



Forum: Practical Perspectives

Grade retention and academic outcomes: evidence from Brazil

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Despite the widespread use of grade retention in Latin America, its impact on academic outcomes remains debated. This article examines the effects of retention using a longitudinal student-level dataset (2012-2017) from Rio de Janeiro, Brazil's second-largest municipal education system. Applying a difference-in-differences approach with student fixed effects, we find that grade retention significantly improves short-term academic performance, with consistent results across robustness checks. Our analysis suggests that this improvement is partly driven by the fear of retention and the additional support provided to students at risk of repeating the school year. However, the impact of retention extends beyond these factors, indicating its role as a direct intervention in enhancing learning outcomes. This study contributes to the retention literature by offering evidence from a developing country, highlighting the potential benefits and complexities of this widely debated policy. While retention incentivizes short-term academic gains, its long-term effects and associated costs warrant further consideration.

Keywords: grade retention; grade repetition; primary education; academic outcomes.

Repetência escolar e resultados acadêmicos: evidências do Brasil

Apesar do uso disseminado da repetência escolar na América Latina, seu impacto sobre os resultados acadêmicos segue sendo objeto de debate. Este artigo examina os efeitos da repetência utilizando um conjunto de dados longitudinais em nível de aluno (2012-2017) do município do Rio de Janeiro, a segunda maior rede municipal de ensino do Brasil. Aplicando um modelo de diferenças em diferenças com efeitos fixos para o aluno, encontramos que a repetência melhora significativamente o desempenho acadêmico de curto prazo, com resultados consistentes em diversas verificações de robustez. Nossa análise sugere que essa melhoria se deve, em parte, ao medo da repetência

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e ao suporte adicional oferecido aos alunos em risco de repetição. No entanto, o impacto da repetência vai além desses fatores, indicando seu papel como intervenção direta na melhoria da aprendizagem. Este estudo contribui para a literatura sobre repetência ao oferecer evidências em um contexto de país em desenvolvimento, destacando os benefícios potenciais e a complexidade dessa política amplamente debatida. Embora a repetência incentive ganhos acadêmicos de curto prazo, seus efeitos de longo prazo e custos associados merecem maior consideração. Palavras-chave: repetência escolar; reprovação; ensino fundamental; desempenho acadêmico.

Repetición escolar y resultados académicos: evidencia de Brasil

A pesar del uso generalizado de la repetición de grado en América Latina, su impacto en los resultados académicos sigue siendo debatido. Este artículo analiza los efectos de la repetición utilizando un conjunto de datos longitudinales a nivel de estudiante (2012-2017) del municipio de Río de Janeiro, el segundo sistema educativo municipal más grande de Brasil. Aplicando un enfoque de diferencias en diferencias con efectos fijos por estudiante, encontramos que la repetición de grado mejora significativamente el rendimiento académico a corto plazo, con resultados consistentes en diversas pruebas de robustez. Nuestro análisis sugiere que esta mejora se debe en parte al temor a repetir el año y al apoyo adicional brindado a los estudiantes en riesgo de repetir. Sin embargo, el impacto de la repetición va más allá de estos factores, indicando su papel como intervención directa en la mejora del aprendizaje. Este estudio aporta a la literatura sobre repetición al ofrecer evidencia en un contexto de país en desarrollo, destacando los posibles beneficios y las complejidades de esta política tan debatida. Aunque la repetición fomenta avances académicos a corto plazo, sus efectos a largo plazo y los costos asociados merecen ser considerados cuidadosamente.

Palabras clave: repetición escolar; reprobación; educación primaria; rendimiento académico.

1. INTRODUCTION

Grade retention is widely practiced in Latin America, including Brazil. In 2018, 6% of 15-year-olds in Organisation for Economic Co-operation and Development (OECD) countries reported repeating a grade in primary school, compared to 13.9% in Latin America (OECD, 2020). Despite its additional costs and debated impacts, retention remains popular among teachers.

This paper examines the effects of retention using a longitudinal dataset (2012–2017) from Rio de Janeiro, Brazil's second-largest municipal education system. We estimate the impact of retention in the 3rd and 4th grades on 4th and 5th-grade performance using a difference-in-differences (DID) approach with student fixed effects. Our findings reveal positive impacts of retention on academic achievement, with effect sizes of 0.40 and 0.43 standard deviations, consistent across robustness checks.

These results contribute to the retention literature. Early studies (1980s-1990s) largely found negative effects (Holmes, 1989; Jimerson, 2001), but more recent work highlights methodological flaws, particularly selection bias (Allen et al., 2009; Lorence, 2006). Emerging evidence suggests positive short-term retention effects, especially in early grades (Figlio & Ozek, 2020; Jacob & Lefgren, 2004; Nunes et al., 2018; Schwerdt & West, 2013; Schwerdt et al., 2017), though these benefits typically fade within three years. Additionally, disentangling retention effects from remedial interventions remains a challenge.

Conversely, some studies find null or negative effects (Chen et al., 2010; Roderick & Nagaoka, 2005; Valbuena et al., 2021). Retention may harm psychological well-being, non-cognitive skills (Peixoto et al., 2016), and long-term outcomes, such as high school completion (Jacob & Lefgren, 2009), dropout rates (Eren et al., 2017; Manacorda, 2012), and adult criminal activity (Eren et al., 2018).

The literature offers no consensus, making Brazil a critical case. Brazilian studies largely focus on automatic grade promotion (Machado & Vasconcelos, 2020), with few papers using longitudinal data to analyze retention (Correa et al., 2014; Gomes & Hanushek, 1994; Luz, 2008; Riani et al., 2012). Most report negative effects but rely on designs comparing students based solely on observable characteristics.

This paper is structured as follows: Section 2 outlines Rio de Janeiro's retention policy, Section 3 discusses the dataset, Section 4 details the empirical strategy, Section 5 presents results, and Section 6 provides robustness checks. Section 7 explores drivers, followed by conclusions in Section 8.

2. INSTITUTIONAL CONTEXT

Rio de Janeiro operates Brazil's second-largest municipal education system, serving approximately 400,000 students in 2019. Starting in the 3rd grade, students are evaluated bi-monthly by the Municipal Education Department (MED) through standardized assessments. While the MED develops and oversees the exams, teachers administer them in classrooms and grade the writing sections. These exams, taken by all students in the same grade, determine proficiency levels (Resolução SME nº 1123, de 24 de janeiro de 2011).

Students are categorized into four proficiency levels: Inadequate, Regular, Good, and Very Good. Teachers assess performance bi-monthly, considering factors like quizzes, development, and behavior. Students rated Inadequate in the final two months must attend remedial classes and pass an exam. Those scoring below five on this exam are retained.

While legislation governing Rio's education system does not mandate specific interventions for retained students, it emphasizes prevention. Schools must offer extra activities during the school year for students with an Inadequate rating or low scores. Additionally, these students must attend extra classes during the July recess and undergo reevaluation in August (Resolução SME nº 1123, de 24 de janeiro de 2011).

3. DATA

The dataset comprises a longitudinal panel of primary education students in Rio de Janeiro (2012-2017). It includes bimonthly academic scores from MED evaluations but lacks information on proficiency levels and attendance. We estimate the impact of 3rd grade retention on 4th grade performance and 4th grade retention on 5th grade performance. Retention is identified when students remain in the same grade for two consecutive years. The analysis includes 30,825 students for 3rd grade and 29,013 for 4th grade.

The treatment group comprises students who repeated the 3^{rd} or 4^{th} grade in 2015, divided into three subgroups: (a) those who resumed a regular path afterward, (b) those who repeated the next grade in 2017, and (c) those who repeated two consecutive years. The control group consists of students following a regular progression.

Our complete database initially contained 892,146 students. First, we excluded students with potentially incorrect information, such as different grades in the same year. This exclusion resulted in a loss of 1,893 students, less than 0.2% of the dataset. Additionally, we excluded students who were absent in the dataset for the entire period, as we needed to track their progress throughout their school years. By doing so, we lost 727,691 students, which accounts for 81% of the dataset.

Different possibilities could explain this data loss. First, we might be losing students due to administrative inaccuracies. Each student has a unique code in the system, which should not change as they progress along the school years or if they change schools. However, we know from direct communication with the MED that such mistakes happen. Second, students might be leaving the municipal education system for three reasons: i) families could be migrating to another municipality,

ii) parents could be transferring their children to private schools, and iii) students could be evading the education system altogether. These losses can be problematic for us if any of these three reasons are related to retention. However, migration and transfers to private schools, presumably, are more associated with socioeconomic fluctuations and changes in parents' job market. Moreover, primary schooling is mandatory in Brazil, so the evasion rate at this stage is low.¹

In Box 1, we examine our sample compared to all students on the complete dataset in 2014 and 2015. While our sample presents a lower retention rate and higher academic scores, indicating that our sample does not represent all of Rio's students (referring to the external validity), this is true for both the control and treatment groups, suggesting that our results are internally valid. Additionally, our regression estimations include school and grade, or student fixed effects, dealing with socioeconomic characteristics of the students that may differentially affect promoted or retained students' performance.

BOX 1 COMPARISON BETWEEN OUR SAMPLE AND THE COMPLETE DATASET

	3 rd grade retention			4 th grade retention			
	Our sample	Complete dataset	Diff	Our sample	Complete dataset	Diff	
Retention rate	13.8	17.5	-3.7***	7.2	8.7	-1.5***	
N	30,825	51,182	82,007	29,695	48,491	78,186	
	Panel B: Average score						
		3 rd gr	ade retentior	1			
		2014			2015		
	Our sample	Complete dataset	Diff	Our sample	Complete dataset	Diff	
Treatment	3.2	3.1	0.1**	5.3	5.0	0.4***	
Control	7.1	6.8	0.3***	7.2	6.8	0.4***	
		4 th gr	ade retention	ı			
	2014				2015		
	Our sample	Complete dataset	Diff	Our sample	Complete dataset	Diff	
Treatment	4.0	3.9	0.1*	5.9	5.7	0.2***	
Control	6.8	6.5	0.2***	7.0	6.7	0.3***	

Source: MED's bimonthly evaluation data from 2012 to 2017.

Notes: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. The retention rate was calculated as the ratio between the number of students who repeated the 3^{rd} or 4^{th} grades in 2015 and those enrolled in these grades in 2014. We only considered students present in 2014 and 2015 for the complete dataset. The scores are the average of the original bi-monthly score (non-standardized) by each year and grade.

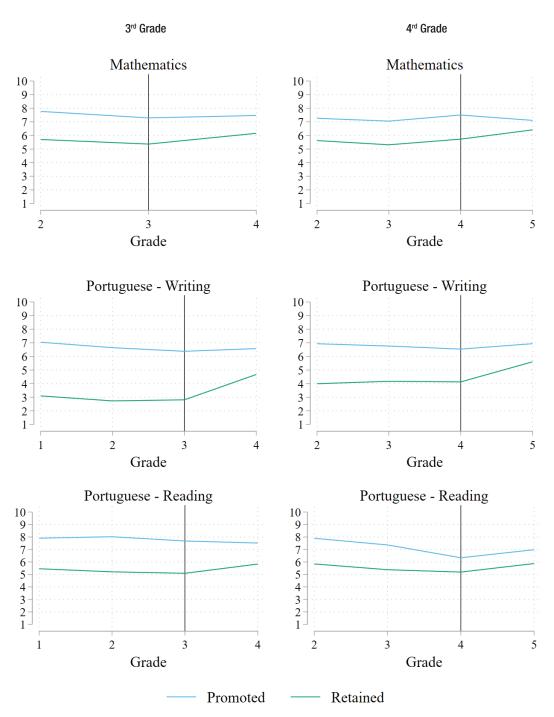
¹ Between 2014 and 2015, the evasion rate was 2.1 for the 3rd grade and 2.0 for the 4th grade (Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira [INEP], 2020).

Our dependent variable is the math, writing, and reading score of the evaluation administered bimonthly by the MED. Since the exam changes yearly, we cannot evaluate growth over the years. However, since the exam is the same in all schools, we can compare the results across treatment and control students by standardizing the scores, using the mean and standard deviation according to the month, grade, and year the exam took place.

For our objective, we only need the exam to be comparable across treatment and control groups and not over the years. Each class has retained and promoted students, all taking the same exam. Differences in the test application by teachers are distributed across treatment and control students and controlled by school and grade or student fixed effects in the regression estimations. For the writing exams, which are graded by the teachers, different teachers may grade differently. However, since our analysis is within schools and grades, we can still use the test to compare treatment and control students.

Figure 1 shows how the scores behave over the grades for retained and promoted students. As expected, retained students have lower scores than promoted ones. We can see that all retained students had an increase in their scores after repeating the 3rd or 4th grade. The DID method assumes that students' scores would have followed the same trajectory over time in the absence of retention. Except for reading, the two groups of students have similar trends before the retained grade, so Figure 1 mostly supports this assumption.

FIGURE 1 SCORES OVER THE GRADES BY TREATMENT STATUS



Source: MED's bimonthly evaluation data from 2012 to 2017.

Notes: The scores are the average of the original bimonthly score (non-standardized) by each grade. The data contains the repeated year and a balanced sample of the main results.

4. METHODS

We use a same-grade comparison approach (Lorence, 2006) to evaluate the impact of $3^{\rm rd}$ and $4^{\rm th}$ grade retention, employing a DID framework. The data is balanced across years, and all specifications include subject and municipal administration fixed effects, accounting for the three municipal administrations during the study period. Year trends are omitted to maintain a same-grade comparison, avoiding cross-grade contrasts within the same year.

The estimated equations are the following:

$$Y_{itsu} = \beta_0 + \beta_1 Tr_i + \beta_2 D_t + \beta_3 (Tr_i * D_t) + \delta_{itsu} + \eta + \gamma_{it} + \epsilon_{itsu}$$
 (1)

In this equation, i represents the student, t denotes the grade, and su refers to the subjects (math, writing, and reading). Y_{itsu} corresponds to the standardized score for the 4^{th} or 5^{th} grade, while Tr_i indicates the treatment (retention in the 3^{rd} or 4^{th} grade), and D_t is a period dummy variable (=1 if post). The interaction term $Tr_i * D_t$ captures the Treatment#Post effect. δ_{itsu} represents subject fixed effects, η accounts for municipal administration fixed effects, and γ_{it} includes school fixed effects. Finally, ϵ_{itsu} is the error term.

$$Y_{itsu} = \beta_0 + \beta_1 Tr_i + \beta_3 (Tr_i * D_t) + \delta_{itsu} + \eta + \gamma_{it} + \omega_t + \epsilon_{itsu}$$
(2)

$$Y_{itsu} = \beta_0 + \beta_1 Tr_i + \beta_2 D_t + \beta_3 (Tr_i * D_t) + \delta_{itsu} + \eta + \rho_i + \epsilon_{itsu}$$
(3)

Equations (2) and (3) are similar to Equation (1), with ω_t representing grade fixed effects and ρ_i denoting student fixed effects.

5. MAIN RESULTS

Box 2 presents the main findings: retaining the 3rd or 4th grade significantly improves academic performance in the short term. For 3rd grade retention, the effect size with student fixed effects is 0.43, slightly higher than the 0.40 observed for 4th grade retention. Results are consistent across fixed effects specifications. Henceforth, we focus on results using student fixed effects, our preferred model.

BOX 2 MAIN RESULTS - ESTIMATED EFFECTS OF GRADE RETENTION ON ACADEMIC ACHIEVEMENT

	3 rd grade retention			4 th grade retention		
	4 th grade standardized score			5 th grade standardized score		
	(1)	(2)	(3)	(4)	(5)	(6)
T	0.398***	0.426***	0.333***	0.336***	0.320***	0.299***
Treatment#Post	(0.018)	(0.018)	(0.014)	(0.019)	(0.019)	(0.015)
Subject FE	Yes	Yes	Yes	Yes	Yes	Yes
Administration FE	Yes	Yes	Yes	Yes	Yes	Yes
School FE	Yes	Yes	No	Yes	Yes	No
Grade FE	No	Yes	No	No	Yes	No
Student FE	No	No	Yes	No	No	Yes
Observations	292,963	292,963	292,963	354,750	354,750	354,750
R-squared	0.292	0.297	0.648	0.171	0.175	0.554
Students	30,825	30,825	30,825	29,013	29,013	29,013
Clusters: Class	5,978	5,978	5,978	7,474	7,474	7,474

Source: MED's bimonthly evaluation data from 2012 to 2017.

Notes: Standard errors clustered at the class level are in parentheses. *p < 0.05, **p < 0.01, ***p < 0.001. Estimations include math, writing, and reading.

Box 3 examines heterogeneous effects within the treatment group. Students who maintained a regular school path or repeated the same grade twice experienced positive impacts. However, students who repeated consecutive grades showed negative effects, suggesting that consecutive retentions harm academic outcomes. For students with a regular school path post-retention, benefits persisted, though diminishing over time (Box 4).

BOX 3 HETEROGENEITY IN THE TREATMENT GROUP

		3 rd grade retention	n	4 th grade retention			
	4 th grade standardized score			5 th grade standardized score			
	Regular school path	Repeated the 4 th grade in 2017	Repeated the 3 rd grade in 2016	Regular school path	Repeated the 5 th grade in 2017	Repeated the 4 th grade in 2016	
	(1)	(2)	(3)	(4)	(5)	(6)	
Treatment#Post	0.454***	-0.230***	0.473***	0.343***	-0.239***	0.477***	
	(0.015)	(0.022)	(0.022)	(0.014)	(0.043)	(0.037)	
Observations	271,908	246,162	253,065	348,698	324,869	326,725	
R-squared	0.622	0.633	0.634	0.546	0.536	0.537	
Students	29,303	27,157	27,499	28,653	27,063	27,143	
Clusters: Class	5,816	5,543	5,695	7,409	7,259	7,312	

Source: MED's bimonthly evaluation data from 2012 to 2017.

 $\textbf{Notes:} \ \text{Standard errors clustered at the class level are in parentheses.} \ ^*p < 0.05, ^{**}p < 0.01, ^{***}p < 0.001. \ \text{Estimations include math, writing, and reading.} \ \text{All on the class level} \ \text{Notes:} \ \text{Standard errors clustered at the class level are in parentheses.} \ ^*p < 0.05, ^{**}p < 0.01, ^{***}p < 0.001. \ \text{Estimations include math, writing, and reading.} \ \text{All on the class level} \ \text{Notes:} \ \text{Standard errors clustered at the class level} \ \text{The clast level} \ \text{The class level} \ \text{The class level} \ \text{The clas$ estimations include subject, administration, and student fixed effects.

BOX 4 **RETENTION EFFECTS BY GRADE**

	3 rd grade retention Standardized score		4 th grade retention		
			Standardi	ized score	
	(1)	(2)	(3)	(4)	
4 th grade	0.475***	0.477***	-	-	
	(0.018)	(0.014)	-	-	
5 th grade	0.407***	0.407***	0.328***	0.326***	
	(0.020)	(0.015)	(0.019)	(0.014)	
6 th grade	-	-	0.351***	0.157***	
	-	-	(0.021)	(0.018)	
Subject FE	Yes	Yes	Yes	Yes	
Administration FE	Yes	Yes	Yes	Yes	
School FE	Yes	No	Yes	No	
				(Continua)	

(Continue)

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	3 rd grade retention Standardized score (1) (2)		4 th grade retention Standardized score		
			(3)	(4)	
Grade FE	Yes	Yes	Yes	Yes	
Student FE	No	Yes	No	Yes	
Observations	359,211	359,211	434,657	434,657	
R-squared	0.184	0.599	0.158	0.517	
Students	29,253	29,253	28,653	28,653	
Clusters: Class	7,593	7,593	9,429	9,429	

Source: MED's bimonthly evaluation data from 2012 to 2017.

Notes: Standard errors clustered at the class level are in parentheses. *p < 0.05, **p < 0.01, ***p < 0.001. Estimations include math, writing, and reading. Only contains students who maintained a regular school path after the retention.

6. ROBUSTNESS CHECKS

To address the endogeneity of grade repetition, we re-estimate the main results, excluding the repeated grade. Specifically, we omit the 3rd grade from the 3rd grade retention analysis and the 4th grade from the 4th grade retention analysis. Box 5 shows consistent results, confirming the robustness of our findings.

REMOVING THE REPEATED YEAR BOX 5

	3 rd grade retention	4 th grade retention 5 th grade standardized score		
	4th grade standardized score			
	(1)	(2)		
Treatment#Post	0.453***	0.236***		
	(0.013)	(0.015)		
Observations	184,935	260,781		
R-squared	0.678	0.555		
Students	30,825	29,013		
Clusters: Class	3,702	5,702		

Source: MED's bimonthly evaluation data from 2012 to 2017.

Notes: Standard errors clustered at the class level are in parentheses. *p < 0.05, **p < 0.01, ***p < 0.001. Estimations include math, writing, and reading; and subject, administration, and student fixed effects.

Additional robustness checks (available upon request) reinforce the results. For instance, analyzing only math scores – given potential biases in reading and writing – yields similar findings. We also investigate the role of socioeconomic factors, including age, race, gender, and mother's education. Retention is more common among boys, black and brown students, and children of less-educated mothers, consistent with previous studies (Oliveira & Soares, 2012; Valbuena et al., 2021).

7. UNDERSTANDING OUR RESULTS

What explains the improved performance of retained students? To explore this, we first compared the treatment group with a more comparable control group. This control group consisted of students who scored below 4 (on at least one or all subjects) in the 3rd or 4th grade in 2014 but were promoted to the next grade in 2015. These low-performing students were likely candidates for retention in 2015. Results in Box 6 (columns 1 and 3) show that retained students outperform promoted low-performing peers in subsequent academic performance.

We also compared two groups of promoted students: those scoring below four and those scoring between four and seven. Higher-performing students face an upper limit to score improvement (e.g., a student scoring eight cannot exceed ten) while lower-performing students have greater room for improvement. Columns 2 and 4 in Box 6 present these findings, revealing that promoted lowperforming students outperform promoted higher-performing peers.

BOX 6 ESTIMATION WITH A MORE COMPARABLE CONTROL (COLUMNS 1 AND 3) AND A **COMPARISON BETWEEN PROMOTED STUDENTS (COLUMNS 2 AND 4)**

	3 rd Q	grade treatment	4 th grade treatment		
	4 th grade	standardized score	5 th grade standardized score		
	(1)	(2)	(3)	(4)	
Treatment#Post	0.213***	0.357***	0.263***	0.248***	
	(0.017)	(0.038)	(0.018)	(0.064)	
Treatment students	Retained	Promoted lower- performing	Retained	Promoted lower- performing	
Control students	Promoted lower- performing	Promoted higher- performing	Promoted lower- performing	Promoted higher- performing	
Observations	84,560	23,481	64,680	54,732	
R-squared	0.363	0.403	0.310	0.322	
Students	7,668	2,609	4,821	4,561	
Clusters: Class	5,608	3,668	6,352	6,156	

Source: MED's bimonthly evaluation data from 2012 to 2017.

Notes: Standard errors clustered at the class level are in parentheses. $^*p < 0.05, ^{**}p < 0.01, ^{***}p < 0.001$. Estimations include math, writing, and reading; and subject, administration, and student fixed effects.

The results are positive and significant: Promoted lower-performing students outperform promoted higher-performing students academically. Box 6 highlights that lower-performing students, likely close to being retained, show higher performance. As noted in Section 2, these students often receive remedial classes to avoid retention, which may explain their improvement. Additionally, the threat of retention may drive them to perform better, a phenomenon noted in the literature (Carvalho & Firpo, 2014).

However, these factors do not fully explain the findings, as retained students outperform promoted lower-performing peers. Retention has an impact beyond its threat or remedial activities. Notably, the threat of retention is effective only because retention itself is a real policy intervention.

8. CONCLUDING REMARKS

This paper estimates the impact of 3rd and 4th grade retention on 4th and 5th grade performance using a DID with fixed effects approach, based on a panel of Rio de Janeiro primary students from 2012 to 2017. Our results show that repeating a grade significantly improves academic achievement, consistent across robustness checks.

We suggest that the fear of retention may partly drive this effect, though retention itself contributes more than just the threat. Our findings indicate that retention serves as a short-term incentive for improved academic performance. However, as other studies have shown that retention has been associated with negative outcomes in the long term and affects students' psychological wellbeing, policies should consider leveraging other educational strategies - such as targeted remedial interventions and providing continuous feedback or additional support – before resorting to grade repetition.

Requiring a student to repeat a grade is not the only way to ensure they are prepared for more advanced material, and it might not be the most cost-effective strategy. Effective after-school or summer learning programs have been identified as promising interventions (McCombs et al., 2011; Terzian et al., 2009). Early identification of struggling students and tailored interventions, such as family engagement, could help reduce retention rates and their associated negative effects. Family engagement strategies can include supporting learning both at school and home, shared governance of school decisions, and coordination with community programs (Morris & Nóra, 2024). Retention policies must consider all its possible effects on students and its high costs for the school system, especially considering its prevalence among vulnerable students.

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DATA AVAILABILITY

The full dataset supporting the findings of this study is available upon request to the Municipal Department of Education of the city of Rio de Janeiro. The data are not publicly available for two reasons: (i) they contain sensitive information that could compromise the privacy of students in the municipal school system; and (ii) the agreement established with the Department at the time of data acquisition restricts sharing with third parties.

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