception of Knowledge about Higher Education* and the *Certainty and Feasibility*[2] of higher education plans. The MRCML model allows the representation of complex constructs, including more than one dimension using items with ordered response categories. The MRCML parameters were estimated by ConQuest GUI using the marginal maximum likelihood method with the EM algorithms (Wu et al., 1998). To compare the fit of the nested models, we used the standard likelihood ratio test that compares the change in the deviance using the –2 Log Likelihood statistic, Akaike Information Criterion (AIC), and Schwartz Criterion (SC). Also, we examined Pearson's reliability coefficient and correlations among dimensions.

Plausible values from the final model were obtained to explore the relationship between construct level and other variables. Plausible values are a representation of the range of abilities that a student might reasonably have. Instead of directly estimating a student's ability, a probability distribution for a student's ability is estimated (Wu & Adams, 2002).

Analyses

We explored the knowledge and perception of knowledge about HE by grade and school SES using descriptive and inferential statistics (t-tests, chi-square tests). Table A3 presents descriptive statistics of the main variable of interest for the overall sample and by grade. We used multilevel regression analysis to investigate relevant predictors of the "*Knowledge and Perception of Knowledge*" construct using the Plausible Values and Expected a Posteriori Estimate from the IRT analyses as dependent variable. As predictor variable we included School activities, a continuous variable based on seven items about school activities aimed at providing college information, as reported by students (Table A4).[3] The regressions controlled in the first level for mother's education level (Completed Higher Education = 1), student's grade level in high school (11th grade = 0, 12th grade = 1), gender (female = 1), and by the *Certainty/Feasibility* and *School activities* constructs. In the second level, regressions included school socioeconomic status (high and middle-high socioeconomic level equal to 1). Independent variables were introduced sequentially into the model.[4] Additionally, we included variables indicating the frequency of students' visits to higher education institutions and visits to websites; both variables are dichotomous.

Results

We first present results regarding the development of knowledge about HE in 11th and 12th grades. Then, we explore descriptively the potential role of school activities. Finally, we investigate the association between information sources and the development of HE knowledge controlling for variables at the student and school level.

1) How Does Students' Knowledge About Higher Education Change Between 11th and

2 A second multidimensional construct, *Certainty/Feasibility*, was estimated included the following dimensions: *Perceived affordability, Academic motivation, Grit* (adapted from Duckworth et al. 2007), *Academic preparation* (designed and pilot tested by MideUC, www.MIDEUC.cl) and *self-concept* and *Certainty of academic choices*. More details are available from the authors.

3 The variable was constructed using the Rasch model and details are presented in Santelices et al. (2025).

4 All variance inflation factors (VIF) were below 5 and tolerance value were higher than 0.1 indicating lack of multicollinearity (Field, 2013). Estimation errors distribute normally and robust standard errors were used to control for possible heteroscedasticity.

12th Grade? Are There Differences Among Socioeconomic Groups?

Students exhibited an overall low level of *Knowledge and Perception of Knowledge about Higher Education* (−0.98 logits), and in both dimensions, *Knowledge and Perception of Knowledge of Programs and Institutions* (−0.44 logit) and *Knowledge and Perception of Knowledge of Financial Costs and Higher Education Access Policies* (−1.53 logits). As expected, senior-year students exhibited a higher level of *Knowledge and Perception of Knowledge about Higher Education* (−0.75 logits) than in junior year (−1.22 logits), showing an increase in the knowledge and perception of both dimensions (Table A3). For example, in 11th grade, 52% indicated that they are informed about the courses included in the program they would like to study, 38% about the accreditation status of the institution, and in 12th grade, the percentages increased to 71% and 56% respectively. In addition, in 11th grade, 35% correctly answered a specific question about an admission pathway[5], while in 12th grade, the proportion increased to 50%.

The dimension of *Knowledge and Perception of Knowledge of Programs and Institutions* in 11th grade showed statistically significant differences in favor of students from upper SES schools when compared to students from lower SES schools (Table 1 below). However, the difference between socioeconomic groups became not statistically significant in 12th grade. For example, in 11th grade, 28% of students from lower and medium SES schools reported being informed about the accreditation status of the institution, compared to 45% of students from upper SES schools, which is statistically different. In 12th grade, both percentages increased: the first group to 53% and the second to 57%, and the difference was no longer statistically significant. The same happened with the question about how informed they were about applying to the institution of their choice: in 11th grade, the difference between groups was statistically significant, and in 12th grade, the difference was not statistically significant. In 11th grade, 39% of students from lower and medium SES schools reported being informed compared to 53% of upper SES schools' students; in 12th grade, the first group increased to 57% and the second to 63%.

In contrast, the dimension of *Knowledge and Perception of Knowledge about Financial Cost and Higher Education Policies* did not exhibit statistically significant differences in 11th grade among socioeconomic groups. However, in 12th grade, the students from lower and medium SES schools had more information about this topic than students from upper SES schools, and this difference was statistically significant (Table 1). For example, in 11th grade, 28% of students from lower and medium SES schools and 27% of students from upper SES schools reported that they knew how to apply for a scholarship. In 12th grade, this difference increased to 39% in the first group and decreased to 23% in the second group. The same was observed in the question about how informed they were about free tuition. In 11th grade, the difference between groups was not statistically significant, and in senior year, the difference became statistically significant: 46% of students from lower and medium SES schools report they were informed compared to 44% of students from upper SES school students; the first group increased to 64% and the second to 53% in 12th grade.

Table 1

Constructs "Knowledge and Perception of Knowledge About Higher Education" by School SES

Constructs "Knowledge and perception of knowledge about HE"	11th grade			12th grade		
	School socioeconomic level			School socioeconomic level		
	Lower and medium SES schools	Upper SES schools	Group difference	Lower and medium SES schools	Upper SES schools	Group difference
Knowledge and perception of knowledge about financial cost and HE access policies	−1.84	−1.74	0.10	−1.20	−1.32	0.12**
Knowledge and perception of knowledge about programs/institutions	−0.90	−0.47	0.62***	−0.27	−0.20	0.07
Knowledge and perception of knowledge about HE	−1.37	−1.11	0.26***	−0.74	−0.77	0.03

†p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001.

5 The item is "which cohorts are considered in the calculation of the high-school ranking application score?"

2) Are There Differences in the Informational Sources Implemented by Schools and/or Explored by Students Between 11th and 12th Grade?

When analyzing the *School Activities* construct, we observed that students effectively perceived that more informational school activities were carried out in 12th grade (0.22 logits) than in 11th grade (−0.48 logits). The difference (0.74 logits) is statistically significant. Students from upper SES schools perceived more informational activities implemented within their schools in both 11th and 12th grades compared to those students in lower and medium SES schools. These differences by school SES were statistically significant in 11th and 12th grade. Based on students' accounts, the main difference between the types of activities implemented by schools refers to the implementation of vocational tests and talks by people related to HE institutions. In 12th grade, 51% of students in lower and medium SES schools reported completing vocational tests, compared to 93% of students in upper SES schools. In 12th grade, 48% of students from lower and medium SES reported attending talks compared to 82% of students in upper SES schools (see Tables 2 and 3).

The potential use of other information sources, not included in the *School Activities* construct, was explored. Results show that the number of visits to higher education institutions and the use of web pages, both activities that could be undertaken independently from schools, increased between 11th and 12th grades (Table 4). However, there were no significant differences between students from schools of different socioeconomic levels (Table 4).

Table 2

School Activities as Perceived by Students, by Grade and by School Socioeconomic Level

	School socioeconomic level		
	Lower and medium SES schools	Upper SES schools	Difference
11th grade	−1.32	0.12	1.44***
12th grade	−0.57	0.79	1.36***
	0.75	0.67	0.08

†p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001.

Table 3

Proportion of Students who Responded Yes in School Activities Items

Question	11th grade			12th grade		
	Lower and medium SES schools	Upper SES schools	Difference	Lower and medium SES schools	Upper SES schools	Difference
	Responding Yes					
Have you responded vocational tests at your school?	0.42	0.87	0.45***	0.51	0.93	0.42***
At your school, have there been organized vocational fairs and exhibits?	0.56	0.83	0.26***	0.68	0.96	0.28***
At your school, have there been talks from people related to institutions of Higher Education?	0.42	0.73	0.31***	0.48	0.82	0.34***

†p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001.

Table 4

Proportion of Students Reporting Visits to Higher Education Institutions and Visits to Websites, by Grade and School SES

	11th grade	12th grade	Difference	t-test	p-value	
Visiting HE institutions	0.48	0.59	0.11***	−3.37	0.00	
Websites information	0.25	0.32	0.07***	−3.38	0.00	
	11th grade		Difference	12th grade		Difference
	Lower and medium school SES	Upper school SES		Lower and medium school SES	Upper school SES	
Visiting HE institutions	0.23	0.26	0.03	0.39	0.27	0.12***
Websites information	0.48	0.48	0.00	0.63	0.56	0.07†

*p < 0.05; **p < 0.01; ***p < 0.001.

3) How Does HE Knowledge Development Relate to Information Sources When Controlling for Sociodemographic and Psychological Variables?

The results from the MRCML model showed that there was a positive association between being in 12th grade and both dimensions of the information construct (*Knowledge and Perception of Knowledge about Programs/Institutions* and *Knowledge and Perception of Knowledge about Financial Costs and HE Access Policies*) when compared to 11th grade, even when controlling for other predictors included in the model.

We observed no statistically significant school effect in the constructs under study as measured by the random effect estimate. However, attending an Upper SES school was positively associated to *Knowledge and Perception of Knowledge about Programs/ Institutions*. The relationship between the school's SES and *Knowledge and Perception about Financial Cost and HE Access Policies* was not statistically significant.

The reported level of *School Activities* was positively associated to *Knowledge and Perception of Knowledge about Financial Cost and HE Access Policies* and to *Knowledge about Programs/Institutions*, but the latter relationship was significant only at a 10% level. The associations between *School Activities* and the dimensions of HE knowledge did not change by school SES (Upper SES school vs. lower and medium SES school) or by grade (11th vs. 12th grade), as revealed by the non-statistically significant interaction terms.

The variable visits to higher education institutions were always significant and showed a positive association with *Knowledge and Perception of Knowledge about Programs/ institutions* and *Knowledge and Perception of Knowledge about Financial Cost and HE Access Policies*. The interaction between visits to higher education institutions and school SES was negative, which indicated the positive association of visits to higher education institutions on the *Knowledge about Higher Education* was larger among students attending lower and medium SES schools.

Access to HE Websites had a positive association only with the construct *Knowledge and Perception of Knowledge about Financial Cost and HE Access Policies*. The interaction term referring to information from websites and school SES was not statistically significant.

Regarding individual characteristics, the constructs *Academic Preparation*, *Academic Motivation*, *Grit*, and *Perceived Affordability* showed no association with *Knowledge and Perception of Knowledge about Higher Education*. Only *Certainty of Academic Choices* had a statistically significant positive relationship with *Knowledge and Perception of Knowledge about Programs/Institutions* and *Knowledge and Perception of Knowledge about Financial Cost and HE Access Policies*.

Table 5

Regression Predicting Knowledge and Perception of Knowledge About Higher Education, Knowledge and Perception of Knowledge About Financial Cost and Access Policies and Knowledge About Program and Institutions

	Model 1: Knowledge and perception of knowledge about higher education		Model 2: Know. financial cost & access policies		Model 3: Know. about program & institutions	
Parameter	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Fixed part						
Intercept	−2.11***	0.43	−2.41***	0.45	−1.81***	0.46
Grade	0.34***	0.09	0.32***	0.09	0.37***	0.10
Certainty and feasibility (5 dimensions)						
Perceived affordability	0.40	0.27	0.39	0.26	0.42	0.31
Academic preparation	0.10	0.08	0.10	0.10	0.09	0.06
Academic motivation	−0.02	0.06	−0.05	0.09	0.02	0.04
Grit	−0.09	0.09	−0.04	0.09	−0.14	0.07
Certainty of academic choices	0.43***	0.10	0.28***	0.10	0.58***	0.11
Visit to HE institutions	0.42***	0.02	0.43***	0.03	0.41***	0.02
All website information	0.13†	0.07	0.15***	0.05	0.10	0.10
Visit to HE institutions x Upper school SES	−0.20***	0.03	−0.23***	0.05	−0.16***	0.03
All website information x Upper school SES	0.01	0.09	0.01	0.09	0.03	0.13
School activities	0.07***	0.02	0.09***	0.03	0.04†	0.02
Mother's education	−0.03	0.02	−0.10***	0.04	0.02	0.03
Upper SES school	0.12	0.12	−0.04	0.11	0.29**	0.13
School activities x Year	−0.01	0.01	−0.02	0.01	−0.02	0.01
School activities x Upper school SES	0.02	0.02	−0.01	0.02	0.03	0.03
Certainty of academic choices x Grade	−0.27***	0.04	−0.20***	0.05	−0.34***	0.05
Certainty of academic choices x Upper SES school	−0.17***	0.04	−0.18**	0.05	−0.15**	0.05
Upper SES school x Grade	0.01	0.10	0.11	0.10	−0.10	0.10
Null model						
School level variance	0.01		0.01		0.01	
Student level variance	0.62		0.65		0.77	
Intraclass correlation level 2	1%		1%		1%	
Snijders/ Bosker R-squared level 1						
Snijders/ Bosker R-squared level 2						
−2 Log likelihood	2,532.9		2,581.6		2,767.9	
AIC	2,532.9		2,581.6		2,767.9	
BIC	2,532.9		2,581.6		2,767.9	
N cases	533		533		533	
N observations	1,066		1,066	1,066	1,066	
Model with explanatory variables and random effects						
School level variance	0.01		0.01		0.01	
Student level variance	0.33		0.38		0.43	
Intraclass correlation level 2	1%		1%		1%	
Snijders/ Bosker R-squared level 1	0.37		0.31		0.36	
Snijders/ Bosker R-squared level 2	0.45		0.48		0.58	
−2 Log likelihood	1,717.6***		1,856.6***		1,986.4***	
AIC	1,755.7		1,894.7		2,024.4	
BIC	1,848.8		1,987.8		2,117.4	
N cases	533		533		533	
N observations	1,066		1,066	1,066	1,066	

†p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001

The association (coefficient) was larger with *Knowledge and Perception of Knowledge about Programs/Institutions* than with the financial dimension of knowledge. The relationship was positive, showing that the students who report being more certain of their preferences and plans have more information in both subdimensions. The association was larger among students attending lower SES schools when compared to that of students attending upper SES schools. It is also stronger among students in 12th grade when compared to those in 11th grade.

Discussion

In this section, we discuss the findings from our study, starting with the main variable, *Knowledge and Perception of Knowledge about Higher Education*. We then examine results regarding the efforts undertaken by schools to increase *Knowledge and Perception of Knowledge about Higher Education* as reported by students in the questionnaire items and captured by the variable *School Activities*. We then focus on other informational activities students may undertake on their own and close the section by examining the association of other personal student characteristics to *Knowledge and Perception of Knowledge about Higher Education*.

Descriptive results from our study show that overall students exhibit low levels of *Knowledge and Perception of Knowledge about Higher Education*. Although we observe some positive variations in the level of knowledge during students' transition from 11th to 12th grade, the level of information remains low even in the last year of high school. The statistically significant difference observed in the dimension *Knowledge and Perception of Knowledge about Programs and Institutions* observed between socioeconomic groups in 11th grade becomes non-statistically significant in 12th grade. The opposite takes place with the dimension *Knowledge and Perception of Knowledge about Financial Cost and HE Access Policies*. No statistically significant differences were observed between socioeconomic groups in 11th grade, but they were observed in 12th grade in favor of students enrolled in lower and medium SES schools. Students report that more informational efforts, as measured by the *School Activities* construct, are carried out in 12th grade than in 11th grade, and the difference is statistically significant.

In addition, regression results suggest that *School Activities* reported by students are associated with students' *Knowledge and Perception of Knowledge about Higher Education* and show no differential association to a school's SES when considering other personal and contextual variables. Visits to higher education institutions are also associated with *Knowledge and Perception of Knowledge about Higher Education*, and that association is larger among students attending medium and low SES schools compared to those from high SES schools. Access to HE websites has a positive association only with the construct *Knowledge and Perception about Financial Cost and HE Access Policies*. Both visits to higher education and HE websites are activities that students may be doing on their own and not necessarily as a result of school initiatives.

When examining descriptively the variable *School Activities*, we observe that students report that more informational school activities are carried out in 12th grade than in 11th grade. This difference is statistically significant. However, activities carried out by schools to support students during the transition to higher education are reported more frequently by students attending high SES schools than by those students attending low and medium SES schools in both 11th and 12th grade. Students report that the main differences between the types of activities implemented by schools between 11th and 12th grade refer to the implementation of vocational tests and talks by people related to HE institutions.

School activities reported by students are associated with students' *Knowledge and Perception of Knowledge* but show no differential association by school's SES when considering other personal and contextual variables. These results do not seem to support the higher relative importance of school activities in the development of college knowledge for low-income students as described in previous research (Gonzalez, 2016; McDonough, 2005; Perna & Titus, 2005).

Furthermore, it is interesting to note that there is no statistically significant school effect (random effect) in the regression analysis of the dependent variable *Knowledge and Perception of Knowledge about Higher Education*, suggesting that informational efforts undertaken by schools may not reach all students attending the same school in the same way.

A different type of informational activity, however, exhibits a behavior more like that reported in previous studies (Gonzalez, 2016; McDonough, 2005). The association between visits to higher education institutions and higher education knowledge is larger in students attending medium and low SES schools compared to those from high SES schools. In Chile, visits to higher education institutions are frequent and occur mainly in 12th grade. School counselors organize them, sometimes as the result of their own initiative and sometimes because higher education institutions themselves pursue them as a marketing strategy. Students may also visit institutions on their own, contacting them directly or through friends and family.

Regression results suggest that *Certainty of Academic Choices* is associated with both subdimensions of the information construct reported by students, and mother's education is associated with the subdimension *Knowledge and Perception of Knowledge about Financial Cost and HE Access Policies*. The significance of the variable measuring *Certainty of Academic Choices* is in line with the results reported by Desjardins et al. (2019), who suggested that students make college choices with some degree of self-awareness about their academic possibilities. We interpret the lack of statistically significant association between *Knowledge and Perception of Knowledge about Higher Education* and the individual variables *Academic Motivation, Academic Performance, Grit,* and *Perceived Affordability* as a suggestion of how little students know about higher education and how general and extensive that situation is, with little variation observed among students with different characteristics.

To explore the variable *Knowledge and Perception of Knowledge about Higher Education* and its association with variables from school and students, we have used a complex measure which allows us to examine more than one dimension at the same time. The measure was developed using specially designed questionnaire items and the multidimensional random coefficient multinomial logit (MRCML) model proposed by Wang et al. (2004). This model provides more precise estimates of ability and its association with other variables than those used by previous research examining the role of information (Bettinger et al., 2012; Peter & Zambre, 2017).

Implications and Future Research

We interpret these findings as showing that more and earlier information for the transition process is needed for all students, with a special focus on providing such information early during high school in low-income schools and focusing particularly on the *Knowledge and Perception of Knowledge about Financial Cost and HE Access Policies* dimension.

Schools are playing a role in the informational process but should start playing it earlier in high school and address costs, financial aid, and labor outcome indicators. This could be done by designing and implementing school activities to help students navigate informational websites and help them interpret and use the information. In addition, a stronger collaboration between high schools and higher education institutions through information and vocational guidance activities could be helpful, as the statistical significance of the variable visit to HE institutions suggests. Such collaboration should include a broad range of quality institutions and not be limited to institutions that

actively pursue recruiting, as this may indicate a need for marketing and not necessarily an adequate fit with students' academic profiles or needs. Training opportunities for school staff should include the information needed for students to successfully navigate the transition process and the information platforms currently available.

In future research, we expect to explore the information process in technical secondary schools, where almost 50% of Chile's students, including the poorest, enroll. Studying this group may allow us to observe socioeconomic differences more accurately since the sample included in this study may have excluded the lowest-income schools.

Conclusion

In this article, we explored how the knowledge about higher education changes between 11th and 12th grade, identifying possible differences between students by knowledge subdimensions, socio-demographic groups, and possible consequences of school activities. Results from our study show that students exhibit low levels of information in both knowledge subdimensions. Despite positive variations observed from 11th to 12th grade and the association of school activities and higher education knowledge, the low level of information remains in the last year of high school. We also observe differences between subdimensions that would have been challenging to address with a unidimensional approach. Additional efforts should be implemented by schools to ensure broad and equal access to higher education, particularly in low-income schools, and on the topics of tuition costs, financial aid, and labor outcome indicators. This can be achieved through school activities that guide students in using informational websites about higher education, among other tools. Stronger collaboration between high schools and the higher education sector, including a diverse group of institutions, is also recommended. Training school staff to help students navigate the transition to higher education process and use information platforms is essential, especially in schools of low socioeconomic status, where students face stronger barriers.

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Appendix A

Table A1

Items Included in the Knowledge and Perception About Financial Cost and Access Policies Dimension (Dimension 1)

Label	Item	Type of response	Coding
i38_a	How informed do you feel about requirement of scholarships or loans	Ordinal	1 Not at all informed 2 Somewhat informed 3 Informed 4 Very Informed
i38_b	How informed do you feel about steps to apply scholarships	Ordinal	1 Not at all informed 2 Somewhat informed 3 Informed 4 Very Informed
I38_c	How informed do you feel about amounts of scholarships	Ordinal	1 Not at all informed 2 Somewhat informed 3 Informed 4 Very Informed
I38_d	How informed do you feel about tuition amount that pay national loan	Ordinal	1 Not at all informed 2 Somewhat informed 3 Informed 4 Very Informed
I38_e	How informed do you feel about conditions to renew scholarships or loan	Ordinal	1 Not at all informed 2 Somewhat informed 3 Informed 4 Very Informed
I40_a	Are you are informed about: Bicentenario scholarship	Dichotomous	1 Yes 0 No
I40_b	Are you are informed about: Juan Gómez Millas scholarship	Dichotomous	1 Yes 0 No
I40_c	Are you are informed about: Free-college policy	Dichotomous	1 Yes 0 No
I40_d	Are you are informed about: BEA scholarship	Dichotomous	1 Yes 0 No
I40_e	Are you are informed about: Nuevo Milenio scholarship	Dichotomous	1 Yes 0 No
I40_f	Are you are informed about: Teacher scholarship	Dichotomous	1 Yes 0 No
I40_g	Are you are informed about: CAE scholarship	Dichotomous	1 Yes 0 No
I40_h	Are you are informed about: JUNAEB scholarship	Dichotomous	1 Yes 0 No
I41a	Do you think you would qualify for the following financial aid alternatives? Bicentenario scholarship	Dichotomous	1 Yes 0 No
I41b	Do you think you would qualify for the following financial aid alternatives? Juan Gómez Millas scholarship	Dichotomous	1 Yes 0 No
I41c	Do you think you would qualify for the following financial aid alternatives? Free-college policy	Dichotomous	1 Yes 0 No
I41d	Do you think you would qualify for the following financial aid alternatives? BEA scholarship	Dichotomous	1 Yes 0 No
I41e	Do you think you would qualify for the following financial aid alternatives? Nuevo Milenio scholarship	Dichotomous	1 Yes 0 No
I41f	Do you think you would qualify for the following financial aid alternatives? Teacher scholarship	Dichotomous	1 Yes 0 No
I41g	Do you think you would qualify for the following financial aid alternatives? PSU scholarship	Dichotomous	1 Yes 0 No
I41h	Do you think you would qualify for the	Dichotomous	1 Yes

Table A1 (Continued)

Items Included in the Knowledge and Perception of Knowledge About Financial Cost and Access Policies Dimension (Dimension 1)

I41i	Do you think you would qualify for the following financial aid alternatives? CAE scholarship	Dichotomous	1 Yes 0 No
I41j	Do you think you would qualify for the following financial aid alternatives? Other	Dichotomous	1 Yes 0 No
I41k	Do you think you would qualify for the following financial aid alternatives? None	Dichotomous	1 Yes 0 No
I42	What are the requirements of Bicentenario scholarship?	Dichotomous	1 True requirement 0 False requirements
I43	What are the requirements of Free-college policy?	Dichotomous	1 True requirement 0 False requirements
I44	What are the requirements of BEA scholarship	Dichotomous	1 Right 2 Wrong 1 True requirement 0 False requirements
I53_a	How much do you know about: Propaedeutic program	Ordinal	1 Nothing (0) 2 A little (1) 3 Something (2) 4 Very Much (3)
I53_b	How much do you know about: PACE program?	Ordinal	1 Nothing (0) 2 A little (1) 3 Something (2) 4 Very Much (3)
I53_c	How much do you know about: Ranking 850 program?	Ordinal	1 Nothing (0) 2 A little (1) 3 Something (2) 4 Very Much (3)
I53_d	How much do you know about: Talent and Inclusion Program?	Ordinal	1 Nothing (0) 2 A little (1) 3 Something (2) 4 Very Much (3)
I53_e	How much do you know about: SIPEE program	Ordinal	1 Nothing (0) 2 A little (1) 3 Something (2) 4 Very Much (3)
I54	How much do you know about: High School ranking as an admission indicator?	Ordinal	1 Nothing (0) 2 A little (1) 3 Something (2) 4 Very Much (3)
I55	What are the requirements of PACE program?	Dichotomous	1 True requirement 0 False requirements
I56	With whom does the High School ranking compare your GPA?	Dichotomous	1 True statement 0 False statements
I57	What year of high school grades are included in the calculation of the HS ranking?	Dichotomous	1 True statement 0 False statements

Table A2

Items Included Knowledge and Perception of Knowledge About Programs/Institutions Dimension (Dimension 2)

Label	Item	Type of response	Coding
I27_a	How informed do you feel about institution issues: teachers quality	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I27_b	How informed do you feel about institution issues: infrastructure	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I27_c	How informed do you feel about institution issues: geographic location	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I27_d	How informed do you feel about institution issues: student profile	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I27_e	How informed do you feel about institution issues: scholarships and loans	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I27_f	How informed do you feel about institution issues: accreditation	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I27_g	How informed do you feel about institutional issues: prestige	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I27_h	How informed do you feel about institution issues: application process	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I27_i	How informed do you feel about institution issues: admission score (PSU)	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I28_a	How informed do you feel about program issues: courses	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I28_b	How informed do you feel about program issues: student skills	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I28_c	How informed do you feel about program issues: tuition	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I28_d	How informed do you feel about program issues: employability	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I28_e	How informed do you feel about program issues: wages	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1) 3 Informed (2) 4 Very Informed (3)
I28_f	How informed do you feel about program issues: additional costs	Ordinal	1 Not at all informed (0) 2 Somewhat informed (1)

Table A2 (Continued)

Items Included Knowledge and Perception of Knowledge About Programs/Institutions Dimension (Dimension 2)

I29	Do you know if the institution of your choice is properly accredited?	Dichotomous	1 Yes 0 No
I30	How many years of accreditation does your selected institution have?	Dichotomous	1 Correct answer 0 Incorrect answer/ I don´t know
I31	Do you know if the institution of your choice is a public institution?	Dichotomous	1 Correct answer 0 Incorrect answer/ I don´t know
I32	What is the average first year salary of your selected career?	Dichotomous	1 Correct answer 0 Incorrect answer/ I don´t know
I33	What is the employability of your selected career the first year?	Dichotomous	1 Correct answer 0 Incorrect answer/ I don´t know
I34	Did family members study in your selected program?	Dichotomous	1 Yes 0 No/ I don´t know
I35	Did family members study in your selected institution?	Dichotomous	1 Yes 0 No/ I don´t know

Table A3

Descriptive Statistics for Knowledge About Higher Education

Dimension	11th grade	12th grade	Difference	N	Mean	Std. deviation	N	Min	Max
Knowledge and perception about financial cost and higher education policies	−1.79	−1.28	0.51	533	−1.53	0.82	1066	−4.38	0.69
Knowledge about programs/ institutions	−0.66	−0.24	0.43	533	−0.44	0.89	1066	−3.82	1.57
Knowledge about higher education	−1.22	−0.75	0.47	533	−0.98	0.79	1066	−4.10	0.92

Table A4

Item Mapping for the Variable School Informational/Vocational Activities

Label	Item	Type of response	Coding
i46	Have you carried out vocational tests at your school?	Dichotomous	1 Yes 0 No
i48a	Has your school counselor informed you about…? Scholarship and available sources of funding	Ordinal	1 Nothing 2 A small amount 3 A moderate amount 4 A great deal
i48b	Has your school counselor informed you about…? Different Careers/programs	Ordinal	1 Nothing 2 A small amount 3 A moderate amount 4 A great deal
i48c	Has your school counselor informed you about…? Different institutions of Higher Education	Ordinal	1 Nothing 2 A small amount 3 A moderate amount4 A great deal
i48d	Has your school counselor informed you about…? How choose a program	Ordinal	1 Nothing 2 A small amount 3 A moderate amount 4 A great deal
I49	At your school, Have there been organized vocational exhibitions?	Dichotomous	1 Yes 0 No
I50	At your school, Have there been talks from people related to institutions of Higher Education?	Dichotomous	1 Yes 0 No