https://doi.org/10.36315/2024v1end027
Education and New Developments 2024

PERCEPTUAL-VISUAL-MOTOR SKILLS AND SPEED AND LEGIBILITY OF HANDWRITING IN MIXED SUBTYPE DYSLEXIA

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Abstract

For handwriting to be acquired, it is necessary to combine coordination of visual-motor skills to the motor planning, cognitive planning and to the perceptual skills.A study showed that all students with Dyslexia of the Mixed subtype have lower performance in writing quality and visual-motor perceptual ability. This study aimed to present a case study on the relationship between the perceptual-visual-motor skills, the speed and legibility of handwriting in schoolchildren with mixed dyslexia. Ten schoolchildren of both sexes, aged between 9 years and 13 years and 1 month with an interdisciplinary diagnosis of mixed subtype dyslexia participated in this study. The translated and adapted Brazilian Portuguese version of the Detailed Assessment of Speed of Handwriting (DASH) and the Visual Perception Development Test 3 (DTVP 3) were applied. DASH consists of five tasks: best copy, alphabet writing, quick copy of a sentence, quick graphic and free writing. DTVP 3 consists of subtests with reduced motor skills, general visual perception and visual-motor integration. For the study of the relationship between the variables in this study, a correlation analysis was performed for variables with non-parametric distributions, using the Spearman coefficient, in order to measure the degree of association between two quantitative variables of interest. The results revealed relationships between the skills of general visual perception, reduced motor skills and viso-motor integration with the speed and legibility of handwriting, showing that the altered visual component present in mixed subtype dyslexia may be responsible for the viso-motor alterations that compromise speed and legibility of the handwriting of these students. the findings of this study allowed us to conclude that the better the hand-eye coordination, the greater the number of written words and the number of readable words and that the greater the use of automaticity for writing letters of the alphabet and number of words written, the lesser the use of figure-ground visual ability.

Keywords: *Handwriting, assessment, dyslexia.*

1. Introduction

The perceptual-visual-motor function can be understood as the result of the visual-motor skills, motor and cognitive planning, visual perception, position in space, spatial relations, figure-ground and shape constancy (Brown & Rodger, 2008). However, if a student presents alterations in the development of visual perception, it may cause difficulties in visual-motor skills, that is, in the ability to coordinate vision with body movements, in object recognition, in the relationships between themselves and space and in the basic acquisitions of size, shape and spatial orientation, which in turn may interfere with the typical development of learning processes (Fusco, Okuda, & Capellini, 2011).

The literature indicates that complaints related to difficulties in handwriting have increased and point to the lack of perceptual-visual-motor skills as a justification (Howe et al., 2017). Such difficulties in handwriting can be seen in students with learning disabilities and dyslexia has a high prevalence among these disorders.

Dyslexia of the Mixed subtype is characterized as a specific learning disorder of reading (APA, 2013). Students with Dyslexia of the Mixed subtype have lower performance in writing quality and visual-motor (Sellin, 2020)

2. Methods

This study aimed to relate the visual-motor perception skills and the speed and readability of handwriting in students with mixed subtype dyslexia.

This study was approved by the Research Ethics Committee (4.862.668) of the Faculty of Philosophy and Sciences of the São Paulo State University "Júlio de Mesquita Filho" - FFC/UNESP, Marília, São Paulo, Brazil.

2.1. Characterization of students

Ten students of both genders aged between 9 years and 13 years and 1 month, diagnosed with mixed subtype dyslexia were selected by convenience, that is, they all come from the Specialized Rehabilitation Center CER/CEES II, located in the city of Marília, São Paulo, Brazil. These students underwent multidisciplinary assessment and diagnosis, including speech therapy, neurological and neuropsychological assessment and were not submitted to any speech therapy or psychoeducational intervention prior or during data collection for this study.

2.2. Description of the procedures

To achieve the objective of this study, the following instruments were used: The Detailed Assessment of Speed of Handwriting – DASH is a procedure used to assess the speed and readability of handwriting (Barnett et al., 2007; Cardoso, 2014; Cardoso, Henderson, & Capellini, 2014) and The Developmental Test of Visual Perception, third edition (DTVP-3) (Hammill, Pearson, & Voress, 2014).

- **Analysis of results**

Data were statistically analyzed using the IBM SPSS Statistics Software (Statistical Package for the Social Sciences) version 25.0. The level of statistical significance defined in this study was set at 0.05 (5%), that is, all confidence intervals built throughout the work were constructed with 95% statistical confidence. The statistical test used was Spearman's Correlation Analysis, in order to verify the degree of relationship between the variables of interest.

3. Results

Table 1. Shows the relationship between DTVP-3 subtests and Copy Best task from the DASH.

Variable	Statistic	[DTVP - score] EH	[DTVP - score] CO	[DTVP - score] FG	[DTVP - score] VC	[DTVP - score] FC	[DTVP - terms 1] EH	[DTVP - terms 1] CO	[DTVP - terms 1] FG	[DTVP - terms 1] VC	[DTVP - terms 1] FC	[DTVP - terms 2] VMI	[DTVP - terms 2] MRVP	[DTVP - terms 2] GVP
W2	CC (r)	0.667	-0.095	-0.180	0.034	-0.019	0.469	-0.205	-0.519	0.053	0.134	0.336	-0.052	0.310
	Sig. (p)	0.035*	0.794	0.620	0.926	0.960	0.172	0.571	0.125	0.883	0.712	0.343	0.886	0.383
	N	10	10	10	10	10	10	10	10	10	10	10	10	10
LW2	CC (r)	0.653	0.461	-0.172	0.062	-0.344	0.436	0.285	-0.494	0.102	-0.177	0.612	-0.317	0.381
	Sig. (p)	0.041*	0.180	0.634	0.864	0.331	0.207	0.425	0.147	0.779	0.624	0.060	0.372	0.278
	N	10	10	10	10	10	10	10	10	10	10	10	10	10
LWPM	CC (r)	0.581	0.437	-0.354	0.098	0.171	0.607	0.306	-0.470	0.227	0.144	0.671	-0.205	0.387
	Sig. (p)	0.078	0.206	0.316	0.787	0.636	0.063	0.390	0.170	0.529	0.691	0.034*	0.570	0.269

Note: EH: eye-hand coordination, CO: copying, FG: figure-ground, VC: visual closure, FC: form constancy, VMI: visual-motor integration, MRVP: motor reduced visual perception, GVP: general visual perception, W2: words written in 2nd minute, LW2: legible words in 2nd minute, LWPM: legible words per minute

Table 1 showed that the better the eye-hand coordination, the higher the number of written words and number of readable words in the second minute, also which showed that the better the visual-motor integration, the greater the amount of readable words per minute.

Table 2. Correlation between the subtests of DTVP-3 and the DASH alphabet writing task.

Variable	Statistic	[DTVP - score] EH	[DTVP - score] CO	[DTVP - score] FG	[DTVP - score] VC	[DTVP - score] FC	[DTVP - terms 1] EH	[DTVP - terms 1] CO	[DTVP - terms 1] FG	[DTVP - terms 1] VC	[DTVP - terms 1] FC	[DTVP - terms 2] VMI	[DTVP - terms 2] MRVP	[DTVP - termos 2] GVP
Total letters written	CC (r)	-0.003	0.282	-0.630	0.153	-0.350	0.094	0.330	-0.709	0.140	-0.336	0.149	-0.582	-0.160
	Sig. (p)	0.993	0.430	0.051	0.674	0.321	0.796	0.351	0.022*	0.699	0.343	0.681	0.078	0.658
	n	10	10	10	10	10	10	10	10	10	10	10	10	10

Note: EH: eye-hand coordination, CO: copying, FG: figure-ground, VC: visual closure, FC: form constancy, VMI: visual-motor integration, MRVP: motor reduced visual perception, GVP: general visual perception

In Table 2, the correlation between the DTVP-3 subtests and the DASH alphabet writing task, which indicated that the greater the use of automaticity for the writing of alphabet letters, the less the use of visual figure-ground skill.

Table 3. Correlation between the DTVP-3 subtests and the DASH copy fast task.

Variable	Statistic	[DTVP - score] EH	[DTVP - score] CO	[DTVP - score] FG	[DTVP - score] VC	[DTVP - score] FC	[DTVP - terms 1] EH	[DTVP - terms 1] CO	[DTVP - terms 1] FG	[DTVP - terms 1] VC	[DTVP - terms 1] FC	[DTVP - terms 2] VMI	[DTVP - terms 2] MRVP	[DTVP - terms 2] GVP
W2	CC (r)	0.664	0.095	-0.489	0.185	0.043	0.521	-0.061	-0.690	0.211	0.080	0.505	-0.228	0.237
	Sig. (p)	0.036*	0.794	0.151	0.610	0.906	0.123	0.868	0.027*	0.559	0.827	0.136	0.526	0.509
	N	10	10	10	10	10	10	10	10	10	10	10	10	10

Note: EH: eye-hand coordination, CO: copying, FG: figure-ground, VC: visual closure, FC: form constancy, VMI: visual-motor integration, MRVP: motor reduced visual perception, GVP: general visual perception, W2: words written in 2nd minute

Table 3 shows the relationship between the DTVP-3 subtests and the DASH copy fast task, indicating that the better the eye-hand coordination, the greater the number of words written in the second minute. This table also indicated that the greater the number of words written in the second minute, the less the use of the visual figure-ground skill, thereby demonstrating that automaticity in writing words has little dependence on the task of visual closure.

Table 4. Correlation between the subtests and variables of the DTVP-3 and the DASH free writing task.

Variable	Statistic	[DTVP - score] EH	[DTVP - score] CO	[DTVP - score] FG	[DTVP - score] VC	[DTVP - score] FC	[DTVP - terms 1] EH	[DTVP - terms 1] CO	[DTVP - terms 1] FG	[DTVP - terms 1] VC	[DTVP - terms 1] FC	[DTVP - terms 2] VMI	[DTVP - terms 2] MRVP	[DTVP - termos 2] GVP
LW2	CC (r)	0.602	-0.483	0.263	-0.102	0.210	0.659	-0.592	0.082	-0.057	0.456	0.067	0.317	0.303
	Sig. (p)	0.066	0.157	0.463	0.780	0.561	0.038*	0.072	0.821	0.877	0.186	0.854	0.373	0.394
	N	10	10	10	10	10	10	10	10	10	10	10	10	10
IW2	CC (r)	0.154	-0.590	0.115	0.160	0.123	-0.034	-0.678	-0.203	0.176	0.108	-0.240	0.290	-0.125
	Sig. (p)	0.670	0.072	0.753	0.659	0.734	0.925	0.031*	0.574	0.626	0.766	0.505	0.416	0.730
	N	10	10	10	10	10	10	10	10	10	10	10	10	10

Note: EH: eye-hand coordination, CO: copying, FG: figure-ground, VC: visual closure, FC: form constancy, VMI: visual-motor integration, MRVP: motor reduced visual perception, GVP: general visual perception, LW2: legible words in second minute, IW2: illegible words in second minute

Table 4 shows the correlation between the subtests and variables of DTVP-3 and the DASH free writing task, indicating that the better the eye-hand coordination, the better the legibility in writing the words. It was also observed between copying and illegible words in the second minute, which indicates that the lower the performance in copying, the greater the number of illegible written words.

It was possible to observe that the visual-motor perception skills are related to handwriting. The results of this study showed that the difficulty in perceptual-visual-motor skills compromises the performance of handwriting related to the speed and legibility of handwriting (Racine et al., 2008).

Another hypothesis that would justify the low performance in DASH tasks in the cases presented in this study would be due to difficulties in visual perception, visuospatial orientation, visual memory and visual-motor integration (Feder & Majnemer, 2007), it can be justified by the fact that the processing of these skills is concentrated in the occipital lobe responsible for information, detailing and visual association (Rotta & Pedroso, 2015).

4. Conclusion

Through this study, it was possible to relate the visual-motor perception skills and the speed and readability of handwriting of students with mixed subtype dyslexia. Despite the justifications presented, further studies are still needed to help verify how factors related not only to visual skills, but also attention, perception, fine motor function and memory can interfere with handwriting.

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https://doi.org/10.36315/2024v1end027
Education and New Developments 2024

THE CONTRIBUTION OF A COLLABORATIVE APPROACH IN UNDERSTANDING RESISTANCE FACTORS WHEN IMPLEMENTING CHANGE

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Abstract

Students' wellbeing and their educational success are playing an increasingly important role in the policies, decisions, and actions of educational administrators. Therefore, the desire to meet students' needs is the driving force behind changes in the school environment, which can lead to a degree of resistance from educational staff who do not always see the merits of the proposed actions.The aim of this development research is to equip educational administrators with a better understanding of the resistance factors, concerns, reactions, and obstacles encountered when implementing change to promote educational success and well-being in a context of diversity. This development research, carried out with partners representing five francophone schools and community organizations involved with youth in four Canadian provinces, members of the RÉVERBÈRE research network.The research resulted in a preliminary report with the aim of developing a questionnaire to determine the presence of resistance, concerns, and organizational obstacles to change.The questionnaire then developed will be used by educational administrators to demystify and better understand the presence and the types of resistance in their institutions with the objective of establishing an initial portrait of their context reality in order to better support their staff members. This tool will consider current changes with a view to well-being, inclusion, and openness to diversity. In this communication, we most of all highlight the contribution of the development research process to the co-construction of the items in the preliminary report and the accumulation of evidence firstly based on research based knowledge , and then, during activities carried out with our partners. Validating items with partners in the field adds relevance to this report and enriches it with concrete examples from their respective environments where changes are taking place. In a context of major change, we will also highlight the benefits of a partnership approach, i.e. research and development, to encourage collaboration between members of the research and practice communities with a view to better understanding the factors of resistance to change in educational context.

Keywords: *Educational change, resistance, development research, inclusion, diversity.*

1. Introduction

The education sector is constantly changing to better support the diversity of learners. Educational changes require efforts and most of all adjustments from the education community, most of all teachers and the different partners involved in childrens' diverse learning and growing needs. These changes are not always easy, and they all too often lead to resistance on the part of educational partners, for a variety of reasons that we seek to better understand. It is through a development research process that this research aspires to better understand factors related to resistance within the educational system,, both school and community based, who are trying to meet the diversified needs of students. The aim of this collaborative project is also to promote a better understanding of concerns, reactions and obstacles associated with resistance. To do so, we wish, with our collaborative partners, to develop tools for administrators that would provide insight upon the anatomy of resistance within their organization. This project is part of the