

PERCEPTUAL VISUAL MOTOR PERFORMANCE OF 5 YEARS OLD BRAZILIAN PRESCHOOLERS: PRELIMINARY STUDY

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Abstract

Introduction: Perceptual visual motor development in childhood is essential for learning to write, as it depends on the integration of visual perception and fine motor coordination. Difficulties in this process can compromise school performance. Therefore, early assessment can identify risks and plan interventions in early childhood education. **Aims:** This study aimed to characterize and analyze the perceptual visual motor performance of 5 years old Brazilian preschoolers. This is a cross-sectional study with a qualitative and quantitative approach, conducted with 20 preschoolers of both sexes, aged 5 years to 5 years and 11 months. Individual assessment was performed using the Developmental Test of Visual Perception – 2nd ed. (DTVP-2) in the domains of General Visual Perception (GVP), Visual Perception of Reduced Motor Skills (VRM), and Visual Motor Integration (VMI). data were analyzed using the nonparametric Friedman test. The analyses revealed significant weaknesses in the visual motor integration subtests, indicating specific difficulties in visual motor coordination. The analyses also showed that perceptual visual motor development evolves gradually throughout early childhood. However, visual-motor coordination emerges as a particularly challenging domain for this age group. The results reinforce the importance of early assessment and systematic intervention of these skills in early childhood education to promote the development of handwriting.

Keywords: Early childhood education, handwriting, hand-eye coordination, perceptual visual motor.

1. Introduction

According to Sargiani and Maluf (2018), during the first six years of life, children need to develop cognitive-linguistic skills that will be the cornerstones for later academic success.

Thus, the Early Childhood Education period can be considered the pre-literacy phase, where stimulations with predictors for literacy should be carried out to ensure the full development of reading and writing during the literacy period.

Among the predictive skills of literacy, perceptual-visual-motor skills stand out, responsible for the skills directly related to the development of reading and writing. Visual ability is responsible for receiving stimuli via visual processing in order to interpret them and is considered one of the main gateways of information for learning, as it is responsible for the discrimination of letters for the recognition of the alphabet and the selection for discrimination in reading and writing (Mendes, 2019).

Impaired visual perception can have negative impacts on the performance and functional abilities of schoolchildren, including problems with spelling, reading, cursive writing, written production, and mathematics (Cornoldi & Vecchi, 2003; Souza & Capellini, 2011).

Therefore, establishing the visual-perceptual-motor profile is important not only to understand its development, but also to identify and prevent early changes that may compromise the period of formal literacy.

2. Objectives

This study aimed to characterize and analyze the perceptual visual motor performance of 5 years old Brazilian preschoolers.

3. Methods

This study was approved by the Research Ethics Committee of the Faculty of Medicine of São José do Rio Preto (FAMERP), São José do Rio Preto, São Paulo, Brazil, under protocol number 6.834.846 and CAAE 73675023.3.0000.5415.

This is a cross-sectional study with a qualitative and quantitative approach. Twenty preschoolers, aged between 5 years and 5 years and 11 months, with a mean age of 65.25 months ($SD = 2.87$), both male and female, from two small municipal schools in the northwestern region of the state of São Paulo, participated in this study.

The data collection instrument used was the Developmental Test of Visual Perception – 2nd ed. - DTVP-2- (Hamill, Pearson, & Voress, 2001), composed of a battery of 8 subtests that comprise and measure different, yet interrelated, visuomotor and perceptual-visual skills. The DTVP-2 was administered individually after establishing rapport, with a playful and welcoming explanation of the assessment. The sessions took place in a specific room at the schools, with adequate environmental conditions and free from distractions, outside of regular school hours. The children used graphite pencils and felt-tip pens, without erasers, as per the instrument's instructions. The average application time was 60 minutes per participant.

Data analysis was performed using descriptive statistics on the variables evaluated based on the instrument used, with the aim of characterizing the sample and presenting the results in a systematic way. Inferential statistical tests were performed, adopting a significance level of 5% ($p < 0.050$) as the criterion for interpreting the findings.

4. Results and discussion

Table 1 presents the results of applying the Friedman Test to the subtests that comprise the Visual-Motor Integration (VMI) domain of the DTVP-2, with the aim of verifying possible performance differences between the variables evaluated in the age group. Four tasks were analyzed: Visual-Motor Coordination (VMC), Copying (CO), Spatial Relations (SR), and Visual-Motor Speed (VMS), in children aged 5 years to 5 years and 11 months.

Table 1. Comparison of pre preschoolers performance in visual-motor integration and DTVP-2 tasks.

Tasks	n	Mean	Standard deviation	P-value
VMI VMC	20	6,35	1,63	< 0,001
VMI CO	20	8,75	2,49	
VMI SR	20	10,65	2,78	
VMI VMS	20	10,10	3,29	

Caption: VMI: Visual-Motor Integration; VMC: Visual-Motor Coordination; CO – Copying; SR: Spatial Relations; VMS: Visual-Motor Speed

The results of this study demonstrated that tasks requiring motor precision combined with spatial organization still represent a challenge for preschool children, especially those that require more refined eye-hand coordination, a skill whose acquisition tends to intensify throughout childhood (Thompson & Steinbeis, 2020).

In Table 2, the Friedman Test was also applied in order to verify possible differences between the perception of reduced motor skills and the DTVP-2 tasks.

Table 2. Comparison of pre preschoolers performance in the perception of reduced motor and the DTVP-2 tasks.

Tasks	n	Mean	Standard deviation	P-value
PRM SP	20	9,45	1,88	0,121
PRM FG	20	9,80	2,24	
PRM VC	20	8,10	3,71	
PRM FC	20	8,55	2,52	

Caption: PMR: Perception of Reduced Motor; SP: Space Position; FG: Figure-Ground; VC: Visual Closure; FC: Form Constancy.

No statistically significant differences were observed between the Reduced Motor Visual Perception (RMP) subtests, indicating homogeneous performance. This pattern suggests greater functional stability in visual discrimination tasks with low motor demands. This finding is consistent with the early and continuous maturation of basic perceptual skills (O'Brien & Kuhaneck, 2019).

The data found in this study corroborate a more organized functional profile in tasks that demand visual discrimination amidst complex stimuli, speed of response, and motor precision. This observation is in line with the discussions of Silva and Capellini (2024), who emphasize that perceptual-visuo-motor development related to writing depends on adequate stimuli offered during sensitive periods of development.

5. Conclusion

The results of this study allowed us to conclude that the perceptual-visual-motor development of 5-year-old preschoolers resulted from the greater neurobiological maturation typical of early childhood, especially in fine motor coordination skills, visual-motor integration, and visual perception.

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