

Descriptive Differences in Mathematics Performance in the Early Lifespan: Kindergarten through College

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Introduction

While much research has been published regarding the developmental pathways in the early lifespan related to the acquisition of reading skills, there is a relative dearth of research studies that explore the pathways of mathematics development throughout the elementary, secondary, and postsecondary years. The purpose of this study is to examine the self-reported and measured differences in various aspects of mathematics performance throughout the span of general public education between three previously identified groups: college students in a control group, college students with documented mathematics difficulties, and college students with documented mathematics disorders. Previous research has indicated several sources of individual differences with regard to math performance, such as (a) reading ability (Fleischner & Manheimer, 1997), (b) nonverbal/visual skills (Rourke, 1993), (c) working memory (Swanson, 1994), (d) poor math fluency (Geary, 1993), and (e) attention and/or hyperactivity (Geary, Hoard & Hamson, 1999).

Method & Results

Forty-five college undergraduates representing three groups (15 students in a *control group*, 15 students with self-identified *math difficulties*, and 15 students with confirmed *math disorders*) each underwent a comprehensive psychoeducational test battery including the Wechsler Adult Intelligence Scale-III, Wechsler Memory Scale-III, Woodcock Johnson III Tests of Achievement, measures of personality, and measures of attention. Each participant also completed a structured interview that documented each student's mathematics history, self-reported difficulties in acquiring arithmetic and algebraic concepts, and current difficulties in performing various forms of functional mathematics. Descriptive results indicate that students with math difficulty experience increased difficulty when acquiring basic elementary skills (**Figure 1**), and students with documented math disorders experience the greatest difficulty with math skill acquisition. A similar pattern is noted in each group's typical ability to perform functional math skills (**Figure 2**), with the math difficulty group and the math disorder group experiencing a much greater degree of difficulty using math in routine, daily activities. The results in **Figure 3** suggest that nonverbal reasoning, working memory, math fluency, and inattention (as mentioned in the introduction) continue to be variables of interest in this population.

Discussion

The preliminary data generated by looking at how obtained psychoeducational scores vary with the age of onset of math difficulties (Figure 3), provide confirmation of the findings of previous researchers, and suggest that an additional variable (Stress) may also impact math skills acquisition. Results from **Figure 3** suggest implications for future research, which are itemized below. An increased understanding of how individuals assimilate and acquire mathematics content over the early lifespan (during the formal education years) will lead directly to earlier identification of students experiencing difficulty, and will increase existing knowledge regarding instructional interventions designed to provide early remediation. In time, results from this strain of research will have implications for designing increasingly effective universal instructional methods which will meet the needs of a broader range of learners with varying individual differences.

References

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Figure 3: Psychoeducational Factors for Age of Onset of Math Difficulty (Math Disorder Group)

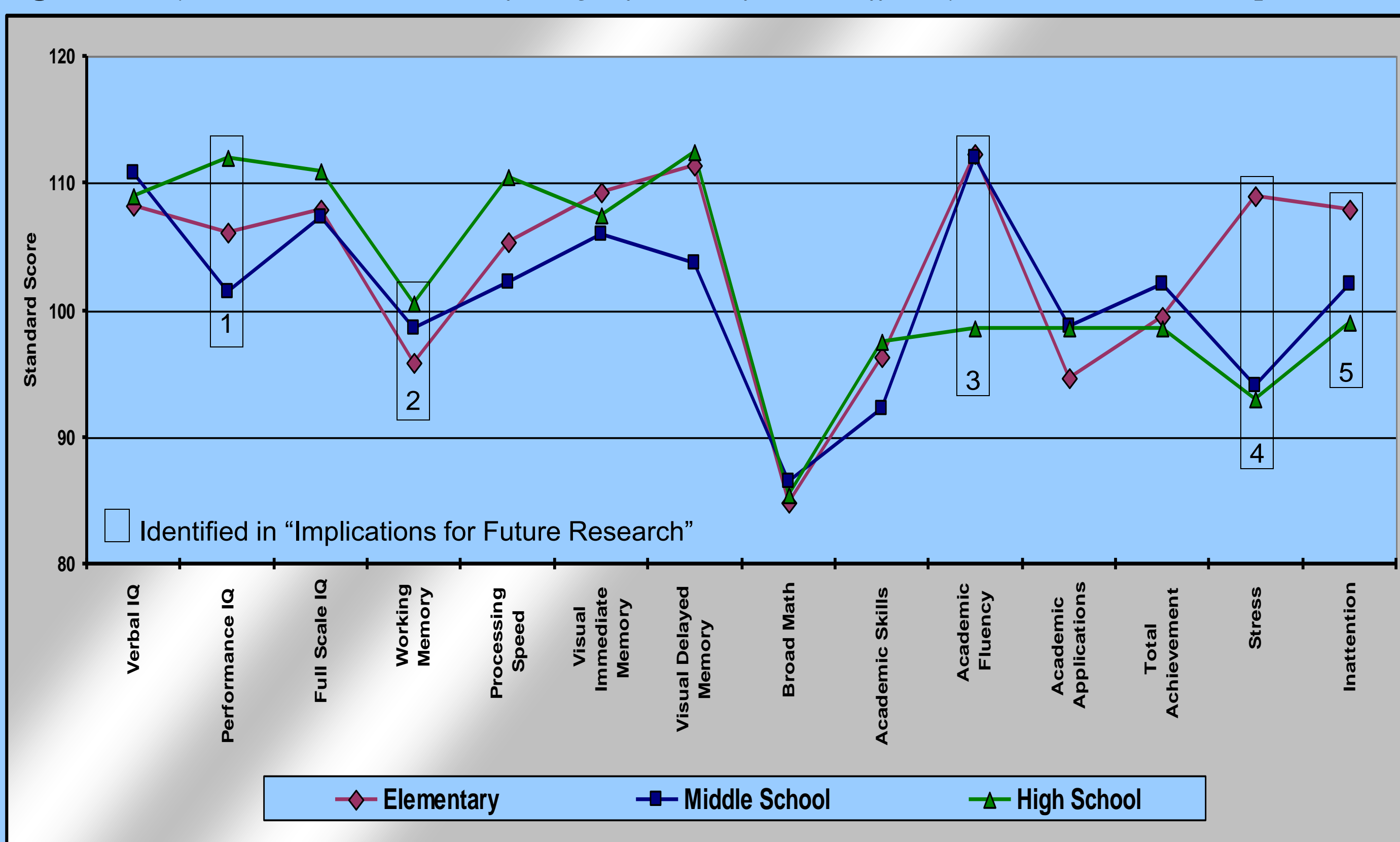


Figure 1: Difficulties in Math Skill Acquisition by Group

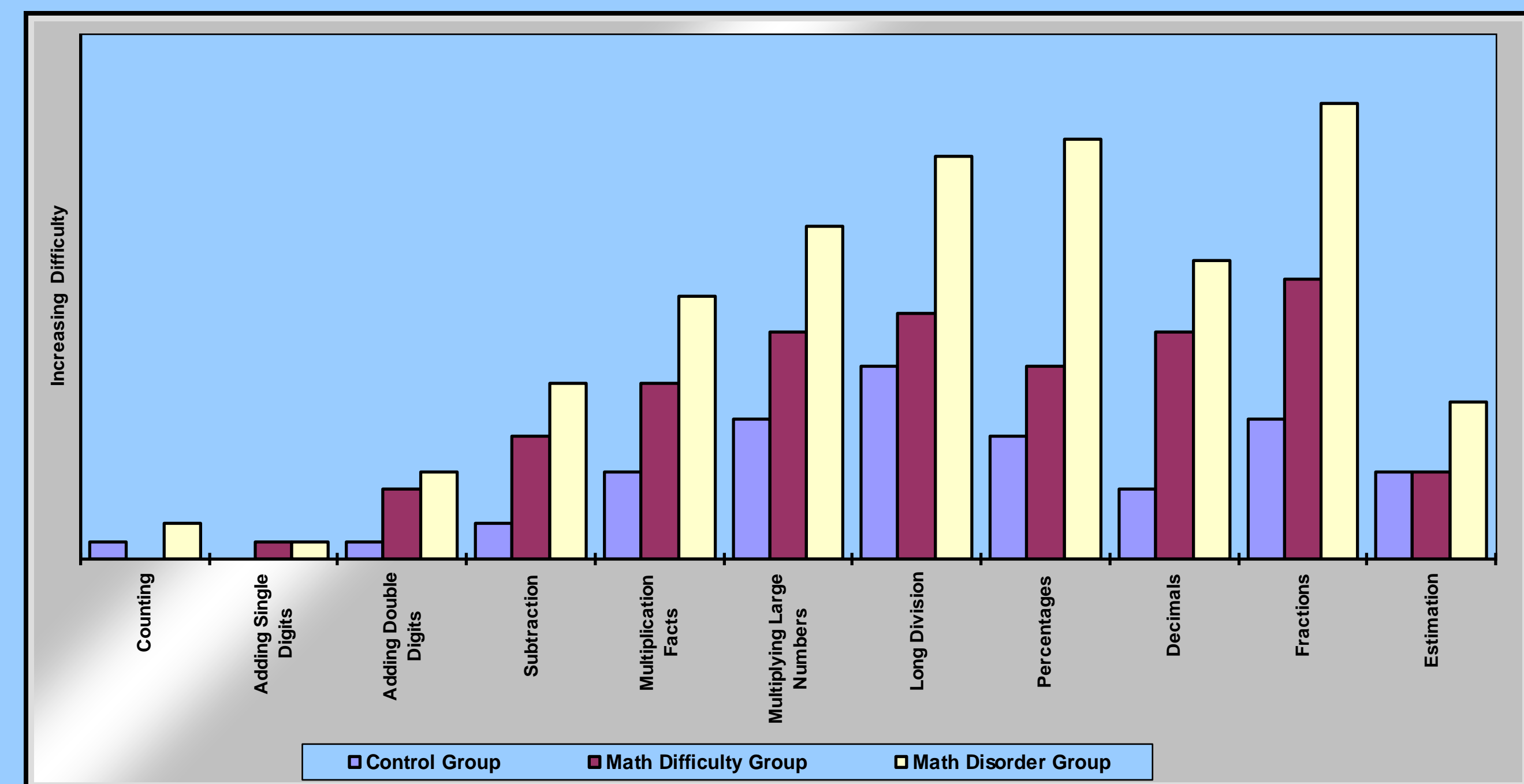
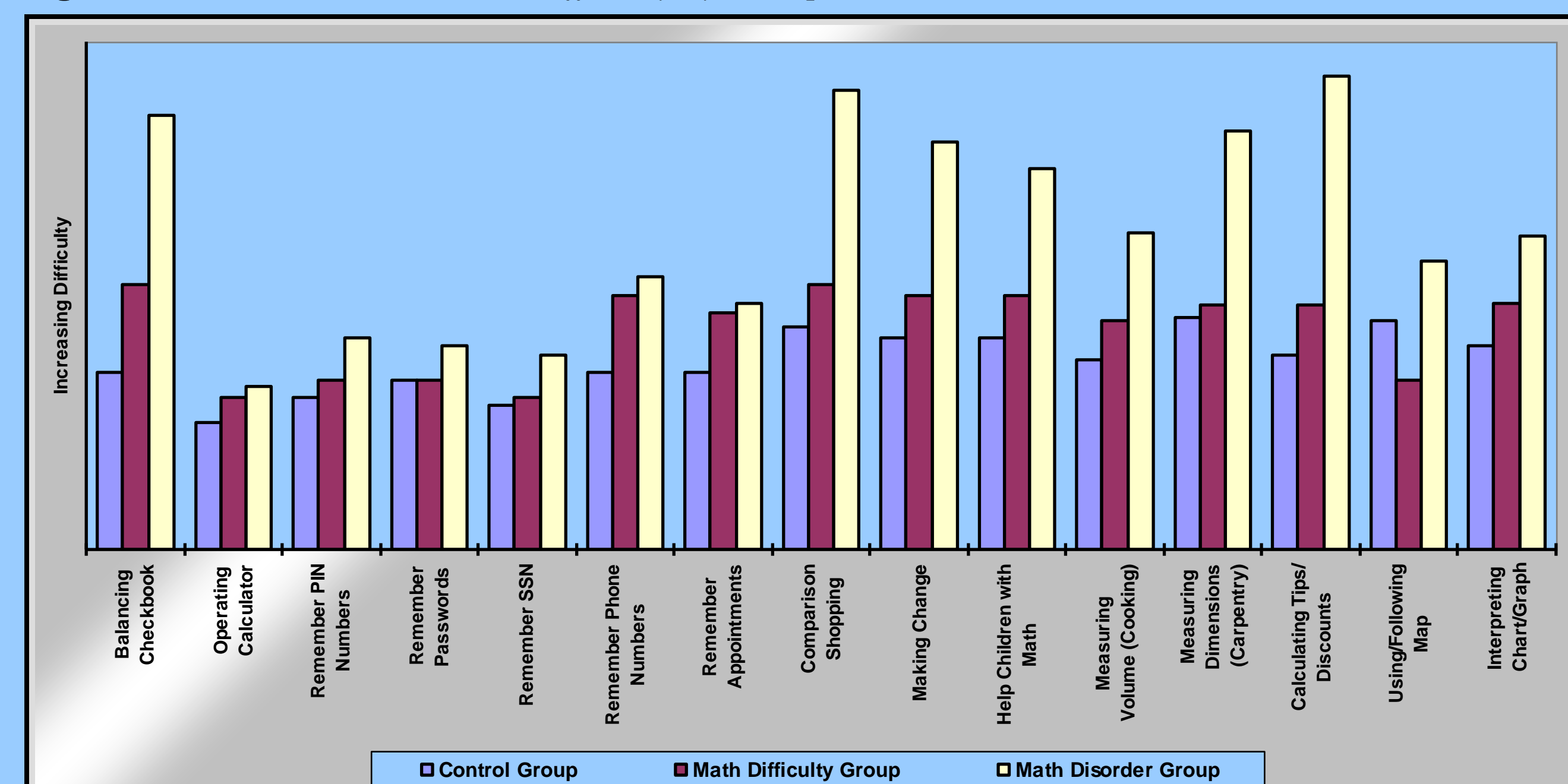


Figure 2: Functional Math Skill Difficulty by Group



Implications for Future Research

1. Is the age of onset of math difficulty related to levels of nonverbal reasoning ability (Performance IQ)?
2. How is math difficulty related to Working Memory capacity?
3. Does speed in performing academic tasks increase the presence of computational errors in younger students?
4. Does onset of math difficulty in elementary school increase level of perceived stress in later grades?
5. Do increased levels of inattention result in earlier onset of math difficulties?