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**Health and education: a partnership  
required for school success*****Saúde e educação: uma parceria  
necessária para o sucesso escolar*****ABSTRACT**

**Purpose:** To investigate the association between home environment resources and the school performance of children from a public school in Belo Horizonte, Brazil, enrolled in the fourth year of the second cycle of Elementary School. **Methods:** This is a cross-sectional descriptive study in which 48 children aged between 8 and 12 years old participated. It included 28 boys, 20 girls, and their respective guardians. The children were evaluated in hearing and school performance regarding reading, writing, and arithmetic. In the home environment, the resources that promote proximal processes, activities that indicate stability in family life, parent's practices that promote a family-school connection, the resources that may contribute to the development of academic learning, the child's health, the presence of altered communication, family literacy, and socioeconomic data were assessed. **Results:** There is a relationship between the home environment resources and the academic performance in reading and writing (for all categories of the Home Environment Resources Scale, HERS). The statistical relationship between performances in arithmetics was found in two of HERS' categories: home environment resources and family-school connection. **Conclusion:** The home environment influenced the learning development of the assessed children.

**RESUMO**

**Objetivo:** Investigar a associação entre recursos do ambiente familiar e o desempenho escolar de crianças de uma escola pública de Belo Horizonte, matriculadas no quarto ano do segundo ciclo do Ensino Fundamental. **Métodos:** Trata-se de estudo do tipo transversal descritivo, do qual participaram 48 crianças de 8 a 12 anos, sendo 28 meninos e 20 meninas, e seus respectivos responsáveis. Da criança, avaliou-se a audição e o desempenho escolar em leitura, escrita e aritmética. No ambiente familiar, investigaram-se os recursos que promovem processos proximais, as atividades que sinalizam estabilidade na vida familiar, as práticas parentais que promovem a ligação família-escola, os recursos do ambiente familiar que podem contribuir para o desenvolvimento da aprendizagem escolar, a saúde da criança, a presença de alteração na comunicação, o letramento da família e dados socioeconômicos. **Resultados:** Há relação entre recursos do ambiente familiar e o desempenho acadêmico dos alunos na leitura e na escrita (para todas as categorias do Inventário de Recursos do Ambiente Familiar - RAF). A relação estatística entre o desempenho em aritmética foi encontrada em duas das categorias do RAF: recursos do ambiente familiar e ligação família-escola. **Conclusão:** O ambiente familiar exerceu influência no processo de aprendizagem das crianças estudadas.

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**Conflict of interests:** nothing to declare.

## INTRODUCTION

The progress in the constitution of a universal, equanimous, and whole health system requires the consolidation of health actions that promote intersectorality<sup>(1)</sup>. Therefore, to ensure the right to health, some tactics that aim at contemplating the basic and strategic principles of the Unified Health System (SUS) have been structured.

Basic care is defined in Brazil by the National Basic Care Policy as a set of individual and collective actions involving health promotion and protection, prevention of problems, diagnosis, treatment, rehabilitation, damage reduction, and health maintenance, with the objective of developing full care that can influence the situation of health and autonomy of people as well as determinant conditions of health in groups<sup>(2)</sup>.

The point of entry of SUS users to primary care has been represented, since 1994, by the Family Health Strategy (ESF) because it indicates mechanisms that are favorable to integrality<sup>(3)</sup>. ESF aims at reorganizing basic care in the country according to the principles of SUS; its essential attributes are continuity, integrality, and coordination of care inside SUS<sup>(2)</sup>.

From the effective work of ESF, it was possible to observe the need for interdisciplinary programs involving professionals from several fields of knowledge in health to meet the demands of the community in the territory. Then, the Family Health Support Group (NASF) was created, aiming at amplifying the scope of basic care, working on the health project of the territory with multiprofessional actions of prevention, promotion, habilitation, and rehabilitation of individuals and the family<sup>(2)</sup>.

In this context, the speech language pathologist has relevance as a communication professional who is able to work in basic care, with the possibility of working with users when they first come to the health services<sup>(4)</sup> because Basic Health Units are the point of entrance for the population when it comes to health services<sup>(2)</sup>.

Basic care assists the subject as an individual and regarding sociocultural insertion, aiming at full care<sup>(2)</sup>; therefore, school is a privileged space for the work of NASFs, since health and education promotion are interconnected strategies, essential for any health project<sup>(1)</sup>.

From the perspective of amplifying specific health actions addressed to students in the public network (Elementary School, High School, Federal Network of Professional and Technological Education, Education for Adolescents and Adults), the Program Health in School (PSE) was established, by the Presidential Decree n. 6,286, on December 5, 2007, resulting from an articulation between the Ministry of Health and the Ministry of Education and Culture<sup>(1)</sup>.

One of PSE's objectives was to articulate the actions in the public health network with the actions in the elementary education public network, to increase the reach and the impact of actions regarding students and their families, thus optimizing the use of available spaces, equipment, and resources<sup>(1)</sup>.

As a health and education promoter, school helps to build the subject. In the school environment, each one of these

subjects carries the culture and the education from the environment where they lived in. While the child develops, the resources that influence school performance change naturally; therefore, it is possible to observe the influence of the family environment from early childhood education until university. The knowledge acquired by the children is formed by the environment where he or she lives in; therefore, it is impossible to dissociate the development of learning, family microsystem and family-school mesosystem<sup>(5)</sup>.

Components of the family environment that favor the learning process and the formation of neural networks, such as pedagogical materials, books, magazines, miniatures of animals, objects in different shapes and sizes, the family-school connection, the child's routine, and family structure, have a direct impact on the increasing learning process of the students<sup>(5)</sup>. Literature points out to a narrow relationship between the family context and the learning process of the child<sup>(6)</sup>.

The bioecological model of development, which investigates the process of reciprocal interaction between an active developing human body and people, objects, and symbols (proximal processes), is the theoretical base for the Home Environment Resources Scale (HERS). Proximal processes cannot function in places that are unstable and unpredictable in space and time. The microsystems of family and school have the proximal processes, constituting a mesosystem of connections and processes between both systems, affecting the development of the child<sup>(5)</sup>.

This study uses the existing social equipment: the health center in which community health agents (ACS) work, inside the ESF; NASF, in which the speech-language pathologist and other health professionals work; and the school inserted in the PSE, with the objective of investigating the association between the resources of the family environment and the school performance of children in a public school of Belo Horizonte, Brazil.

## METHODS

This is a descriptive cross-sectional study conducted with students in elementary school and their family members, living in a region of Belo Horizonte presenting high rates of vulnerability to health<sup>(7)</sup>. The project was approved by the Research Ethics Committee (COEP) of the institution, protocol n. 0686/11.

All of the children who were regularly enrolled in the fourth year of the second cycle of elementary school were eligible to participate in the study. However, those with history of changes in neuropsychomotor development, uncorrected hearing, and/or visual impairment were excluded from the study, or in cases when the family or the child refused to participate, or if the family was not located for the interview. Parents were enlightened as to the voluntary aspects of their participation, its goals and repercussion, and then signed the informed consent.

The children were assessed at school regarding school performance in terms of reading, writing, and arithmetic, and parents were interviewed as to the resources of the family environment in a visit to the household.

All participants performed pure tone audiometry at the school library, in an acoustic cabin, properly calibrated, to rule out the possibility of hearing loss. The normal standard for tone audiometry was considered as the presence of thresholds of up to 25 dB in the frequencies of 250, 500, 1,000, 2,000, 4,000, 6,000, and 8,000 Hz<sup>(8)</sup>.

Children underwent the School Performance Test (SPT)<sup>(9)</sup>, which consists of a reading task (individual), and a written test and an arithmetic test (both in groups). The written test assesses the writing of the person's name and isolated words after a dictation, the reading task assesses the recognition of isolated words from the context, and the arithmetic analysis evaluates simple mathematic operations.

The SPT lasted 40 minutes in the classroom, in average, for the group part, and 5 minutes for the individual part. The results were compared to the standard score of the test for the children enrolled in the fourth year of the second cycle of elementary school. Reference values of the test were considered to classify the performance as superior, medium, and inferior for each subtest.

HERS<sup>(5)</sup> was performed in household visits, combined with anamnesis. The school provided a list of addresses of the students who were part of the study. To conduct the household visits, managers of seven health centers in the area corresponding to the address of most students were contacted (five students were not inside the area of the health centers). According to the child's address, the managers informed the agent in charge of the area to accompany the researchers in household visits.

In household visits, using HERS, the resources in the family environment that could contribute to the school learning process during elementary school were investigated, and three domains were obtained: resources promoting proximal processes, activities indicating a stable family life, and parental practices that promote the family-school connection. The survey was applied with a semi-structured interview, and each topic was presented to the mother/informer orally. The examiner was free to paraphrase the content of the question in case the interviewee had difficulties to understand it<sup>(5)</sup>. In each topic, the interviewer began by asking an open question. Then, the items mentioned by the interviewee in the free answer were signed; afterwards, the interviewer presented the other items, one at a time. If the answer to the initial question included an item that was not on the list, it was marked and described in the item "other".

Besides, the interview with the parents investigated questions about the child's health, the beginning of speech, presence of changes in communication, literacy of the family, and socioeconomic data.

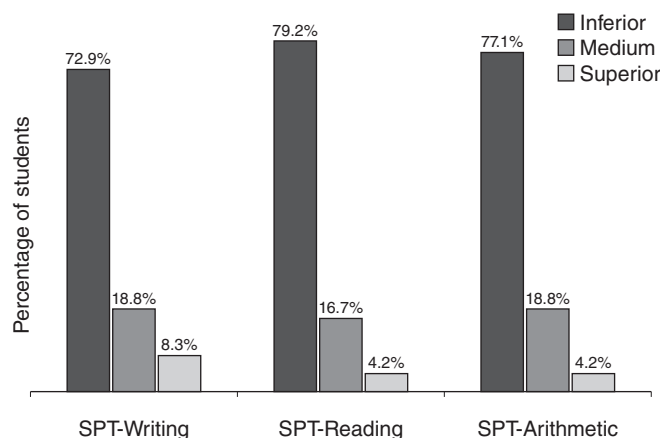
For the descriptive analysis, frequency distribution was performed for the categorical variables in the evaluation. The statistical analysis used the Student's *t*-test to relate the results from the reading, writing, and arithmetic tests to the availability of resources in the family environment. A 5% significance level was adopted. Statistically significant results were marked with an asterisk.

## RESULTS

Of the 65 assessed children, 17 were excluded from the study for the following reasons: living in an area of urban occupation that was not located by the researchers (6), not having an address in the data from the health center and school (1), lack of parent's availability for an interview with the researchers (2), having changed address without informing the school and the health service (1), household not being located by the researchers (4), altered thresholds of hearing (2), and presence of neurological changes (1). Therefore, the analyses refer to 48 children.

Of the 48 analyzed children, 28 (58.3%) were boys, aged between 8 and 12 years old, mean age of 9.3 years ( $\pm 0.76$ ). From the total, 19 (39.6%) attended full-time school from the program "Integrated School".

The SPT results can be observed in Figure 1. As shown, more than 70% of the assessed children present worse performance in the three evaluated domains (writing, reading, and arithmetic).



**Figure 1.** Performance of fourth graders of elementary school in the School Performance Test (reference values are standardized according to Stein<sup>(9)</sup>)

After analyzing the resources in the family environment, absolute values were observed ranging from 16 to 58 points, with an average of 38 ( $\pm 10.2$ ). In the category of predictable activities that indicate some level of stability in family life, the mean was 19.1 points ( $\pm 5.8$ ), ranging from 4 to 29. In the category of parental practices promoting the family-school connection, scores ranged between 5 and 18 points, with mean of 11.1 ( $\pm 3.2$ ).

The relationship between the SPT results and resources in the family environment can be seen in Table 1. For this analysis, children were grouped for each SPT test in normal (medium and superior performance) and altered (inferior performance). Table 1 presents mean and standard deviation values for each one of these groups in the three domains of HERS.

It was possible to observe relationships between the total HERS scores and writing and reading tests in the SPT. Besides, there was a relationship between the performance of students in the arithmetic test and two HERS categories: resources from the family environment and family-school connection.

The results indicate that girls performed better in reading than boys (Table 2). No relationship was observed between gender and the other SPT tests.

As to the effect of the participation in the Integrated School regarding the performance of children in the SPT, no statistically significant relations were observed (Table 3).

## DISCUSSION

This study was performed by the partnership between health and education services, by considering the principles of work from the ESF and the health planning of the territory. The analyzed students entered the PSE<sup>(1)</sup> and families were visited by the researchers accompanied by the health agents, who represent the connection between the community and health services<sup>(10)</sup>.

Partnerships between the school and seven health centers located in the area where the children lived were established.

**Table 1.** Analysis of the score in the three domains of the Home Environment Resource Inventory and performance in the three tests of the School Performance Test

SPT	Resources in family environment	Stability in family life	Family-school connection	HERS - Total
<b>SPT-Writing</b>				
Normal (n=12)	44.9 (±7.0)	20.0 (±5.8)	12.5 (±3.1)	77.4 (±8.3)
Altered (n=35)	35.8 (±10.2)	19.0 (±5.9)	10.6 (±3.1)	65.4 (±13.9)
Student's <i>t</i> -test	2.84	0.50	1.69	2.78
p-value	0.007*	0.610	0.090	0.008*
<b>SPT-Reading</b>				
Normal (n=9)	45.0 (±10.5)	18.0 (±5.0)	13.3 (±3.1)	76.3 (±11.2)
Altered (n=38)	36.5 (±9.6)	19.5 (±6.0)	10.6 (±3.0)	66.6 (±13.7)
Student's <i>t</i> -test	2.33	0.71	2.34	1.95
p-value	0.24	0.48	0.24	0.05*
<b>SPT-Arithmetic</b>				
Normal (n=10)	43.6 (±4.3)	19.2 (±5.3)	12.9 (±2.9)	75.7 (±8.7)
Altered (n=37)	36.6 (±10.9)	19.2 (±6.0)	10.6 (±3.2)	66.5 (±14.2)
Student's <i>t</i> -test	3.00	0.03	1.97	1.91
p-value	0.004*	0.970	0.050*	0.060

\*p<0.05

**Caption:** SPT = School Performance Test; HERS = Home Environment Resources Scale; SD = standard deviation

**Table 2.** Relationship between performance in the School Performance Test and gender

SPT	Female		Male		$\chi^2$	p-value
	Normal n (%)	Altered n (%)	Normal n (%)	Altered n (%)		
Arithmetic	4 (20)	16 (80)	6 (22)	21 (78)	0.34	1.00
Reading	7 (35)	13 (65)	2 (7)	25 (93)	5.65	0.02*
Writing	6 (30)	14 (70)	6 (22)	21 (78)	0.36	0.73

\*p<0.05

**Caption:** SPT = School Performance Test

**Table 3.** Relationship between performance in the School Performance Test and in the Integrated School

SPT	Participates in the Integrated School		Does not participate in the Integrated School		$\chi^2$	p-value
	Normal n (%)	Altered n (%)	Normal n (%)	Altered n (%)		
Arithmetic	3 (16.7)	15 (83.3)	7 (24.0)	22 (76.0)	0.37	0.71
Reading	2 (11.0)	16 (89.0)	7 (24.0)	22 (76.0)	1.21	0.44
Writing	2 (11.0)	16 (89.0)	10 (34.0)	19 (66.0)	3.10	0.09

**Caption:** SPT = School Performance Test

The health centers were located in neighborhoods close to school; in areas of low, medium, and high risk, with high levels of vulnerability to health in terms of sanitation and socioeconomics, with the following indicators: percentage of households with inadequate or absent water supply, sewer system, and garbage collection; percentage of inhabitants per household; percentage of illiterate people; percentage of private households whose income is up to half a minimum wage; and percentage of black/brown and indigenous people<sup>(7)</sup>. Some houses were located in areas of urban occupation, and there were no community health agents in charge of the family, no pavement on the streets, and the area was difficult to access. It was possible to observe that the family context of the children was similar due to the lack of resources and similar unconventional family organization<sup>(11)</sup>.

The investigated children mostly presented lower performance for the three categories in the SPT: reading, writing, and arithmetic. A study that compared the performance of reading and writing among students in a public school and those in a private school from Belo Horizonte showed that most poor readers and poor writers attended public schools<sup>(12)</sup>.

About 40% of the assessed children participated in the project Integrated School, and spent two shifts in the institution attending oriented activities. Integrated School was created in 2006 by the City Hall of Belo Horizonte to increase the learning possibilities of the student attending public schools, thus increasing the time they stay in school from four and a half hours to nine hours. The idea is to increase the activities conducted in school to fields such as music, sports, culture, basic computer notions, and leisure<sup>(13)</sup>. A study conducted in Massachusetts proved that only one year after increasing the time children stay in school, the students presented better results in local evaluation tests. The longer permanence of children in school allows the performance of more tasks and enables the contact with other fields of knowledge, such as music, informatics, and other languages<sup>(14)</sup>.

However, the fact that children participated in Integrated School did not interfere in their performance regarding reading, writing, and arithmetic tasks. There are two hypotheses: the time since the project has been established, which is recently, so it is not possible that the influence of this insertion in the learning development is shown. Another possible justification is that children were assessed in the beginning of the school year, so they had just entered school; therefore, there was no previous information about their attendance to Integrated School. Another hypothesis about the results is the situation of social vulnerability to which children are exposed, which can require them to spend more than in the program to show improvements in school learning. This happens because a poor school performance must be seen as a symptom that is related to multiple etiologies. Two major groups of causes to be considered are the following: matters of pedagogical difficulties and associated pathologies and disorders. Inside the group of causes related to pedagogical difficulties, unfavorable or little encouraging sociocultural conditions have a direct influence on poor school performance<sup>(15)</sup>, which can be observed in the studied population.

The assessed children had more difficulties in reading tasks. Reading is a complex and interactive process that requires two cognitive routes: the lexical and the phonological routes<sup>(16)</sup>. Two-route models help to understand the process of reading and writing acquisition, which is mutually influenced by the school and the family environment, due to the form of reading acquisition and exposure to several stimuli, which have a direct impact on the access to the phonological and lexical routes<sup>(6,16)</sup>. International studies have been showing that only the fact of reading out loud to a child leads to considerable gain in the development of oral and written language<sup>(17)</sup>, which does not seem to be true among children who are in high-risk situations.

In the analysis between the resources of the family environment and school performance, it was observed that most children do not perform regular activities other than attending school. When they are not at school, they play outside or in the house, watch television, but only a few read books or magazines at home. A lack of pedagogical resources, such as books, newspapers, magazines, and toys, was observed, as well as a family environment that would be less supportive of the low performance of their children at school<sup>(18)</sup>.

There was a relationship between the resources in the family environment and the performance of children in arithmetic and writing tests. Such findings were also found in an investigation involving the families of 100 children with school-related complaints attending the three first grades of Elementary School<sup>(19)</sup>. By comparing two subgroups that were respectively constituted of children who only had the intention of writing, and the other group with children who elaborated articulated phrases, the author observed that those with more elaborate writing lived in places with more availability of toys and books, similar to the findings in this study.

Language starts to develop together with the baby's life; therefore, actions in ESF are required, starting with puericulture, to promote language stimulation for the child. The program "Reach Out and Read", conducted in Washington, is based on evidence and prepares children to be successful at school by establishing partnerships with health servers. Health professionals work by indicating books and guiding families with regard to the importance of reading out loud to the children since early childhood<sup>(20)</sup>. In this program, it has been observed that parents who participate in are more prone to reading out loud to their children, and that the children present better performance in terms of receptive and expressive language, besides increasing the vocabulary<sup>(21)</sup>.

School performance was not related to predictable activities that indicate some level of stability in family life and that was also observed by other authors<sup>(11,22)</sup> who investigated the relationship between school performance and family constitution. It is worth mentioning that even though no direct relationship has been found in some studies, family is decisive for the emotional adjustment of the children; family stability is an essential factor for the child to be able to focus on learning activities<sup>(23)</sup>. National and international literature<sup>(23,24)</sup> show that variables from the family environment, such as perception of family involvement, are directly related to the value of the task and perception of awareness.

The family–school connection in HERS was related to the better performance of the children in writing and arithmetic tests, thus showing that the participation of the family together with the school is a successful strategy and that parents contribute largely to the children’s learning process. Therefore, one of the main objectives of PSE should be to promote the approximation between parents and school.

It is believed that the children who own more books and dictionaries, the ones who play with more pedagogical resources, and share more activities with their parents develop better writing skills<sup>(19)</sup>, which suggests better language development for the children, which is indispensable for learning reading, writing, and arithmetic skills. Preventing pathologies and promoting health is up to the professionals who work in the health centers, the entry point for SUS. The speech language pathologist has important contribution to the field of school development because this professional works with human communication and is skilled to improve the development of reading and writing among students, as well as to prevent changes and develop health promotion strategies<sup>(25)</sup>.

Education is a process that contributes with the development of the subject, and health guides the vitality and the quality of life for the individuals. Health and education are two processes that need to be side by side due to their mutual contribution for the individual and the society toward life in citizenship. In this sense, it is clear that school and community are spaces where ESP works in.

ESF uses tools based on sciences such as sociology and psychology. To ensure the promotion of quality of life and to prevent factors that can jeopardize the health of the family, education in health is an important step for the use of such tools<sup>(26)</sup>. Literature shows the efficiency of a program including household visits to mothers with the objective of promoting their children’s development, besides the positive aspects of integrating practices of stimulation and intervention of children in actions involving basic health<sup>(27)</sup>.

It is known that the partnership between education and health is necessary for the promising development of an individual. Therefore, it is necessary to mention the importance of the collective construction of these two sectors, as well as the articulation of combined actions in their agendas. In this study, it was possible to experience directly the integrated work between school and ESF, mediated by the university, which conducted this articulation. For managers and professionals of the participating institutions, the need to maintain this partnership became clear, as well as the lack of skilled professionals to work on the subjects related to school performance.

This analysis could map the resources in the family environment, once the study was conducted *in loco* by the researcher, based on HOME<sup>(28)</sup>. This instrument was internationally used for household investigations. It is important to consider that the financial cost of the study becomes higher due to household visits; however, the benefit of the fact that the researcher goes, in person, to know the family environment

where the child lives is immeasurable, once the subjective, clinical, and diagnostic impressions were personally verified by the researchers. By narrowing the gap between health and education, this study showed that combined actions in primary care can strengthen the school performance of students by intervening in the family and in the community; the school was seen as a space of health promotion. The development of intersectoral actions of health promotion allows health and education professionals to increase their potential in terms of work and reflection, extrapolating the actions in quality and magnitude, without, however, losing its specificity.

## CONCLUSION

It was observed that family environment has influence on school performance among the assessed children in the fourth year of Elementary School, and that the lack of resources, such as toys, books, and reasoning games, as well as the lack of activities performed outside of school, are related to learning difficulties among children. Therefore, these items must be approached in health promotion actions from the PSE teams, together with ESF initiatives.

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