

PSYCHO-PEDAGOGICAL INTERVENTION PROGRAM IN STUDENTS WITH LEARNING DIFFICULTIES

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ABSTRACT. The present research aims to investigate the efficacy of a psychopedagogical intervention program based on educational techniques, designed to develop organizational skills in children with disorders from the attention deficit and hyperactivity spectrum who present learning difficulty. The set of techniques can be easily implemented by the teacher in the classroom and has been applied in the context of the *Language and communication* curriculum area. Disorders belonging to the spectrum of the attention deficit and hyperactivity expose students to a risk of poor school performance, social isolation and antisocial behavior. The biggest challenge for a teacher is to maintain the interest of such a child, accept and appreciate him. Starting from the principle of differentiated instruction, equal opportunities can be ensured for all students by applying pedagogical intervention programs in the case of students with disorders from the attention deficit and hyperactivity spectrum.

Keywords: *learning difficulties, organizational skills, intervention programs, executive functions, and neuropsychological tests.*

ZUSAMMENFASSUNG. Die gegenwärtige Forschung zielt darauf, die Wirksamkeit eines psicho-pädagogisches Interventionsprogrammes zu untersuchen. Dieses basiert auf pädagogischen Techniken, die der Entwicklung von organisatorischen Fähigkeiten bei Kinder mit Störungen im Spektrum des Aufmerksamkeits-Defizit und Hyperaktivität, die Schwierigkeiten beim Lernen haben, dienen. Das Technikenpaket ist von den Lehrern einfach umzusetzen und wurde im Kontext des Lehrplan-Bereichs der Sprache und Kommunikation angewendet. Die Störungen im Spektrum des Aufmerksamkeits- und Hyperaktivitätsdefizits setzen den Schülern das Risiko an schlechte Schulleistungen aus, soziale Isolation und antisoziales Verhalten. Die grösste Herausforderung, für ein Lehrer, ist das Interesse solchen Schüler zu bewahren, ihm zu akzeptieren und zu beurteilen. Ausgehend vom Prinzip der differenzierten Erziehung, durch die Anwendung von psicho-pädagogischen Interventionsprogramme beim Schülern mit mit Störungen im Spektrum des Aufmerksamkeits-Defizit und Hyperaktivität, es kann einen gleichen Niveau von Erziehung allen Schülern erhalten werden.

Schlüsselwörter: *Lernschwierigkeiten, organisatorische Fähigkeiten, Interventionsprogramme, exekutive Funktionen, neuropsychologische Tests*

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1. Introduction

Deficit in the sphere of attention deficit and hyperactivity, other manifestations such as impulsiveness or poor executive functions, expose students to the risk of poor school performance, social isolation and antisocial behavior. Students with disorders from the attention deficit and hyperactivity spectrum acquire harder their skills of organization, planning, time management, in comparison with their school colleagues. To what extent do these deficits affect school performance?

We can find out the answer to this question measuring the development level of organizational skills of school activity, for example: students must write down their homework, organize their projects and their study time, maintain an optimum motivation and maintain focused their attention for considerable time, adapt to different teachers, keep up with a large volume of materials and requirements.

Difficulties students with disorders from the attention deficit and hyperactivity spectrum meet when they have to adapt to school can be ameliorated through structured and customized psycho-pedagogical intervention programs. Psycho-pedagogical literature in the field of intervention programs for disorders from the attention deficit and hyperactivity spectrum belongs, in our opinion, to the exploration (observation) and formative ameliorative parcelling interventions type.

Even in the case of these exploratory-formative approaches, literature from our country is not enough for this kind of studies, and the cultural factor as well as the Romanian educational context are two variables that raise up questions concerning the effectiveness of interventions proposed by the results of international studies.

The school environment is a context that requires planning, control, coordination and evaluation of the interaction and of the ways of active participation in the educative-instruction process. In consequence, school is an appropriate environment to exercise self-control (Miranda et al., 2006). At the same time, school represents a challenge for children with disorders from the attention deficit and hyperactivity spectrum, this disorder being usually diagnosed when going to school, that is after the age of seven, precisely because of the accentuation of symptoms as a consequence of the increase in requirements concerning attention, school work organization and other responsibilities.

Specialized international literature is rich in research focused on the effectiveness of various types of interventions on behavior and academic achievement of students with disorders from the attention deficit and hyperactivity spectrum. Most of these studies measure the effectiveness of the psycho-pedagogical program on indicators such as increase of task oriented behavior frequency, decrease of frequency and periods of attention deficit, decrease of frequency and periods of hyperactivity.

Psycho-pedagogical interventions in school can benefit from various techniques such as behaviors reinforcement and behavior reduction strategies or combined behavioral and cognitive techniques with focus on organization strategies, social skills and independent work skills (Miranda et al., 2006).

Combined intervention techniques is an option also recommended by the American Academy of Pediatrics that introduces the concept of educational and behavioral intervention (Campbell & Cohen, 1990, quoted by Reiber & Mc Laughlin, 2004).

Psycho-pedagogical intervention can and sometimes must be associated with medical intervention, respectively drug treatment. Experience shows that drug treatment does not resolve difficulties by itself. Even after its commencement, organizational skills have to be formed and / or consolidated. Medications only prepare the body for proper functioning, but do not equip it with the necessary skills.

2. Methodology

2.1 Research objectives

Starting from the principle of differentiated instruction, it is recognized that all students must receive educational resources appropriately, according to individual characteristics and needs. By applying some psycho-pedagogical intervention programs on students with disorders from the attention deficit and hyperactivity spectrum, equal opportunities of development for this category of students can be ensured.

This paper aims to elaborate and implement a psycho-pedagogical intervention program based on "organizational skills development techniques in the case of students with disorders from the attention deficit and hyperactivity spectrum". This set of techniques has been developed so that it could be implemented by the classroom teacher in the context of *Language and communication* curriculum area.

2.2 Hypotheses

General hypothesis

Consistent application in the case of students with disorders from the attention deficit and hyperactivity spectrum (grades 2-4), of a psycho-pedagogical program structured on general organization components, in relation to the specific profile of executive functions contribute to efficiency of learning.

We will measure learning efficiency indices as follows: performance at reading comprehension, picture composition, reading fluency and executive functioning skills using the Rey test (complex figure) and the Tower subtest of the Nepsy tests battery.

Specific hypotheses

1. The profile of executive functions correlates differently with school performance in reading and writing tasks.

2. The development and practice of organizational skills, self-organization supports significantly the elimination process of reading and writing difficulties.

2.3 Research development

In order to test the proposed hypotheses, an intra-subject experimental approach of the type pretest-intervention-posttest has been chosen.

The independent variable is the pedagogical intervention.

The dependent variable becomes operational by the scores obtained after applying the general organizational skills assessment scale, the results obtained from the neuropsychological tests (Rey complex figure test: copy and recall; Tower subtest) with the psycho-pedagogical ones (L'Alouette test; reading comprehension, picture composition).

2.4 The procedure

The present research was conducted on a number of 55 students with disorders from the attention deficit and hyperactivity spectrum.

The first stage consisted in using some educational assessment tools. These were applied to the entire class of students, some of them presenting disorders from the attention deficit and hyperactivity spectrum, to see if there were differences between the two groups of students on the vocabulary and graphics performance. The purpose of using an evaluation tool in a classroom was to observe the behavior of students with disorders from the attention deficit and hyperactivity spectrum during an activity. We expect that students with disorders from the attention deficit and hyperactivity spectrum will be more frequently distracted by other stimuli and present difficulties in focusing on assigned tasks.

This phase began by applying a behavior assessment scale in the case of the students with disorders from the attention deficit and hyperactivity spectrum. This scale was completed by the teacher, allowing highlighting the types of attention deficit and hyperactivity disorder (predominantly inattentive, hyperactive or combined).

Afterwards, two dictation tests were applied: one of them consisted in isolated words and sentences and the other one in an eight lines text.

In the process of writing by dictation intervene auditory and phono-articulator factors as well as semantic and motor-kinesthetic factors. Due to this aspect, dictation seems to be an adequate task for our research. In this task, the text was presented orally, and students only had to listen. Students had to write only at the second presentation of the text. The rhythm of dictation for this task was the one usually used with these students. Once they have finished writing, students reread their work and had the opportunity to correct any errors.

Afterwards another test was given and students had to write down the ideas of a text they heard. The text was presented orally two times. The purpose of this task was to observe how students write by dictation and how they manage to convey in writing the ideas they formulated starting from a text presented orally.

In order to highlight problems in reading fluency and text comprehension, students were asked to read a text at first sight and narrate orally what they read.

There were identified 52 students with disorders from the attention deficit and hyperactivity spectrum who also presented learning difficulties. The parents of 42 students gave their consent to participate in implementing the intervention program.

Students with disorders from the attention deficit and hyperactivity spectrum who also presented lexical and graphical problems underwent further investigations, in the second stage.

The second stage consisted in the use of psycho-pedagogical instruments.

L'Alouette Test (the lark) was used in the case of all students with disorders from the attention deficit and hyperactivity spectrum. P. Lefavrais (Foucambert, 1983), the author of the test explains that the habitude of seeing the words allows you to formulate them starting from what is strictly necessary to recognize them, called aspect-stimulus. He also explains that ideation makes the reader go on and anticipate the formulation and maybe make a mistake and place there a word his degree of understanding allows him to expect to occur. It is about projecting (throwing) sense on words. Preparing a text for lecture is therefore proposing a text to be read aloud, a text that is apparently quite simple for a reader but in reality is composed of *trap-words* (words you would not expect).

Another task was reading a text at first sight and its comprehension. Reading includes two basic processes, namely the *decoding process* that involves understanding the relationship between phoneme and grapheme and its translation from a representation specific to oral language into written language, and the *process of comprehension*, that make the student understand the meaning of isolated words or of words that are in the context.

Laurence Rieben (1989) makes a cognitive analysis of learning to read difficulties. The distinction Rieben makes between the two processes involved in reading is the following:

- Word identification processes are very fast and automatized central processes;
- Understanding processes require maximum concentration of cognitive resources, which is possible as long as the previous processes present a sufficient level of automation.

The evaluation of written expression – picture composition – aimed highlighting the capacity of organizing and formulating ideas, the familiarity with the grammar, the vocabulary level. It is one of the activities with the best results in the evaluation of speech development, speech fluency, of the ability to organize and formulate correct sentences. It also indicates the details that attracted attention.

The neuropsychological tests used were Rey test (complex figure) and Tower subtest from Nepsy battery. Perceiving visually is not the same as experiencing a simple sensory contact, but a reactivation- in contact with the reality - of the visual

habituations or contracting new ones. Tower subtest may reflect deficits in the ability to plan work strategy.

The implementation of the intervention program consisted in development techniques of the organizational skills in students with disorders from the attention deficit and hyperactivity spectrum. It lasted over eight weeks and represented the third stage.

The fourth stage consisted in the reevaluation of the results. In this stage were used: L'Alouette test, tasks for reading comprehension and picture composition and neuropsychological tests (Rey-complex figure test and Tower subtest of Nepsy battery). In this stage, reading comprehension and picture composition tasks were similar to those used in the second stage, respecting the structure and composition rules.

2.5 Participants

The research was conducted on a group of research participants composed of 42 students with disorders from the attention deficit and hyperactivity spectrum, inattentive, hyperactive / impulsive and combined type, integrated in mainstream education. Previously was obtained verbal permission from students and classroom teachers and written consent from the parents of students involved in this research.

Students that participated in the research were enrolled in the 2nd, 3rd, and 4th grades in several schools in the city of Targu Mures. As the manifestation of learning difficulties (dyslexia-dysgraphia phenomena) has a constant character, the diagnosis is established starting with the second year of schooling.

2.6 Instruments

The methodology of this study is a composite one and includes docimological and psychological tests and a behavioral assessment scale.

At first, was applied a *Rating scale of children's with attention deficit and hyperactivity disorder behavior*. This was applied to the teacher in order to confirm / infirm the presence of characteristic symptoms in these students. The scale includes symptoms characteristic to different types of attention deficit and hyperactivity disorder: inattention, hyperactivity / impulsivity and combined indicating the frequency of each manifestation (never, sometimes, often, always) and was elaborated taking into account the diagnostic criteria presented in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, 2000).

In order to detect students with disorders form the spectrum of the attention deficit and hyperactivity presenting lexicographical disorders were used tasks including dictation, listening comprehension and reading comprehension of a text at first sight.

Dictation tests were made so as to meet phonetic and lexical requirements specific to Romanian language. It started with the dictation of isolated words and sentences, continued with a text made up of words containing various combinations

of consonants, groups of letters, diphthongs, etc., in the composition of which was taken into account student's ability to concentrate.

Another test was listening comprehension, in which students had to write down the ideas of a text that had been presented orally. The text was new to students, adequate to their age. When asking students to transcribe spontaneous oral language into written language we tried to verify if mistakes were caused by the conflicting value of the word or by some disturbing elements involved in the circumstances and the specific of the dictation test.

Reading a text at first sight was another test used for identifying learning difficulties, being a visual-auditory task involving reaching comprehension by using symbols: letters and words. Reading fluency and the ability to narrate orally what was read were analyzed.

There were used the following psycho-pedagogical tests: L'Alouette, reading comprehension, picture composition and the neuropsychological tests: Rey complex figure test and Tower subtest from Nepsy battery.

L'Alouette test was applied, which provides indications of the performance of reading aloud an unknown text. The text consists of 265 words, many of them unknown to the subjects and must be read in less than three minutes. Words that make up the text are mostly neologisms ("concession", "fluid", "deduction", "dialect", etc.), complex structured, impossible constructions ("At dawn a trumpet declines", "A cart of articulation is neutral", "The brush soufflé has an ancient, warm, refreshing difficulty " etc.), a "salad" of words that form various sentences, meaningless in context. This test's main purpose is to evaluate the accuracy and speed of reading aloud. The test enables the evaluation of the reading fluency. There is no control of reading comprehension.

Reading comprehension test is an informational tool concerning reading comprehension. In this test was analyzed conscious reading, the way in which words, sentences and text were understood. The term of conscious reading involves an active reading in which are engaged student's thinking operations and affective processes, thus contributing to a nuanced and sensitive understanding of the text. Formulated questions indicate if text's message was understood, details will be asked for, the relationship cause-effect/consequences of the events will be highlighted, participants will be asked to explain the sense of words whose meaning is obvious from the text read. Students will use their imagination and continue the text. This task aims to highlight the ability to read and understand a text of students with disorders from the attention deficit and hyperactivity spectrum.

Picture composition is another assessment task. It is one of the activities with the best results in evaluating speech development, speech fluency, the ability to organize and formulate sentences correctly and in noticing details that attracted attention.

Rey complex figure test is designed to test planning and organization that are deficient in students with disorders from the attention deficit and hyperactivity spectrum. The figure from this task is a complex geometric route that has several properties: the absence of an obvious significance, easy graphic achievement and a pretty complicated assembly structure in order to ask for a perceptive, analytical

and organizing activity. This task consists in copying and then recalling a complex figure. Copying the Rey complex figure shows student's graphic and motor organization capacity and his visual and spatial abilities, as this reproduction can be achieved only if there is a certain organization, significance and report determined by the knowledge stored in memory.

Tower subtest (Korkman, M. at al, 2005) "assesses the executive functions of planning, monitoring, self-regulation and problem solving. The child must take into account respecting some rules under time constraints." The target area is attention / executive functions - central elements in the neuropsychological assessment from Nepsy tests battery.

The neuropsychology of development uses the term *executive functions* to designate the use of planning and flexible strategies (Denckla, 1996), the ability to adopt, maintain and transfer cognitive sets, to use structured search strategies, in order monitor performance and correct errors, the ability to resist or inhibit the urge to respond to issues that are important but irrelevant in the task (Denckla, 1996, Pennington, Groisser and Welsh, 1993). These components of the executive functions interact, direct and modulate attention processes, including maintaining an optimal neurophysiologic activation and vigilance, the search, selection and attention focus on relevant information from a wide range of stimuli.

Description of the psycho-pedagogical intervention program

The intervention program was conducted over eight weeks and implemented by the classroom teacher. At the end of each week were distributed materials for the following week's activities. Difficulties encountered in the application of a certain technique were discussed with the teacher. The intervention consists in a set of development and consolidation techniques of general organizational skills in classroom activities, in *Language and communication* curriculum. During the program new techniques were introduced and previous ones were consolidated. Cumulative consolidation was achieved. In accordance with the finding, the interventions were focused on consolidating the behaviors showing deficits.

During the intervention were used worksheets, calendars, agenda, wall clocks, etc. Necessary materials and weekly progress monitoring records were compiled, multiplied and provided by the experimenter.

Techniques that form the intervention are grouped into several categories addressing different aspects of the organizational skill. Thus, there were proposed several planning techniques, prioritization techniques, self-monitoring techniques, techniques for preparing materials for school.

1. "Be an ace" - is an acronym that is meant to remind students they can be successful in school if they approach tasks in an organized manner. Students receive a card detailing the content of the acronym.

This technique was adapted from the technique "Think Smart" from "Teaching Kids with Learning Difficulties in the Regular Classroom" (Susan Winebrenner, 1996).

In the first meeting was discussed the meaning of the phrase “Be an ace” and the content of the acronym. Students learned the acronym as well as its content. Once automated, it was used at the beginning of each activity. These words reminded them to think positively, creatively, to be organized, to have materials prepared and write down important information.

2. Use lists to organize:

- List with the materials needed the following day or for a specific activity in *language and communication* curriculum

- List with the requirements for the following day

Students were presented with a list - model, which contains materials that will be needed in that day in the *language and communication* curriculum. The teacher shows how to use the list and ticks off the materials checked. The student will design with the teacher another list of materials needed that day. As they enumerate them, they will write them down one below the other. The teacher will ask the student to tick off the list the materials he has and needs for the first class. The reward for carrying out this activity was a notebook to be used at home.

3. Perhaps the most important technique is using a weekly calendar. Initially, in the classroom will be posted a calendar for every month. This calendar will be an interactive one, as it will be filled with events, in collaboration with the students. There will be highlighted the current week, current day and will be marked the schedule and other important events of the day: What month are we in? What day is it today? What date is it today? Let’s locate the date on your calendar! What classes do we have today? Let’s write them down in the notebook! Did something new emerge? For example, if the student is awarded a red star, this change is signaled and the event is marked in the calendar.

The next step consists in compiling student’s own timetable, completing a calendar page for the current week.

The student will be assigned the role of reminding colleagues at the end of each day, about the classes of the next day, homework to be done and materials needed the following day.

3. Results

The association between executive functioning profile and the performance profile in terms of reading and writing in the case of students with disorders from the attention deficit and hyperactivity spectrum presenting learning difficulties has been analyzed.

3.1 Correlation tests on variables in pretest

Correlation matrix presents Pearson coefficients obtained from the six associated instruments (Rey complex figure test: copy and recall; Tower subtest, L’Alouette test, reading comprehension; picture composition) in pretest (Table 1).

Table 1.

Correlations between the results on all 6 variables, in the pretest measurement

		Rey-copy	Rey-recall	Tower	L'alouette	Reading comprehension	Picture composition
Rey-copy	Pearson Correlation	1	,657**	,654**	-,040	,480**	,251
	Sig. (2-tailed)		,000	,000	,802	,001	,109
	N	42	42	42	42	42	42
Rey-recall	Pearson Correlation	,657**	1	,585**	,058	,276	,136
	Sig. (2-tailed)	,000		,000	,715	,076	,390
	N	42	42	42	42	42	42
Tower	Pearson Correlation	,654**	,585**	1	-,132	,329*	,134
	Sig. (2-tailed)	,000	,000		,403	,033	,397
	N	42	42	42	42	42	42
L'alouette	Pearson Correlation	-,040	,058	-,132	1	,444**	,457**
	Sig. (2-tailed)	,802	,715	,403		,003	,002
	N	42	42	42	42	42	42
Reading comprehension	Pearson Correlation	,480**	,276	,329*	,444**	1	,616**
	Sig. (2-tailed)	,001	,076	,033	,003		,000
	N	42	42	42	42	42	42
Picture composition	Pearson Correlation	,251	,136	,134	,457**	,616**	1
	Sig. (2-tailed)	,109	,390	,397	,002	,000	
	N	42	42	42	42	42	42

Results from two tasks of the Rey complex figure test (copying and recall) are correlated ($r = 0.65$, $p < 0.01$), students with good results at Rey-copy task tend to reach the same level at Rey-recall task; also the results from Rey complex figure test correlate with results from Tower subtest ($r = 0.65$, $p < 0.01$ and $r = 0.58$, $p < 0.01$). Therefore, results on the three neuropsychological tests are consonant and highly correlated.

Variables measuring school performance correlate positively ($r = 0.61$, $p < 0.01$), students who perform well on reading comprehension tend to have good results at picture composition test, and also at L'Alouette test, which measures reading fluency ($r = 0.45$, $p < 0.01$). Related to our initial hypothesis, the one concerning the way in which the executive functioning profile, highlighted through neuropsychological tests, relates to school performance in reading and writing tasks, one can say that this is done differently. The results of Rey complex figure test-copy correlate positively with those of reading comprehension ($r = 0.48$, $p < 0.01$), in other words, students who had good scores on Rey-copy also had good scores at this variable of school performance.

Tower subtest scores correlate ($r = 0.32$, $p < 0.05$) with the results in reading comprehension. There are correlations between the results obtained at L'Alouette test and those at reading comprehension test ($r = 0.44$, $p < 0.01$) and also between results obtained at L'Alouette test and those obtained at picture composition test ($r = 0.45$, $p < 0.01$). In conclusion, in terms of pretest measurements, we can say that:

- The three variables measuring school performance (reading comprehension, picture composition, L'Alouette) correlate positively.
- The results of the three neuropsychological tests (Rey complex figure test - copy and recall, Tower subtest of Nepsy test battery) also correlate positively with each other.
- School performance in reading tasks (reading comprehension) correlates with the Rey Complex Figure – Copy results and Tower subtest results.
- Picture composition and l'Alouette tests do not correlate with the results of three neuropsychological tests.

We can conclude that school performance correlates differently with neuropsychological tests. In order to vary these findings, we want to see what happens to these correlations if we make a different analysis, keeping in mind the grade the student comes from. By controlling the variable grade it can be noticed that academic performances correlate positively with neuropsychological test results, especially in the case of the 3rd grade, where the results on reading comprehension test are strongly correlated with results from all three neuropsychological tests ($r = 0.78$, $p < 0.01$ - Rey complex figure test - copy, $r = 0.66$, $p < 0.01$ - Rey complex figure test - recall, $r = 0.79$, $p < 0.01$ - Tower subtest).

Analyzing separately the correlations in the case of students with disorders from the attention deficit and hyperactivity spectrum undergoing a medical treatment respectively those without a medical treatment, a major difference can be seen: in the case of students not benefiting from medical treatment, school performance does not correlate with the results on neuropsychological tests; significant correlations can be observed only in the group of students with disorders from the attention deficit and hyperactivity spectrum receiving medication (results at reading comprehension test and Rey complex figure test - copy: $r = 0.50$, $p < 0.01$).

The same correlations were tested separately on the attention deficit and hyperactivity variable that divides subjects into three groups: ADHD predominantly hyperactive, predominantly inattentive and ADHD - combined type. It seems that the group in which the associations between the results of neuropsychological tests and those of school performance are more common, is the group of subjects with ADHD combined type, in which case the results of reading comprehension test correlate with the results of Rey complex figure test - copy $r = 0.61$, $p < 0.01$. In the case of ADHD hyperactive type correlations are missing, and in the case of the inattentive type there are correlations only between the results of Rey tests between each other ($r = 0.77$, $p < 0.01$) and only between the results of reading comprehension and picture composition between each other ($r = 0.74$, $p < 0.05$).

3.2 Correlation tests on posttest

The same sets of correlations in the mirror were performed for posttest variables to see if the correlation trends remain. Results showed:

- Positive correlation between the results of Rey complex figure test - copying and school performance variables ($r = 0.57$, $p < 0.01$ - reading comprehension, $r = 0.54$, $p < 0.01$ - picture composition).
- Positive correlation between Rey - recall and the results of picture composition ($r = 0.40$, $p < 0.01$).
- Positive correlation between the results of Tower subtest and results of school performance variables ($r = 0.37$, $p < 0.05$ - reading fluency, $r = 0.80$, $p < 0.01$ - reading comprehension, $r = 0.73$, $p < 0.01$ - picture composition).
- Positive correlation between test results of L'Alouette test and the other variables of school performance ($r = 0.51$, $p < 0.01$ - reading comprehension, $r = 0.36$, $p < 0.01$ - picture composition).

Correlations were established according to the grades students were in, in the case of posttest measurements. When controlling the *grade* variable, in the analysis of correlations between posttest variables was observed:

- At the level of the 2nd grade, positive correlation between Tower subtest results and results to reading comprehension test ($r = 0.63$, $p < 0.05$) and picture composition ($r = 0.87$, $p < 0.01$).
- At the level of the 2nd grade, positive correlation between the results obtained at reading fluency measurement test, L'Alouette test, and reading comprehension ($r = 0.58$, $p < 0.05$).
- At the level of the 3rd and 4th grade several correlations between neuropsychological test scores and school performance.
- At the level of the 3rd grade: very strong correlation between the results on Rey complex figure test - copying and the results in academic tasks ($r = 0.80$, $p < 0.01$ - reading comprehension, $r = 0.65$, $p < 0.01$ - picture composition), between the results at Rey complex figure test - recall and the results in academic tasks ($r = 0.77$, $p < 0.01$ - reading comprehension, $r = 0.68$, $p < 0.01$ - picture composition) and between Tower subtest results and performance in reading comprehension test ($r = 0.70$, $p < 0.01$).
- In the 4th grade: strong correlations between Tower subtest and school performance ($r = 0.91$, $p < 0.01$ - reading comprehension, $r = 0.89$, $p < 0.01$ - picture composition), between Rey complex figure test results - copying and L'Alouette test results that measure reading fluency ($r = 0.68$, $p < 0.05$) and between reading comprehension test and Rey-Copying ($r = 0.61$, $p < 0.05$).

In order to establish correlations between the results obtained by students with disorders from the attention deficit and hyperactivity spectrum undergoing a medical treatment and those of students not benefitting from a medical treatment, there is an improvement compared to the pretest situation, in the sense that there are not significant differences between the results obtained by students receiving medication

compared with those not receiving medication. There are positive correlations between neuropsychological test scores and school performance in the group benefitting from medical treatment but also in the group not benefitting from medical treatment.

The results at Rey complex figure test - copying, correlate with the results on reading comprehension ($r = 0.49, p < 0.01$) and picture composition ($r = 0.41, p < 0.05$) in students with disorders from the attention deficit and hyperactivity spectrum undergoing a medical treatment, but also correlate in the case of students not undergoing medical treatment with the results at reading comprehension ($r = 0.58, p < 0.05$) and picture composition ($r = 0.63, p < 0.05$).

Results at Tower subtest correlate with those at L'Alouette test ($r = 0.43, p < 0.05$), reading comprehension ($r = 0.77, p < 0.01$) and picture composition ($r = 0.70, p < 0.01$) in the case of students with disorders from the attention deficit and hyperactivity spectrum benefitting from medical treatment and in the case of students not benefitting from medical treatment. Results at Tower subtest correlate with those on reading comprehension ($r = 0.83, p < 0.01$) and picture composition ($r = 0.72, p < 0.01$).

There were established correlations according to the type of attention deficit and hyperactivity, although the number of students with attention deficit and hyperactivity disorder predominantly hyperactive / impulsive was quite small (4 students).

Regarding the correlations of variables in posttest in the case of controlling the type of ADHD, we mention that:

- No improvement can be noticed in the case of the hyperactive type, variables do not correlate not even in posttest.
- At the level of inattentive type there are strong correlations between neuropsychological test results and school tasks performance. Results on Rey complex figure test - copy test correlate with results at reading comprehension ($r = 0.84, p < 0.01$) and picture composition ($r = 0.80, p < 0.01$). Results from Rey – recall correlate with the results at reading comprehension test ($r = 0.72, p < 0.05$).
- Correlations exist also in the combined type. There is a strong correlation in the combined type between the results at the Rey complex figure test - copy and reading comprehension ($r = 0.61, p < 0.01$) and picture composition ($r = 0.47, p < 0.05$) as well as between the results at Tower subtest and both variables of school performance (reading comprehension $r = 0.92, p < 0.01$ and $r = 0.85$ and picture composition, $p < 0.01$).

3.3 Analysis of the intervention program's efficiency

T test was used to compare variables: Rey complex figure tests (copy and recall), Tower subtest, L'Alouette test and those vising school performance measured before the intervention (pretest) and after the intervention (posttest).

It was noticed that in the case of all pairs of variables the average between the pretest and posttest increased. In other words, there is a difference between the results, that is there are better scores on all posttest variables compared with the pretest scores. For example the average result on Rey – copy increased from 32.50 to 44.64;

the average results on picture composition (pretest) increased to 48.10 in the posttest. It will be verified if these differences are significant.

For each pair of tested variables was evaluated correlations' value between variables and the significance level. There were observed high correlations between the variables of each pair and the fact that these are significant. For example, the highest Pearson coefficients ($r = 0.84$ for Rey-copy variable, $p < 0.01$, $r = 0.95$, $p < 0.01$ for L'Alouette test) show a major difference that occurred in the case of students between the two measurements (Table 2).

Table 2.

Correlations between variables and the significance level

	r
Pair 1 Rey copy 1 & Rey copy 2	,848**
Pair 2 Rey recall1 & Rey recall2	,697**
Pair 3 Reading comprehension 1 & Reading comprehension 2	,817**
Pair 4 Picture composition 1 & picture composition 2	,663**
Pair 5 Tower 1 & Tower2	,308*
Pair 6 L'Alouette 1 & L'Alouette 2	,952**

Best scores obtained by students in posttest were not due to random variation but to psycho-pedagogical intervention performed between the two measurements.

T test was repeated on pair samples on these variables, controlling also the variable –grade (students with disorders from the attention deficit and hyperactivity spectrum were enrolled in the 2nd, 3rd and 4th grade).

The results in which was used the variable - grade, showed there are no differences between grades in terms of student's school performance improvement. In other words, results were better for most students with disorders from the attention deficit and hyperactivity spectrum, regardless their year of study.

We used the same test that was employed in the context of controlling another variable to see if there are differences in terms of performance between students benefitting from medical treatment and those not benefitting from medical treatment.

In the case of controlling this variable, results were also conclusive: the results have significantly improved in both groups of students (those with disorders from the attention deficit and hyperactivity spectrum who received treatment and those who did not receive medical treatment), this condition not causing differences in posttest results at neuropsychological tests and at school performance tests.

Another attempt was to repeat the test, controlling the ADHD TYPE variable. With regard to the types of ADHD, analyzing the results divided into three types (hyperactive, inattentive and combined) it can be said that in the case of students from the inattentive and combined group, the intervention had effects in the sense of improving their performance between pretest and posttest.

In what concerns the hyperactive students, there are some variables that register improvements between pretest and posttest, but these improvements are not significant. It is the case of hyperactive students' results in reading comprehension and picture composition (the two school performance variables) and Rey test - copy.

4. Conclusions

The present research was conducted on a group of participants consisting of 55 students with disorders from the attention deficit and hyperactivity spectrum, out of which after detecting learning difficulties (reading, writing) by passing dictation, listening comprehension and reading evaluation tests remained in the study 42 students.

A psycho-pedagogical intervention program was applied for a period of eight weeks, the program being structured on the organizing, self-organizing component, with a general character.

Summarizing, the results obtained show positive correlations between the following variables:

- in pretest: between the variables measuring school performance (text comprehension, image composition and reading fluency); between the results of the three neuropsychological tests; in the case of the 3rd grade students, between reading comprehension with all the three neuropsychological tests results; between school performance and neuropsychological tests of students with disorders from the attention deficit and hyperactivity spectrum receiving medical treatment; in the case of students with disorders from the attention deficit and hyperactivity spectrum- combined type, between the results on neuropsychological and school performance tests;

- in posttest: in the 3rd and 4th grades positive correlations between neuropsychological test results and school performance; in the 3rd grade between Rey figure test results and results in academic tasks; between neuropsychological test results and school performance in both treatment and no treatment group; in the case of the students with disorders from the attention deficit and hyperactivity spectrum predominantly inattentive there are strong correlations between neuropsychological test results and school tasks results; between neuropsychological tests results and school performance in the case of students with disorders from the attention deficit and hyperactivity spectrum receiving medical treatment and those not receiving medical treatment.

This means that these variables interact and influence the performance of students with disorders from the attention deficit and hyperactivity spectrum. The partial factors involved influence some learning segments, for example:

- in pretest: in the case of disorders from the predominantly inattentive type of attention deficit and hyperactivity spectrum, correlate only the results on Rey tests between each other and on text comprehension and image composition school tasks; school performance in text comprehension tasks and results at Rey-copy test correlate with results from the Tower subtest;

➤ at posttest: positive correlation between Rey - Copy test and school performance variables (reading comprehension and image composition); between Rey recall test and writing by dictation results between L'Alouette test and both school performance variables (reading comprehension and image composition); at the level of the 2nd grade between L'Alouette test results and reading comprehension results; at the level of the 2nd grade between Tower subtest results and performance in reading comprehension and image composition; at the level of the 3rd grade: very strong correlations between Tower test and reading comprehension results; at the level of the 4th grade: strong correlations between the Tower test and school performance (reading comprehension and image composition), at the level of the 4th grade: correlations between reading comprehension and Rey-copy test; in the case of disorders from the combined type of attention deficit and hyperactivity spectrum, between Tower subtest results and both variables school performance (reading comprehension and writing by dictation).

At the other extreme lies the lack of correlation:

➤ in pretest: between results at image composition, reading fluency and results at the three neuropsychological tests; between school performance and neuropsychological tests in the case of students not receiving medical treatment and those with disorders from the predominantly hyperactive type of attention deficit and hyperactivity spectrum;

➤ in posttest: in the case of disorders from the predominantly inattentive type of attention deficit and hyperactivity spectrum, which means that these variables do not influence the performance of students with disorders from the attention deficit and hyperactivity spectrum.

In conclusion we can say that in the case of children with disorders from the attention deficit and hyperactivity spectrum, the psycho-pedagogical intervention program should integrate contents and experiences from the set of factors that have an impact on disorders from the attention deficit and hyperactivity spectrum.

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