THE STORY WITH AN END: THE ROLE OF READING FOR LEISURE IN THE REDUCTION OF ASYMMETRIES IN ACADEMIC PERFORMANCE*

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* DOI: https://doi.org/10.18601/01245996.v27n53.10. Recepción: 12-02-2024, modificación final: 03-07-2025, aceptación: 12-06-2025. Sugerencia de citación: Sánchez Martínez, J. M., Rodríguez-Rivera, A. P., Camacho Murillo, A. (2025). The story with an end: The role of reading for leisure in the reduction of asymmetries in academic performance. *Revista de Economía Institucional*, 27(53), 249-270.

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The story with an end: The role of reading for leisure in the reduction of asymmetries in academic performance

This study examines the impact of reading habits on student performance in Colombia. Using micro-level data from the Saber 11 test and linear regressions, the results show that access to books at home and reading two or more hours daily are positively associated with higher scores. Public school students generally score lower than private school peers, though those who read extensively can outperform them. However, neither books nor reading time fully closes the urban–rural gap.

Keywords: Saber 11 test, academic performance, reading for entertainment, books of entertainment.

Lectura y desempeño académico: evidencia de la prueba Saber 11 en Colombia

Resumen: Este estudio examina el impacto de los hábitos de lectura sobre el desempeño estudiantil en Colombia. Utilizando datos a nivel micro de la prueba Saber 11 y análisis de regresión lineal, los resultados muestran que el acceso a libros en casa y leer dos o más horas diarias se asocian positivamente con puntajes más altos. Los estudiantes de colegios públicos, en general, obtienen peores resultados que sus pares de instituciones privadas, aunque quienes leen con mayor frecuencia pueden superarlos. Sin embargo, ni la disponibilidad de libros ni el tiempo de lectura logran cerrar completamente la brecha de rendimiento entre estudiantes urbanos y rurales.

Palabras clave: prueba Saber 11, desempeño académico, lectura por placer, libros en casa
JEL: I21, I24, O15

Leitura e desempenho acadêmico: vidências da prova Saber 11 na Colômbia

Resumo: Este estudo analisa o impacto dos hábitos de leitura no desempenho dos estudantes na Colômbia. Utilizando dados em nível micro da prova Saber 11 e análise de regressão linear, os resultados indicam que o acesso a livros em casa e a leitura por duas ou mais horas diárias estão positivamente associados a notas mais altas. Estudantes de escolas públicas geralmente têm desempenho inferior ao de seus colegas do setor privado, embora aqueles que leem com frequência possam superá-los. No entanto, nem a disponibilidade de livros nem o tempo de leitura eliminam completamente a lacuna de desempenho entre estudantes urbanos e rurais.

Palavras-chave: prova Saber 11, desempenho acadêmico, leitura por prazer, livros em casa; JEL: I21, I24, O15

1. INTRODUCTION

Since the 1950s, there has been a significant development of achievement tests for the evaluation of education worldwide. In the 1960s, the evaluation of mathematics, reading, geography, science, and non-verbal ability science was of primary interest by the International Association for the Evaluation of Educational Achievement (IEA), which has since extended the evaluation scope to further programs (Martínez Rizo 2018). These evaluation programs, together with the Program for International Student Assessment (PISA), has provided important inputs from an international perspective on educational achievements to the development of national tests in Colombia, including the Saber 11 test (Martínez Rizo 2018).

The academic performance of students is influenced by several factors explored in the literature, including age, gender, and socioeconomic level, among other factors (Aturupane et al. 2013; Giménez and Castro Aristizábal 2017; Céspedes-Parra and Camacho-Murillo 2022; Arenas 2021; Colomo et al. 2016). The influence of the number of books for entertainment at home and the hours dedicated to recreational reading per day on students' academic performance in the Saber 11 test has received less attention in Colombia, despite being relevant factors that promote academic quality (Rodríguez and Hernandez 2021). Similar to Bastian's passion for recreational reading in Michael Ende's 1979 book *The Neverending Story*, positive attitudes toward reading at home have been demonstrated as an effective educational strategy to increase students' performance (Gil 2009). Students´ family as a social institution performs different functions, including the educational and economic support for children (Ganiyeva, 2022); therefore, families are the main channel for students to get access to recreation resources (including books for leisure and entertainment). Students that have access to entertainment books for reading tend to perform better academically than students without such access (Grayson 2011).

In academic gap analyses, Angulo (2021) found differences in the scores of the Saber 11 test between students in Antioquia (Colombia) from official (public) and unofficial (private) educational institutions (favoring the latter group), and from rural and urban areas (urban students generally performing better). Ramos, Duque, and Nieto (2012) found better scores in PISA for students from urban areas, mainly due to family characteristics and not by school characteristics. In light of the findings in the literature on the association between

reading for entertainment activities and students' performance, it is important to analyze if score asymmetries between students can fade away as students from public schools and rural areas have a greater number of books for entertainment and/or devote further hours of pleasant reading per day. This analysis is of fundamental interest for public initiatives that could see reading for entertainment as a strategy to lessen the score gaps between students and to help attain Sustainable Development Goals 4 (Quality Education) and 10 (Reduced Inequalities).

The aim of this paper is to analyze the factors that influence students' performance in the Saber 11 test, giving emphasis to the effects of reading for entertainment. Two complementary hypotheses are examined. First, whether a greater number of books for entertainment at home and a greater amount of time spent reading recreational texts are positively associated with better Saber 11 test results. Second, whether an increase in the number of books and hours of reading for entertainment help students from official schools and rural areas to reduce the expected gaps in the Saber 11 test results, as compared to students from unofficial schools and urban areas, respectively.

These hypotheses are analyzed based on the results of the Saber 11 test in Colombia conducted in 2020. The Colombian Institute for Educational Evaluation (ICFES) applied this test in person to students from across the country in October and November, considering all biosafety protocols enforced by law during the pandemic (Semana Magazine, 2021). Thus, neither the results nor the information provided by the students at the time of presentation is subject to potential bias. This manuscript is divided into five sections. The second section consists of a brief literature review on the association between students' academic performance and reading for entertainment. The third section describes the data and methodology used. The significant findings of the study are presented in the fourth section, and some conclusions and implications are provided in the fifth section.

2. BRIEF LITERATURE REVIEW

Since the 1980s, research related to the lifestyle of adolescents in different dimensions, including academic performance, has intensified (Barca et al. 2007). Bello (2021) classifies the factors that affect academic performance into demographic variables, such as the student's sex, age, and place of residence; academic variables, including prior academic performance, teacher support, time spent browsing the

Internet, and parental educational level; and socioeconomic variables, such as the economic stratum and occupation of the parents. Books available at home and reading for entertainment are factors that affect academic performance from the socioeconomic (Bello 2021) and cultural dimensions Gil (2013). These factors will be analyzed below along with individual characteristics that explain the heterogeneity between students' performance around book and reading intensity.

2.1. Recreational reading and academic performance

Although the debate regarding the impact of the educational system on the preparation of readers and writers remains open, studies conducted to date have been incipient (Pérez and Rincón 2013). Reading is one of the first lessons students are taught at school (Gil 2009). Schools help children to learn the codes of language and the progressive assimilation of comprehension mechanisms for reading, which ultimately enrich their ability to read effectively (Corchete-Sánchez, 2014). On the other hand, families play an important role in promoting children's interest in recreational reading (Gil 2009). The early and continue contact between parents and children turns the family environment into a privileged place to instill values and consolidate habits such as reading (Corchete-Sánchez, 2014).

In a study by Rodríguez and Hernández (2021), the reading variable was associated with the Saber 11 tests. It was found that the greater the daily amount of reading for entertainment, the better the students' overall test results. As reading stimulates the imagination, lack of reading reduces interest in research in school. This makes it difficult to understand and analyze the lessons (Rodríguez and Hernández 2021). Similarly, Fraguela-Vale et al. (2016) found that young adults who spend more time reading recreationally have better grades, regardless of whether they spend more time studying. Students who read often have a critical view of the educational system, as they perceive that more time is spent on traditional methodologies rather than on participatory proposals that support their autonomy and initiative (Fraguela-Vale et al. 2016). To understand the role that (non-forced) recreational activities play in students' academic success or failure, an analysis of their recreational reading impacts on academic outcomes is necessary (Dezcallar et al. 2014).

The number of books in a home is related to socioeconomic factors (Bello 2021). Owning books enhances the family's purchasing power. Culture is a resource that is conditioned by economic resources; however, a stock of entertainment books can serve as an indicator of

practices that contribute to families' cultural capital (Cervini 2002). Additionally, the number of books at home can indicate how involved parents are in the development and education of their children (Angulo 2021). According to Rodríguez and Hernández (2021), Mediavilla and Gallego (2016), Chaparro, González, and Caso (2016), and Nieto and Ramos (2011), the more books available in a home, the better the academic performance of the child. A lack of books at home reduces the consultation resources available to students and their ability to develop the necessary reading habits for school success (Grayson 2011).

On the other hand, some studies have highlighted the difficulty that access to reading material for entertainment represents for low-income students; the scarcity of reading material becomes a constraint that could lead to poor results in critical reading. The study by Ome & Menéndez (2022) shows that only 58% of students have access to reading materials outside the school; this is a fact that could limit the creation of a reading culture, which ultimately leads to better results in national tests.

2.2. Gaps in academic performance

In Colombia, Morelli, Borrero, and Umaña (2014) discuss the disparity between students from official and unofficial schools and between those from rural and urban areas. Díaz and Tobar (2016) confirm the disparity in skills between official and unofficial schools (in favor of the unofficial ones in all competencies evaluated in the Saber 11 test) and suggest that it may be caused by the limited financial resources of official schools. The fact that 80% of young Colombians are enrolled in official schools adds to this gap, according to Salazar and Alvarez (2020).

Regarding the geographical location of students (and their schools), there has been no evidence of the difference between academic performance on the Saber 11 test for students from different parts of the country. There are usually less favorable conditions for students to perform well in rural institutions because of the lack of adequate external and internal infrastructure (Angulo 2021). Urban institutions tend to behave similarly to unofficial institutions in Colombia as note by Rodríguez et al (2021), who find that urban schools were ranked in the two highest positions in 2020 in Saber 11 test, whereas rural institutions were ranked in lower positions. There is consensus in the literature that students in urban areas perform better academically

than students in rural areas (Santín 2001; Rodríguez and Hernández 2021; Mediavilla and Gallego 2016).

The review of literature to this point prompts analyses on the uncertain positive effects of reading for entertainment activities on the reduction of score gaps between students from official and unofficial schools, and from rural and urban areas. Analyses to capture the sources of heterogeneity between students' performance is fundamental when designing strategies to reduce existing gaps in national exams such as the Saber 11 test. The promotion of reading for entertainment among heterogeneous populations is an assertive strategy for promoting academic excellence in formal education students and reducing educational gaps between them.

3. MATERIALS AND METHODS

To meet the aim of this research, this chapter is developed into two analytical parts. The first part analyzes the data employed, including their source, study period, treatment of the data, and the organization required for the analysis. The second part explains the econometric model used to analyze the following research hypotheses: i) whether a greater stock of books for entertainment at home and a greater number of hours of recreational reading are associated with an increase in the score of students in the Saber 11 test; ii) whether the expected gap in the Saber 11 test results between students from official and unofficial schools, and from rural and urban areas, are likely to reduce from increases in the number of books and hours of reading for entertainment.

3.1. Data

This research is conducted with the results of the Saber 11 test in 2020, administered by the Colombian Institute for Educational Evaluation. Saber 11 test focuses on the assessment of secondary school students, level 11, in mathematics, critical reading, science, social and civic skills, and English as a second language (Rodríguez and Hernandez 2021). Despite the Covid-19 pandemic, the whole population of students (504,872) took the standardized exam in the second semester of 2020 in person. An exhaustive review of data was conducted, allowing the identification of 15,979 students who left blank answers to the survey of the exam. Thus, a sample of 488,893 students remained for this study. The data are available at DataIcfes database (ICFES, 2021).

The Saber 11 test is the mechanism by which the Colombian government evaluates students who complete their training process in secondary education. This test can be taken by students who are finishing eleventh grade (the last one in secondary school), who have obtained a bachelor's degree, and who have passed a high school validation exam (ICFES 2021). Saber 11 is a standardized evaluation conducted every six months by ICFES, that is aligned with other tests that comprise the National Standardized Evaluation System (SNEE): Saber 3, Saber 5, and Saber 9 (ICFES, 2013).

Table 1 shows the scores by competence and global score. The average scores in critical reading and mathematics exceed 50 points. The highest result available for each of the competencies is 100 points. The academic competence that shows the lowest performance is English. The mean of the overall score, the result of the sum of the average results by competencies for each student, was 248.78 points. The standard deviation of the scores was 48.39 points, denoting that the data has a dispersion of approximately 20%. The maximum available score is 500 points.

Table 1.
Descriptive statistics of the scores by competence and global score

Score	Observations	Mean	Standard Deviation	Minimum	Maximum
Critical Reading	488.893	52.21	10.09	22	100
Mathematics	488.893	51.10	11.59	17	100
Natural Sciences	488.893	48.32	10.40	24	100
Social and Civic Skills	488.893	48.29	11.93	19	100
English	488.893	47.07	11.07	28	100
Average Score		248.78	48.39		500

Source: Author's elaboration based on data from DataIcfes

Table 2 presents the mean scores by competencies and the global mean score obtained by the students, correlated to the number of recreational books they own (other than school textbooks). The crosstab results suggest that students with more books at home perform better on the test compared to students with less books. This positive relationship exists for the global score and for the score in each academic competence. In terms of competencies, critical reading and mathematics achieve the highest scores. It is important to note that only 6.43% of the families in the sample under study own more than 100 books.

Table 2.
Relationship between Saber 11 average score and the number of books at home

Competence	0–10 books	11–25 books	26–100 books	Over 100 books
Critical Reading	49.51	52.64	55.83	56.30
Mathematics	48.08	51.46	55.30	55.76
Natural Sciences	45.49	48.66	52.19	52.92
Social and Civic Skills	45.01	48.66	52.76	53.80
English	43.94	47.13	51.43	53.36
Global Score	233.92	250.52	269.10	272.96
Number of students	205,943	151,249	100,257	31,444

Source: Author's elaboration based on data from DataIcfes

The relationship between the number of hours spent reading for entertainment each day and the scores achieved on the Saber 11 test is presented in Table 3. According to the relationship between the scores of students and the amount of daily reading for entertainment, the more hours of reading each day, the better the results are for each competence individually and cumulatively. The results indicate that critical reading and mathematics are the skills with the best results achieved. Only 4.43% of students spend more than 2 hours a day reading for entertainment, while 10.41% of all students say they read between 1 and 2 hours a day, resulting in 85.26% of students reading for one hour or less daily.

Table 3.
Relationship between average score and daily reading time for entertainment

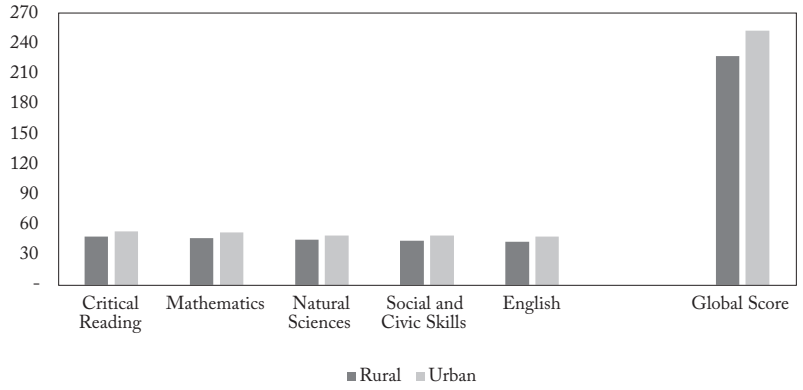
Competence	Do not read for entertainment	30 minutes or less	Between 30 and 60 minutes	Between 1 and 2 hours	Over 2 hours
Critical Reading	50.61	51.12	53.70	53.92	55.64
Mathematics	50.05	50.08	52.60	52.09	53.05
Natural Sciences	46.93	47.26	49.82	49.82	51.07
Social and Civic Skills	46.14	46.95	50.17	50.60	52.64
English	46.15	45.85	48.26	48.84	50.35
Global Score	241.29	243.11	256.58	256.97	264.45
Number of students	95,400	188,895	132,035	50,900	21,663

Source: Author's elaboration based on data from DataIcfes

Data show that, out of 488,893 students belonging to the research sample, 80,407 belong to schools in rural areas (16%), while 408,486 are in urban areas (84%). Figure 1 shows the scores achieved by

students in rural and urban areas by competence and at a global level and identifies a significant gap between students in the global score.

Figure 1.
Saber 11 test scores in rural and urban areas by competencies and global

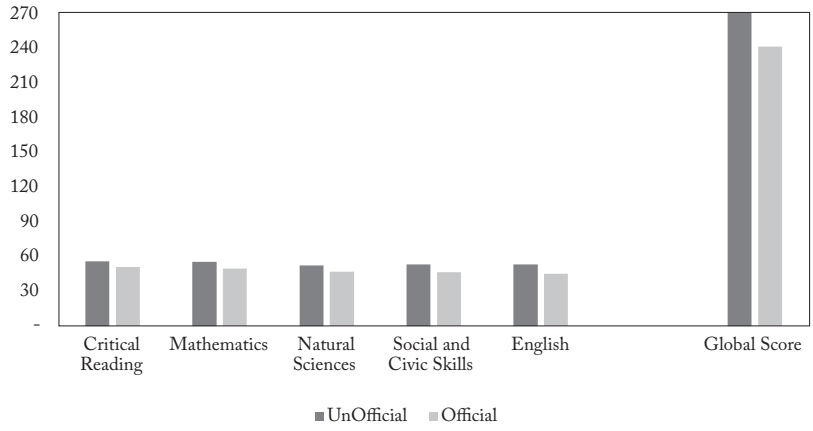


Source: authors based on data from DataIcfes.

Figure 2 analyzes the scores of students from official and unofficial schools by competencies and shows better results for students from unofficial schools (private schools). Official schools in Colombia are primarily funded and administered by the government, while unofficial schools generate operational income through annual and monthly fees levied on their students, and their academic activities are managed by a private entity (under the supervision of the Ministry of Education).

Based on the academic gaps identified between students in Figures 1 and Figure 2, this research statistically examines the relationship between the variables of reading for entertainment (number of books at home and hours of recreational reading each day) and geographical location (urban/rural) and nature (official/unofficial) of the school. Particular attention is given to whether recreational reading can be used as a strategy to moderate the gap in academic performance between rural and urban students and between students from official and unofficial schools.

Figure 2.
Saber 11 test scores in official and unofficial schools by competencies and global score



Source: authors based on data from DataIcfes.

3.2. Model

We use the Classic Linear Regression Model, under the Ordinary Least Squares estimation method, to analyze different factors that influence on students' global scores in the Saber 11 test. Particularly, the study examines the influence of reading for entertainment on the Saber 11 test score. Eq. (1) examines the first research hypothesis, namely, whether a greater number of books for entertainment at home and a more dedicated amount of time reading recreational texts correlate positively with better Saber 11 test scores. To analyze this hypothesis, the coefficients of books and reading in Eq. (1) are estimated. The general specification of the equation is as follows:

$$Score_i = \beta_0 + \beta_1\, books_i + \beta_2\, reading_i + \beta_3\, official_i + \beta_4\, urban_i + \sum_{j=1}^{k} \omega_j\, controls_{ji} + e_i \quad (1)$$

where *Score* is the overall result of the Saber 11 test for each student (i); *books* are the number of books the student has at home, organized as follows: from 11 to 25 books, from 26 to 100 books, more than 100 books (from 0 to 10 books is the control group); *reading* represents the daily dedication to the recreational reading of the student: reads 30 minutes or less, reads between 30 and 60 minutes, reads

between 1 and 2 hours, reads more than 2 hours (does not read is the control group); *official* is equal to 1 if the school is official and 0 if it is unofficial; *urban* is 1 if the school is in an urban area and 0 if it is in a rural area. Controls such as *women* are included, which takes the value of 1 if the student is a female and 0 if male; *stratum* is a variable of the student's socioeconomic stratum that is grouped into the following categories: stratum 3–4, stratum 5–6, no stratum, and stratum 1–2 (the latter is the control group). These stratification categories are proxy variables for the student's family income (the higher the stratum, the higher the income). The *edufather* and *edumother* variables include the last academic level gained by the student's parents: primary, high school, technical, and professional. The variable *day* captures the academic time of the school: morning, afternoon, single-full, night, and Saturday.

Endogeneity problems from reverse causality between *reading* and *Score* could be a problem if the direction of causality were not as expected. This potential issue can be rolled out in this paper based on three different characteristics. First, reading for entertainment is a noncontrolled activity by teachers and parents that helps the readers gain vocabulary, general culture, logical thinking, and confidence in the long run (from early stages of the childhood onwards); therefore, leisure reading is taken as an inherent input of people's lifetime for academic success. Second, the census data used in this study significatively reduce potential biased estimates following the property of consistency in OLS. Third, previous trials with the use of instrumental variables (not depicted here), which assumed the presence of reverse causality, showed overestimated and statistically insignificant coefficients.

Eq. (2) extends the analysis with the interaction of variables of interest, with which the second hypothesis is analyzed; that is, if the expected increase in the results of the Saber 11 tests, explained by a greater number of books and hours of reading for entertainment, differs between students from official and unofficial schools and between students from rural and urban areas. The estimated coefficients of the interacting variables are important for the analysis of this second hypothesis. The specification is as follows:

$$Score_i = \beta_1\, books_i + \beta_2\, reading_i + \beta_3\, official_i + \beta_4\, urban_i + \sum_{m=1}^{l} \theta_m\, book \cdot official_{mi} + \sum_{m=1}^{l} \gamma_m\, book \cdot urban_{mi} + \sum_{m=1}^{l} \delta_m\, reading \cdot official_{mi}$$

$$+\sum_{m=1}^{l}\rho_m\, reading\cdot urban_{mi}+\sum_{j=1}^{k}\omega_j\, controls_{ji}+\beta_0+e_i \qquad (2)$$

The potential heterogeneity between students regarding the overall score achieved in the Saber 11 test is controlled through the inclusion of robust standard errors (adjusted by clusters); Thus, more efficient and noise-free estimated coefficients can be obtained. The possible presence of perfect or quasi-perfect correlation between the qualitative variables *books* and *reading* is rejected through the test of tetrachoric correlations, which are designed for dichotomous and polytomous explicative variables (Freiber et al. 2013).

4. EMPIRICAL RESULTS

Table 4 shows the estimated results of the linear regression models presented in Eq. (1) and Eq. (2). The estimated coefficients in Eq. (1) are analyzed with particular attention to the parameters of *books* and *reading* to evaluate the first hypothesis of the paper. Next, the estimated parameters of the interaction variables, Eq. (2), are analyzed to verify the second hypothesis.

According to the central results of this research in Table 4, column (i), those families with 11 or more entertainment books at home tend to perform better than those in the control group (with 0–10 books). One of the notable results is observed in the range of 26–100 books, where 17.1 more points were recorded in comparison with the control group in the Saber 11 test. These results are statistically significant at the 1% critical value and back the study by Rodríguez and Hernández (2021) with the Saber 11 test of 2017 and 2018, which finds that students with a greater number of recreational books in their homes score better on this national test.

The results in column (i), Table 4, also indicate that reading for entertainment is positively associated with better Saber 11 test scores. Those students who read for entertainment more than 2 hours a day achieve 16.3 points higher than those who do not read for entertainment (the control group), implying that spending a greater amount of time reading for entertainment can positively affect academic performance. According to Rodríguez and Hernández (2021), students who devote more than two hours per day to reading for recreation achieve better results. That is the case of a students in Bogota, who obtained a perfect score of 500 points in the Saber 11 test in 2023

and adduced the success to her "love for leisure reading", and to her family's constant support (Noticiascaracol, 2023, November 11).

Table 4.
Factors affecting Saber 11 global scores

	Eq. (1) Column (i)	Eq. (2) Interactions Column (ii)
books		
11–25 books	7.7796***	8.2703***
	(.1406)	(.4950)
26–100 books	17.1763***	21.5842***
	(.1709)	(.5831)
100+ books	15.3629***	25.1629***
	(.2831)	(.9113)
reading		
<30 minutes	3.9553***	2.3499***
	(.1593)	(.5387)
30–60 minutes	11.8549***	7.8856***
	(.1756)	(.5932)
1–2 hours	11.4143***	5.7779***
	(.2374)	(.7987)
2+ hours	16.3335***	4.5441***
	(.3325)	(1.1730)
official	−13.268***	−7.9384***
	(.1699)	(.3770)
urban	14.3975***	9.3145***
	(.1638)	(.3754)
Control Variables		
woman	Yes	Yes
stratum	Yes	Yes
edufather and edumother	Yes	Yes
day	Yes	Yes
Constant	225.1298***	225.0413***
	(.3047)	(.5213)
Interaction of variables book • official		
11–25 books • official		- 2.8311***
		(.3870)
26–100 books • official		- 6.9470***
		(.4077)
100+ books • official		-16.4433***
		(.6033)
book • urban		
11–25 books • urban		2.5299***
		(.3599)
26–100 books • urban		1.4054***
		(.4778)
100+ books • urban		1.4408*
		(.8127)
reading •official		

	Eq. (1) Column (i)	Eq. (2) Interactions Column (ii)
< 30 minutes • official		−1.6888***
		(.4020)
30–60 minutes • official		−1.1106**
		(.4343)
1–2 hours • official		−2.5412***
		(.5832)
2+hours • official		1.2325*
		(.7784)
reading • urban		
<30 minutes • urban		3,2305***
		(0,4207)
30–60 minutes • urban		5,5047***
		(0,4718)
1–2 hours • urban		8,8159***
		(0,6379)
2+hours • urban		12,6388***
		(0,9941)
Number of observations	488,893	488.893
R-squared	.2826	0,2849
Prob > F	.0000	0.0000
Root Mean Square Error	40.99	40.92

***Significant at 1%, **significant at 5% and *significant at 10%.
Robust standard errors are in parenthesis.

Based on the findings in column (i), students from official schools obtain 13.2 points less in the standardized test than students from unofficial (private) schools. This result is statistically significant at the 1% level and confirms the presence of academic gaps between students of official and unofficial academic entities. According to Lorduy (2021), the ranking in the Saber 11 tests is dominated by private schools up to the 32nd place; and within the top 10, six schools belong to B calendar (academic calendar from mid-August to mid-June), and the remaining belong to calendar A (academic calendar from February to mid-November). In line with our findings, Morelli et al. (2014) find that private school students perform 17 times better than their counterparts in official schools; and Aturupane et al (2013) affirm that the best students are those who can pay for a higher quality education; a fact that confirm the leadership position of private schools in the Saber 11 test.

Furthermore, the results in column (i) indicate that students studying in urban areas achieve better results on the Saber 11 test than those studying in rural areas. The results of the former group

are 14.3 points greater than the results of the latter group. This finding is statistically significant at the 1% level and demonstrates the presence of gaps in academic performance between urban and rural students in favor of the former. The study by Rodríguez and Hernández (2021) finds similar evidence —on average, urban students achieved 19.4 points higher in the Saber 11 tests than rural students in 2017–2018.

4.1. Results in control variables

There is a significant difference in the overall scores between males and females with respect to the control variables listed in column (i), which are listed in Table 4. In Saber 11, on average, females achieve 6.2 points lower than males. Student gender has been considered a factor contributing to differences in academic performance among students (Farooq et al. 2011). Other works involving the Saber 11 tests have shown that male students have a higher average score than females (Rodríguez and Hernández 2021) and that males excel in mathematics, while females perform well in critical reading (Rodríguez, Ordoñez, and Hidalgo 2021).

Regarding the socioeconomic stratum variable, individuals belonging to strata 3 and 4 performed 2.3 points better on tests than the control group (students from strata 1 and 2); however, students from strata 5 and 6 and those who did not manifest stratum were 5.1 points and 21.1 points below the control group, respectively (see column (i)). According to these results, which are statistically significant at the 1% level, students who achieve better scores in Saber 11 tend to be in the middle rather than the top strata as may be expected. As noted by Rodríguez and Hernández (2021), stratum 3 students obtained the highest average score (263.0 points), followed by stratum 2 students (257.9 points). The lowest score among the categories analyzed was achieved by students in stratum 6 (217.0 points) (Rodríguez and Hernández 2021).

Based on the results of the study on the relationship between the educational levels of the parents (father and mother) and the academic performance of the student, children typically obtain higher scores in the Saber 11 test when the parents have higher levels of education (from complete high school to postgraduate). The findings of this study are statistically significant at a 1% level, and they complement those of Rodríguez and Hernández (2021) for Colombia and of Farooq et al. (2011) for Pakistan. Chaparro, González, and Caso (2016) considered the level of education of the parents as a highly relevant

factor in approving student profiles for secondary school admission in Baja California, Mexico.

4.2. Heterogeneity around books and reading time

A statistical analysis of Eq. (2), column (ii), reveals heterogeneity between students from official and unofficial schools and students from urban and rural areas regarding reading for entertainment. Using this model, it is possible to achieve a greater degree of goodness of fit, demonstrating that the explanatory factors included explaining 28.49% of the variance of the overall results of the Saber 11 tests. Based on the results of the F test, we can reject the null hypothesis that all estimated parameters are statistically significant zero at the significance level of 1%.

When including heterogeneity between students from official and unofficial schools, it is observed that no matter how many recreational books students from the official school have at home, their performance remains below those of students from unofficial schools (see column (ii)). In comparing students from official and unofficial schools with 11–25 books at home, the results indicate that the former receives 2.8 points less in the score of Saber 11 than the latter. This gap becomes greater when expanded to 26–100 books (6.9 points less for official schools) and 100+ books (16.4 points less for official schools). Considering these significant results at 1%, it is evident that increasing the number of recreational books in student homes (certainly associated with a greater degree of financial capability of families, or with state agreements for the purpose) is essential to close the gap between students from official and unofficial schools.

Significant results in column (ii) are observed regarding the interactions between books and urban and rural areas. Urban students with 11–25 recreational books gain an average of 2.5 points more in Saber 11 than their rural counterparts with the same number of recreational books. When the number of books increases to 26–100 and 100+, the rating gap narrows to 1.40 and 1.44 difference points, respectively. However, the latter result (1.44 difference points) is only statistically significant at the 10% level.

Based on the interaction between daily hours of reading for entertainment and official school in column (ii), only students from official schools who read for more than two hours for entertainment each day have a greater chance of getting a higher overall score than those from unofficial schools. This result is statistically significant at the 10% level. There is evidence that official students did not perform

as well in Saber 11 as unofficial students when compared to other groups of recreational reading times. These findings imply that wide recreational reading times (for two hours or more per day) may be the key to bringing students from official schools closer to those from unofficial schools in terms of academic achievement.

In column (ii), the results show that students from urban areas who read less than 30 minutes for entertainment earn on average 3.2 points more than students from rural areas who read for the same amount of time (see column (ii)). This asymmetry in the average result of the tests becomes more acute when we compare the same groups of students in the upper ranges of reading time for entertainment: when the students read 30–60 minutes a day, the gap increases to 5.5 points; when they read for 1–2 hours, the gap increases to 8.8 points; and when they read for 2 hours or more, the gap reaches a maximum value of almost 13 points. As these results are significant at 1%, they illustrate the challenges associated with reducing gaps in academic performance among students from urban and rural areas through recreational reading.

5. CONCLUSION AND IMPLICATIONS

This paper examines some of the factors that influence the academic score of students in the Saber 11 test, emphasizing reading for entertainment (number of recreational books at home and hours of reading for entertainment per day). Analyses are based on data from DataIcfes using a linear econometric model through the ordinary least squares method. Estimates show that, when there are more entertaining books available in the student's home, the representative student has a greater chance of achieving a higher score in the Saber 11 test. Moreover, if students devote more daily hours to read entertainment books, they are likely to achieve a higher overall score in the Saber 11 national test.

Gaps in academic performance between students from official and unofficial schools, and from rural and urban areas, are identified. Students enrolled in official academic entities typically achieve a significantly lower overall score than students enrolled in unofficial educational institutions. In addition, students located in urban areas generally achieve significantly better results than those from rural centers.

Based on the findings, one existing option to reduce the score gap between students from official and unofficial schools is the provision

of recreational reading slots to the former group for more than two hours per day. Unfortunately, no matter how much effort a family makes to provide recreational reading material at home, the gap in the Saber 11 test results always increases for official school students as compared to unofficial school students and decreases for rural students as compared to urban students.

The findings of this study have implications for public policy aimed at increasing the number of books for entertainment available to families and encouraging children to read more each day. The departmental and municipal governments can establish strategies for targeting families that have children in official schools (usually economically vulnerable families) to have access to books for entertainment through the following channels: the promotion of book purchase programs at low costs for low-income families (through alliances between municipalities and publishers), the creation of a state-owned mobile library plan for book lending, the creation of reading houses in strategic areas by public or private entities (the latter can be promoted through tax benefits), and the launch of book donation campaigns.

In terms of reading hours, the government and families can work together to promote initiatives to extend students' reading time at home, especially in public schools during afternoon breaks and evening hours. Family as social institution plays a fundamental role for recreational reading activities between parents and children; this role can foster greater interest in autonomous reading, which can positively impact the students' academic performance in their schools.

Future studies on the reading-performance link can consider other econometric models, including hierarchical or multilevel linear models, to account for potential random effects between clusters.

Acknowledgments. We want to thank Universidad Externado de Colombia and the Ministry of Education of Colombia for the opportunity to contribute to this important topic and for the data provided.

Declaration of Interest. There are no relevant competing interests to declare

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