Feasibility of adaptive computerized working memory and math intervention in 7-year-old children born preterm

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WHAT IS KNOWN: Computerized trainings may help decrease preterm children’s risk for academic underachievement, but feasibility of such interventions at school age is not known.

OBJECTIVE: We aimed to evaluate preterm children’s and their parents’ motivations and the general feasibility of adaptive computerized working memory training (Cogmed©) versus an open-access math training (XtraMath©).

WHAT THIS STUDY ADDS: Our findings suggest that home-based delivery of both computerized trainings as intervention for school-aged children born preterm is feasible; however, XtraMath© may be easier to implement into everyday life.

RESULTS

Overall, feasibility of both trainings was high. For example, children reported “the training was fun” (*Mean* (*SD*) Cogmed©: 2.55 (0.69), XtraMath©: 2.58 (0.72)); parents rated integration into everyday life as easy (Cogmed©: 2.79 (0.69), XtraMath©: 2.97 (0.61)).

Bootstrapped independent-samples *t*-tests showed that, on average, parents in the XtraMath© group reported significantly higher general feasibility of the training compared with the Cogmed© group (see **Table 1**), representing a medium-sized effect, *d* = 0.56.

Table 1. Comparison of online training programs

	Online training program		Mean difference	BCa 95% CI	p
	Cogmed© n = 29	XtraMath© n = 31			
Child’s sex - male	15 (51.7%)	15 (48.4%)			.796
Gestational age, weeks	33.00 (1.95)	32.68 (2.17)	0.32	(-0.67 – 1.28)	.547
Age, years	7.07 (0.45)	7.17 (0.31)	-0.10	(-0.29 – 0.09)	.316
Child report: Training Motivation	-0.04 (0.56)	0.04 (0.63)	-0.08	(-0.35 – 0.20)	.596
Parent report: Training Satisfaction	-0.06 (0.64)	0.04 (0.59)	-0.10	(-0.44 – 0.23)	.545
Parent report: Child’s Motivation	0.03 (0.61)	-0.03 (0.73)	0.06	(-0.24 – 0.36)	.694
Parent report: General Feasibility	-0.26 (0.91)	0.23 (0.83)	-0.49	(-0.90 – -0.08)	.037

METHODS

As part of a prospective, randomized-controlled, multi-center trial in Germany, preterm children (28 – 35+6 weeks of gestation; stratified by gestational age and sex) participated in one of two adaptive computerized trainings (Cogmed© versus XtraMath©) at home for 5 days/week for 5 weeks during their first year of school (**Figure 1**).

At the post-training assessment, *n*=60 children answered questions adapted from the Intrinsic Motivation Inventory [1] (e.g., “I liked this training very much.”). In addition, *n*=59 parents completed questions regarding training motivation, satisfaction, and general feasibility (e.g., “Did your child have fun performing the training?”). Child and parent responses were z-standardized and averaged into index scales (Cronbach’s $\alpha \geq .74$).

Figure 1. Randomization Flow-Chart

HIE: Hypoxic Ischemic Encephalopathy; PVL: Periventricular Leucomalacia; IVH: Intraventricular Hemorrhage; ODD: Oppositional Defiant Disorder

Please have a look at our related e-poster: *Preterm children’s long-term academic performance after adaptive computerized training: A randomized controlled trial* by Jaekel et al.

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CONCLUSION

Our findings indicate that computerized trainings represent a motivating and feasible avenue towards intervention for school-aged preterm children. Compared with Cogmed©, the adaptive, open-access XtraMath© training may be easier to implement into everyday life, which may facilitate regular practice and fidelity.