School performance of children with learning difficulties: comparison between children with and without intellectual disabilities

Desempenho escolar de crianças com distúrbio de aprendizagem: comparação entre crianças com e sem deficiência intelectual

El rendimiento escolar de los niños con dificultades de aprendizaje: comparación entre los niños con y sin discapacidad intelectual

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Abstract

In a culture where the ability to read / write is so valuable, studying the variables involved in learning disabilities is very important. These variables are related to organic and social factors and since these subjects are important and complex, many professionals research them. In the present study, we examined the school performance of children with learning difficulties. Children of the first group had intellectual disability (ID) whereas the cognitive level of the children in the second group was adequate. The diagnosis of ID and learning disorder was made after review and discussion by a multidisciplinary team and included mood disorder, attention deficit disorder, hyperactivity disorder, and environmental inadequacies, among others. The initial hypothesis was that children with ID had worse academic performance; however, after statistical analysis, we observed that children with a normal cognitive level had great academic difficulty, as also did those with ID. These data are a warning for us, because they show that children with poor school performance who are "labeled" by their teachers, parents and other professionals as having intellectual disabilities really have and average cognitive level. However, they have other features that interfere with learning, such as emotional and environmental changes. The study also reinforces the importance of a differential diagnosis in each case, because even though these children show the same school performance, the cause of their problems is distinct and there is a more appropriate treatment for each specific case.

Keywords: Intellectual disability; Attention deficit disorder with hyperactivity; underachievement; Learning disorders; Differential diagnosis.

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Resumo

Em uma cultura onde o saber ler/escrever é tão valorizado, estudar as variáveis envolvidas nas dificuldades de aprendizagem é de suma importância. Essas variáveis são relacionadas a fatores orgânicos e sociais e, por tal tema ser tão importante e complexo, diversos profissionais o pesquisam. Neste trabalho analisamos o desempenho escolar de crianças com dificuldades de aprendizagem, mas em um grupo as crianças apresentavam deficiência intelectual (DI) e no outro, o nível cognitivo médio. Vale ressaltar que tanto o diagnóstico de DI como o de alterações de aprendizagem foi dado após avaliação e discussão em equipe multiprofissional. A hipótese inicial era que as crianças com DI tivessem um pior desempenho acadêmico, porém, após análise estatística dos dados, observou-se que as crianças com nível cognitivo normal apresentavam uma grande dificuldade acadêmica, assim como aquelas como DI. O diagnóstico médico dessas crianças era variável, englobando transtorno do humor, transtorno do déficit de atenção e hiperatividade, inadequações ambientais, dentre outros. Este dado serviu como alerta, demonstrando que muitas crianças com pobre desempenho escolar, que são "rotuladas" por seus professores, pais e outros profissionais como tendo deficiência intelectual, na verdade apresentam nível cognitivo na média, mas possuem outras variáveis que interferem de modo importante na aprendizagem, como alterações emocionais e ambientais. O estudo também reforça a importância do diagnóstico diferencial em cada caso, pois mesmo essas crianças apresentando o mesmo rendimento escolar, as causas são variáveis e, em cada situação há um tratamento mais apropriado, melhorando o prognóstico.

Palavras-chave: Deficiência intelectual; Transtorno do déficit de atenção com hiperatividade; Baixo rendimento escolar; Transtornos de aprendizagem; Diagnóstico diferencial.

Keywords: Intellectual disability; Attention deficit disorder with hyperactivity; underachievement; Learning disorders; Differential diagnosis.

Resumen

En una cultura donde la capacidad de lectura/escritura es tan valorada, el estudio de las variables que intervienen en los problemas de aprendizaje es de suma importancia. Estas variables están relacionadas con factores orgánicos y sociales y porque este tema es tan importante y complejo, muchos profesionales lo investigan. En este estudio se analiza el desempeño académico de niños con problemas de aprendizaje, en un grupo de niños con discapacidad intelectual (DI) y en otro con nivel cognitivo normal. Tanto el diagnóstico de DI como de trastorno del aprendizaje fue definido después de evaluación y discusión en equipo multidisciplinario. La hipótesis inicial era que los niños con DI tendrían un rendimiento académico peor, sin embargo, después del análisis estadístico, se observó que los niños con nivel cognitivo normal presentaban una gran dificultad académica, así como aquellos como DI. El diagnóstico médico de estos niños variaba, abarcando trastorno del estado de ánimo, ~~de~~ hiperactividad y déficit de atención, deficiencias ambientales, entre otros. Estos datos han servido como una advertencia, mostrando que muchos niños con bajo rendimiento escolar, que están "etiquetados" por sus profesores, padres y otros profesionales como teniendo discapacidad intelectual, en realidad tienen nivel cognitivo en promedio, pero son influienciados por otras variables que interfieren de manera importante en el aprendizaje, como cambios emocionales y ambientales. El estudio también refuerza la importancia del diagnóstico diferencial en cada caso, porque aun que lo niños presenten el mismo bajo rendimiento escolar, las causas son variadas y, en cada caso hay un tratamiento más apropiado lo que mejora el pronóstico.

Palabras clave: Discapacidad intelectual; Trastorno por déficit de atención con hiperactividad; Rendimiento escolar bajo; Trastornos del aprendizaje; Diagnóstico diferencial.

Introduction

The causes of school failure have been studied by professionals from different areas, such as neurologists, pediatricians, speech therapists, psychologists, and pedagogues. On this basis, a common definition of the learning difficulty or disorder is a highly complex task. Poor academic performance is one of the more evident manifestations present both in children simply showing learning difficulties as in children who really have a learning disorder.

Learning difficulty is characterized by a result substantially below that expected for the development of basic school elements[1-2] and is manifested as extrinsic factors, such as emotional and behavioral impairment.

Learning disorder, on the other hand, is an expression that refers to a heterogeneous group of changes and manifestations due to significant difficulties in the acquisition and use of hearing, speech, reading, writing, reasoning or mathematical skills, characterized by a

performance below the expected level in reference to the measurements of intelligence and education appropriate for age[3]. In this condition, there is aptitude-achievement discrepancy, with aptitude being represented by the general capacity of intelligence and achievement by specific performance in reading, written expression or mathematics representing academic performance[4]. The greatest difference between them is that learning difficulty is manifested through extrinsic factors while learning disorder is represented by intrinsic factors in each individual.

Intellectual deficiency (ID) has been pointed out as the main cause of failure of school performance. It is defined as stopped or incomplete development of intellectual functioning, essentially characterized by impairment during the period of development of the faculties that determine the overall level of intelligence, i.e., of cognitive, language and motricity functions and of social behavior. The prevalence of ID ranges from 1 to 3% of the population[5], although there are estimates of up to 10%.

ID is diagnosed on the basis of three criteria: beginning of clinical signs and symptoms before 18 years of age, intellectual function significantly below average demonstrated by an intelligence quotient (IQ) of 70 or less, and deficient adaptive skills in at least two of the following areas: communication, self-care, social/interpersonal skills, self-orientation, school performance, work, leisure, health, and safety. An IQ of more than 85 is considered normal and individuals with an IQ of 71 to 84 are considered to have borderline intellectual function[6].

One of the instruments used for neuropsychological assessment is the Wechsler Intelligence Scale for Children (WISC)[7]. This test was first published in 1949 in the United States, was then revised in 1974 and fully remodeled in the 1990's (WISC III) [7]. It is a psychometric test, thus being exclusively used by psychologists. According to current legislation, it assesses and measures 2 important data, i.e., the verbal IQ and the execution IQ. The total IQ is the result of the sum of the two measurements (verbal and execution IQ). This instrument is used to assess children and adolescents aged 6 to 16 years and is one of the tests necessary for a diagnosis of intellectual deficit.

Another tool is Raven's Progressive Matrix Test, developed by John C. Raven at the University of Dumfries, Scotland, and standardized and published in 1938. The original form denoted Standard Progressive Matrices, known in Brazil as General Scale, was planned in order to cover all ranges of intellectual development. However, it was obseved that children had difficulties with tests requiring more reasoning. Thus, a special colored version was developed in 1947 (Raven's Colored Progressive Matrix Test), applicable to children aged 3 to 11 years and to persons with difficulties in understanding[8].

The objective of the present study was to analyze the school performance of children with learning difficulties who had been diagnosed or not with intellectual deficiency.

Methods

The study was approved by the Research Ethics Committee of HCRP–USP (Protocol HCRP nº 12250/2014). This was a retrospective study based on the data contained in the medical records of the institution.

The sample consisted of data from the medical records of children assessed between 2008 and 2013 at a specific outpatient clinic for children with learning difficulties seen at HCRP–USP, a tertiary care hospital. The data for 2014 were not included in the study because of a transition in the protocols of psychological evaluation from WISC III to WISC IV.

The data were divided into two groups: G1 (n = 11) consisting of the medical records of children with learning difficulties and with a diagnosis of mild intellectual deficiency, and G2 (n = 13) consisting of the medical records of children with learning difficulties and

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with a median/borderline cognitive level. The diagnosis of intellectual deficiency was made after multidisciplinary discussion involving a speech therapist, a neurologist and a neuropsychologist and was based on the results of the WISC III[9], Raven8 and Vineland II Scale[10].

Children with syndromes that would impair the cognitive part, with changes in hearing function, with medical records containing incomplete data regarding multidisciplinary assessment and an undefined multidisciplinary diagnosis were excluded from this Scale study.

Material and procedure of data collection

The following data were collected and tabulated: birth history of the child, age, gender, schooling and the data listed below regarding the diagnosis after evaluation/discussion of the cases by the multiprofessional team.

- Results of the Wechsler Intelligence Scale for Children (WISC III)[9]

- Results of Raven's Progressive Matrix test[8]: This is a nonverbal test used to test intelligence.

- Results of the Vineland II Adaptive Behavior Scale [10]: This instrument assesses the adaptive behavior of an individual. It can be applied as an interview directed to the parents and deals with four major domains: communication (receptive, expressive and written); autonomy (personal, domestic and communicative); socialization (interpersonal relations, leisure and social rules), and motor function (fine and gross).

Difficulty in two of these areas associated with low IQ values in the above tests suggests the presence of intellectual deficiency.

- Results of the School Performance Test (SPT)[11]: This instrument permits the quantitation of children's reading, writing and arithmetic performance. Crude scores were obtained for the three subtests: writing (writing one's own name and separate words presented in the form of dictation – a maximum of 35 points), arithmetic (oral solution of problems and written arithmetic operations – a maximum of 38 points), and reading (recognizing words separate from a context - a maximum of 70 points). The crude values achieved by the child in each subtest were collected, as well as their total value (sum of the three subtests).

Statistical analysis

Descriptive statistics methods were used to characterize the children in terms of the variables studied.

The Mann-Whitney test was used to analyze the difference in school performance between groups and the test of Equal Proportions was used to determine whether there was a difference in proportion between goups regarding the variables of pre-, peri- and postnatal intercurrences, with the level of significance set at $\alpha = 5$ in all analyses.

Results

Forty-three medical records were first selected. Nineteen of these, containing incomplete data, were excluded. Thus, the study was conducted on the data of only 24 children.

The characteristics of the sample were as follows: mean age was 10 years and three months (standard deviation of 1.6) for G1, and nine years and five months (standard deviation of 2.5) for G2. G1 (n=11) consisted of five boys and six girls and G2 (n=13) consisted of seven boys and six girls. Schooling ranged from the 2nd to the 7th year of elementary school in both groups, with a similar distribution in both groups.

The intercurrences during the pre-, peri- and postnatal periods are reported as percentages in Figure 1. There were no statistically significant differences between groups in the proportion of intercurrences.

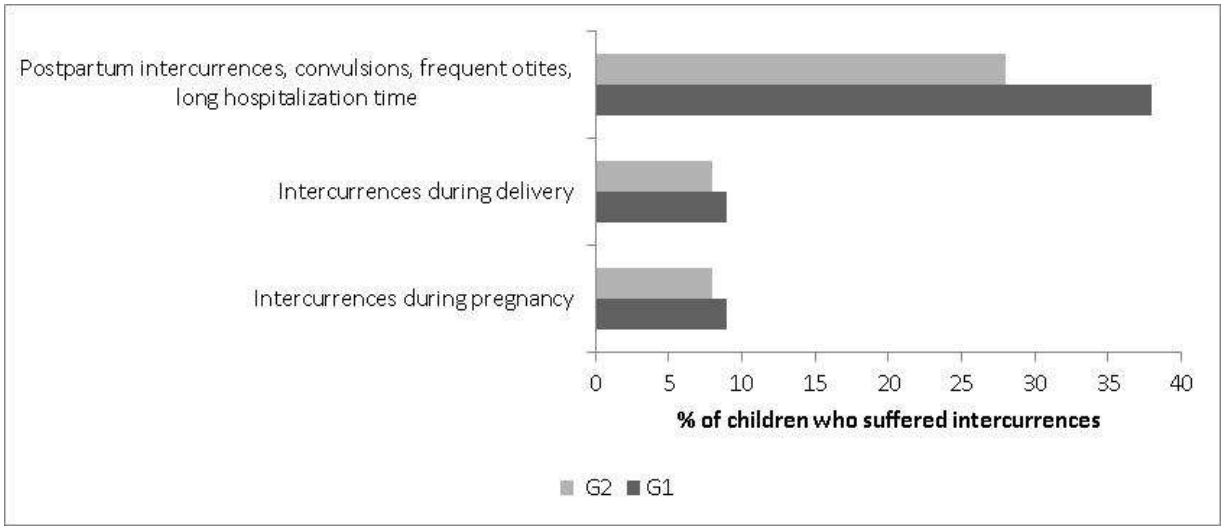

Figure 1. Percentage of intercurrences during the pre-, peri- and postnatal periods. Equal proportion test with no statistically significant differences ($\alpha = 0.05$) .

Figure 2 illustrates the diagnoses made by the multiprofessional team for G2 children. There was wide variability, with the presence of diagnoses of attention deficit and hyperactivity disorder (ADHD), emotional changes, environmental changes, dyslexia and specific language impairment (SLI). It should be pointed out that G1 children had a diagnosis of intellectual deficiency.

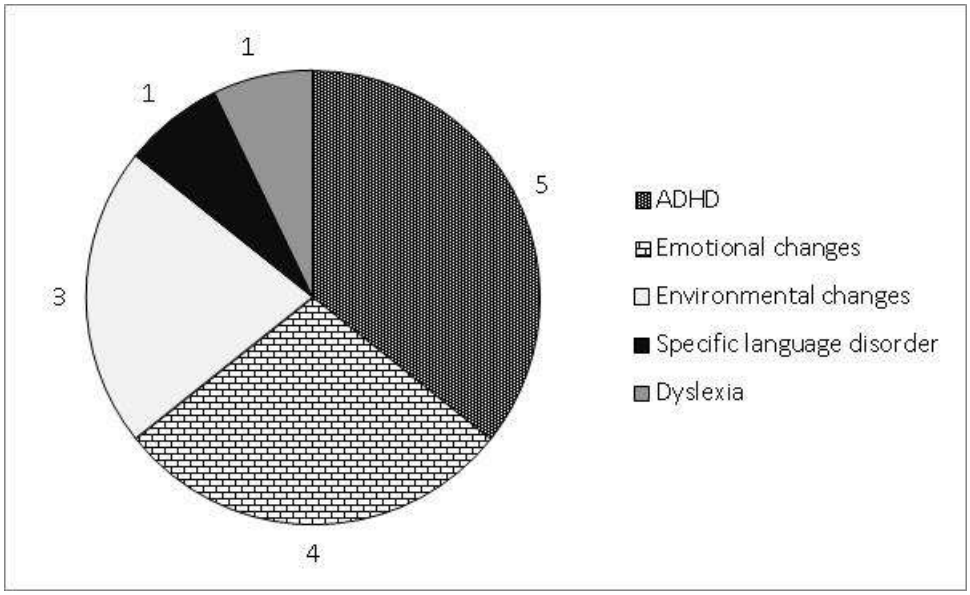

Figure 2. Diagnoses of G2 children after discussion by a multidisciplinar team

The SPT results for the different tasks (reading, writing and arithmetic) are listed in Figure 3. No statistically significant differences were observed between groups when performance was analyzed separately for each task (reading, writing and arithmetic). However, when the general performance in the test was analyzed (sum of scores) the result obtained demonstrated that G2 had greater difficulty in the execution of the tasks compared to the group of children with intellectual deficiency (G1). Statistical analysis showed that G1 had significantly higher scores than G2.

For better visualization, the same results are presented graphically in Figure 4.

Figure 3. Values for the various SPT tasks in each group

	G1					G2					
	Mean	**DP**	**Med**	**Min V**	**Max V**	**Mean**	**DP**	**Med**	**Min V**	**Max V**	**p-valor**
Writen	10.4	9	7	0	29	3.8	7	1	1	25	0.4
Reading	34.7	5	43	0	69	14	5	2.5	4	65	0.3
Arithmetic	6	29	4	0	18	4.9	24	4.5	1	17	0.6
Total	51	39	62	0	106	22.8	35	10	10	107	0.02*

SD = standard deviation/ Med = median/ Min V = minimum value/ Max V = maximum value. There was no statistically significant difference according to the Mann–Whitney test (α = 0.05). * indicates a statistically significant difference

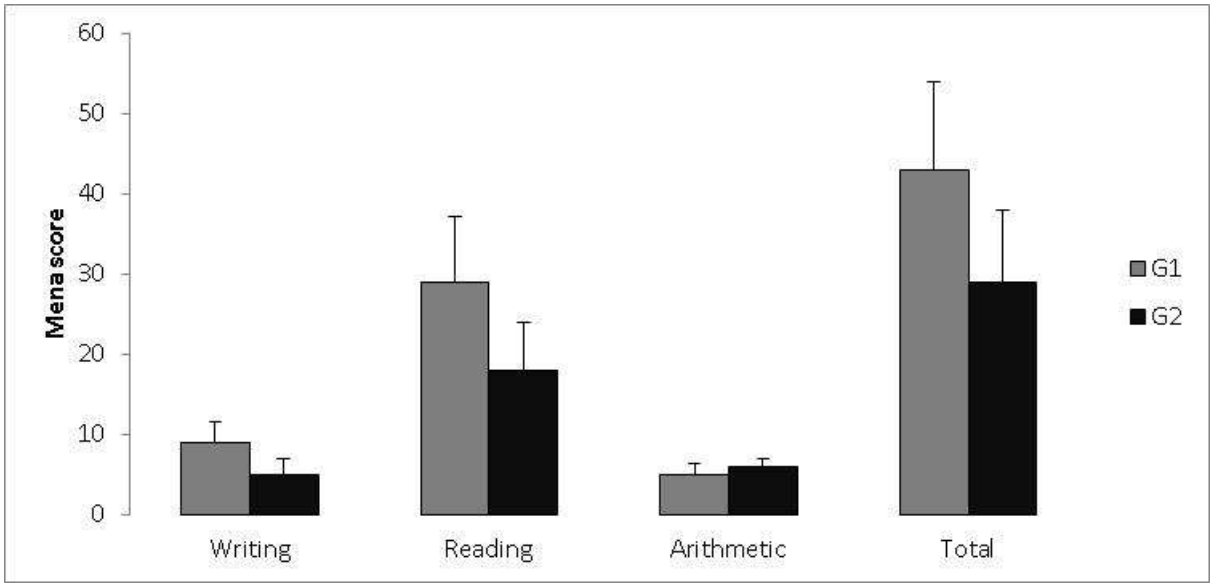

Figure 4. Mean group scores per SPT task and total score. * indicates a statistically significant difference between groups in this item according to the Mann–Whitney test (α = 0,05).

Discussion

The literature indicates that problems occurring during the pre-, peri- and postnatal period are among the factors that can cause intellectual deficiency. Examples of prenatal causes are maternal undernutrition, infectious diseases, and toxic and genetic factors. During the perinatal period, deficiency may occur due to hypoxia or anoxia, prematurity and low weight. The postnatal causes are severe undernutrition/dehydration, infections, intoxications, and accidents[5]. Various intercurrences were detected in the present study in both G1 and G2, but the proportion of such intercurrences was similar in the two groups, so that no clues were detected regarding the causal factors of intellectual deficiency in G1.

The multiprofessional assessment team detected other different diagnoses in G2, the group of children with learning disorders but no deficits. Among the different diagnoses that might somehow contribute to the school failure of these children, ADHD was the most frequent, followed by emotional changes and environmental changes. Only one case of dyslexia and one case of specific language disorder were detected.

Regardig the diagnostic variables detected in the present study, we emphasize the repercussions of ADHD on the child's life, since this disorder causes damage in multiple areas such as adaptation to the academic setting, interpersonal relations, and school performance[12]. The school difficulties of children with ADHD can be

explained by the fact that the attention process is essential and of primordial importance for appropriate learning during the phase of language acquisition and development[13].

The present results demonstrate that the presence of emotional changes may also have a devastating effect on school performance, since it was present in several G2 children. It is known that children with psychological changes have difficulty in using the repertory of learning strategies such as organization and planning, monitoring, attention, and elaboration[14], in addition to behavioral problems that potentiate school difficulties[2-15]. These children usually have adequate intellectual ability, but because of the lack of interest and motivation and their sense of self-deprecation, these children avoid participating in school activities[16]. Among the emotional changes in school age, anxiety disorder is the most common (prevalence between 4% and 25% in this population)[17]. In a Brazilian study, the prevalence of anxiety disorder was 4.6% in children, and 5.8% in adolescentes[18].

In the present study, environmental inadequacies emerged as another possible causal fator of poor school performance. Studies have stated that the family environment of children with poor school performance usually involves a larger number of adversities and risk factors, such as drug use, family destructuration and presence of physical and domestic violence, among others, in addition to being a poorer environment in terms of materials (books, newspapers, toys and music)[19-20]. Some authors have also pointed out that a higher level of maternal schooling is positively related to the quantity of environmental resources[19-21] and acts as a protective factor for the development of written language[20].

Comparison of the two groups in the present study regarding the results of writing, reading and arithmetic tests raised an alert for educators and clinicians. It was already somehow expected that the group with intellectual deficiency would have difficulties in performing school tasks, since these tasks require cognitive skills. However, even greater difficulties were observed in children with a diagnosis of ADHD and of emotional, environmental or language alterations, even though the intellectual level of these children was found to be within average standards.

Traditionally, many educators believe that intellectually deficient students rapidly forget what was previously taught to them. One day they “know” something and the next day they no longer remember what they knew. There is the belief that they can learn but have difficulties in transferring their knowledge to other situations or materials. The condition of intellectual deficiency has been cited as a variable that permits a slow acquisition and poor retention of previously taught discriminations. However, the question of poor retention can be largely attributed to faulty instruction programs rather than to the characteristics of intellectual deficiency[22]. One of the more interesting results of the present study was the fact that the group with intellectual deficiency showed a better performance in tests of academic actvities such as reading/writing and arithmetic. This result strongly suggests that there is an association of intrinsic and extrinsic factors, underscoring the importance of both the school and the family environments for the performance of the child in different activities.

There is a tendency to believe that school failure is provoked by intellectual deficit, with children being often “labeled” as incompetent. However, the present results demonstrate that this is not always the case and serve as an alert to health professionals, teachers and parents, showing that a differential diagnosis is of extreme importance for a more precise and judicious intervention and for referral to pertinent interventions (psychotherapy, speech therapy, educational psychology, and “school tutoring”, among others).

Childhood is a critical period for the development of skills and knowledge, when education plays a primordial role in the integration of an individual with society. On this basis, health professionals and educators should be qualified in the identification of children at risk for leaning difficulties, in the counseling of families and, if

necessary, in referring the child to multidisciplinary rehabilitation as soon as possible, and in the search of an etiologic diagnosis. These difficulties can be potentially compensated for and even overcome as long as opportune and appropriate strategies are implemented early[19].

Conclusion

Children with learning disorders of various causes (ADHD, emotional changes, environmental causes and others) have severe difficulties represented by poor school performance. This inadequate school performance is similar to, or worse than that of children with intellectual deficiency. The present results alert us to the fact that an early differential diagnosis should be made in cases of poor school performance in order to discover its etiology and to provide a more effective treatment and a better prognosis. These data also emphasize that not all children with severe school difficulties have intellectual deficiency, as judged by several professionals.

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