

A Meta-Analysis of Handwriting and Visual-Motor Integration (VMI): The Moderating Effect of Handwriting Dimensions

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Abstract : Prior research has claimed a close association between handwriting and mathematics attainment with the help of spatial cognition. However, the exact mechanism behind this relationship remains un-investigated. Focusing on visual-motor integration (VMI), one critical spatial skill, this meta-analysis aims to estimate the size of the handwriting- visual-motor integration relationship and examine the moderating effect of handwriting dimensions on the link. With a random effect model, a medium relation ($r=.26$, 95%CI [.22, .30]) between handwriting and VMI was summarized in 38 studies with 55 unique samples and 141 effect sizes. Findings suggested handwriting dimensions significantly moderated the handwriting- VMI relationship, with handwriting legibility showing a substantial correlation with VMI, but neither handwriting speed nor pressure. Identifying the essential relationship between handwriting legibility and VMI, this study adds to the literature about the key cognitive processing needs underlying handwriting, and spatial cognition thus highlights the cognitive mechanism regarding handwriting, spatial cognition, and mathematics performances.

Keywords : handwriting, visual-motor integration, legibility, meta-analysis

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