



## Postural changes and pain in the academic performance of elementary school students

### *Alterações posturais e dor no desempenho acadêmico de estudantes do ensino fundamental*

**Maria Homéria Leite de Moraes Sampaio<sup>[a]</sup>, Lucia Conde de Oliveira<sup>[a]</sup>, Francisco José Maia Pinto<sup>[a]</sup>, Maria Zuleide Amorim Muniz<sup>[b]</sup>, Regina Cláudia Tabosa Ferreira Gomes<sup>[c]</sup>, Geni Rodrigues Loiola Coelho<sup>[a]\*</sup>**

<sup>[a]</sup> Universidades Estadual do Ceará (UECE), Fortaleza, CE, Brazil

<sup>[b]</sup> Universidade de Maringá, Maringá (UEM), PR, Brazil

<sup>[c]</sup> Universidade de Fortaleza (UNIFOR), Fortaleza, CE, Brazil

---

#### Abstract

Postural changes and pain in the spine of children and adolescents of school age are influenced by the permanent incorrect sitting position, misuse of furniture and weight of the backpack. The aim of this study was to verify postural changes and pain in the academic performance of elementary school students. It was a cross-sectional study, with a descriptive and analytical approach. The subjects were 83 elementary students, aged 8 to 12 years, of Kindergarten and Elementary Education at Paulo Sarasate Municipal School, Ceará. It was performed from March to June 2008. In the physical examination it was used an evaluation form, based on Global Postural reeducation, by Souchard method, which included the variables: compromised anterior, posterior;

---

\*MHLMS: MSc, e-mail: [mariahomeria21@hotmail.com](mailto:mariahomeria21@hotmail.com)

LCO: PhD, e-mail: [conde.lucia@gmail.com](mailto:conde.lucia@gmail.com)

FJMP: PhD, e-mail: [maiapinto@yahoo.com.br](mailto:maiapinto@yahoo.com.br)

MZAM: Specialist, e-mail: [mariazuleidemuniz@hotmail.com](mailto:mariazuleidemuniz@hotmail.com)

RCTFG: MSc, e-mail: [reginaclaudiag@unifor.br](mailto:reginaclaudiag@unifor.br)

GRLC: MSc, e-mail: [genioliola@bol.com.br](mailto:genioliola@bol.com.br)

superior shoulder muscle chains and pain and, in academic performance, a semi-structured questionnaire with the variables: behavior, attendance and performance. The data was stored in the Statistical Package for the Social Science (SPSS) version 18.0. In the descriptive analysis, absolute and relative frequencies were used, and in the inferential analysis, the following tests were applied: Mann-Whitney, to verify the existence of significant differences in changes in groups A and B, at a significance level of 5%, and the F statistical test, for comparing postural changes and pain, in the three grades. Results: it was noted that the majority of the students presented postural changes, such as forward head, lifted shoulders, dorsal hyperkyphosis and pain, which predominantly occurred in the anterior chain, when compared with the posterior and superior chains. These changes in both groups were statistically significant only in subjects of the fifth grade with satisfactory academic performance and behavior. It was concluded that there was no association between postural changes and school performance, although it was influenced by pain.

**Keywords:** Spine. Posture. Lower Back Pain. Adolescents. Students.

### **Resumo**

*Alterações posturais e dor na coluna das crianças e adolescentes em idade escolar são influenciadas pela permanente posição sentada incorreta, uso inadequado do mobiliário e peso da mochila. O objetivo foi verificar as alterações posturais e dor no desempenho acadêmico de estudantes do ensino fundamental. Estudo transversal, com abordagem descritiva e analítica, cujos sujeitos foram 83 estudantes de 8 a 12 anos da Escola Municipal de Ensino Infantil e Fundamental Paulo Sarasate, Ceará, de março a junho/2008. No exame físico, utilizou-se ficha de avaliação baseada na Reeducação Postural Global, pelo método Souchard, com as variáveis: comprometimento da cadeia anterior, posterior, superior do ombro e dor e, no desempenho acadêmico, questionário semiestruturado com as variáveis: comportamento, assiduidade e rendimento. Os dados foram armazenados no programa Statistical Package for Social Science (SPSS), versão 18.0. Na análise descritiva, usaram-se as frequências absolutas e relativas, e na análise inferencial, os testes: Mann-Whitney, para verificar a existência de diferenças significativas de alterações nos grupos A e B, ao nível de significância de 5%, e o teste estatístico "F", para comparar as alterações posturais e dor, nas três séries. Resultados: Percebeu-se que a maioria dos alunos apresentou alterações posturais, tais como anteriorização da cabeça, ombros enrolados, hipercifose dorsal e dor, cuja prevalência ocorreu na cadeia anterior. Essas alterações nos dois grupos foram estatisticamente significantes apenas naqueles com desempenho acadêmico de comportamento e rendimento satisfatórios da 5ª série. Concluiu-se que não ocorreu associação entre as alterações posturais e desempenho escolar, porém, este foi afetado pela dor.*

**Palavras-chave:** Coluna Vertebral. Postura. Dor Lombar. Adolescentes. Estudantes.

## **Introduction**

Correct posture, which represents the organization and balance of the body system, requires a position of alignment and support of the musculoskeletal structures between the various segments, which involves the adoption of a healthy lifestyle. According to Graup, Santos and Moro (1), incorrect posture habits and remaining in a sitting position for long periods predict an imbalance of the musculoskeletal system and compromise the body structure. These factors are recurrent in the school population, arising from the activity itself and the absence of mechanisms to

encourage the adoption of the correct posture. Thus, the sitting posture leads to an overload on the ischial tuberosity, due to the body weight leaning forward and reducing the myofascial flexibility, while the upright torso supports the constant action of the abdominal and back muscles.

Postural changes are disorders that affect children and adolescents (2) and have a 70% to 80% prevalence in the adult population, which undermine the social and professional performance, generating high financial costs (3, 4). Found in the anteroposterior planes, these changes include scoliosis, dorsal kyphosis and lumbar lordosis (1). According to Santos

et al., these changes undermine the support and body mobility (5). One consequence is the appearance of lower back pain or lumbago (6), process that involves biomechanical, individual and occupational factors (7). Both changes and pain require an early diagnosis, which may be through a physiotherapy evaluation performed with children and adolescents, considering that incorrect postural patterns during this stage of development may become continuous (6, 7). According to Foss, Martins and Bozola (8) the realization of postural analysis in each muscle group, performed as a form of prevention, covers the following chains: *anterior*, *posterior* and *lateral*.

From another perspective, it appears that in their daily trajectory, children and adolescents spend a large amount of time in the school environment. As described by Campos (9), "for five or six years, children go to school, where, through directed learning, they acquire the habits, skills, information, knowledge and attitudes that society considers essential to be a good citizen". Therefore, this process is named school performance. According to Dal'Igna (10), school performance is the association between the arrangement of school knowledge from childhood, the subjects, i.e. the pupils, students and apprentices, and the techniques of evaluation of characteristics, behaviors and skills of these subjects.

Although there is interaction between them, according to Campos (9) "[...] learning must not be confused with performance, which is the behavior by which the occurrence of learning takes place, this being one of the many variables that influence performance". In relation to the study of performance, "[...] this is the study of the observable changes that occur in the behavior of the individual that learns [...]" (9). Learning, according to the author, represents the process of orderly transformation of the behavior through exercise or repetition, under the influence of environmental and bodily factors. For Castro (11) this involves age, gender, socioeconomic status, color, and the social and housing profile. Therefore, the promotion of social and educational policies contributes to the identification of these factors and the introduction of practices that seek improvements in learning.

When this identification is related to the causes of performance modification in the student and the environment (9), according to Dazzani and Faria (12), "in-depth knowledge of the factors that determine and explain the reduction in the performance of students is essential [...] and represents an enormous

challenge for teachers, psychologists, educators or anyone sensitive to the demands for a more just and equitable world".

Furthermore, it is important to emphasize automations, agile and fast movements performed in a shorter time and with less effort, such as quick reading, writing words, and induction, the efficiency of which need improved mental and motor skills and habits, and "the majority of motor skills involve the overall movements and the coordination of small muscles" (9). These movements, when compromised by misalignment and instability of the spine, increase the stress of the spinal extensor muscles and lead to great discomfort in the lumbar region. Moreover, shortened ischia and ileus muscles result in painful symptoms, causing lordosis of the lumbar region, which increases the burden on the spine and the discs. This statement strengthens the argument that the school is the setting for the implementation of education and teaching-learning interventions, with school life being the principle period in which the student is in a phase of growth, and therefore, the best phase to introduce strategies and actions for the prevention of musculoskeletal disorders.

The scientific and social relevance of this study is to contribute to the thematic discussion, considering that adolescence is an ideal time to prevent and reverse postural changes, acquired mainly during the time in school, this being a form of health promotion and prevention of serious damage in adulthood. Postural analysis performed with students, besides being a conscientization tool, not only for these students but also for parents and/or guardians and teachers, is expected to contribute to the encouragement and adoption of sound postural practices, favoring the reduction of damaging posture and reverberating beyond the school environment.

The aim of this study was to analyze the existence of an association between postural changes and pain in the academic performance of elementary education students.

## Methods

A cross-sectional study, with a descriptive and analytical approach, was conducted from March to June 2008.

Participants were 83 children and adolescents of both genders, in 3<sup>rd</sup> to 5<sup>th</sup> grade of elementary

education, aged 8 to 12 years, who were enrolled in EMEIF – the Paulo Sarasate Municipal School of Kindergarten and Elementary Education, located in Fortaleza, Ceará, and attending in the afternoon period, who were present on the days of the intervention. This location was chosen as the staff developed strategies related to prevention and health promotion with the students and because they displayed interest in the study and welcomed the researchers. The age range was chosen because it is the most affected by postural dysfunctions, mainly due to the immaturity of muscle and bone formation, with the musculoskeletal system still undergoing development. Students who presented neurological disorders, non-scoliotic congenital changes, communication difficulties, or that could not remain standing were excluded.

The evaluations were performed in the school, in a space reserved and assigned by the management, where the students could be individually evaluated, wearing bathing suits or physical education uniforms. Initially, there was a visit to the school to inform the students and teachers about the purpose of the study, and to deliver the Informed Consent (IC) form, which was signed by the parents or guardians of the students who wished and agreed to participate. The study followed the recommendations of Resolution 196/96 of the National Health Council, which deals with ethical principles of research with human subjects. For this, the aims were explained, ensuring the confidentiality of the study subjects and the ethical commitment to their anonymity and freedom from any embarrassment and moral or physical suffering. If the subjects wanted to stop participating, they had that right at any time, even if the study has not been completed. The project was approved by the Ethics Committee of the University of Fortaleza - UNIFOR and data were collected after the emission of authorization No. 346/2007. Next, all participants that fulfilled the inclusion criteria were selected.

A postural evaluation form based on the Global Postural Re-education – GPR, Souchard method (13) was used as the data collection instrument. During the data collection, the student was asked to stand barefoot in the pitch position while the physiotherapist stood behind the student, checking the height of the scapulas, shoulders and iliac. Then, the student was asked to remain in an anterior trunk inclination position, checking for the presence of gibbosity. Next, the student was placed in profile, standing again in the natural posture,

for the verification of the normal curvatures of the trunk. This evaluation allowed the students to be separated into groups A and B. Group A consisted of 48 children and adolescents with spinal alterations such as kyphosis, lordosis, rectification, hyperkyphosis, hyperlordosis and scoliosis, while group B consisted of 35 children and adolescents without postural changes or pain in the academic performance of their school functions.

Finally, the teachers were given a semi-structured questionnaire, regarding the school performance of the students, based on the *Dynamic School Learning* method from the book *Applied Institutional Psychopedagogy* (14). The student questionnaire was answered by the head teacher of each of the school grades and covered the following topics: class participation, completion of classroom and homework, class attendance, behavioral performance and notes on tests and schoolwork. The data were stored in the Statistical Package for the Social Sciences (SPSS) version 18.0 program.

The descriptive analysis of the data was carried out using absolute and relative frequencies. In the inferential analysis, the Mann-Whitney test was used to verify whether there were significant differences in the postural changes, between groups A and B, at a significance level of 5%. Then, the F statistical test of variance, in the ANOVA analysis table, was used to compare the three grades studied, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup>, at a significance level of 5%, regarding postural changes and pain in the academic performance of their school functions.

## Results

In this study, in relation to the posture evaluation, it was found that the majority of the students, 48 (57.8%), presented 176 postural changes, with predominance in the anterior lesional chain, 85 (48.3%) changes, distributed in the 3<sup>rd</sup> to 5<sup>th</sup> grade, these being 21 (24.7%), 30 (35, 3%) and 34 (40.0%) students, respectively. In all the grades studied, more than half of the students (above the 50<sup>th</sup> percentile) presented postural changes or pain in the academic performance of their school functions. In the inferential analysis, when comparing groups A (consisting of 48 children and adolescents with spinal abnormalities such as kyphosis, lordosis, rectification and scoliosis) and B (consisting

of 35 children and adolescents without postural changes or pain in the academic performance of their school functions), no statistically significant difference was shown, through the Mann-Whitney test at the level of 5% ( $P = 0.670$ ); that is, there was no significant difference between groups A and B. In the stratification of the two groups, by grade, using the F-test in ANOVA, similar results were obtained, i.e., none of the grades studied (**3<sup>rd</sup> to 5<sup>th</sup> grade**) presented significance in the test at the 5% significance level: **3<sup>rd</sup> grade ( $p = .822$ ), 4<sup>th</sup> grade ( $p = .140$ ) and 5<sup>th</sup> grade ( $p = .070$ )** (Table 1). This indicated that the differences between groups A with and B without postural changes, in relation to the 3<sup>rd</sup> to 5<sup>th</sup> grades, respectively, were due to chance alone.

When relating the school academic performance, presented by the concepts behavior, attendance and performance, with the postural changes stratified by grade (3<sup>rd</sup> to 5<sup>th</sup>), it was observed that the majority of respondents, 33 (39.8%), that had postural change were in the 4<sup>th</sup> grade, with the best relative concepts (satisfactory behavior, attendance and performance) corresponding to: 12 (60%), 16 (80.0%) and 13 (65.0%) respectively. However, the students of the 3<sup>rd</sup> grade that presented no postural changes, were those who showed the best concepts, corresponding to 11 (78.6%), 12 (85.7%) and 10 (71.4%), respectively.

In general, through the Mann-Whitney test at a significance level of 5%, it was found that the school performance in the categories behavior, attendance and performance, showed no significant difference between the students who had postural change, compared to those who did not have this deviation, in all the grades ( $p = .670$ ). In particular, in the 4<sup>th</sup> grade, no statistical significance was observed in any of the concepts, ( $p = .332$ ,  $p = .386$  and  $p = .195$ ). In 3<sup>rd</sup> grade ( $p = .539$ ,  $p = .903$  and  $p = .456$ ). In 5<sup>th</sup> grade, the students with postural changes presented better behavior and performance than those without changes ( $p = .040$  and  $.029$ ), although attendance was not statistically significant ( $p = .156$ ) (Table 2).

The data of Table 3 showed that, in relating groups A (with postural change) and B (without postural change), with each of the grades analyzed separately, there was a predominance of pain among the students of the 4<sup>th</sup> grade, 11 (55.0%).

By correlating the presence of pain and the occurrence of postural change, the existence of an association between these variables at a significance level of 5% was detected, revealing that the presence of pain was significantly associated with postural changes in each of the grades analyzed: 3<sup>rd</sup> grade ( $p = .005$ ), 4<sup>th</sup> grade ( $p = .032$ ), 5<sup>th</sup> grade ( $p = .004$ ), through the Mann-Whitney test at a significance level of 5%.

**Table 1** - Postural evaluation of students of the 3<sup>rd</sup> to 5<sup>th</sup> grades of EMEIF - Paulo Sarasate Municipal School of Kindergarten and Elementary Education, 2008

Postural changes	Grade of the students			
	3rd $p = .822^*$ N (%)	4th $p = .140^*$ N (%)	5th $p = .070^*$ N (%)	Total $p = .670^*$ N (%)
<b>Group A: 48 students with changes (57.8%)</b>	13 (48.1)	20 (60.6)	15 (65.2)	48 (57.8)
Anterior chain	21 (24.7)	30 (35.3)	34 (40.0)	85 (48.3)
Posterior chain	10 (20.8)	19 (39.6)	19 (39.6)	48 (27.2)
Superior shoulder chain	6 (26.1)	8 (34.8)	9 (39.1)	23 (13.1)
Pain	6 (30.0)	11 (55.0)	3 (15.0)	20 (11.4)
Total changes	43 (24.4)	68 (38.7)	65 (36.9)	176 (100)
<b>Group B: 35 students without changes (42.2%)</b>	14 (51.9)	13 (39.4)	8 (34.8)	35 (42.2)
Total students: Group A and Group B	27 (32.5)	33 (39.8)	23 (27.7)	83 (100)

Note: (\*) Mann-Whitney test



**Table 2** - Academic performance of students of the 3<sup>rd</sup> to 5<sup>th</sup> grades of EMEIF - Paulo Sarasate Municipal School of Kindergarten and Elementary Education, 2008

Postural changes	Academic performance					
	Satisfactory behavior N(%)	Unsatisfactory behavior N(%)	Satisfactory attendance N(%)	Unsatisfactory attendance N(%)	Satisfactory performance N(%)	Unsatisfactory performance N(%)
<b>3rd Grade 27 (32.5%)</b>						
Group A: with changes, 13 (48.2%)	7 (53.8)	6(46.1)	12(92.3)	1(7.7)	5 (38.5)	8(61.5)
Group B: without changes, 14 (51.8%)	11(78.6)	3(21.4)	12(85.7)	2(14.3)	10(71.4)	4(28.6)
<b>P -value</b>	<b>.539</b>		<b>.903</b>		<b>.456</b>	
<b>4th Grade 33 (39.8%)</b>						
Group A: with changes, 20 (60.6%)	12 (60)	5 (25)	16(80)	1 (5.0)	13 (65)	4(20)
Group B: without changes, 13 (39.4%)	8 (61.5)	5(38.5)	12(92.3)	1 (7.7)	8 (61.5)	5(38.5)
<b>P -value</b>	<b>.332</b>		<b>.386</b>		<b>.195</b>	
<b>5th Grade 23 (27.7%)</b>						
Group A: with changes, 15 (65.2%)	14(93.3)	1(6.67)	15(100)	0 (0)	15(100)	0 (0)
Group B: without changes, 8 (34.8%)	6 (75)	2(25)	7 (87.5)	1(12.5)	6 (75.0)	1(12.5)
<b>P -value</b>	<b>.040</b>		<b>.156</b>		<b>.029</b>	

Note: (\*) Mann-Whitney test (P = .670)

**Table 3** - Relationship of postural change with the presence of pain among students of the 3<sup>rd</sup> to 5<sup>th</sup> grades of EMEIF - Paulo Sarasate Municipal School of Kindergarten and Elementary Education, 2008 (\*)

Grade	Presence of pain	Presence of postural change		P -value (*)
		Group A Yes (%) 48 (57.8)	Group B No (%) 35 (42.8)	
<b>3rd</b>	Yes	13 (48.2)	14 (51.8)	<b>.005</b>
	No	6 (46.2)	0 (0)	
<b>4th</b>	Yes	7 (53.8)	14 (100)	<b>.032</b>
	No	20 (60.6)	13 (39.4)	
<b>5th</b>	Yes	11 (55.0)	0 (0)	<b>.004</b>
	No	9 (45.0)	13 (100)	
	Yes	15 (65.2)	8 (34.8)	
	No	6 (40.0)	0 (0)	
	No	9 (60.0)	8 (100)	

Note: (\*) Mann-Whitney test

## Discussion

Posture is defined as a multifaceted arrangement that considers the individuality of each person who, in the environment that he/she occupies, has a physical expression linked to personality, mobility and representation, being an effect of the harmonic action of the organic systems. Diverse stimuli determine the practice of appropriate and inappropriate posture. Inappropriate posture represents the unbalanced performance of some organs of the bodily systems, triggering pain and discomfort. Appropriate posture requires balance, healthy performance of structures and organs, and physical harmony, which need conscientization, good aesthetics and care, essential to the postural system (15).

This system has three relevant functions in its control, the first of which provides support to the human body with forces acting to compose the skeletal system. The second strengthens the supportive structures, while mobilizing the body. The

third provides the necessary balance for the body from its support base (16).

The findings of this study verified the presence of postural changes in the majority of the students (children and adolescents) of school age, and corroborates with the literature, such as in the study by Graup, Santos and Moro (1), which found changes in 265 adolescent students aged 15 to 18 years; Bueno and Rech (17) in 864 students from 8 to 15 years of age; Melo, Silva, Silva and Toscano (18) in 44 children and adolescents with hearing impairments aged 7 to 17 years; Vasconcelos et al. (19) in 32 deaf students aged 7 to 21 years; Junior, Sampaio, Aguiar and Pinto (20) in 670 students from 11 to 19 years of age; and Rodrigues and Yamada (2) in 513 school children aged 11 to 15 years.

The identification of a high prevalence of postural changes in the population of children and adolescents was found in the studies by Vasconcelos et al. (19) and Rodrigues and Yamada (2).

It is important to note that the human body structure was not adapted to remain in the sitting posture for extended periods of time, to be repeatedly mobilized or to be held in fixed static postures. The structure of the spinal column consists of vertebrae, ligaments, muscles and intervertebral discs, in which components called discs are located and act as pressure cushions and bear the weight. The curvature of the spine is concave as the spine has to be mobilized with flexibility, rigidity and perfection (21).

Regarding the posture associated with the school environment, it is clear that, in the everyday activities, there is no practicing of healthy habits. Elements like furniture (desks and chairs), ergonomics and proportions of the space, the incorrect sitting posture and the inappropriate way of carrying excessive weight, potentiate postural changes. It is in this environment that the greatest problems are triggered, due to the maintenance, persistence and accentuation of incorrect postural habits (21).

This study found that, of the 83 students aged 8 to 12 years, the majority 48 (57.8%) presented changes, in which predominance was in the anterior chain, with 85 (48.3%) changes in students of all grades. The most frequent changes were forward head, lifted shoulders and dorsal hyperkyphosis. This is in agreement with the study by Detsch et al. (22), with adolescents aged 14 to 18 years, in which the high prevalence of antero-posterior changes was 70%, being more frequent in students with a normal body weight and those that watched television for more than 10 hours per week.

The lateral changes presented a proportion of 66%, being more frequent in overweight or obese students and those who had parents or guardians who had completed, at most, elementary education.

In a study by Penha et al. (23), which evaluated 132 female students aged between 7 and 10 years, the following postural deviations were observed: valgus ankle, valgus knee, knee hyperextension, medial rotation of the hip, antepulsion, pelvic anteversion, lateral pelvic tilt, lumbar hyperlordosis, trunk rotation, scoliosis, thoracic hyperkyphosis, winged scapula, shoulder abduction, prostration of shoulders, medial rotation of shoulder, shoulders imbalance and forward head.

In this study, the presence of pain associated with the existence of postural changes was detected at the 5% significance level in each grade. The study by Graup, Santos and Moro (1) aimed to analyze the prevalence of sagittal postural changes in the lumbar spine and associated factors, in adolescents of Federal Education Network of Florianópolis. The results showed a prevalence of lower back pain in 49.6% of the subjects, with a weekly frequency in 43.1% of those evaluated. Approximately 21% of the adolescent students experienced painful conditions every day.

Regarding postural changes associated with the academic performance of students, this association does not follow a paradigm in the literature, nor in the results obtained here, Although statistically analyzed, this study presented the limitation of not allowing the establishment of this association. Studies are needed with Brazilian students, which highlight this association, considering that the majority are focused on revealing its prevalence, as previously mentioned above. It is assumed that many complex factors may be related and, ideally, this would be studied and comprehended from different angles. However, it is essential to point out some important considerations of other studies on the academic performance of students, which led to the following question: In what context was the performance of the students evaluated by the teachers participating in this study?

Dal'igna (10) published a study entitled "Academic performance of boys and girls: Is there a difference?" In this study, the author analyzed how gender directs and shapes the pedagogical discourse and other discourses related to the perception of academic performance in school. Pedagogy of investigation was used and a discussion group was formed with teachers of the lower grades of the municipal and state school

networks in São Leopoldo/RS. Some of these perceptions related to behaviors and knowledge highlighted were: "Boys do not achieve the average because of their behavior - inattentive, insecure, disinterested, distracted. Regarding the girls, their difficulties are justified by their cognitive ability, therefore, they have not achieved the average due to their lack of knowledge" (10). Furthermore: "The better performance of girls is justified by their greater interest, attention and effort, while boys do not learn because they have difficulty concentrating" (10, p. 256).

Pereira (24) highlights the impact of the various threats related to the social identity in human behavior regarding the performance and the judgment and evaluation aspects. The author says: "The privileged space in which the impact of the threat to identity exerts some influence on school performance is the school environment" (24), and adds that, "[...] this context allows an increase in the importance of the beliefs welcomed by the teacher on the threats to the identity of the student [...] in the school performance" (24, p. 205). The author also warns: "it is imperative that the differences among individuals are considered, as threats to the identity tend to suffer mediation from factors such as gender, ethnicity, age, socioeconomic status or the circumstances and the idiosyncrasies of the individual" (24, p. 208).

In summary, the existence of postural changes in the school environment is worrying, making it indispensable for parents, teachers and health and education professionals to become aware of the importance of correcting and reducing these changes, in order to avoid permanent and more serious changes. For Salve and Bankoff (15), to prevent postural changes is to analyze the environment, furniture, location, type of work, break periods, equipment and instruments, to comprehend the particular dynamics of the individuals to promote the improvement of their quality of life.

## Conclusion

The findings of this study demonstrate that the majority of the children and adolescents presented postural changes such as: forward head, lifted shoulders, dorsal hyperkyphosis, hyperlordosis and pain significantly related to these changes.

In the evaluation of the chains, the anterior lesion-chain showed the highest prevalence of changes in

the study. This suggests to the school that the children with some kind of postural changes should be monitored by professionals of the area, particularly regarding the need for pain relief and impairment of the lesional chains.

According to the study there was no association between postural changes and poor academic performance, with regard to: the behavior, performance and attendance of the students in the classroom, requiring more studies in the area with a larger sample, which can be correlated with other studies and with the same variables.

This study contributed to an increase in the knowledge of the students regarding proper posture and changes that arise due to incorrect posture, considering that knowledge leads to action. For physiotherapy that deals with the complexity of changes and that has achieved a greater extent in actions aimed at health promotion and disease prevention, this study adds to the advances in the scientific field.

## References

1. Graup S, Santos SG, Moro ARP. Estudo descritivo de alterações posturais sagitais da coluna lombar em escolares da rede federal de ensino de Florianópolis. *Rev Bras Ortop.* 2010; 45(5):453-9.
2. Rodrigues PL, Yamada EF. Prevalence of postural alterations in students of Basic Education in the city of Vila Velha, Espírito Santo state, Brazil. *Fisioter Mov.* 2014; 27(3): 437-45.
3. Assis FD, Amaral C, Tucci C, Costa SMB. Uso terapêutico da radiofrequência pulsátil no gânglio dorsal da raiz de L2 na lombalgia discogênica. *Columna.* 2009; 8(2):139-42.
4. Tejeda-Barreras M, Rodriguez-Celaya C, Santillana-Macedo MA. Tratamiento de dolor lumbar crónico mediante radiofrecuencia pulsada y aplicación de esteroides em forma epidural. Estudio comparativo. *Columna/Columna.* 2010; 9(1):24-29.
5. Santos CIS, Cunha ABN, Braga VP, Saad IAB, Ribeiro MAGO, Conti PBM, et al. Ocorrência de desvios posturais em escolares do ensino público fundamental de Jaguariúna, São Paulo. *Rev Paul Pediatr.* 2009; 27(1):74-80.



6. Silva MS, Pinto MA, Gomes LMX, Barbosa TLA. Pain in hospitalized children: nursing team perception. *Rev Dor*. 2011; 12(4):314-20.
7. Barros SS, Angelo RCO, Uchoa EPBL. Lombalgia ocupacional e a postura sentada. *Rev Dor* 2011; 12(3):226-30.
8. Foss MHDA, Martins MRI, Bozola AR. Alterações posturais em cirurgões provocadas pela atividade profissional. *Rev Bras Cir Plást*. 2012; 27(2):195-200.
9. Campos DMS. *Psicologia da aprendizagem*. 41 ed. Petrópolis: Vozes; 2014.
10. Dal'Igna MC. "Há diferença"? Relações entre desempenho escolar e gênero. [Dissertação]. Porto Alegre: Universidade Federal do Rio Grande do Sul; 2005.
11. Castro RF. Fatores associados ao desempenho escolar na 4ª série do ensino fundamental. In: Lordêlo JAC, Dazzani MV. *Avaliação educacional: desatando e reatando nós* [Internet]. Salvador: EDUFBA; 2009 [cited 2015 Apr 14]; p. 265-95. Available from: [https://repositorio.ufba.br/ri/bitstream/ri/5627/1/Avaliacao\\_educacional.pdf](https://repositorio.ufba.br/ri/bitstream/ri/5627/1/Avaliacao_educacional.pdf).
12. Dazzani MV, Faria M. Família, escola e desempenho acadêmico. In: Lordêlo JAC, Dazzani MV. *Avaliação educacional: desatando e reatando nós* [Internet]. Salvador: EDUFBA, 2009 [cited 2015 Apr 14]; p. 249-264. Available from: [https://repositorio.ufba.br/ri/bitstream/ri/5627/1/Avaliacao\\_educacional.pdf](https://repositorio.ufba.br/ri/bitstream/ri/5627/1/Avaliacao_educacional.pdf).
13. Souchard PE. *Reeducação postural global*. 5 ed. São Paulo: Ícone; 2004.
14. Fagali EQ, Del Rio do Vale Z. *Psicopedagogia institucional aplicada: a aprendizagem escolar dinâmica e construção na sala de aula*. 11 ed. Petrópolis, RJ: Vozes; 2011.
15. Salve MGC, Bankoff ADP. Postura Corporal – um problema que aflige os trabalhadores. *Rev Bras Saúde Ocup*. 2003; 28(105/106):91-103.
16. Stokes M. *Neurologia para fisioterapeutas*. São Paulo: Editorial Premier; 2000.
17. Bueno RCS, Rech RR. Desvios posturais em escolares de uma cidade do sul do Brasil. *Rev Paul Pediatr*. 2013; 31(2):237-42.
18. Melo RS, Silva PWA, Silva LVC, Toscano CFS. Avaliação Postural da Coluna Vertebral em Crianças e Adolescentes com Deficiência Auditiva. *Arq Int Otorrinolaringol*. 2011; 15 (2):195-202.
19. Vasconcelos GAR, Fernandes PRB, Oliveira DA, Cabral ED, Silva LVC. Avaliação postural da coluna vertebral em escolares surdos de 7-21 anos. *Fisioter Mov*. 2010; 23(3):371-80.
20. Junior JVS, Sampaio RMM, Aguiar JB, Pinto FJM. Perfil dos desvios posturais da coluna vertebral em adolescentes de escolas públicas do município de Juazeiro do Norte – CE. *Fisioter Pesq*. 2011; 18(4):311- 6.
21. Bracciali LMP, Vilarta R. Aspectos a serem considerados na elaboração de programas de prevenção e orientação de problemas posturais. *Rev Paul Educ Fís*. 2000; 14(2):159-71.
22. Detsch C, Luz AMH, Candotti CT, Oliveira DS, Lazonon F, Guimarães LK et al. Prevalência de alterações posturais em escolares do ensino médio em uma cidade do Sul do Brasil. *Rev Panam Salud Publica*. 2007; 21(4):231-8.
23. Penha PJ, João SMA, Casarotto RA, Amino CJ, Penteado DC. Postural assessment of girls between 7 and 10 years of age. *Clinics*. 2005; 60(1):9-16.
24. Pereira ME. Identidade, avaliação e desempenho escolar. In: Lordêlo JAC, Dazzani MV. *Avaliação educacional: desatando e reatando nós* [Internet]. Salvador: EDUFBA, 2009 [cited 2015 Apr 14]; p. 201-224. Available from: [https://repositorio.ufba.br/ri/bitstream/ri/5627/1/Avaliacao\\_educacional.pdf](https://repositorio.ufba.br/ri/bitstream/ri/5627/1/Avaliacao_educacional.pdf).

Received: 09/07/2013  
Recebido: 07/09/2013

Approved: 08/19/2015  
Aprovado: 19/08/2015

