



Effects of a Physical Activity Intervention on the Development of Visual Perception in Children

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Introduction

- Visual perception (VP) involves the intake and processing of visual information, which is associated with many parts of the brain.
- VP can be impaired in children with various neurodevelopmental disorders such as cerebral palsy, ADHD, and intellectual disability.
- While previous studies suggest that physical activity could positively impact VP development, the empirical evidence is limited.

Purpose

- The current study was designed as a preliminary investigation. This study examined effects of a physical activity program on VP development in typically developing children as a prospective case-control pilot study.

Methods

Participants

- A total of 20 typically developing children aged 4-7 years were purposefully recruited from Seoul and the suburbs, and assigned to either the case or control group, with 10 children each.

Procedures & Intervention

- The case group underwent a 24-session physical activity intervention program focusing on fundamental motor skills for 60 minutes twice a week over 12 weeks.
- The intervention program, designed to maintain a moderate intensity of ratings of perceived exertion (RPE) 13-17, consisted of activities outlined in Table 1.

Measures & Analyses

- The Korea Developmental Test of Visual Perception 2 (K-DTVP-2) test was used to measure general visual perception, motor reduced visual perception, and motor integration of both groups before and after the intervention.
- Two-way ANOVA with repeated measures was performed to analyze the data.

Table 1. The physical activity program based on fundamental motor skills.

W1 · ball throw and catch(1m apart in place→run) · zigzag run with a ball · relay race(use the ball as a baton)	W2 · ball catch and throw(1.5m apart in place→run) · under catch a ball and zigzag run · over catch a ball and zigzag run · relay race
W3 · ball catch and throw(2m apart in place→run) · under catch a ball and zigzag run→hop · over catch a ball and zigzag run→jump · relay race	W4 · ball catch and throw(2.5m apart in place→work) · under catch a ball and jump→gallop · over catch a ball and jump→gallop · relay race(use the ball as a baton and jumping)
W5 · ball catch and throw (3m apart in place→work) · under catch a ball and walk on a balance beam · over catch a ball and walk on a balance beam · throw and catch a ball while walking on a balance beam	W6 · ball catch and throw(1~2m apart in place→run) · under catch a ball and hop→skip · over catch a ball and hop→skip
W7 · ball catch and throw(1~2m apart in place→run) · kick a ball(ball in place→roll) · under catch a ball and gallop→skip · over catch a ball and gallop→skip	W8 · throw a ball→roll over→catch a ball and run · throw a ball→roll over→catch a ball→throw and catch a ball while running · shuttle run(catch a ball→run→throw a ball→repeat)
W9 · throw and catch a ball while running · catch a ball and walk on the balance beam→zigzag run→jump · playing tag rugby	W10 · throw and catch a ball up by yourself (place→walk→run) · run to the fixed place by the sound of the whistle→stop→repeat · running alternately around the cone of various colors, then going to the color instructed by the teacher and stopping
W11 · throw and catch a ball while running · everyone stand in a line up and throw a ball to the person next to you	
W12 · all run together, throw and catch a ball · playing tag rugby	

Results

- There were significant time effects on GVP ($p=.011$) of the case group, but time effects in the control group (Table 2).
- There were no significant group effects on all study variables of both groups (Table 2).
- There were significant interaction effects on all study variables (GVP, $p<.001$; MRVP, $p=.014$; VMI, $p=.004$), while no significant changes were observed in the control group over 12 weeks (Figure 1).

Table 2. Interventions effects on K-DTVP-2 between groups and time.

Variable	Group	Pre	Post	<i>p</i>
GVP	Case	94.10±15.8	111.6±17.8	T .011
	Control	108.8±7.68	103.9±10.3	G .543
				T*G <.001
MRVP	Case	102.8±17.6	121.4±14.8	T .068
	Control	115.8±11.3	112.7±16.4	G .702
				T*G .014
VMI	Case	85.9±24.6	100.7±20.2	T .196
	Control	101.0±9.52	94.8±10.6	G .527
				T*G .004

Notes. T: time, G: group, T*G: time*group, GVP: General Visual Perception, MRVP: Motor Reduced Visual Perception, VMI: Visual Motor Integration.

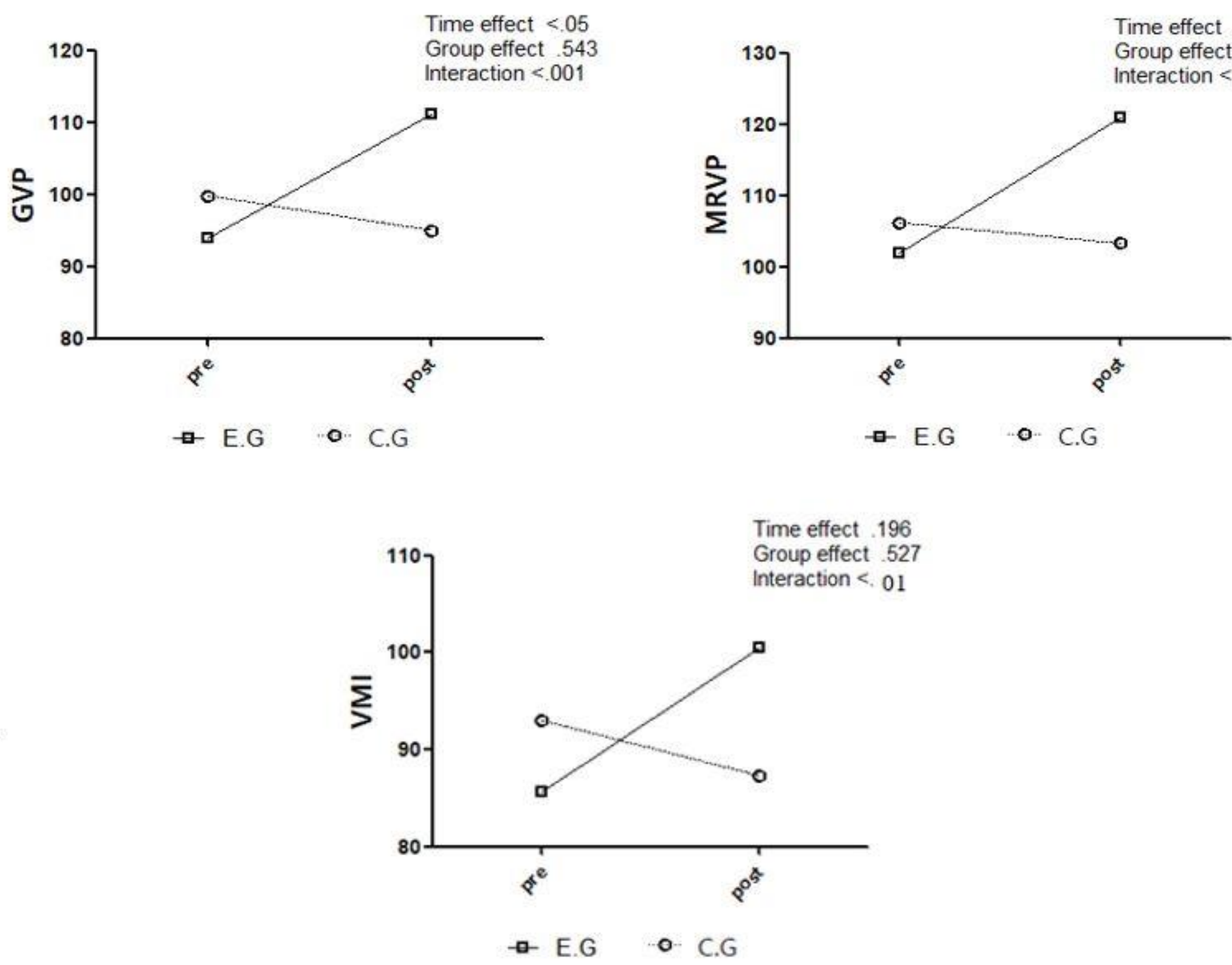


Figure. 1. Participant`s Visual perception scores of K-DTVP-2.

Note. EG=experimental(**case**) group; CG=control group, Interaction=time*group; GVP=general visual perception; MRVP=motor reduced visual perception; VMI=visual motor integration.

Conclusion

- Physical activity in typically developing children led to significant improvements across all areas of the DTVP test.
- The study findings suggest that a physical activity program focusing on fundamental motor skills can aid in the enhancement of visual perceptual development in preschoolers.
- Future research and clinical application of physical activity interventions for children with visual perceptual development delays are warranted.