

Original articles

Suggestive signs of stress in school children with learning disabilities

Sinais sugestivos de estresse infantil em escolares com transtorno de aprendizagem

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ABSTRACT

Purpose: to compare suggestive signs of stress in children with learning disorders (with and without speech-language intervention) and in children without learning problems, and to identify suggestive signs of stress among groups according to the gender of the participants.

Methods: the study included 25 children with learning disorder. Of these children, 10 were diagnosed, but without intervention and 15 children were receiving speech-language intervention. Also 25 children without any learning problems participated in the study. In all groups, a children's stress scale was applied.

Results: it was observed that 43% of children with learning problems without intervention, 56% of children with learning problems in intervention and 83% of children without learning problem, showed warning signs for child stress. These differences were not statistically significant. In addition, were not found differences between genders.

Conclusion: in all groups, there was a high frequency of warning signs for child stress, showing that this may not be a determining factor in academic achievement in the study sample.

Keywords: Stress, Psychological; Learning; Learning Disorders

RESUMO

Objetivo: comparar sinais sugestivos de estresse entre crianças com transtornos de aprendizagem (com e sem intervenção fonoaudiológica) e em crianças sem qualquer dificuldade escolar, além de verificar sinais sugestivos de estresse entre os grupos de acordo com o sexo dos participantes.

Métodos: participaram do estudo 25 crianças com transtorno de aprendizagem, 10 com diagnóstico, porém sem intervenção e 15 em intervenção fonoaudiológica, e 25 crianças sem queixas de aprendizagem. Em todos os grupos foi aplicada uma escala de estresse infantil.

Resultados: observou-se que 43% das crianças com transtorno de aprendizagem sem intervenção, 56% das crianças com transtorno de aprendizagem em terapia e 83% das crianças sem o transtorno, apresentaram sinais de alerta. Estas diferenças não foram estatisticamente significantes. Também não foi encontrada esta diferença entre os sexos.

Conclusão: nos dois grupos houve alta frequência de sinais de alerta para o estresse infantil, mostrando que este pode não ser um fator determinante no desempenho escolar na amostra estudada.

Descritores: Estresse Psicológico; Aprendizagem; Transtornos de Aprendizagem

INTRODUCTION

Several factors may influence childhood scholar development, so difficulties in this process can be caused due to aspects of organic, intellectual/cognitive and emotional origin. By observing more closely the behavior of children with learning disorders, the interactive dynamic between the neurobiological, social and educational factors that influence the learning process should be considered. It is then necessary to distinguish, when possible, those factors that can be indicators of a learning disorder. The children's stress can be considered an aggravating factor of such difficulties, since it has direct influence on the child's behavior and can thus contribute to their school failure.

For the DSM-V¹, the term Specific Learning Disorder refers to learning difficulties and the use of academic skills, indicated by the presence of at least one of the following symptoms that have persisted for at least 6 months (although targeted interventions to these difficulties): reading words inaccurately or slowly and with effort; difficulties to understand the meaning of what is read; difficulties in orthography; difficulties with written expression (e.g. commits multiple errors in grammar or punctuation in the sentences, inadequate organization of paragraphs and written expression of ideas without clarity); difficulties to master the number sense, numerical facts or calculation, and difficulties in reasoning. According to the manual, such learning difficulties start up during the school years, but do not show through until the demands by the affected academic skills exceed the limited capabilities of the individual. Still, learning difficulties cannot be explained by intellectual disabilities, visual acuity or uncorrected hearing problems, other mental or neurological disorders, psychosocial adversity, lack of proficiency in academic instruction language or inadequate educational instruction.

It is observed that children with learning disorders maybe at high risk for developing mental disorders, as they tend to have low self-concept, high *locus* of external control, they are less socially accepted and more anxious than their peers without learning disabilities². One of these mental disorders that has become present in the lives of these children is child stress, which directly affects the entire scholar and cognitive development process.

Stress can be characterized as "a set of reactions we have when something happens that frightens us, annoys us extremely when excited or make us happy"³. It can be considered that any situation, good

or bad, which leads to a human's homeostasis loss and enables an adaptation, it creates stress, but that is only harmful if there is a individual's predisposition³. Stress develops when the requirements become superior to the individual's ability to overcome them, making it impossible to resist and to create strategies to deal with them⁴. For some authors⁵, child stress is similar to the adult in many aspects, such as difficulties of interaction and socialization, and can have serious consequences if it is excessive.

Another factor affected by stress and directly influences the children's school performance is the decrease in memory, both short and long term. The presence of acute stress activates the release of corticotropin hormone (CRH), which affects the process by which the brain collects and stores the received information, causing significant changes in neuroplasticity process⁶. Still, for the authors, stress enhances synaptic plasticity and neurons function of the amygdala, which affects differently the hippocampus and prefrontal cortex. These factors may contribute to over activation of the neural circuitry that controls fear, anxiety and emotion. It can also generate a state of depression⁷.

Previous studies that investigated the presence of signs of stress in children with learning problems found an association between the presence of stress and poor school performance⁸⁻¹¹. On the other hand, other studies have not found this association^{12,13}, since there were no statistically significant differences in childhood stress indicators between the groups with and without learning disorders.

Still, according to the literature, girls have a higher susceptibility to show signs of stress when compared to boys^{9,14-16}. Other authors¹⁷ found no statistically significant differences between the sexes, although they have found a prevalence of signs of stress in females.

After reviewing the literature, it can be considered that there is a relationship between childhood stress and school failure in children with learning disorders, as well as a higher incidence in females. However, this matter is still poorly addressed in national and international literature and deserves greater attention from researchers, since the consequences of emotional problems such as stress, have been suggested as aggravating academic difficulties faced by individuals with a learning disorder. Thus, the objective of this study was to compare the level of suggestive signs of stress in children with learning disorders (with and without speech-language intervention) and in children without school difficulties. Still, it was intended to check

the level of stress among groups according to the participants' gender.

METHODS

All procedures were submitted and approved by the Research Ethics Committee at the home institution, under protocol number 002/2012. This work is an observational research, case-control design.

Participants

Participants were 50 children of both sexes, aged between 8 and 12, students from 3rd to 7th year of elementary school, divided into the following groups:

- GI: 25 children with learning disorder, which 10 had the diagnosis of specific learning disability (SLD), but did not initiate the intervention (GIA) and 15 were receiving speech-language intervention (GIB).
- GII: 25 children without reading and writing learning complaint, which is the control group.

Children from both cited groups GI and GII were matched according to age. In the first group, 44% (11) was made up of girls and 56% (14) of boys. In the second group, 48% (12) were girls and 52% (13) were boys.

The inclusion criteria in the group with learning disabilities (GI) were: (a) Authorization of participation by parents or responsible for signing the Terms of Free and Clarified Consent Term (TFCC), according to the National Council of Health 196/969; (b) be aged between 8 and 12 years old and be enrolled in primary education; (c) normal visual and auditory acuity; (d) Provide Intelligence Quotient (IQ) within the normal range, i.e., > 80; (e) do not make use of psychotropic medication and did not file a complaint of another neurological condition, according to parents' reports; (f) For GI A group: to receive interdisciplinary diagnosis at the Clinical School of the home institution and not be receiving therapeutic intervention; (G) For GI B group: to have interdisciplinary diagnosis of SLD, evidenced by the interdisciplinary evaluation of the Clinic School at home institution and be receiving therapeutic intervention at the the same location.

In GI A and GI B groups, children were excluded whom: (a) presented other diagnoses: genetic syndromes, neurological or neuropsychiatric conditions, such as attention deficit disorder or attention deficit hyperactivity disorder (ADD/ ADHD); (b) presented other diagnoses of learning disabilities:

mixed disorder of scholastic skills, school difficulties of pedagogical origin; (c) had cognitive inability to respond to the proposed test;

For the group of children without learning disabilities (GII) the following inclusion criteria were considered: (a) parental authorization by signing the consent form; (b) to be aged 8 to 12 years and be in elementary school; (c) to be nominated by teachers for not complaining of difficulties in learning and not having school performance below expectations; (d) do not make use of psychotropic medication, does not present any type of sensory impairment, neurological and developmental delay, according to parents' reports.

They were excluded from the GII: (a) Children with a history of school failure; (b) children who had difficulties in reading and writing, according to results of clinical assessment.

Local

The application range at the GIA and GIB was conducted at the Clinic of Speech Pathology and Audiology from the home institution. Data collection in the GIA occurred at the Clinic of Diagnosis, after receiving the diagnosis of SLD. The School Clinic receives referrals of children and young people with learning difficulties complaints, among other difficulties, for the interdisciplinary assessment, diagnosis and intervention. Participants of GIB were in therapeutic intervention at the Written Language Clinic, also in School Clinic from the home institution where data were collected. For GII, data collection was carried out at the participants' school, which is municipal and located in the interior of São Paulo state, in an appropriate room granted by school officials.

Procedures

The children from both groups were submitted to the Child Stress Scale (CSS) developed by Lipp and Lucarelli¹⁸. The scale consists of 35 items with Likert scale from 0 to 4 points, grouped into four factors: physical reactions (PR), characterized as physical changes in the individual's body; psychological reactions (PR), which are emotional, such as anxiety, tension, anxiety, etc. psychological reactions with depressive component (PRDC), which are beyond emotional reactions associated with negative behaviors, and psycho-physiological reactions (PPR), when there are physical and emotional changes in the individual. According to each statement, the child should not

fill any part of a circle if the exposed situation never happens; fill a quarter of this circle when it happens a bit; two quarters when it happens sometimes; three quarters when almost always happens and the whole circle when it always happens.

Each child was given a pen and a form of the scale, and a demonstration by the researchers the correct way to answer each question.

The calculation of the response was made by counting the points assigned to each item; each quarter circle completed by the child is equivalent to one point. For final analysis, the test was divided into 4 phases: Alert, being the transient stress (total score range between 39.6 and 59.5); Resistance, characterized by an excess of stress sources in the child's life (total score range above 59.5 to 79.4); Near-exhaustion, being a very serious stage of stress (total score range above 79.4 points to 99.3, 7 or more items have circles completely painted in of full scale) and Exhaustion, the most severe phase of stress (total score above 99.3 points, independently of the score in the others criteria regarding the different stress factors).

Data analysis

The comparative statistical analysis was performed between groups and genders. The statistical Chi-Square test was used, adopting the significance level of 5%.

RESULTS

It was observed that 57% of children with SLD without intervention (GIA) did not show any sign of stress. In the group with SLD in the intervention

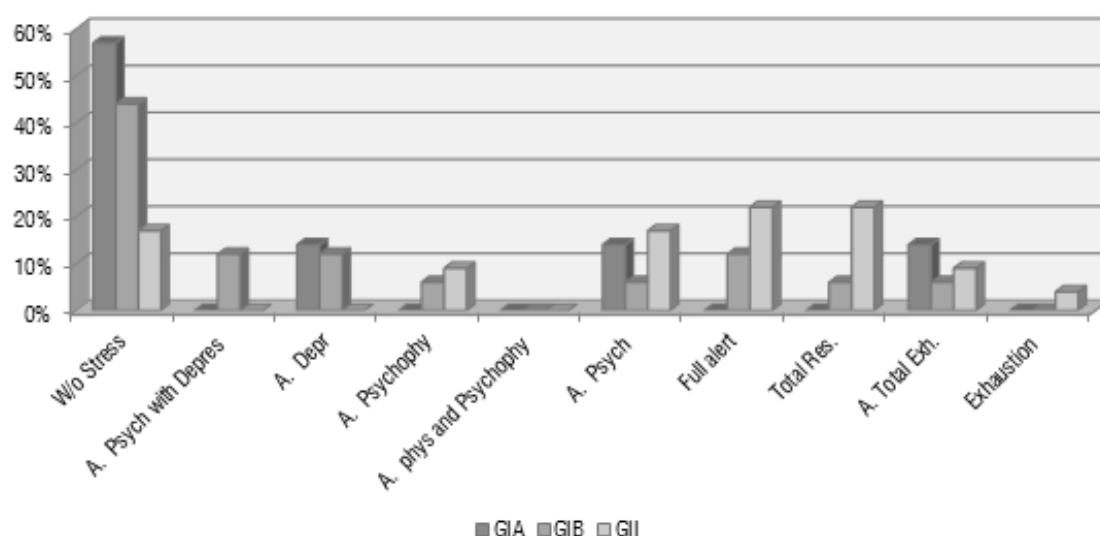
process (GIB), it was observed in 44% of children. On the other hand, only 17% of children without SLD (GII) showed no sign of stress. Thus, most children without learning disorder, as well as those just diagnosed with SLD and those who were in the intervention showed some warning signs for stress. It is observed in Figure 1 that 22% of children without SLD demonstrated full alertness and total resistance, and 17% presented alertness on psychological reactions. In the group with the disorder, 14% of children in GIA and 12% of GIB presented alert on depression, and 12% of the GIB children presented alert on psychological reactions with depressive component. In short, for the group without disorder, the psychological reactions were a more frequent warning sign. In the group with SLD, the most common warning signs for the GIA were for depression and psychological reactions, and for the GIB the most frequent warnings were psychological reactions with depressive component.

Figure 1 shows the alert reactions to the different dimensions of CSS, in different groups.

Despite noting differences between the groups regarding the stress level, the comparative statistical analysis showed no statistically significant difference in the analyzed parameters. For this, the level of stress among the three groups was compared, also, separating the groups between: GIA compared to GII, GIB compared with GII, GIA added with GIB and compared with GII, as shown in Table 1.

The stress level among boys and girls was also compared, considering the total sample, not being noticed statistically significant difference between the genders, although the number of girls with any warning signs is higher than boys (Table 2).

Parameters of childhood stress level in different groups



Subtitle:

W/o Stress – without stress

A. Psych with Depres – Alert in psychological reaction with depressive component

A. Depr – Alert in reaction with depressive component

A. Psychophy – Alert in psychophysiological reaction

A. phys and Psychophy – Alert in physical reaction with psychophysiological component

A. Psych – Alert in psychological reactions

Full alert – Full alert

Total Res. – Total resistance

A. Total Exh. – Almost total exhaustion

Exhaustion – Exhaustion

Figure 1. Comparison of the presence of suggestive signs of stress between groups (GIA - children with learning disorder who has never received speech therapy; GIB - children with learning disorder in speech therapy and GII - children without learning problems)

Table 1. Comparison between groups in relation to stress level

Stress level parameters	GIA (n=7)	GIB (n=16)	GII (n=23)	GIA X GIB X GII (p value*)	GIA X GII (p value*)	GIB X GII (p value*)	GIA + GIB X GII (p value*)
No stress	57%	44%	17%	0.147	0.073	0.143	0.063
Psychological alert with depressive component	0%	12%	0%	0.141	----	0.082	0.148
Alert in depressive component	14%	12%	0%	0.241	0.065	0.225	0.148
Alert in Psychophysilogic	0%	6%	9%	0.716	0.419	0.778	0.550
Alert in physical and psychophysiological	0%	0%	0%	0.352	0.419	0.226	0.148
Alert in Psychological	14%	6%	17%	0.646	0.356	0.791	0.550
Full alert	0%	12%	22%	0.407	0.177	0.820	0.437
Total Resistance	0%	6%	22%	0.198	0.177	0.187	0.080
Almost total exhaustion	14%	6%	9%	0.370	0.666	0.226	0.550
Exhaustion	0%	0%	4%	0.600	0.575	0.395	0.312

*p value considered = <0.05 (chi-square test)

Subtitle: GIA - children with specific learning disorder who has never received speech-language intervention; GIB - children with specific learning disorder in speech-language intervention and GII - children without specific learning problems

Table 2. Comparison between boys and girls in relation to stress level

Stress level parameters	Boys (n=24)	Girls (n= 22)	P value*
No stress	50%	27%	0.686
Psychological alert with depressive component	4%	0%	0.166
Alert in depressive component	8%	0%	0.166
Alert in Psychophysiological	8%	4%	0.603
Alert in physical and psychophysiological	4%	4%	0.950
Alert in Psychological	4%	9%	0.499
Full Alert	8%	18%	0.892
Total Resistance	8%	18%	0.322
Almost total exhaustion	0%	13%	0.061
Exhaustion	4%	0%	0.333

*p value considered = <0.05 (chi-square test)

DISCUSSION

Given the obtained results in this study in which there were no statistically significant differences in the stress level among children with and without SLD, nor between boys and girls, these results were also observed in previous studies^{12,13,17}.

In a study¹², besides not showing statistically significant difference in the stress level among students with and without learning difficulties in 3rd and 4th grade, the authors found 23.3% of the samples were at risk for emotional and health problems. Students with learning disabilities, when compared with the subgroup without school problems, reported more physical illnesses and symptoms, headache complaints, mainly, and behaviors indicative of stress, anxiety and depression, more often fears and nightmares. In our study, we also observed warning depression signs in the group with SLD (14% in diagnostic process and 12% in intervention). The greater or lesser probability of depression appearance is seen as the result of a series of environmental conditions interaction, particularly stress, loss and individual predispositions¹⁹.

A study¹³ that evaluated 342 children at a school in São Paulo also found no statistically significant differences between the groups with and without school failure, corroborating the results of our study. Although, only 30% of the studied children showed stress signs, and of these, 38.2% were indicated as having poor school performance. Yet, when the authors studied the childhood stress from the average school performance achieved by children, it could be seen that children with stress had a worse performance when compared

to children without stress. Thus, the study showed the influence of stress in school performance.

By researching young adults and college students with high and low academic achievement, some authors^{20,21} also found no significant correlations between performance and stress level experienced by graduate students, but the authors related the academic qualifications of students with other variables, such as behavior patterns and age.

On the other hand, unlike this research, some studies indicate the relationship between stress level and low academic performance, and they are described below.

In the study conducted by Stasiak and Weber⁸, 39 children from the elementary school were evaluated and these authors reported the psychophysiological factors as a higher factor that interferes with learning, such as colleague's bad behavior, or even teacher disincentives; what differs from the results found in our study, in which that most frequent warning signs for the group with no intervention disorder was for depression and psychological reactions (such as anxiety, tension and anguish), and from the group in intervention, the most frequent warnings were psychological reactions with depressive component and alert to depression.

The study conducted by Pacanaro²² found that 40% of the sample with learning difficulties showed high stress levels, and the difficulty of learning can be a contributing factor to increased stress, although the majority of the sample did not show suggestive stress signs. Another study⁹ that related stress and school, conducted with 158 students from 1st to 4th grade, with and without learning difficulties, found a high frequency of stress symptoms (55% of the sample), particularly

among the weakest students (67%), more frequently among girls, predominantly cognitive symptoms (getting worried about bad things that can happen, be afraid and desire to cry). Students classified as weak showed difficulty paying attention and felt sad. Still, when analyzing the level of stress among older children and young people, one study¹⁰ found that a large part out of 341 analyzed adolescents presented median stress levels, highlighting the academic difficulty as a major influencer of the observed stress.

In our study, 83% of children without learning complaints have some warning stress sign, compared to 43% of the group with SLD in the evaluation process and 56% in the intervention process, therefore, we cannot attribute the stress as a contributing factor for learning problems. In this regard, some authors^{23,24} reported that stress does not always have negative effects. For them, stress is part of life, and when well managed can have a positive effect, and when poorly managed or ignored can be destructive. The results of a study²⁵ suggest that stress levels during emotional learning tasks operate as a switch, determining the memory destination. On the other hand, the information from this study about the high frequency of warning stress signs among children with adequate school performance elicits the reflection that such children could present even better results, further developing their potential in the absence of stressors. Another study²⁶ investigated the stress and malnutrition effect on learning in rats. The results showed no effects of isolated stress on learning, however, in previously undernourished rats, an episode of acute stress, before the execution of learning tasks and spatial memory, positively affects the acquisition of learning. On the other hand, the information from our study of high frequency of stress warning signs among children with adequate school performance elicits the reflection that such children could present even better results, further developing their potential in the absence of stressors.

Regarding comparisons between the genders, one study¹⁴ indicated the difference between boys and girls in stress event, pointing the female as the one with a higher incidence of symptoms, even considering the social and cultural aspects. Pacanaro and Nucci¹⁷ did not identify statistically significant differences in stress responses between male and female with the 106 students of 4th grade students of public and private school, although there was stress prevalence in females.

A survey¹⁶ observed relationship between emotional problems (including stress) with school performance, also pointing to a higher prevalence of stress and anxiety in female gender, which also points out another study⁵ with 883 children from private, municipal and state schools, which showed that 18.2% had stress levels, also with a higher prevalence in females.

These results corroborate the data from our study, which found a higher frequency of warning stress signs in female gender, although no statistically significant difference was observed.

Researchers¹⁵ observed the presence of stress symptoms in 255 schoolchildren aged 7 to 14 years old, from three different types of schools (municipal, private and philanthropic particular confessional). The authors analyzed the difference in stress levels between schools, gender and grade, and found that the type of school had a strong association with the students' stress level and the number of girls with stress was significantly higher than boys, which differs from the results of our study. The authors concluded that schools have an important role in childhood stress and it is possible within a school to present low stress levels, depending on the characteristics thereof.

Some studies with school age children have shown high prevalence of stress, ranging from 30% to 60%^{5,9}, which corroborates our study, and it was observed a high frequency of warning signs for the group with SLD (43% in a diagnosis process and 56% in the intervention process) and especially for the group without learning complaints (83%).

In the period of intellectual, emotional and affective development, children are faced with numerous generating stress situations and, most often, do not yet have the ability to deal with these situations. However, for some authors²⁷, not all children undergoing the same stress level develop stress symptoms and various social support forms that the child receives directly influence the stress level in childhood.

A survey conducted among 66 schoolchildren with pronounced stress symptoms showed that, according to the complaints cited by children, parents and teachers have a great impact on the development of childhood stress¹⁵. Other authors¹² also found that school and familiar context events could hinder academic performance.

However, a good academic performance can bring different consequences for the child: it helps children improve their self-esteem; however, if parents or other significant adults press them demanding perfection, the

same school performance may also constitute a factor that makes the child more vulnerable. Still, stressful experiences related to school environment, such as those that occur in tests situations, competitions, conflicts with peers or teachers, can lead to unhealthy results such as phobias, somatic complaints and depressive episodes²⁸. Thus, as much strenuous and clever the child is, he will hardly perform well in school during a stress crisis, because the symptoms directly influence school performance²⁹.

A study³⁰ investigated the effect of an intervention program in math skills in children with dyscalculia. There was a reduction of stress level, attention problems and anxiety to the extent that there was an increase in math grades. The authors reported that higher than expected emotional problems were observed for this group. Thus, a specific intervention in children with problems in mathematics showed positive effect on stress level of these children. Although the cited study has stimulated mathematical abilities, this data does not support the present study, since there was no statistically significant difference between the group with learning disorder who has never received speech-language intervention, group in intervention and the group without learning problems, demonstrating that the intervention with the reading and writing skills did not provide differences in the stress level of the studied individuals.

Regarding school environment, behavior and teacher's attitudes in with the student are paramount, because the teacher can project in students their own complexes, emotional, marital, social difficulties, and repeat with the child their own experiences of misplaced or suffered education³¹. These events can cause confusion in the student in the learning process and the school can become a stress source³².

Thus, all these above mentioned factors may be related to the high frequency of warning signs in our study, for all studied groups, and they need to be addressed in future studies, in order to reduce this incidence, since stress can cause serious damage in the academic and social life of these children, as previously discussed.

Still, for the teenager who has affectionate and close family relationships, are better able to cope with stressful experiences than those without such support, and family support constitutes the most important protective factor in adolescence¹⁹.

As previously discussed, several studies indicate differences in stress levels between genders. To know about stress factors between boys and girls is

fundamental to provide better learning conditions in schools, respecting the gender differences. It is also important to know these differences and what causes high levels of stress between genders, to be possible to develop in schools a guidance of parents and teachers in order to promote mental health and psychological well-being of children in development, respecting their particularities¹⁷.

Thus, further research is needed, with larger samples of students in order to investigate and understand the different causes of stress in school and family environment, and its influence on academic performance, also arousing the professionals' views that working in the diagnosis and intervention of learning problems, in order to minimize the symptoms and provide protective factors for this emotional issue. Such information are relevant for the promotion of institutional policies that enable better conditions for students to develop their academic potential and a better quality of life.

CONCLUSION

In this study, no statistically significant differences were observed for stress signs among children with and without SLD, although there was a high frequency of warning signs in all studied groups. This difference was also observed between boys and girls in the sample. Thus, the need for further research with emphasizes on larger samples, to determine whether the emotional factors such as stress, actually have an influence on the school performance of children with learning disorder.

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