Article

Students with Socioeconomic Disadvantages who have Academic Success in Language: Examining Academic Resilience in South America

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Abstract: Framed in a context with an emerging economy and with a high percentage of school failure, this study aimed to identify the factors that turn students with socioeconomic disadvantages into resilient students. Two questions guided the research: Can resilience be supported in students in adverse socioeconomic situations? What factors influence building resilient students? A cross-sectional study was carried out from 2011 to 2015 in Chile, using a multilevel logistic regression model with three levels, considering the hierarchical data structure. The behavior of 63100 to 76400 sampled students was analyzed. Results show five relevant factors in building resilience: self-efficacy in language, minor aggressions and violence perceived by students, norms and values of the establishment, interest in study, and self-efficacy. Some risk factors identified were an atmosphere of less respect and trust, engagement in physical education activities and good performance in carrying them out. These results could orient educational leaders interested in supporting the educational community in order to improve the academic success of disadvantaged students.

Keywords: socio-educational resilience; protective factors; risk factors; multilevel logistic model, SIMCE

1. Introduction

In Chile, relations in the educational system marked by inequality constitute an increasingly relevant topic since the return of democracy [1–4]. Among other reasons, this interest has arisen specifically due to the differences detected in standardized tests. It has been observed that students with greater economic opportunities obtain better returns, a fact which does not only apply to Chile, but also to many countries in Latin America and the world [5–7].

Several studies have managed to identify a group of students who, despite coming from disadvantaged contexts, achieve academic success [8]. It is therefore necessary to identify the factors associated with this satisfactory performance, also considering that aiming towards equality in the educational field will prospectively guarantee equal life opportunities for all [9].

The concept of resilience has become fundamental to explain how students from socially disadvantaged backgrounds show satisfactory or outstanding performances. It refers to the individual's abilities to overcome adverse contexts and events, avoiding negative consequences that unfavorably compromise their development [10–13]. In the educational field, resilient students would be those who have academic success, despite coming from socio-economically disadvantaged environments. This definition has been adopted in most papers on resilience, which use

socioeconomic status indexes to determine the state of disadvantage, in addition to a test score that records academic success [8].

Resilience is thus a central notion, since it changes the perception of "invulnerability" attributed to some individuals, which considers that children are born with certain characteristics that allow them to innately resist adversity. This congenital notion of the ability to overcome adversity has been replaced by the concept of resilience, which contrasts mainly by connoting a process that can be promoted socio-environmentally, questioning the bias that the family is the only one responsible for their children's successful performance.

The latest theoretical propositions regarding resilience refer to an ecological-transactional model, where the factors that promote it lie within the family, the individual, but also the community [9,14]. That is, the key to building socio-educational resilience —or academic success despite vulnerability— is not exclusively based on the students' cognitive resources, but also on the influence of non-cognitive and environmental variables, as it is a dynamic concept [15,16]. The exclusivity between resilience and academic performance has also been questioned. Specifically, Azuelos and Quintard [17] point out that the link between resilience and (academic) "success" would constitute a restrictive association, given there are other dimensions of school life such as socialization and behavior.

Some research has focused on identifying protective factors that would favor the ability to face adversity. Among them, it is possible to highlight personal factors such as social approach, positive humor, and a stable biological rhythm. Cognitive and affective factors have also been found, such as a higher verbal and mathematical IQ, in addition to complex skills such as empathy. Other outstanding individual qualities are high self-esteem, achievement drive, feelings of self-reliance and autonomy, low hopelessness, and adequate problem-solving abilities [14].

The link between students' age and the motivation they have in regard to school should be noted as well: Valle et al. [18] observe an inverse relationship between students' progress in time in the school system and their motivation in academic activities, together with time management in the execution of their duties. Estévez et al. [19] point out, on the contrary, that the more time students spend doing school activities at home, the higher the intrinsic motivation and efficiency in time management they will manifest, reducing anxiety related to school activities.

Lee and Stankov [20] conducted a study to establish which non-cognitive variables could best predict success in standardized tests. They identified some related to personality traits, the curriculum, school climate, the emotional environment, etc. The students' prospective judgments of their own abilities and their projections, teaching support [21], and classroom climate were valued as the most influential factors for good academic performance. Also, teachers' resilience was proposed by Katsantonis [22] as a central factor anchored in self-efficacy as a mediating variable of the relationship between school climate and work.

Resilience processes involve coordinating parents or responsible adults, teachers and managers, expanding resources, and involving institutions and community organizations [23]. Community schools are a special variant in supporting resilient processes. Kerr and Dyson [24] define them as establishments that have modified their traditional design to operate with network governance models, developing strategies that involve addressing at-risk students' ecologies or social environments.

Cordero, Pedraja, and Simancas [25] proposed other factors to consider in educational resilience. Teaching standards stand out [26], which are in turn influenced by the number of students per classroom and the socio-affective climate. Cheung, Sit, Soh, Ieong, and Mak [27] identified expectations regarding studies [28–30] and family structure [31], as factors that predict academic resilience. Resilient processes would be linked to the development of secure connections with others, as a support for self-acceptance that allows to moderate reactivity when young people face adverse environmental difficulties [32].

The existing evidence of the impact that support has on resilience, both regarding academic performance and future success, led, for instance, the European Union to review and study intervention programs in schools that favor the development of non-cognitive abilities, mainly socio-

emotional skills. Eight (8) key components were proposed: curriculum, classroom climate, early intervention, targeted interventions, student participation, teachers' own welfare competencies, parental involvement in the learning process, and curriculum adaptation and implementation [33]. Martin et al. [34] and Wills and Hofmeyr [35], sustain the socio-emotional support inherent in resilient processes: the authors suggest that the incorporation of support models for young people's resilience reinforces its connection with educational processes.

Regarding the specific area of language, from an individual perspective, García-Crespo, Galián, Fernández-Alonso, and Muñiz [36] propose self-confidence in reading skills and school discipline as central factors for resilient processes. However, in contextual terms, additional support for normal curriculum activities operates as a central protective element. For example, González and Delgado [37] establish that there is greater effectiveness, in the short and long term, in oral development and in reading and writing skills of disadvantaged children and young people when students participate in special, complementary intervention programs from an early age. Hudson et al. [38] propose a similar scenario regarding reading comprehension and literacy. The authors emphasize the beneficial effects of additional methods of support for normal curricular activities, offering students further possibilities to stimulate this area of learning. Although they value the support of extracurricular activities, whether recreational, performance or academic, Cladellas et al. [39] warn that their effectiveness in school performance is restricted to a duration that does not exceed ten (10) hours per week, including as well parental support.

Socio-educational support would be a central element for students' social support in general. For instance, Li et al. [40], who studied the written diaries of Chinese children and youth who had migrated from the countryside to the city, associate language patterns of more resilient children with positive emotions. This condition is consistent with their own capacity for emotional regulation, an important predictor of a resilient disposition. The authors refer to interpersonal emotional self-regulation as an important prerequisite for generating social connections of high resilient value, such as developing proper teacher-student support. This is relevant as long as educational support is considered as an inciting factor in the development of personal goals [21].

Regarding risk factors in linguistic and even behavioral development, López-Rubio et al. [41] suggest that violence and absenteeism generate a significant decrease in the effectiveness of teaching and a considerable increase in conflicts between teachers and students. Ruiz-Ariza et al. [42] highlight that children who are more attracted to physical activities would only have outstanding performance in sports, whereas their academic performance in general would be unsatisfactory. That is, deficits in the area of language are due to both personal and contextual factors. Maier, Vitiello, and Greenfield [43] emphasize the need to use children's psychosocial strengths from an early age, as they are factors with high predictive capacity on the initial levels of language and formal literacy. The context of the classroom would also be a predictor of their subsequent developments.

Despite coming from socio-economically disadvantaged or adverse environments, academically successful students, specifically in the area of language, must be further characterized. The importance of Language as a subject is sustained mainly by its influence on the development of reading comprehension, a significant weakness in Chilean students [44,45]. There are currently no investigations in Chile on this matter, which makes this study even more relevant.

2. Materials and Methods

The SIMCE's database, administered by the Education Quality Agency, was used. SIMCE tests assess the achievement on fundamental objectives and the minimum mandatory notions of the current curricular framework in different areas of learning. It collects information from teachers, students and parents or guardians through quality questionnaires regarding Chilean education (Education Quality Agency, LAW NUM. 20.529) [46].

SIMCE's context questionnaires are composed by a series of questions that vary according to each grade. Student questionnaires range between 17 and 29 questions; teacher questionnaires, between 28 and 36; and parent and/or guardian questionnaires, between 25 and 31. All questions have a different number of items and are measured in nominal, ordinal and other dichotomous scales. These

instruments measure the perception of various topics of an individual, family, or school-related nature, aside from collecting sociodemographic information.

The sampled population corresponds to resilient and non-resilient 4th grade students of urban educational establishments in Chile who took the SIMCE Language test between 2011 and 2015. The resilient group was obtained based on a composite index, used by Salvo-Garrito et al. [47], formed by parent/guardian expectations in terms of the maximum academic development that their pupil should achieve, educational level of each parent or guardian, household income, computer possession, Internet connection, and the number of books in the home. These variables are similar to those used in the ESCS Test for social, cultural and economic status index, which is used by several authors to detect resilient students [25,48–50].

Resilient students were those who had average values less than or equal to zero in the index, and an academic performance exceeding the cut-off score in the SIMCE Language test, as stated by the Chilean Ministry of Education [51–53]. Non-resilient students were those with equal index values, but whose SIMCE Language test results indicated insufficient learning in language [51–53].

Most sampled students were between 9 and 10 years of age, and sex distribution was balanced. Table 1 shows the distribution of resilient and non-resilient students based on academic performance in Language.

Table 1. Average performance in Language in both Resilient and Non-resilient groups from 2011 to 2015.

Student category		2015	2014	2013	2012	2011
	N	33956	33123	32764	34033	35027
Resilient	M	311.4	311.9	312.1	313.1	312.7
	SD	19.1	18.9	19.7	20.9	20.7
Non-Resilient	N	39560	43271	36818	33092	35636
	M	205.0	205.8	203.4	202.8	204.5
	SD	26.0	24.1	26.7	27.1	25.9

Note: N: Sample size; M: Mean; SD: Standard Deviation.

For data analysis, a quantitative, non-experimental, correlational and cross-sectional research design was used, with correlated information from the classroom and from the schools [54]. The model used corresponds to a multilevel logistic regression model with three levels, considering the hierarchical structure of data, in which students are considered to be grouped and nested in two higher levels: one represented by classrooms, and another by the educational establishments.

Specifically, the three-level model is defined as follows, where specifies individual $i = 1, \ldots, n$; specifies classroom $j = 1, \ldots, J$; specifies school $k = 1, \ldots, K$; and specifies the independent variable $h = 1, \ldots, H$,

Level 1 represents the individual *i* in classroom *j* in school *k*:

$$Y_{ijk} = log\left(\frac{\pi_{ijk}}{1 - \pi_{ijk}}\right) = \beta_{0jk} + \sum_{h=1}^{H} \beta_{jk} X_{hijk} + \varepsilon_{ijk}$$

Level 2 represents classroom *j* within school *k*: $\beta_{0jk} = \gamma_{00k} + u_{0jk}$

Level 3 represents school *k*: $\gamma_{00k} = \gamma_{000} + u_{00k}$

Therefore, the three-level model in a single equation is given by

$$\gamma_{00k} = \gamma_{000} + \sum_{h=1}^{H} \gamma_{h00} X_{ij} + u_{00k} + u_{ojk} + \varepsilon_{ijk}$$

The dependent variable, categorical, represents the group of resilient students, where the variable to be estimated would be the probability that the student "i", from classroom "j" and school "k", will be included within the corresponding group, that is $P(Y_{ijk} = 1|\beta) = \pi_{ijk}$.

The coefficients estimated in the model cannot be interpreted directly as in a linear regression, so it is necessary to estimate the odds ratios (OR) of each independent variable. This statistic measures the relationship between the probability of an event occurring versus the probability of it not occuring when the value of the variable increases by one unit while everything else remains constant. Therefore, ORs associated with an explanatory variable will take a value greater than the unit if said variable increases the probability of a student belonging to a group (positive coefficients), and a value smaller than the unit if said variable decreases the probability of its occurrence (negative coefficients) [25].

The model contains random intercepts for classroom and school, as well as independent variables and individual residual error. It is assumed that the errors have a multivariate normal distribution, with a mean vector 0 and matrix of variances and covariances 'diagonal block' [55]. With this type of models, possible biases in the estimates are avoided, derived from the correlation between the values of the school variables of the students belonging to the same classroom and to the same establishment [56].

The independent variables used in the Xijk models correspond to the determinant variables selected from the context questionnaires, which complement the standardized tests of the SIMCE academic performance, such as sex, type of establishment, in addition to variables obtained from the context questionnaires s applied to teachers, students, and parents and/or guardians.

In order to evaluate the contribution of the inclusion of the hierarchical factors corresponding to the establishment and the nested course within the establishment, the estimation of the Intraclass Correlation Coefficients (ICC) [57] obtained through the non-conditional or null model was used for each year of study.

3. Results

3.1. Intraclass Correlation Coefficients, ICC.

ICC results obtained for both factors throughout the years exceeded the value of 0.05, considered sufficient to determine the inclusion of each hierarchical factor in the model [58, p.74]. Both hierarchical factors were significant throughout the years, because their confidence interval did not include zeros. The cumulative total of ICC for both factors had a high contribution to the variance explained by the model, where the highest in the hierarchical level of course nested within the school varied between 0.21 and 0.24 over the years. In contrast, the ICC for the college factor varied between 0.16 and 0.18 in the same period (see Table 2).

Table 2. Intraclass Correlation Coefficient from 2011 to 2015

Level	2015	2014	2013	2012	2011
School	.18	.18	.17	.17	.16
Course – School	.24	.21	.22	.23	.23
Total	.42	.39	.39	.40	.39

3.2. Protective factors of socioeducational resilience in language.

In the evaluations carried out, numerous statistically significant variables (p≤.05) were identified, associated with higher SIMCE scores in resilient students. These variables were ranked according to their association with students' status as resilient or otherwise through an indicator corresponding to ORs which expresses the number of resilient students in relation to the amount of non-resilient students for each unit of change in the selected variable.

Table 3 summarizes the protective factors selected by ORs greater than 2.0 and between 1.5 and 2 from 2011 to 2015, ordered by their degree of association with resilience. This criteria was used to show the effect of OR. Those below 1.5 were not included as their impact is very low [59]. All

parameters estimated in the model were statistically significant (p≤.001). These factors are differentiated by their relationship with aspects of the students, the establishment and the classroom.

In the case of protective factors, an OR of 5.57 was obtained for a higher level of language self-efficacy. This means that resilient students at least quintuple non-resilient students, as language self-efficacy increases. Among some of the establishment's own factors that have emerged in recent years, the reduction of violence and aggressions are associated with a greater presence of resilient students with OR of 2.6.

The school rules and values were identified with an OR range between 1.76 and 2.29. This places these factors within the highest levels of association with the student's resilience. Aside from students' characteristics, variables related to teachers are also significant, with high values of association with socio-educational resilience. In recent years, protective aspects of socio-educational resilience arise, among which are self-efficacy, self-confidence and less discrimination (Table 3).

Table 3. Odds Ratio of resilient students in relation to non-resilient students by protective factors of socio-educational resilience.

Protective factor	Component	2015	2014	2013	2012	2011
OR > 2						
Higher self-efficacy regarding language	Student	—	**5.57**	5.50		—
Less perceived aggressions	Student	**2.61**	—	—	—	—
Less school violence perceived	Student	**2.57**		—		—
Norms and values	School	—	—			**2.29**
Interest in studying	Student	—	—			**2.21**
Entre 1.5 ≤ OR ≤ 2						
Higher self-efficacy regarding language	Student	—			1.71	—
Less school violence perceived	Student		1.62	—	1.98	—
Norms and values	School	—	—	1.78	1.76	
Interest in studying	Student	—	—	1.72	1.96	
Feedback	Teacher	—	—	—	—	1.93
Teacher-student behavior	Teacher	—	1.86	—	—	—
Self-efficacy	Student	1.56	1.68	—	—	—
Self-trust	Student	—	1.57	1.54	1.61	—
Sense of belonging	Student	—	—	—	—	1.57
Less discrimination	Student	1.55	—	—	—	—
Feeling when changing establishments	Student	—	—	—	—	1.51

Note: Confidence intervals at .95 of OR constant (=1) are shown as ¨—¨.

3.3 Factors associated with a greater presence of non-resilient students

The factors associated with most non-resilient students for each unit of change in the selected variable were ranked according to their ORs and classified according to their prevalence on factors related to the student, establishment and classroom, see Table 4.

In recent years, two factors associated with non-resilient students have emerged: a lower environment of respect and trust in the classroom, and greater engagement in physical education activities. Meanwhile, better performance in physical activities and a perception of deteriorated school climate appear as factors moderately associated with a group of non-resilient students.

Table 4. Odds Ratio of non-resilient students in relation to resilient students by risk factors of socio-educational resilience.

OR > 2						
Risk factor	Component	2015	2014	2013	2012	2011
Engagement in school activities	Student	—	—	2.73	2.28	3.27
Care for others and the establishment	Student	—	—	2.02	2.38	—
Engagement in physical activities	Student		—	—	2.05	—
Environment of less trust and respect	Classroom	—		—	2.17	
Between 1.5 ≤ OR ≤ 2						
Engagement in physical activities	Student	1.52	—	—		—
Environment of less trust and respect	Classroom	—	1.71	—		1.88
Good performance in sports	Student	1.55	1.39	—	—	—
Grade repetition	Student	—	—	—	1.54	1.61
Lower social environment	Classroom	—	1.51	—	—	—

Note: Confidence intervals at .95 of OR constant (=1) are shown as ¨—¨.

4. Discussion

The results of this study reveal a set of protective and risk factors associated with performance in the area of language development in sectors of the student population considered vulnerable. These factors could be contemplated in the design of institutional and school community strategies to reverse some of the effects of the socio-educational inequality observed in the Chilean school system.

Studies that emphasize the importance of strategies to support the academic development of students from disadvantaged backgrounds [21,34,35,37,38], suggest an affirmative answer to the question regarding supporting the resilience in students in adverse socioeconomic situations. These are contextual-relational variables, mainly relevant to teachers and/or the community, that can be addressed, modified and/or redirected by each school.

This study answers the question about the factors that influence the emergence of resilient students, showing self-efficacy in language as an important protective factor. This coincides with the statements of García-Vesca and Domínguez-de La Ossa [14], who relieve feelings of self-reliance as a central individual element in the development of resilient processes. This would be related to what was stated by Lee and Stankov [20] and Najafzadeh et al. [21] who link socio-educational resilience with prospective judgments about their own abilities and with confidence in the generation of personal goals, relevant representations to enhance self-perceptions of academic effectiveness. Confidence in reading and the sense of self-efficacy in language skills seem to be more prone to resilient development, the earlier the child has contact with the various language processes [36].

Another protective factor in the relational field refers to the reduction of violence and aggressions of various kinds, similar to what López-Rubio et al. [41], indicated: violence is a disruptive factor in young people's resilience and it is a source of conflicts within the educational community. Furthermore, deficits in resilience associated with a greater participation in sports [42] could be compensated with a link between physical activity and other pedagogical practices that promote linguistic development.

It is possible to consider school rules and values as a protective factor for the development of linguistic skills. These elements are linked to the ability of the institution to transfer its axiological and normative dimension to the student through pedagogical and socio-emotional connections and links to support their educational and resilient processes. Some considerations on values could be the relational display of respect and trust in the classroom, promoted by teaching practice, coinciding with the results of Maier et al. [43], who focused on protective factors in the classroom. González and Delgado [37], Hudson et al. [38], Najafzadeh et al. [21] and Li et al. [40] also consider that the

promotion of participation and socio-emotional support in special intervention programs is complementary to the curriculum.

The results of this research could guide institutional and pedagogical strategies towards the creation and implementation of resilience programs centered, as proposed by Bellis et al. [23], in the use and conversion of all school community resources. Likewise, the extension of resilience programs to community resources, as proposed by Kerr and Dyson [24] and Bellis et al. [23], could involve other agents of child and school ecology or environment.

Self-efficacy, the rules of establishment and the reduction of violence or discrimination of any kind should be relevant for socio-education. These processes should focus on teaching practice in the classroom and in promoting a social climate of respect and self-trust, which could facilitate the development of students' prospective vision. In short, socio-educational resilience programs not only aimed at obtaining better academic results in the area of language, but also, as Azuelos and Quintard [17] point out, at promoting other dimensions of school and human life, such as socialization and positive behavior towards others.

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