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Academic Stress, Interpersonal Relationship Quality at School, and Academic Performance in Chilean students: A Mediation Model from a Gender Perspective

Estrés académico, calidad de las relaciones interpersonales escolares y rendimiento académico en estudiantes chilenos: Un modelo de mediación con perspectiva de género

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Abstract

The present study examined the effect of academic stress on academic performance through school students' interpersonal relationships with peers and teachers, considering potential gender differences. Specifically, we tested whether the quality of interpersonal relationships with peers (classmates) and with teachers mediated the association between academic stress and academic performance. The sample consisted of 1,273 Chilean students from Primary Education (Grades 5–8) and Secondary Education (Grades 9–12). Participants' mean age was 14.20 years (SD = 2.43; range = 10–19), with 47.5% identifying as female (n = 605), 48.0% as male (n = 611), and 4.5% as non-binary (n = 57). Measures included the School Daily Stress Scale, the Interpersonal Relationship Quality Scale, and students' mean grade point average for the current academic year. Mediation analyses indicated a significant negative effect of school-related academic stress on academic performance. Moreover, high-quality interpersonal relationships—with both peers and teachers—showed a positive and significant mediating effect, particularly relationships with peers, in fostering students' achievement outcomes. Analysis of the gender covariate revealed that female and non-binary students were more adversely affected, as academic stress was associated with a lower quality in their positive interpersonal relationships with peers and teachers.

Keywords: performance; stress; interpersonal relationships; student-teacher.

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Resumen

Este estudio propuso investigar el efecto del estrés académico sobre el rendimiento académico a través de las relaciones interpersonales del estudiantado con sus pares y docentes en el nivel escolar, diferenciando efectos por género. De esta manera, se buscó establecer un efecto de mediación de la calidad de las relaciones interpersonales con pares (con quienes comparten como grupo- curso) y con docentes. Participaron un total de 1273 estudiantes de origen chileno de Educación Básica (5° a 8° básico) y de Educación Media (1° a 4° Medio). La edad media fue de 14,2 años (SD= 2,43; rango 10-19), un 47,5% fueron mujeres (n=605), un 48% varones(n=611) y un 4,5% (n=57) autopercibidos como no binarios. Cada participante completó las Escala de Estrés Cotidiano Escolar, y Escala de Calidad de las Relaciones Interpersonales, y se obtuvo el promedio de notas de cada estudiante durante el período del año en curso. Los resultados de los modelos de mediación evidenciaron un efecto significativo negativo del estrés académico escolar sobre el rendimiento académico. Así mismo, los resultados de la mediación de las relaciones interpersonales de calidad del estudiantado con sus pares y docentes se obtuvieron conforme a lo esperado, dando cuenta de un efecto mediador positivo y significativo de estas relaciones, especialmente en lo que respecta a los pares, dentro de la experiencia de logro estudiantil. El análisis de la covariable género mostró mayor afectación en mujeres y aquellas personas con identidad de género no binaria, producto del estrés académico que influye en la calidad de la relación interpersonal positiva con sus pares y docentes.

Palabras clave: rendimiento escolar; estrés; relaciones interpersonales; estudiante-docente.

Introduction

The central objective of schools is to offer students a holistic education that fosters not only academic achievement but also their personal and social development in a comprehensive manner. However, education systems often reduce this objective to quantitative measurement, primarily through grades, which Hattie and Anderman (2013) consider to be the main indicator of learning. This view has been supported by several other studies (Huey et al., 2022; Normann et al., 2023; Normann, 2025), which show that, in practice, education systems tend to reduce the measurement of academic achievement to simple marks or grades, and to neglect an assessment of personal and social dimensions such as habits, effort, collaboration and participation, amongst other aspects. The primacy of grades as an educational indicator has led to the attainment of good academic results being perceived as the primary purpose of schooling, and associated with educational excellence (Leal-Soto and Cuadros, 2021). This approach can place an excessive burden on students, as it fails to consider psychological and interpersonal factors relating to development and social connection that effectively contribute to their holistic development, and which could help alleviate the academic stress caused by the excessive focus on academic performance within the educational experience.

Given the growing interest in the field of education regarding students' mental health and socio-emotional development, the conceptualisation of academic performance must incorporate other competencies that reflect not only the acquisition of knowledge, but also the demonstration of motivational, emotional and psychological characteristics cultivated during the teaching and learning processes (Feraco et al., 2023). Traditionally, academic performance is assessed using quantitative or qualitative grades, which indicate the level of mastery in a specific area according to criteria of success or failure (Chadwick, 1979 cited by Barreto-Trujillo and Álvarez-Bermúdez, 2017). However, these indicators should also reflect the influence of social and contextual factors on the holistic development of students (Winne and Nesbit, 2010). In other words, integrating specific, observable processes into teaching assessment practices that account, in a broader and fairer manner, for the scope of the student learning process and the achievement of their personal and social goals, which should not be subsumed under the mark used to report academic achievement exclusively (Nowruzi, 2021).

For this reason, it is considered pertinent to highlight aspects of the quality of the interaction that students have with one another and with their teachers, as these relationships have been associated with greater student engagement and participation (Li et al., 2024; Niia et al., 2015; Ramberg et al., 2019; Sointu et al., 2017; Wentzel, 2017;), as well as greater satisfaction and well-being (Craven et al., 2024; Obermeier et al., 2024; Patall et al., 2024). These socio-educational indicators provide a broader understanding of academic performance, helping us to better understand how socio-emotional support in the classroom can act as a contributing and protective factor in improving both the educational experience and the mental health conditions associated with the effects of academic

stress, going beyond the mere measurement of grades and recognising the importance of interpersonal relationships and the educational environment in learning.

School stress and academic performance

Various studies describing the negative effects of school-related stress (Frazier et al., 2019; Liu et al., 2022; Pascoe et al., 2021; Salmela-Aro et al., 2017) define stress as the result of a threatening overload that exceeds the individual's available resources, having a direct and negative impact on cognitive, emotional and social aspects, but above all on academic performance and achievement. In this regard, it is not only the negative academic consequences of stress that are significant, but also its interaction with different dimensions or domains of student life, manifesting itself particularly in association with interpersonal relationships within the school (Davies et al., 2016).

The relational dimension of school-related stress, which focuses directly on interpersonal relationships between pupils and other key figures within the school, describes a perception of the levels of support and improvement——or, conversely, of tension, distress and/or overload that pupils may experience, depending on the type of positive or negative interactions they encounter, either directly or indirectly, in relation to the learning process. These relationships have been shown to have a significant impact on the effectiveness of educational processes (Encina-Agurto and Ávila-Muñoz, 2015).

In this regard, Rudland et al. (2020) highlight that the threatening or supportive effect of school-related stress (in terms of a challenge that may be positive or negative for the individual) depends on how the person interprets the influence of the stressor on their learning experience, and the type of stress they experience. These authors conclude that stress can be useful if it represents a challenge rather than an obstacle, and how it impacts the learning experience. It will tend to be perceived negatively if the person cannot feel confident of overcoming it and lacks support to do so. Conversely, stress—in this case, academic stress—can be mitigated through the support provided by key individuals within the educational environment. These authors (Rudland et al., 2020) also suggest that a challenge is defined as something positive and necessary for the acquisition of new mental models that promote learning, whilst an obstacle is defined as something negative that does not promote it.

This perspective on school stress establishes a line of research that highlights the need to pay attention to mediating factors such as the quality of students' interpersonal relationships with significant others within the classroom environment, particularly with peers and teachers with whom they share the educational experience (Mainhard et al., 2018). The presence of academic school stressors stands out as a priority focus of school attention, taking into account aspects of mental health and holistic development. It becomes an achievable priority if strategies are in place to strengthen school bonds which, from a positive perspective of socio-emotional development, can contribute a key factor to student academic performance and achievement (Bardach et al., 2022).

Interpersonal relationships and academic performance

Interpersonal relationships are defined as direct exchanges between people who, guided by a common purpose, establish a dynamic balance between positive and negative aspects, incorporating beliefs, motivations and expectations regarding the relationship and shared achievement (Furman and Buhrmester, 2009). In the educational context, these relationships require a balance between the demands inherent in teaching and learning processes and the benefits derived from the satisfaction these may bring in the flow of everyday life. Through the trust embedded in these relationships, self-efficacy and psychological safety are fostered, elements that facilitate engagement in learning tasks and promote improved academic performance. Evidence in this regard suggests that reducing the risk of interpersonal conflict fosters environments and behaviours conducive to learning, such as asking questions, making mistakes without fear, sharing ideas and seeking feedback (Carmeli et al., 2009; Schimmelpfennig, 2025; Tu, 2021; Yang et al., 2023).

In this regard, the quality of the relationship between teachers and students has been identified as a critical factor, as it influences the provision of behavioural support and emotional resources that foster engagement with teaching and learning processes (Kiuru et al., 2020). These interactions generate interpersonal scaffolding that contributes to academic achievement, as well as to student satisfaction and the development of a sense of belonging to the school (Gillen-O'Neel, 2021).

Furthermore, peer relationships, particularly when peers form stable groups and share the educational experience in the classroom, impact academic performance (Wang et al., 2018). Interacting with peers in the classroom provides companionship, affection, intimacy, validation, and instrumental and emotional support, thereby strengthening self-esteem and identity development (Furman and Buhrmester, 1992). Relationships in the classroom and school thus reflect social learning linked to acceptance and behavioural modelling among peers (Gallardo et al., 2016), which are considered processes that enrich motivation, engagement and the school experience—key aspects for academic success (Allen et al., 2021; Kingery et al., 2011; Palacios & Berger, 2022). Meta-analytical studies show that interaction with peer groups in the classroom is a central factor in performance, as being part of peer groups committed to common academic goals promotes student success (Korpershoek et al., 2020). This is particularly relevant in demanding educational contexts governed by high-performance international standards (Gopinathan and Lee, 2018).

Gender, stress and quality interpersonal relationships at school

Scientific evidence indicates gender differences in how school stress is coped with and in the quality and impact of interpersonal relationships within the educational context. Recent studies show that adolescent girls experience higher levels of school stress than adolescent boys, influenced by gender stereotypes and social expectations (García-Moya et al., 2025). Similarly, research such as that by Bi et al. (2015) and Zhang et al. (2023) reveals that the associations between self-esteem, interpersonal relationships and stress vary significantly by gender, suggesting that school psychosocial conditions and academic stress affect performance and well-being differently, depending on gender identity.

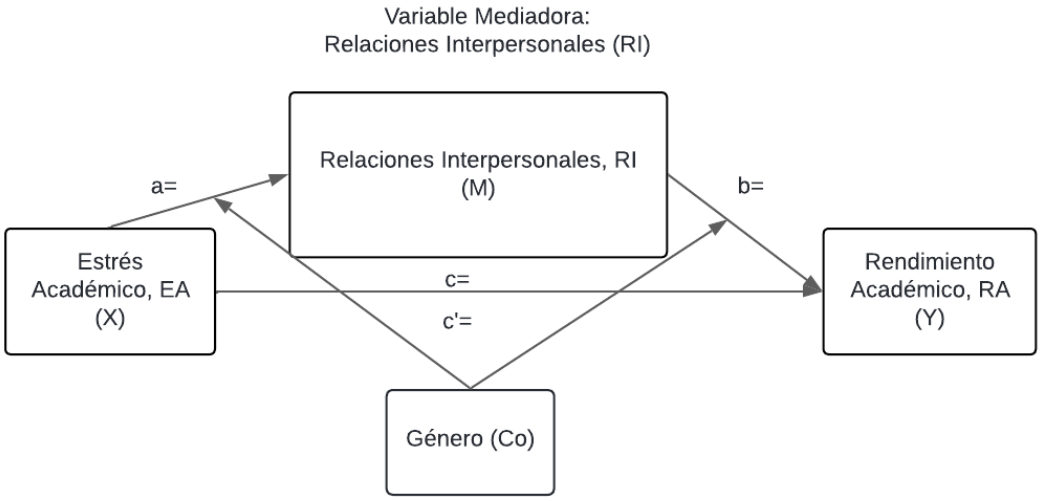
Consistently, Ye et al. (2018) demonstrate that academic stress impacts academic self-efficacy unequally, affecting female students more than their male peers. As for students with non-binary gender identities, research remains limited; the existing literature focuses on general cisgender school experiences, neglecting specific dimensions relevant to gender diversity in relation to academic performance and well-being among the student population (Bower-Brown et al., 2021; Paechter et al., 2021). These findings underscore the importance of considering gender as a moderating variable in the effects of stress and interpersonal dynamics on student performance.

Our study

Given the prior literature, the research hypothesis of this study is that academic stress affects student academic performance, but this relationship may be mediated by positive interpersonal relationships established between students and with teachers. This hypothesis also considers the differentiation of mediation models, treating gender as a covariate but from an inclusive perspective; that is, one that takes into account the diversity present in students' gender identities and not merely a binary male-female perspective.

Taking into account the evidence from previous research, a mediation analysis was proposed to test the fit of the data to the proposed hypothesis (Figure 1). Based on this methodological decision, the aim of this study was to statistically test a mediation model, in which the independent variable was academic stress at school (X), the mediating variables were pupils' positive interpersonal relationships (M) and the dependent variable was academic performance (Y), alongside the covariate of gender (Co). More specifically, the first objective sought to quantify, within a general model, the effect of academic stress on academic performance through students' interpersonal relationships. The second objective was to test a mediation model, in which the mediating variable was positive peer relationships in the classroom, taking into account the covariate of gender to examine its effect on the relationship between academic stress and student academic performance; and, finally, the third objective sought to test the same mediation model between the variables of academic stress and academic performance, taking into account the covariate of gender, but this time taking into account the mediating variable of interpersonal relationships with teachers.

Figure 1. Diagram of the Simple Mediation Model with covariate. Indirect effect of Academic Stress (AS) on Academic Performance (AP) via Interpersonal Relationships (IR), with the effect of the gender covariate (Co).



Method

Participants

The sample was selected using multistage cluster sampling and random group selection in eight schools with multiple year groups (Year 5 to Year 13) whose educational programmes were geared towards academic excellence. The selection considered 44,048 students from public and state-funded private schools in three regions of Chile (Tarapacá, Valparaíso and Metropolitana), based on indicators of academic performance and school cohesion published by the Chilean Ministry of Education (MINEDUC) during 2020–2021.

With a sampling error of 3% and a confidence level of 96%, 1,252 students participated voluntarily. The average age was 14.20 years (SD = 2.43; range 10–19), with 47.5% female (n = 605), 48% male (n = 611) and 4.5% non-binary (n = 57). The distribution by year group is presented in Table 1.

Table 1

Percentage distribution of students by year group

Year	Percentage
Year 5	11.4
Year 6	12.8
7th	9.5
8th	7.8
Year 10	14.5
Year 10	16.1
Year 11	16.6
Year 12	11.3
Total	**100**

Design

A cross-sectional ex post facto design was used, without manipulation of variables, combined with a mediation analysis to examine the effect of academic stress on performance through student interpersonal relationships. Data were collected via online questionnaires.

Instruments

The School Daily Stress Scale (EECE), validated in Chilean adolescent students by Encina-Agurto and Ávila-Muñoz (2015), measures factors in the school environment that are potential sources of stress. It consists of 19 items distributed across three factors: academic (items 9–12, α = .68), relational (items 1–8, α = .80) and environmental (items 13–19, α = .86), rated according to perceived frequency on a scale of 1 to 4 (never to always). The academic stress subscale was used for this study.

Convergent validity was estimated using extracted mean variance (EMV > .50). The reliability of the academic factor was assessed using Cronbach's alpha (α = .68), composite reliability (CR = .75), McDonald's omega (Ω = .67) and EMV = .55. To verify the fit of the original model to our data, goodness-of-fit indices were used (Table 2). Although an optimal fit was not achieved, the indices are close to desirable values, providing sufficient evidence of reliability and validity for the generalisation of the results.

Table 2

Fit indices for the proposed model, the Daily School Stress Scale (EECE) by Encina-Agurto and Ávila-Muñoz (2015).

Model	$\chi 2$	$\chi 2/df$	GFI	IFI	TLI	CFI	RMSR	RMSEA
3 related factors	2,561.741	6.64	0.945	0.850	0.830	0.850	0.072	0.097

Note. $\chi 2$ = Chi-square statistic; $\chi 2$/df = Chi-square divided by degrees of freedom; GFI = Goodness-of-fit index; IFI = Incremental fit index; TLI = Tucker–Lewis index; CFI = Comparative fit index; RMSR = Root mean square residual; RMSEA = Root mean square error of approximation.

Interpersonal Relationship Quality Scale, The version adapted for the Chilean school population by Sandoval-Cartes and Berger (2016) of the original questionnaires NRI-Social Provisions Version (NRI-SPV) (Furman and Buhrmester, 1985) and Network of Relationships Inventory – Relationship Quality (NRI-RQV) (Furman and Buhrmester, 2009) was used. The NRI-RQV consists of 30 items distributed across ten subscales (five positive and five negative; three items each: companionship, intimate trust, emotional support, approval, satisfaction, conflict, criticism, pressure, exclusion and dominance). From the NRI-SPV, six items from two positive subscales (instrumental help and affection) were considered. Each dimension is assessed in relation to significant others in the student's environment (peers and teachers) on a scale from 1 (never or not at all) to 5 (always or excessively). The reliability reported for the original scales ranges from acceptable to good (α > .94).

In this study, we worked exclusively with seven positive subscales (companionship, intimate trust, emotional support, approval, satisfaction, instrumental help and affection), creating two scales of positive interpersonal relationships: one to analyse the relationship with peers in the same class group (classmates) and another to analyse the relationship with teachers. The reliability indices were:

- Peers: α = .96, FC = .97, Ω = .96, VME = .60
- Teachers: α = .94, FC = .95, Ω = .95, VME = .47

The validity of the scales was assessed using goodness-of-fit indices (Table 3). Although an optimal model was not achieved, the values are close to the desired levels, providing sufficient evidence of validity and reliability for the study's analyses.

Table 3

Goodness-of-fit indices for the proposed model, Relationship Quality Scale, version adapted for the Chilean school population by Sandoval-Cartes (2016)

Model	$\chi 2$	$\chi 2/df$	GFI	IFI	TLI	CFI	RMSR	RMSEA
Pay Scale Colleagues	4664.302	10.27	0.824	0.809	0.800	0.809	0.065	0.123
Teachers' Pay Scale	3,953,284	7.18	0.859	0.777	0.755	0.777	0.073	0.115

Note. χ^2 = Chi-square statistic; χ^2/df = Chi-square divided by the degrees of freedom; GFI = Goodness-of-fit index; IFI = Incremental fit index; TLI = Tucker–Lewis index; CFI = Comparative fit index; RMSR = Root mean square residual; RMSEA = Root mean square error of approximation.

Academic performance was estimated as an observed variable, calculated as the student's average marks obtained during the current academic year.

Gender was specified as a categorical covariate, where 1 = male gender identity, 2 = female, and 3 = non-binary.

Procedure

The guidelines of the *American Psychological Association* (2010) were followed regarding informed consent from parents or guardians and student assent for minors. Educational institutions were informed of the study's objectives and their authorisation was obtained via letters signed by institutional management to collect consents and administer the questionnaires.

The questionnaires were administered online during school hours (≈30 min) via SurveyMonkey, in a suitable environment and supervised by trained staff. Anonymity, confidentiality and the exclusive use of data for research purposes were guaranteed.

Data analysis

Initially, an analysis of reliability (Cronbach's alpha, composite reliability, McDonald's omega and mean extracted variance) and validity of the instruments was carried out to determine the generalisability of our results. Subsequently, a correlational analysis of the variables under investigation was conducted.

Finally, to conduct the mediation analyses, the PROCESS macro for SPSS created by Hayes (2013) was applied. The PROCESS macro allows for the estimation of indirect effects, standard errors and confidence intervals based on the distribution obtained using the *bootstrapping* method. This method, based on *Bootstrap Confidence Intervals*, facilitates statistical inference regardless of the normality of the data and the sample size, as it does not require large samples. Indirect effects were calculated for two simple mediation models (PROCESS, Model 4) and 10,000 *bootstrap* samples were used. The statistical significance of the indirect effects was demonstrated by verifying that the established confidence interval (95% CI) did not contain the value 0. The statistical analyses were performed using the SPSS statistical package, version 30.0 for PC.

Results

Correlation analysis of the variables under study

Table 4 shows the correlations of all the variables involved in the study. Academic Stress (AS) is directly and negatively correlated with Academic Performance (AP) and with Positive Interpersonal Relationships with peers (PIRP) and with teachers (PIRT). Similarly, the variable Academic e Performance (AP) is directly related to Positive Interpersonal Relationships with classmates (PIRC) and teachers (PIRD). All correlations are significant, $p<0.001$.

Table 4

Results of the correlation analysis of the variables under study.

	1. EA	2. RIPC	4. RIPD	5. RA
1. EA	-	-.173**	-.263**	-.106
2. HICP		-	.566**	.148**
4. RIPD			-	.175**
5. RA				-
M	2.14	2.75	3.16	6.15
DT	.488	,996	.955	.678

Note. AS= Academic Stress; PIRC= Positive Interpersonal Relationships with Peers; PIRD= Positive Interpersonal Relationships with Teachers; AR= Academic Achievement. **p < .001

The following describes the mediation models of Positive Interpersonal Relationships (PIR) between Academic Stress (AS) and Academic Performance (AP), on the basis that the models presented meet the assumptions for the application of a simple mediation analysis: significant relationships between the independent variable and the dependent variable, between the independent variable and the mediator, and between the mediator and the dependent variable; furthermore, the value of c is greater than c´.

Mediation Model: Academic Stress – Positive Interpersonal Relationships with Classmates – Academic Performance (PROCESS, Model 4)

Figure 2 presents the data for the simple mediation model, using Positive Interpersonal Relationships with Classmates as the mediating variable.

Figure 2. Diagrams and results of simple mediation analysis: AS-PIR-AR (Process 4)

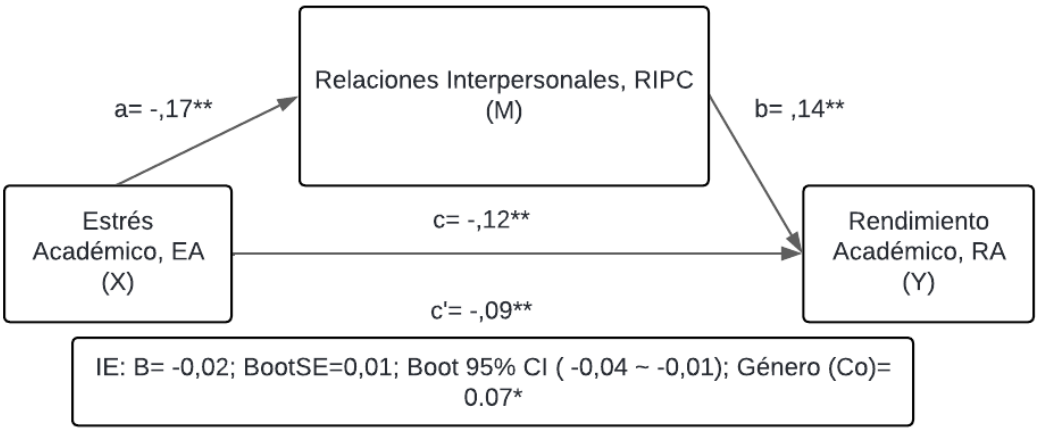


Table 5 shows the data from the mediation analysis. The results of the regression analysis between the mediating variable PIR and the independent variable AS show a significant negative relationship (a: $\beta = -0.17$; SE = 0.17; $p < 0.001$). The results of the multiple linear regression analysis, considering EA and RIPC as predictor variables, show a significant negative relationship between EA and the dependent variable RA (c´: β= -0.09; SE=.40; p<.001) and between RIPC and RA (b: β= .14; SE=.20; p<.001).

The total effect of the independent variable EA on the dependent variable RA was statistically significant (c: β= -.12; SE=.40; p<.001), with the model explaining 4% of the variance in the dependent variable RA. The statistical significance of the indirect effects was demonstrated by verifying that the established confidence interval (95% CI) did not contain the value 0, revealing a statistically significant indirect effect (β = −0.02; BootSE = 0.01; Boot 95% CI [−0.04 to −0.01]).

Table 5

Mediational Analysis Results: EA-RIPC-RA (PROCESS, model 4).

Effects	**Path**	***β***	**SE**	**P**	
Effect EA – RIPC	a	-.17	.17	.00	
HICP effect – RA	b	.14	.20	.00	
Total EA – RA effect	c	-.12	.40	.00	
Direct Effect EA – RA	c´	-.09	.40	.00	
Model total effect ($F_{(4,1258)}$ = 11.46; p<.001; R^2 = .04)					
Indirect Effects	**Path**	***β***	**BootSE**	**Boot 95% CI**	
				IL	**LL**
Total Indirect Effect		-.02	.01	-.04	-.01

Mediation Model: Academic Stress – Positive Interpersonal Relationships with Teachers – Academic Performance (PROCESS, Model 4)

Figure 3 presents the data for the simple mediation model, using Positive Interpersonal Relationships with Teachers as the mediating variable.

Figure 3. Diagrams and results of simple mediation analysis: ER-RIPD-RA (Process 4).

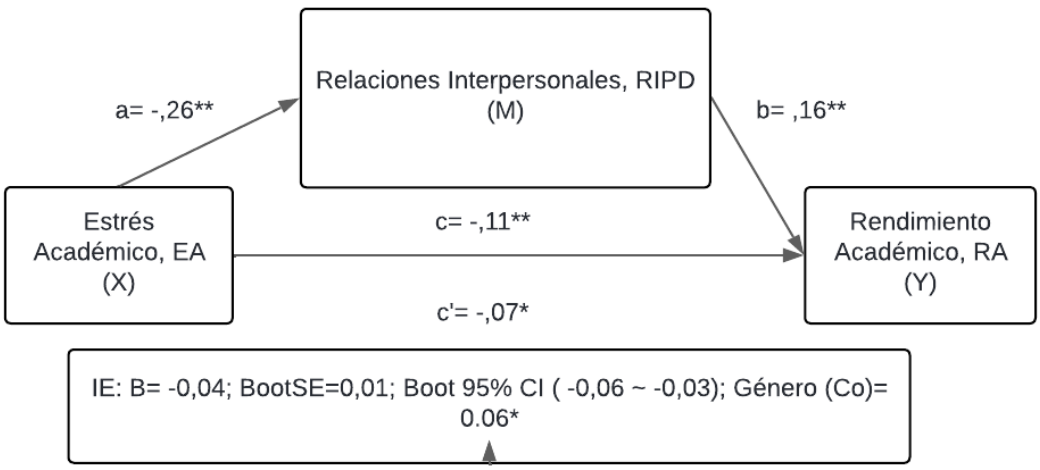


Table 6 shows the data from the mediation analysis. The results of the regression analysis between the mediator variable PIRT and the independent variable AS show a significant negative relationship (a: β = −0.26; SE = 0.06; p < 0.001). The results of the multiple linear regression analysis, considering EA and RIPD as predictor variables, show a significant negative relationship between EA and the dependent variable RA (c´: β = −0.07; SE = 0.42; p < 0.005) and a significant positive relationship between RIPD and RA (b: β = 0.16; SE = 0.21; p < 0.001).

The total effect of the independent variable EA on the dependent variable RA was statistically significant (c: β= -.11; SE=.40; p<.001), with the model explaining 7% of the variance in the dependent variable RA. The statistical significance of the indirect effects was demonstrated by verifying that the established confidence interval (95% CI) did not contain the value 0, revealing a statistically significant indirect effect (β = −0.04; BootSE = 0.01; Boot 95% CI [−0.06 to 0.03]).

Table 6

Results of the ER-RIPD-RA Mediation Analysis (PROCESS, Model 4).

Effects	**Path**	***β***	**SE**	**P**	
Effect EA -RIPD	a	-.26	.16	.00	
RIPD Effect – RA	b	.16	.21	.00	
Total EA – RA effect	c	-.11	.40	.00	
Direct Effect EA – RA	c´	-.07	.42	.02	
Model total effect ($F_{(4,1249)}$ = 14.77 p<.001; R^2 = .04)					
Indirect Effects	**Path**	***β***	**BootSE**	**Boot 95% CI**	
				IL	**LL**
Total Indirect Effect		-.04	.01	-.06	-.03

Finally, it should be noted that the indirect effect that statistically quantifies the reduced negative effect of the independent variable EA on the dependent variable RA corresponds to the mediating variable RIPD, Positive Interpersonal Relationships with Teachers (β = -.04)

Effect of the gender covariate in the Mediation Model of Academic Stress – Positive Interpersonal Relationships with Peers – Positive Interpersonal Relationships with Teachers – Academic Performance (PROCESS, Model 4)

The effect of the gender covariate in these two mediation models had a significant negative effect on the relationship between academic stress (AS) and positive interpersonal relationships with peers (PIRP), (β = −0.13; SE = 0.05; p < 0.001), a significant negative effect on the relationship between academic stress (AS) and positive interpersonal relationships with teachers (PIRT), (β= -.06; SE=.05; p<.005); a significant positive effect on the relationship between positive interpersonal relationships with peers (PIRP) and academic performance (AP) (β= .07; SE=.33; p<.005); a significant positive effect on the relationship between positive interpersonal relationships with teachers (PIRT) and academic performance (AP) (β= .06; SE=.32; p<.005). In the relationship between academic stress (AS) and academic performance (AP), gender had no significant effect in any of the models.

Table 7 shows the results of tests for differences in means based on gender, which meet the assumption of homogeneity of variances (p > 0.05), indicating that there are significant differences between men, women and students who identify as non-binary with regard to the variables of academic stress (AS) and positive interpersonal relationships with classmates (PIRC). There are no differences between gender groups regarding academic performance (AP).

Post-hoc analyses (Scheffé) comparing the means across all groups indicate, in relation to academic stress (AS), that significant differences (p < 0.05) are found between the group of men and students who identify as non-binary. With regard to the variable of positive interpersonal relationships with classmates (PIRC), there are significant differences between the three groups (men, women and students with a non-binary gender identity). For the variable of positive interpersonal relationships with teachers (PIRT), significant differences are found between men and students with a non-binary gender identity.

Table 7

Results Comparison of means between groups by gender factor EA-RIPC-RIPD-RA (PROCESS, model 4).

	Male		Female		Non-binary				
Variable	Mean	*SE*	Median	*SE*	Mean	*SE*	$F_{(2.1270)}$	*p*	η^2 p*
Academic Stress (AS)	2.12	.45	2.14	.50	2.30	.58	3.64	.026	.006
Positive Interpersonal Relationships with Peers (PIRP)	2.86	.93	2.68	1.04	2.21	.84	13.86	<0.001	.022
Positive Interpersonal Relationships with Teachers (PIRT)	3.20	.91	3.17	.98	2.62	.94	9.57	<.001	.015

Note. *Partial eta-squared effect size test: if $0.06 \leq \eta^2 p < .14$, the effect is moderate; and if $\eta^2 p \geq .14$, the effect is strong.

The results indicate that male students are less affected by academic stress and have higher average scores for interpersonal relationships with classmates and teachers. Students with a non-binary gender identity are those who show the greatest impact from academic stress and the lowest average scores for positive interpersonal relationships with classmates and teachers.

Discussion

This study examined the effect of academic stress on academic performance, considering the mediating role of interpersonal relationships with classmates and teachers in this relationship and incorporating gender as a covariate.

The primary aim of the study was to analyse the effect of academic stress on academic performance, and then to examine the mediating effect of students' interpersonal relationships on this relationship. The results support the hypothesis of a significant negative effect of academic stress on performance, in line with the literature which describes stress as an overload that exceeds students' personal coping resources and affects their performance in learning tasks, ultimately impacting their academic performance (Frazier et al., 2019; Liu et al., 2022; Pascoe et al., 2021; Salmela-Aro et al., 2017). In this way, overload and high academic expectations are linked to lower academic achievement (Frazier et al., 2019). This finding reinforces the idea that in the most demanding and strongly results-oriented school contexts, where grades are the predominant indicator, academic stress is not only expressed as distress but is effectively a factor that negatively influences student achievement. Thus, the logic of the 'academisation' of the educational experience takes on particular relevance.

A notable finding is that, although the effect found in the direct mediation model is significant, the explained variance in performance is low, which is consistent with evidence that positions performance as a multi-causal phenomenon (cognitive, motivational, affective and contextual) (Wentzel et al., 2021). This suggests that academic stress constitutes a significant but partial predictor in the relationship with academic performance, whose explanatory power increases when integrated into models with differential mediators, such as, in this case, differences in the quality of interpersonal relationships with various educational stakeholders and based on gender.

The second objective was to identify the mediating role of positive interpersonal relationships with peers, taking gender as a covariate, in the relationship between stress and student academic performance. Finally, the third objective sought to identify, in a similar manner, the mediating role of positive interpersonal relationships, this time with teachers, taking gender as a covariate. The results provide interesting evidence by showing that the relationship between academic stress and performance is explained, in part, by a relational mechanism; under academic stress, an improvement in the quality of positive interpersonal relationships leads to a tendency for performance to improve.

This finding is consistent with the evidence in the literature suggesting that school stress can manifest and be amplified depending on the interpersonal bonds formed at school, with teachers and peers, which can act as risk or protective factors, thereby influencing educational conditions and outcomes (Davies et al., 2016; Encina-Agurto and Ávila-Muñoz, 2015; Mainhard et al., 2018).

In particular, these findings are consistent with research that has documented that the quality of classroom relationships fosters engagement, participation, a sense of belonging and well-being—conditions associated with more favourable trajectories of academic achievement (Craven et al., 2024; Obermeier et al., 2024; Patall et al., 2024; Wentzel, 2017; Niia et al., 2015).

What the study contributes to the body of evidence on this topic is the clarification that these relationships are not merely 'good in themselves', but act as a moderating channel through which academic stress influences academic outcomes.

One notable aspect is the contrast revealed by the results regarding the subjective difference in the relative importance that students attribute to peers and teachers as key figures in their learning and achievement experience, a finding that has not been widely documented in the existing literature. In the models analysed, mediation was significant in both cases (with peers and teachers), but mediation via peer relationships appears to be particularly relevant to the experience of achievement.

This aligns with evidence that positions classmates (peers) as sources of a socio-emotional context that is crucial for conforming to academic norms, developing a sense of belonging, and receiving emotional and practical support within school networks that contribute to engagement and achievement in learning activities (Furman and Buhrmester, 1985; Korpershoek et al., 2020; Wang et al., 2018).

Thus, the findings support the idea that, when stress increases, the peers with whom the learning process and the challenges of academic achievement within the school experience are shared act as an efficient and immediate buffer against the distress caused by that process, thereby protecting student performance. This reinforces the idea that the classroom is a social system where horizontal relationships can function as stress buffers and as catalysts for achievement (Martínez-Maldonado et al., 2019).

The partial mediating effect exerted by relationships with teachers was also significant, which aligns with the literature that conceptualises the teacher–student bond as a socio-emotional scaffold that also sustains motivation and engagement in academic tasks (Kiuru et al., 2020; Gillen-O'Neel, 2021).

Both teachers and peers fulfil complementary roles in the academic experience; the teacher figure can provide structure, support and regulated expectations; whilst the peer figure offers acceptance and companionship within a climate of normalisation in the face of academic demands, which are dimensions particularly sensitive to academic stress. In summary, strong bonds with peers and teachers enable students, even under academic pressure, to maintain effective support systems that give meaning and purpose to their continued attendance at school, reinforcing academic commitment from a multi-contextual perspective (Wang et al., 2018).

Regarding the inclusion of gender as a moderating variable, the analyses conducted showed that gender has a significant effect on the links between academic stress and the quality of relationships with peers and teachers, with a greater impact on women and, more markedly, on students with a non-binary gender identity, who constitute the participants in the sample reporting the highest levels of overload and the least protection against academic stress.

This is consistent with the literature reporting gender differences in school stress and experiences of academic pressure (García-Moya et al., 2025; Zhang et al., 2023) and evidence linking psychosocial conditions to stress and psychosocial adjustment in adolescents, indicating greater vulnerability among women to school pressures and a lack of social support (Graves et al., 2021; Kristensen et al., 2023; Stentiford et al., 2023), and highlights the need to address the educational experience of non-binary students from an inclusive perspective.

What the study contributes in this regard is evidence of how these gender differences fit within a relational model. In other words, stress is associated with a decline in the quality of positive relationships, and this decline appears to be more pronounced in groups that tend to experience greater psychosocial stress in the school environment. These findings allow us to move towards a more precise understanding of the influence of the socio-emotional development process throughout the educational journey, by observing not only that women and people with non-binary gender identities report higher levels of stress, but also that inequality in the academic experience is reflected in access to and stability of relational support within the educational process.

In conclusion, and in line with previous studies and the results obtained, it can be said that this study provides relevant empirical evidence on the relationship between academic stress, the quality of interpersonal relationships and academic performance in primary and secondary school students, within the context of an education system strongly associated with academic success as indicated by high grades, as the primary focus of the educational experience, whilst also incorporating an inclusive gender perspective. The results confirm, in line with previous evidence, that academic stress is negatively associated with performance. They also specifically show that this effect is neither direct nor linear, but is partially explained by the quality of the interpersonal relationships built at school with peers and teachers.

This finding allows us to move from an individual understanding of academic stress towards a relational interpretation of the academic phenomenon. Stress not only has a direct impact on performance but also affects the interpersonal fabric that underpins the educational experience. When relationships with peers and teachers deteriorate under conditions of academic overload, the perception of emotional and instrumental support—which facilitates the development of skills that promote improved academic performance—diminishes.

The inclusion of gender as a covariate also allowed us to identify significant differences in the way academic stress relates to the quality of relationships. Women, and particularly students with a non-binary gender identity, show a greater impact on the quality of their relationships under stressful conditions, which highlights the need for school policies that are sensitive to diversity and psychosocial well-being.

Taken together, the results suggest that educational policies and practices focused exclusively on achievement as measured by grades may prove insufficient if they do not take into account the relational framework that underpins the academic experience. Promoting positive interactions in the classroom not only contributes to well-being but also constitutes a structural condition for academic performance in high-pressure contexts (Astudillo, 2014).

Limitations

We wish to point out that the study had some limitations, the most significant being the use of self-reports as a data collection method. With regard to self-reports for the assessment of academic stress and interpersonal relationships, this is a measure subject to the students' specific and subjective perceptions. The instruments and their scales and/or factors exhibit high reliability indices; however, caution is required with the Relationship Quality Scale regarding the validity for generalising our results, as it does not present an optimal model, although the fit indices approach desirable values. Furthermore, in neither of the two mediation models does the explained variance of the dependent variable—academic performance—exceed 5%. Academic performance is a highly complex variable, frequently linked to individual cognitive variables such as intelligence, aptitudes and prior knowledge; to conative variables such as cognitive and learning styles; and to affective variables such as motivation and personality. Analysing it in its entirety would require much more complex explanatory models, given that academic performance has been less closely linked to contextual variables dependent on the school and the classroom.

Other limitations stem from the cross-sectional design, which makes it difficult to draw broader inferences about the relationship between the study variables. Finally, it should be noted that the sample is restricted to three Chilean regions that met the selection criteria in line with the study hypothesis, but that it is not representative, given the scope of coverage of this study. To this end, it would be optimal to replicate the study by incorporating a larger, nationally representative sample.

Future lines of research

Based on the study's findings and limitations, several lines of research have been identified that would allow for a deeper and broader understanding of the proposed model. Firstly, it would be relevant to conduct longitudinal studies to examine the directionality and temporal stability of the observed effects. The cross-sectional design prevents such assertions from being made; therefore, prospective research could clarify whether relational deterioration precedes the decline in performance or whether both processes feed into one another over time.

Future research could incorporate observational or multi-method measures of classroom interactions, complementing self-reports. The analysis of specific behaviours within the classroom (participation dynamics, peer support, teacher feedback) would allow for a more precise understanding of the micro-interactional mechanisms that explain the identified mediating effect.

Given the low percentage of variance explained in academic performance, it would be relevant to integrate cognitive and motivational variables (such as measures of academic self-efficacy, self-regulation, and achievement goals) that could operate as additional mediators within a more complex model. This would allow us to move towards more comprehensive explanatory models of academic performance.

With regard to the gender perspective incorporated into this study, the inclusion of students with a non-binary gender identity opens up a line of research that is still in its infancy in these fields. It is certainly worth exploring in greater depth the specific relational experiences of these gender groups within the school context, taking into account factors such as an inclusive environment, perceptions of discrimination or institutional support, and their link to academic performance.

Finally, it would be appropriate to replicate the study using nationally representative samples and in educational contexts with varying levels of academic rigour, in order to examine whether the importance of the relational component varies according to the type of school or educational programme.

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