Diagnostik und Behandlung der Rechenstörung
Evidenztabelle

AWMF-Register-Nr.: 028-046
Klassifizierung: S3 (evidenz- und konsensbasiert)

Bereich „Prävention und Behandlung der Rechenstörung"
Führen symptomspezifische Interventionen bei Personen mit Rechenstörung zu einer Verbesserung der Rechenleistung im Vergleich
zu keinen oder nicht-symptomspezifischen Interventionen?
Führen bestimmte Interventionssettings (Beginn, Dauer einer Einheit, Interventionsleiter/in) bei Personen mit Rechenstörung zu
einer Verbesserung der Rechenleistung im Vergleich zu anderen Interventionssettings?

Studientypen

RCT randomisiert-kontrollierte Studie

CT kontrollierte Studie

KS Kohortenstudie bzw. Längsschnittstudie

QS Querschnittsstudie

Evidenzgrade nach SIGN (modifiziert)

1++	RCT (geringer Bias)		
1+	RCT (mittlerer Bias)	CT (geringer Bias)	
1-	RCT (hoher Bias)	CT (mittlerer Bias)	
2++		CT (hoher Bias)	KS (geringer Bias)
2+			KS (mittlerer Bias)
2-			KS (hoher Bias)	QS (geringer Bias)
3				QS (mittlerer bis hoher Bias)

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Wißmann, Heine, Handl, and Jacobs (2013)	CT	Intelligenz: IQ > 85 (nonverbal) Mathematik: PR <= 20 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 52 Einheiten pro Woche: 1 Einheiten insgesamt: 40 Einheit kürzer als 30 Min.: nein durchschn. Gruppenanzahl: 4 Setting: Schule Interventionsleiter: akademisch	Mathematik ES: 0,43 Basiskompetenzen: ES: 0,39	1-
		VG		**KG**			
		N: 17 (29,41 % männlich) Alter: 106,76 (8,35) Monate Klasse: 2 bis 3 **Förderung:** Förderprogramm für Grundschule (Training Basiskompetenzen und Rechenaufgaben)		N: 5 (60 % männlich) Alter: 101,4 (11,3) Monate Klasse: 2 bis 3 **Förderung:** Lese-Rechtschreibförderung			
	Ziel der vorliegenden Studie ist die Evaluation eines modular aufgebauten, neuropsychologisch orientierten numerischen Förderprogramms für rechenschwache Grundschulkinder. Dieses Programm fokussiert den Aufbau basisnumerischer und konzeptueller Kompetenzen, wobei prozedurales und arithmetisches Faktenwissen integriert werden. Im Rahmen eines Experimental-Kontrollgruppen-Designs (N=46) wurden fünf Gruppen von Zweit- und Drittklässlern (geförderte rechenschwache Kinder ohne und mit Leseschwäche, eine Vergleichsgruppe rechenschwacher Kinder mit Leseschwäche, durchschnittliche Rechner ohne und mit Leseschwäche) zu zwei Messzeitpunkten (vor/nach der Intervention) hinsichtlich ihrer arithmetischen Kompetenzen untersucht. Während sich die Kinder der Interventionsgruppen bedeutsam verbessern konnten, waren bei den Kindern der Vergleichsgruppen kaum Leistungszuwächse festzustellen. Der Leistungszuwachs der Kinder mit isolierter Rechenschwäche war deutlich größer als der der Kinder mit einer zusätzlichen Leseschwäche. Die Ergebnisse dieser Studie belegen, dass das eingesetzte Programm zur Verbesserung der arithmetischen Fertigkeiten rechenschwacher Kinder spezifisch wirksam ist. Sie veranschaulichen zudem den Bedarf an Interventionsstudien, die die Wirksamkeit unterschiedlicher Förderansätze für rechenschwache Kinder ohne und mit komorbider Leseschwäche vergleichen.						

Referenz	Studientyp	Stichprobe		Intervention	Ergebnis	SIGN
		Kriterien				
Swanson, Moran, Lussier, and Fung (2014)	RCT	Intelligenz: IQ > 85 (nonverbal) Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)		Dauer in Wochen: 10 Einheiten pro Woche: 2 Einheiten insgesamt: 20 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 3 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,12 Grundrechenarten: ES: 0,07 Textaufgaben: ES: 0,17	1-
		VG	**KG**			
		N: 62 (- männlich) Alter: 99,37 (4,00) Monate Klasse: 3 **Förderung:** Strategietraining für Textaufgaben	N: 20 (- männlich) Alter: 101,28 (4,08) Monate Klasse: 3 **Förderung:** keine Förderung			

The purpose of this study was to investigate the effectiveness of explicit, direct, and generative strategy training and working memory capacity (WMC) on mathematical word problem-solving accuracy in elementary schoolchildren. In this study, children in third grade (N = 82) identified as at risk for math difficulties (MD) were randomly assigned (within classrooms) to one of three treatment conditions that explicitly directed students' attention to different propositions within word problems—paraphrase question propositions (Restate), paraphrase relevant propositions (Relevant), and paraphrase all propositions (Complete)—or an untreated control condition. A significant treatment by covariate design indicated that generative strategy outcomes were conditional on the level of pretest WMC. A clear advantage in posttest problem-solving accuracy and solution planning was found for the complete generative condition relative to the control condition, but this advantage was conditional on setting WMC to a high level. Although no significant treatment advantages were found for solution accuracy when WMC was set to a low level, treatment advantages relative to the control condition were found for measures of schema activation. The results indicated that the effectiveness of generative strategies among children at risk for MD was directly dependent on the level of WMC. (PsycINFO Database Record (c) 2015 APA, all rights reserved). (journal abstract)

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Swanson (2015)	RCT	Intelligenz: IQ >=94 (nonverbal) Mathematik: PR <= 25 (Textaufgaben)			Dauer in Wochen: 8 Einheiten pro Woche: 3 Einheiten insgesamt: 20 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 4,5 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,27 Textaufgaben: ES: 0,27	1-
			VG	**KG**			
			N: 72 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** Strategietraining für Textaufgaben	N: 25 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** keine Förderung			
	This study investigated the role of strategy instruction and working memory capacity (WMC) on problem solving solution accuracy in children with and without math disabilities (MD). Children in grade 3 (N = 204) with and without MD subdivided into high and low WMC were randomly assigned to 1 of 4 conditions: verbal strategies (e.g., underlining question sentence), visual strategies (e.g., correctly placing numbers in diagrams), verbal + visual strategies, and an untreated control. The dependent measures for training were problem solving accuracy and two working memory transfer measures (operation span and visual-spatial span). Three major findings emerged: (1) strategy instruction facilitated solution accuracy but the effects of strategy instruction were moderated by WMC, (2) some strategies yielded higher post-test scores than others, but these findings were qualified as to whether children were at risk for MD, and (3) strategy training on problem solving measures facilitated transfer to working memory measures. The main findings were that children with MD, but high WM spans, were more likely to benefit from strategy conditions on target and transfer measures than children with lower WMC. The results suggest that WMC moderates the influence of cognitive strategies on both the targeted and non-targeted measures. (PsycINFO Database Record (c) 2015 APA, all rights reserved). (journal abstract)						

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Swanson (2014)	RCT	Intelligenz: IQ >=94 (nonverbal) Mathematik: PR <= 25 (Textaufgaben)			Dauer in Wochen: 8 Einheiten pro Woche: 3 Einheiten insgesamt: 20 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 4,5 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,11 Textaufgaben: ES: 0,10	1+
		VG		**KG**			
		N: 43 (- männlich) Alter: 104,88 (8,07) Monate Klasse: 3 **Förderung:** Strategietraining für Textaufgaben		N: 16 (- männlich) Alter: 107,04 (11,16) Monate Klasse: 3 **Förderung:** keine Förderung			
	Cognitive strategies are important tools for children with math difficulties (MD) in learning to solve word problems. The effectiveness of strategy training, however, depends on working memory capacity (WMC). Thus, children with MD but with relatively higher WMC are more likely to benefit from strategy training, whereas children with lower WMC may have their resources overtaxed. Children in Grade 3 (N = 147) were randomly assigned to 1 of 4 conditions: (a) verbal strategies (e.g., underlining question sentence), (b) visual strategies (e.g., correctly placing numbers in diagrams), (c) verbal plus visual strategies, or (d) an untreated control. In line with the predictions, children with MD and higher WMC benefited from verbal or visual strategies relative to those in the control condition on posttest measures of problem solving, calculation, and operation span. In contrast, cognitive strategies decreased problem-solving accuracy in children with low WMC. Thus, improvement in problem solving and related measures, as well as the impairment in learning outcomes, was moderated by WMC. (PsycINFO Database Record (c) 2015 APA, all rights reserved). (journal abstract						

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Re, Pedron, Tressoldi, and Lucangeli (2014) (Studie 1)	RCT	Intelligenz: durchschnittlich (verbal und nonverbal) Mathematik: PR <= 7 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 32 Einheiten pro Woche: 1,5 Einheiten insgesamt: 50 Einheit kürzer als 30 Min.: nein durchschn. Gruppenanzahl: 1 Setting: ambulant Interventionsleiter: akademisch	Mathematik: ES: 0,70	1-
			VG	**KG**		Basiskompetenzen: ES: 0,55	
			N: 10 (- männlich) Alter: - (-) Monate Klasse: 2 bis 5 **Förderung:** Symptomspezifische Einzelförderung	N: 9 (- männlich) Alter: - (-) Monate Klasse: 2 bis 5 **Förderung:** Hausaufgabenbearbeitung in der Gruppe (9 Personen) im Schulsetting		Grundrechenarten: ES: 0,84	
		The purpose of this study was to determine the efficacy of specific, individualized training for students with different levels of mathematical difficulties. Fifty-four students, with either severe or mild math difficulties, were assigned to individualized training or to a control condition. Ten students with severe math difficulties ("dyscalculia") and 17 with mild math difficulties in the individualized training conditions were trained to improve their accuracy and fluency in math, compared to 9 students with severe math difficulties and 18 with mild math difficulties that were in the general training group (control condition). Students in the individualized training condition (both with dyscalculia and with mild math difficulties) outperformed the control groups after the training and at a later follow-up in almost all math components. Overall, this study supports the feasibility of treating both severe and mild mathematical accuracy and fluency difficulties with specific, customized training.					

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Re et al. (2014) (Studie 2)	RCT	Intelligenz: durchschnittlich (verbal und nonverbal) Mathematik: PR <= 7 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 32 Einheiten pro Woche: 1,5 Einheiten insgesamt: 50 Einheit kürzer als 30 Min.: nein durchschn. Gruppenanzahl: 1 Setting: ambulant Interventionsleiter: akademisch	Mathematik: ES: 0,91 Basiskompetenzen: ES: 0,72 Grundrechenarten: ES: 1,10	1-
		VG	**KG**				
		N: 17 (- männlich) Alter: - (-) Monate Klasse: 2 bis 5 **Förderung:** Symptomspezifische Einzelförderung	N: 18 (- männlich) Alter: - (-) Monate Klasse: 2 bis 5 **Förderung:** Hausaufgabenbearbeitung in der Gruppe (18 Personen) im Schulsetting				
	The purpose of this study was to determine the efficacy of specific, individualized training for students with different levels of mathematical difficulties. Fifty-four students, with either severe or mild math difficulties, were assigned to individualized training or to a control condition. Ten students with severe math difficulties ("dyscalculia") and 17 with mild math difficulties in the individualized training conditions were trained to improve their accuracy and fluency in math, compared to 9 students with severe math difficulties and 18 with mild math difficulties that were in the general training group (control condition). Students in the individualized training condition (both with dyscalculia and with mild math difficulties) outperformed the control groups after the training and at a later follow-up in almost all math components. Overall, this study supports the feasibility of treating both severe and mild mathematical accuracy and fluency difficulties with specific, customized training.						

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Powell, Fuchs, Fuchs, Cirino, and Fletcher (2009) (Studie 1)	RCT	Intelligenz: IQ >= 70 (verbal und nonverbal) Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 15 Einheiten pro Woche: 3 Einheiten insgesamt: 41 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,59 Grundrechenarten: ES: 0,59	1+
		VG		**KG**			
		N: 70 (60 % männlich) Alter: 109,57 (5,96) Monate Klasse: 3 **Förderung:** Training arithmetisches Faktenwissen		N: 17 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** keine Förderung			
		The purpose of this study was to assess the efficacy of fact retrieval tutoring as a function of math difficulty (MD) subtype, that is, whether students have MD alone (MD-only) or have concurrent difficulty with math and reading (MDRD). Third graders (n = 139) at two sites were randomly assigned, blocking by site and MD subtype, to four tutoring conditions: fact retrieval practice, conceptual fact retrieval instruction with practice, procedural computation/estimation instruction, and control (no tutoring). Tutoring occurred for 45 sessions over 15 weeks for 15–25 minutes per session. Results provided evidence of an interaction between tutoring condition and MD subtype status for assessment of fact retrieval. For MD-only students, students in both fact retrieval conditions achieved comparably and outperformed MD-only students in the control group as well as those in the procedural computation/estimation instruction group. By contrast, for MDRD students, there were no significant differences among intervention conditions. (PsycINFO Database Record (c) 2012 APA, all rights reserved). (journal abstract)					

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Powell et al. (2009) (Studie 2)	RCT	Intelligenz: IQ >= 70 (verbal und nonverbal) Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 15 Einheiten pro Woche: 3 Einheiten insgesamt: 41 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,18 Grundrechenarten: ES: 0,18	1+
		VG		**KG**			
		N: 36 (61,1 % männlich) Alter: 107,88 (6) Monate Klasse: 3 **Förderung:** Training prozedurales Rechenwissen		N: 17 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** keine Förderung			
		The purpose of this study was to assess the efficacy of fact retrieval tutoring as a function of math difficulty (MD) subtype, that is, whether students have MD alone (MD-only) or have concurrent difficulty with math and reading (MDRD). Third graders (n = 139) at two sites were randomly assigned, blocking by site and MD subtype, to four tutoring conditions: fact retrieval practice, conceptual fact retrieval instruction with practice, procedural computation/estimation instruction, and control (no tutoring). Tutoring occurred for 45 sessions over 15 weeks for 15–25 minutes per session. Results provided evidence of an interaction between tutoring condition and MD subtype status for assessment of fact retrieval. For MD-only students, students in both fact retrieval conditions achieved comparably and outperformed MD-only students in the control group as well as those in the procedural computation/estimation instruction group. By contrast, for MDRD students, there were no significant differences among intervention conditions. (PsycINFO Database Record (c) 2012 APA, all rights reserved). (journal abstract)					

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Powell and Fuchs (2010)	RCT	Intelligenz: IQ >= 70 (verbal und nonverbal) Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 5 Einheiten pro Woche: 3 Einheiten insgesamt: 15 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: - Interventionsleiter: akademisch	Mathematik: ES: 0,88 Grundrechenarten: ES: 0,63 Textaufgaben: ES: 1,13	1-
		VG		**KG**			
		N: 15 (53,3 % männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** Training Textaufgaben		N: 8 (37,5 % männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** keine Förderung			
		Elementary school students often misinterpret the equal sign (=) as an operational rather than a relational symbol. Such misunderstanding is problematic because solving equations with missing numbers may be important for the development of higher order mathematics skills, including solving word problems. Research indicates equal-sign instruction can alter how typically developing students use the equal sign, but no study has been conducted on the effects of such instruction for students with mathematics difficulty (MD) or how equal-sign instruction contributes to word-problem-solving skill for students with or without MD. In the present study, the authors assessed the efficacy of equal-sign instruction within word-problem tutoring. Third-grade students with MD (n = 80) were assigned to word-problem tutoring, word-problem tutoring plus equal-sign instruction (combined) tutoring, or no-tutoring control. Combined tutoring produced greater improvement on equal sign tasks and open equations than did the other 2 conditions. On certain forms of word problems, combined tutoring, but not word-problem tutoring alone, produced more improvement than did the control condition. When compared at posttest with 3rd-grade students without MD on equal-sign tasks and open equations, only combined tutoring students with MD performed comparably. (PsycINFO Database Record (c) 2015 APA, all rights reserved). (journal abstract)					

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Moran, Swanson, Gerber, and Fung (2014)	RCT	Intelligenz: IQ >= 85 (nonverbal) Mathematik: PR < 25 (Textaufgaben)			Dauer in Wochen: 10 Einheiten pro Woche: 2 Einheiten insgesamt: 20 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 4 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,72 Textaufgaben: ES: 0,72	1-
			VG	**KG**			
			N: 59 (54,2 % männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** Strategietraining Textaufgaben	N: 13 (69,2 % männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** keine Förderung			

The purpose of this study was to examine effectiveness of paraphrasing interventions on mathematics word problem-solving accuracy in third grade children (N = 72) at risk for mathematics disabilities (MD). Three instructional conditions directed students' attention through paraphrasing, via writing, to different propositions within word problems. Students were randomly assigned to one of four intervention conditions: paraphrase question propositions (restate), paraphrase relevant propositions (relevant) and paraphrase all propositions (complete) or an untreated control. A mixed ANCOVA indicated that paraphrasing relevant and complete propositions significantly increased posttest accuracy when compared to the control and restate condition. Results from the study provide support for the effectiveness of paraphrasing interventions that directs students to restate/paraphrase propositions of mathematics word problems relative to the control condition. (PsycINFO Database Record (c) 2014 APA, all rights reserved). (journal abstract)

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Lambert (2014)	CT	Intelligenz: durchschnittlich (-) Mathematik: PR < 16 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 98 Einheiten pro Woche: 1 Einheiten insgesamt: - Einheit kürzer als 30 Min.: nein durchschn. Gruppenanzahl: 1 Setting: ambulant Interventionsleiter: akademisch	Mathematik: ES: 2,17	2++
		VG		**KG**			
		N: 26 (38,46 % männlich) Alter: 106,27 (16,7) Monate Klasse: 2 bis 6 **Förderung:** Wasserglasmethode		N: 20 (25 % männlich) Alter: 101,35 (8,2) Monate Klasse: 2 bis 6 **Förderung:** keine Förderung			
	The present study examined the effects of the remediation program Waterglass Intervention Program (WIP; Schlotmann, 2004) for children with mathematical learning disabilities (MLD) compared to the effects of private tutoring. In a prepost-test control group design, the data of n = 26 children (age = 8.86, SD = 1.40) who attended the WIP and n = 20 children (age = 8.45, SD = 0.68) who received private tutoring was analyzed. Intervention outcomes were investigated using a standardized math achievement test, math school grades, as well as parents' judgements. Data analysis revealed that children who attended the WIP showed a greater improvement of math skills and maths grades compared to children who received private tutoring. 17 children treated with the WIP but only 2 children who received private tutoring reached a percentile > 29 at the end of the intervention course. According to ICD-10 criteria, these children would no longer receive an MLD diagnosis. Parents whose children attended the WIP specified higher gains for mathematical abilities but not for psychosocial functioning or MLD symptoms for their children than parents did for the private tutoring group. The results indicate that the WIP is more effective for the remediation of MLD compared to private tutoring.						

Referenz	Studientyp	Stichprobe		Intervention	Ergebnis	SIGN
		Kriterien				
Hutchinson (1993)	RCT	Intelligenz: IQ >= 85 (verbal und nonverbal) Mathematik: mind. 3 Jahre Rückstand bei standardisierten Mathetest (Grundrechenarten, Textaufgaben)		Dauer in Wochen: 17 Einheiten pro Woche: - Einheiten insgesamt: - Einheit kürzer als 30 Min.: nein durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 2,57 Textaufgaben: ES: 2,57	1-
		VG	**KG**			
		N: 12 (41,67 % männlich) Alter: 173,42 (11,4) Monate Klasse: 8 bis 10 **Förderung:** Strategietraining Textaufgaben	N: 8 (50 % männlich) Alter: 172,25 (11,57) Monate Klasse: 8 bis 10 **Förderung:** keine Förderung			
		Designed a strategy to enable 12 learning disabled (LD) Ss (mean age 173.42 mo) to represent and solve 3 types of word problems. The strategy consisted of task sheets of problems and prompt cards for self-questioning; modeling the use of the strategy by thinking aloud; and providing prompts, encouragement, and corrective feedback. Analysis of the single-S data showed the strategy to be an effective intervention for LD Ss with deficits in algebra problem solving, but with criterial knowledge of basic operations and 1-step problems. The instructed Ss had significantly higher posttest scores than a comparison group of 8 LD Ss (mean age 172.25 mo). The instructed Ss demonstrated improved performance on algebra word problems. Maintenance and transfer of the strategy were evident. (PsycINFO Database Record (c) 2015 APA, all rights reserved)				

Referenz	Studientyp	Stichprobe		Intervention	Ergebnis	SIGN
		Kriterien				
Fuchs et al. (2009) (Studie 1)	RCT	Intelligenz: IQ >= 70 (verbal und nonverbal) Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)		Dauer in Wochen: 16 Einheiten pro Woche: 3 Einheiten insgesamt: 48 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,65 Grundrechenarten: ES: 0,62 Textaufgaben: ES: 0,67	1-
		VG	**KG**			
		N: 42 (54,76 % männlich) Alter: 107,76 (7,2) Monate Klasse: 3 **Förderung:** Strategietraining Textaufgaben mit Fokus auf Grundrechenarten	N: 24 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** keine Förderung			
	The purposes of this study were to assess the efficacy of remedial tutoring for 3rd graders with mathematics difficulty, to investigate whether tutoring is differentially efficacious depending on students' math difficulty status (mathematics difficulty alone vs. mathematics plus reading difficulty), to explore transfer from number combination (NC) remediation, and to examine the transportability of the tutoring protocols. At 2 sites, 133 students were stratified on mathematics difficulty status and site and then randomly assigned to 3 conditions: control (no tutoring), tutoring on automatic retrieval of NCs (i.e., Math Flash), or tutoring on word problems with attention to the foundational skills of NCs, procedural calculations, and algebra (i.e., Pirate Math). Tutoring occurred for 16 weeks, 3 sessions per week and 20–30 min per session. Math Flash enhanced fluency with NCs with transfer to procedural computation but without transfer to algebra or word problems. Pirate Math enhanced word problem skill as well as fluency with NCs, procedural computation, and algebra. Tutoring was not differentially efficacious as a function of students' mathematics difficulty status. The tutoring protocols proved transportable across sites. (PsycINFO Database Record (c) 2015 APA, all rights reserved). (journal abstract)					

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Fuchs et al. (2009) (Studie 2)	RCT	Intelligenz: IQ >= 70 (verbal und nonverbal) Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 16 Einheiten pro Woche: 3 Einheiten insgesamt: 48 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,39 Grundrechenarten: ES: 0,53 Textaufgaben: ES: 0,24	1-
		VG		**KG**			
		N: 44 (47,72 % männlich) Alter: 108 (7,2) Monate Klasse: 3 **Förderung:** Training Faktenwissen		N: 24 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** keine Förderung			

The purposes of this study were to assess the efficacy of remedial tutoring for 3rd graders with mathematics difficulty, to investigate whether tutoring is differentially efficacious depending on students' math difficulty status (mathematics difficulty alone vs. mathematics plus reading difficulty), to explore transfer from number combination (NC) remediation, and to examine the transportability of the tutoring protocols. At 2 sites, 133 students were stratified on mathematics difficulty status and site and then randomly assigned to 3 conditions: control (no tutoring), tutoring on automatic retrieval of NCs (i.e., Math Flash), or tutoring on word problems with attention to the foundational skills of NCs, procedural calculations, and algebra (i.e., Pirate Math). Tutoring occurred for 16 weeks, 3 sessions per week and 20–30 min per session. Math Flash enhanced fluency with NCs with transfer to procedural computation but without transfer to algebra or word problems. Pirate Math enhanced word problem skill as well as fluency with NCs, procedural computation, and algebra. Tutoring was not differentially efficacious as a function of students' mathematics difficulty status. The tutoring protocols proved transportable across sites. (PsycINFO Database Record (c) 2015 APA, all rights reserved). (journal abstract)

Referenz	Studientyp	Stichprobe		Intervention	Ergebnis	SIGN
		Kriterien				
Fuchs et al. (2010)	RCT	Intelligenz: IQ >= 70 (verbal und nonverbal) Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)		Dauer in Wochen: 16 Einheiten pro Woche: 3 Einheiten insgesamt: 48 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,73 Grundrechenarten: ES: 0,59 Textaufgaben: ES: 0,87	1-
		VG	**KG**			
		N: 100 (59 % männlich) Alter: 100,13 (5,75) Monate Klasse: 3 **Förderung:** Training Textaufgaben mit Zählstrategie	N: 50 (52 % männlich) Alter: 100,92 (6,96) Monate Klasse: 3 **Förderung:** keine Förderung			
	The primary purpose of this study was to assess the effects of strategic counting instruction, with and without deliberate practice with those counting strategies, on number combination (NC) skill among students with mathematics difficulties (MD). Students (n = 150) were stratified on MD status (i.e., MD alone versus MD with reading difficulty) and site (proximal versus distal to the intervention developer) and then randomly assigned to control (no tutoring) or 1 of 2 variants of NC remediation. Both remediations were embedded in the same validated word-problem tutoring protocol (i.e., Pirate Math). In 1 variant, the focus on NCs was limited to a single lesson that taught strategic counting. In the other variant, 4–6min of practice per session was added to the other variant. Tutoring occurred for 16 weeks, 3 sessions per week for 20–30min per session. Strategic counting without deliberate practice produced superior NC fluency compared to control; however, strategic counting with deliberate practice effected superior NC fluency and transfer to procedural calculations compared with both competing conditions. Also, the efficacy of Pirate Math word-problem tutoring was replicated. (PsycINFO Database Record (c) 2012 APA, all rights reserved). (journal abstract)					

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Fuchs et al. (2008) (Studie 1)	RCT	Intelligenz: IQ >= 70 (verbal und nonverbal) Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 15 Einheiten pro Woche: 3 Einheiten insgesamt: 45 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: nicht-akademisch	Mathematik: ES: 0,13 Basiskompetenzen: ES: -0,04 Grundrechenarten: ES: 0,24 Textaufgaben: ES: 0,18	1-
		VG		**KG**			
		N: 32 (56,25 % männlich) Alter: 113,76 (8,4) Monate Klasse: 3 **Förderung:** Training arithmetisches Faktenwissen		N: 18 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** keine Förderung			
	The major purposes of this study were to assess the efficacy of tutoring to remediate 3rd-grade computational deficits and to explore whether remediation is differentially efficacious depending on whether students experience mathematics difficulty alone or concomitantly with reading difficulty. At 2 sites, 127 students were stratified on mathematics difficulty status and randomly assigned to 4 conditions: word recognition (control) tutoring or 1 of 3 computation tutoring conditions: fact retrieval, procedural computation and computational estimation, and combined (fact retrieval + procedural computation and computational estimation). Results revealed that fact retrieval tutoring enhanced fact retrieval skill, and procedural computation and computational estimation tutoring (whether in isolation or combined with fact retrieval tutoring) enhanced computational estimation skill. Remediation was not differentially efficacious as a function of students' mathematics difficulty status. (Contains 4 tables and 1 footnote.)						

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Fuchs et al. (2008) (Studie 2)	RCT	Intelligenz: IQ >= 70 (verbal und nonverbal) Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 15 Einheiten pro Woche: 3 Einheiten insgesamt: 45 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: nicht-akademisch	Mathematik: ES: 0,11 Basiskompetenzen: ES: 0,13 Grundrechenarten: ES: 0,28 Textaufgaben: ES: -0,07	1-
		VG	**KG**				
		N: 29 (72,41 % männlich) Alter: 112,32 (4,8) Monate Klasse: 3 **Förderung:** Erarbeitung prozedurales Rechenwissen	N: 18 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** keine Förderung				
		The major purposes of this study were to assess the efficacy of tutoring to remediate 3rd-grade computational deficits and to explore whether remediation is differentially efficacious depending on whether students experience mathematics difficulty alone or concomitantly with reading difficulty. At 2 sites, 127 students were stratified on mathematics difficulty status and randomly assigned to 4 conditions: word recognition (control) tutoring or 1 of 3 computation tutoring conditions: fact retrieval, procedural computation and computational estimation, and combined (fact retrieval + procedural computation and computational estimation). Results revealed that fact retrieval tutoring enhanced fact retrieval skill, and procedural computation and computational estimation tutoring (whether in isolation or combined with fact retrieval tutoring) enhanced computational estimation skill. Remediation was not differentially efficacious as a function of students' mathematics difficulty status. (Contains 4 tables and 1 footnote.)					

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Fuchs, Fuchs, Hamlett, and Appleton (2002) (Studie 1)	RCT	Intelligenz: IQ >= 80 (verbal und nonverbal) Mathematik: PR < 7 (Grundrechenarten) und 1 SD IQ-Diskrepanz			Dauer in Wochen: 12 Einheiten pro Woche: 2 Einheiten insgesamt: 24 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: -	Textaufgaben: ES: 1,13	1-
		VG		**KG**			
		N: 8 (100 % männlich) Alter: - (-) Monate Klasse: 4 **Förderung:** Training Textaufgaben am Computer		N: 5 (- männlich) Alter: - (-) Monate Klasse: 4 **Förderung:** keine Förderung			

Explored methods to enhance mathematical problem solving for students with mathematics disabilities (MD). A small-group problem-solving tutoring treatment incorporated explicit instruction on problem-solution rules and on transfer. The transfer component was designed to increase awareness of the connections between novel and familiar problems by broadening the categories by which students group problems requiring the same solution methods and by prompting students to search novel problems for these broad categories. To create a stringent test of efficacy, a computer-assisted practice condition, which provided students with direct practice on real-world problem-solving tasks, was incorporated. 40 4th graders were assigned to problem-solving tutoring, computer-assisted practice, problem-solving tutoring plus computer-assisted practice, or control, and pre-and posttested students on three problem-solving tasks. On story problems and transfer story problems, tutoring (with or without computer-assisted practice) effected reliably stronger growth compared to control; effects on real-world problem solving, although moderate to large, were not statistically significant. Computer-assisted practice added little value beyond tutoring but yielded moderate effects on two measures. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Fuchs et al. (2002) (Studie 2)	RCT	Intelligenz: IQ >= 80 (verbal und nonverbal) Mathematik: PR < 7 (Grundrechenarten), IQ-Diskrepanz >= 1 SD			Dauer in Wochen: 12 Einheiten pro Woche: 2 Einheiten insgesamt: 24 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: -	Textaufgaben: ES: 3,5	1-
		VG		**KG**			
		N: 8 (100 % männlich) Alter: - (-) Monate Klasse: 4 **Förderung:** Training Textaufgaben durch Tutoring		N: 5 (- männlich) Alter: - (-) Monate Klasse: 4 **Förderung:** keine Förderung			
		Explored methods to enhance mathematical problem solving for students with mathematics disabilities (MD). A small-group problem-solving tutoring treatment incorporated explicit instruction on problem-solution rules and on transfer. The transfer component was designed to increase awareness of the connections between novel and familiar problems by broadening the categories by which students group problems requiring the same solution methods and by prompting students to search novel problems for these broad categories. To create a stringent test of efficacy, a computer-assisted practice condition, which provided students with direct practice on real-world problem-solving tasks, was incorporated. 40 4th graders were assigned to problem-solving tutoring, computer-assisted practice, problem-solving tutoring plus computer-assisted practice, or control, and pre-and posttested students on three problem-solving tasks. On story problems and transfer story problems, tutoring (with or without computer-assisted practice) effected reliably stronger growth compared to control; effects on real-world problem solving, although moderate to large, were not statistically significant. Computer-assisted practice added little value beyond tutoring but yielded moderate effects on two measures. (PsycINFO Database Record (c) 2012 APA, all rights reserved)					

Referenz	Studientyp	Stichprobe		Intervention	Ergebnis	SIGN
		Kriterien				
Tournaki (2003) (Studie 1)	CT	Intelligenz: durchschnittlich (-) Mathematik: mind. 2 Schuljahre Rückstand (-)		Dauer in Wochen: 2 Einheiten pro Woche: 4 Einheiten insgesamt: 8 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: akademisch	Grundrechenarten: ES: 2,31	2++
		VG	**KG**			
		N: 14 (- männlich) Alter: - (-) Monate Klasse: - **Förderung:** Strategietraining zum Lösen von Additionsaufgaben	N: 7 (- männlich) Alter: - (-) Monate Klasse: - **Förderung:** keine Förderung			
		Forty-two second-grade general education students and 42 students with learning disabilities (LD) were taught basic, one-digit addition facts (e.g. 5 + 3). Students received instruction via (a) a minimum addend strategy, (b) drill and practice, or (c) control. The effectiveness of the two methods was measured through students' accuracy and latency scores on a posttest and a transfer task (e.g., 5 + 3 + 7). Students with LD improved significantly only in the strategy condition, as compared to drill-and-practice and control conditions, whereas general education students improved significantly both in the strategy and the drill-and-practice conditions as compared to the control condition. However, in the transfer task, students from all groups became significantly more accurate only in the strategy condition, while all students were significantly faster than their control group peers regardless of teaching method. The implications for teachers' differential choices of methods of instruction for students with different learning characteristics are discussed. (PsycINFO Database Record (c) 2012 APA, all rights reserved)				

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Tournaki (2003) (Studie 2)	CT	Intelligenz: durchschnittlich (-) Mathematik: mind. 2 Schuljahre Rückstand (-)			Dauer in Wochen: 2 Einheiten pro Woche: 4 Einheiten insgesamt: 8 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: akademisch	Grundrechenarten: ES: 1,02	2++
		VG	**KG**				
		N: 14 (- männlich) Alter: - (-) Monate Klasse: - **Förderung:** Drilltraining zum Lösen von Additionsaufgaben	N: 7 (- männlich) Alter: - (-) Monate Klasse: - **Förderung:** keine Förderung				

Forty-two second-grade general education students and 42 students with learning disabilities (LD) were taught basic, one-digit addition facts (e.g. 5 + 3). Students received instruction via (a) a minimum addend strategy, (b) drill and practice, or (c) control. The effectiveness of the two methods was measured through students' accuracy and latency scores on a posttest and a transfer task (e.g., 5 + 3 + 7). Students with LD improved significantly only in the strategy condition, as compared to drill-and-practice and control conditions, whereas general education students improved significantly both in the strategy and the drill-and-practice conditions as compared to the control condition. However, in the transfer task, students from all groups became significantly more accurate only in the strategy condition, while all students were significantly faster than their control group peers regardless of teaching method. The implications for teachers' differential choices of methods of instruction for students with different learning characteristics are discussed. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Bottge and Cho (2013)	CT	Intelligenz: - Mathematik: PR <= 10 (Grundrechenarten, Textaufgaben)			Dauer in Wochen: 11 Einheiten pro Woche: - Einheiten insgesamt: - Einheit kürzer als 30 Min.: - durchschn. Gruppenanzahl: - Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,39 Grundrechenarten: ES: 0,18 Textaufgaben: ES: 0,74	2++
		VG		**KG**			
		N: 145 (70,3 % männlich) Alter: - (-) Monate Klasse: 6 bis 8 **Förderung:** Förderung Mathematik, in dem Problemstellungen real dargestellt und gelöst werden müssen (Videos, selbstgebaute Objekte)		N: 163 (62,6 % männlich) Alter: - (-) Monate Klasse: 6 bis 8 **Förderung:** keine Förderung			
	This study compared how students with learning difficulties in math (MLD) who were randomly assigned to two instructional conditions answered items on problem solving tests aligned to the Common Core State Standards Initiative for Mathematics. Posttest scores showed improvement in the math performance of students receiving Enhanced Anchored Instruction (EAI) and typical instruction but the improvement of students in the EAI condition was greater. Much of the total variance in latent ability scores was explained at the teacher level. As we have observed in previous studies, teachers' use of interactive technology tools combined with engaging hands-on applications can make important differences in what students with MLD achieve in mathematics, particularly in problem solving. (Contains 1 note, 4 tables, and 4 figures.)						

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Burns, Kanive, and DeGrande (2012) (Studie 1)	CT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 12 Einheiten pro Woche: 4 Einheiten insgesamt: 50 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: -	Mathematik: ES: 0,55	2++
		VG	**KG**				
		N: 139 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** Training Faktenwissen	N: 142 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** keine Förderung				

The current study reviews a computer-based math fluency intervention with 216 third- and fourth-grade students who were at risk for math difficulties. The intervention used a computer software program to practice math facts an average of three times per week for 8 to 15 weeks. Data were compared to those of 226 students in a control group. Results indicated that students who participated in the intervention had significantly larger gains on their math scores than those in the control group, and students with severe math problems (at or below the 15th percentile) grew at a rate that was equal to that of students with a pretest score that was between the 15th and 25th percentiles. Moreover, significantly fewer students remained at risk for math failure in the intervention group after participating in the intervention. These data suggest that the computer-based intervention was a useful supplemental math intervention. Suggestions for future research are provided. (PsycINFO Database Record (c) 2012 APA, all rights reserved). (journal abstract)

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Burns et al. (2012) (Studie 2)	CT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 12 Einheiten pro Woche: 4 Einheiten insgesamt: 50 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: Schule Interventionsleiter: -	Mathematik: ES: 0,71	2++
		VG		**KG**			
		N: 77 (- männlich) Alter: - (-) Monate Klasse: 4 **Förderung:** Training Faktenwissen		N: 84 (- männlich) Alter: - (-) Monate Klasse: 4 **Förderung:** keine Förderung			
	The current study reviews a computer-based math fluency intervention with 216 third- and fourth-grade students who were at risk for math difficulties. The intervention used a computer software program to practice math facts an average of three times per week for 8 to 15 weeks. Data were compared to those of 226 students in a control group. Results indicated that students who participated in the intervention had significantly larger gains on their math scores than those in the control group, and students with severe math problems (at or below the 15th percentile) grew at a rate that was equal to that of students with a pretest score that was between the 15th and 25th percentiles. Moreover, significantly fewer students remained at risk for math failure in the intervention group after participating in the intervention. These data suggest that the computer-based intervention was a useful supplemental math intervention. Suggestions for future research are provided. (PsycINFO Database Record (c) 2012 APA, all rights reserved). (journal abstract)						

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Marco Ennemoser and Krajewski (2007)	CT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 3 Einheiten pro Woche: 2 Einheiten insgesamt: 6 Einheit kürzer als 30 Min.: nein durchschn. Gruppenanzahl: 5 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,77 Grundrechenarten: ES: 0,77 Textaufgaben: ES: 0,82	2++
		VG		**KG**			
		N: 15 (40 % männlich) Alter: - (-) Monate Klasse: 1 **Förderung:** Förderung des zahlenbezogenen Teil-Ganzes-Verständnis		N: 15 (40 % männlich) Alter: - (-) Monate Klasse: 1 **Förderung:** Lesetraining zur Förderung der phonologischen Bewusstheit			
	Aktuelle Modellvorstellungen über die Entwicklung mathematischer Kompetenzen legen eine möglichst frühzeitige und kompetenzorientierte (versus performanzorientierte) Förderung rechenschwacher Kinder nahe. Vor diesem Hintergrund wurde in der vorliegenden Studie die Effektivität einer Förderung des zahlbezogenen Teil-Ganzes-Verständnisses bei rechenschwachen Erstklässlern überprüft. Im Anschluss an die sechs Sitzungen umfassende Intervention hatte die Trainingsgruppe (n=15) signifikant größere Leistungszuwächse zu verzeichnen als die Kontrollgruppe, die ein unspezifisches Training erhielt (n=15). Die Wirksamkeit der Förderung blieb nicht spezifisch auf das Teil-Ganzes-Verständnis beschränkt, sondern schlug sich im Sinne von Transfereffekten auch in Sachaufgaben sowie im Gesamtergebnis eines standardisierten Mathematiktests nieder.						

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
M. Ennemoser, Sinner, and Krajewski (2015)	RCT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 5 Einheiten pro Woche: 2 Einheiten insgesamt: 10 Einheit kürzer als 30 Min.: - durchschn. Gruppenanzahl: 5 Setting: Schule Interventionsleiter: nicht-akademisch	Mathematik: ES: 0,28 Grundrechenarten: ES: -0,14	1-
		VG		**KG**			
		N: 32 (50 % männlich) Alter: - (-) Monate Klasse: 1 **Förderung:** Förderung mathematischer Basiskompetenzen (Mengen- und Zahlenverständnis)		N: 32 (50 % männlich) Alter: - (-) Monate Klasse: 1 **Förderung:** Keine Förderung			
	Die Effektivität eines Programms zur Förderung mathematischer Basiskompetenzen bei Risikokindern in der ersten Klasse wird in einer empirischen Studie überprüft. In der Untersuchung wurden mit Hilfe eines Tests 64 Kinder identifiziert, die ein erhöhtes Risiko zur Entwicklung einer Rechenschwäche aufwiesen. Die Hälfte dieser Risikokinder wurde der Trainingsgruppe zugeteilt, die über fünf Wochen hinweg mit zehn ausgewählten Sitzungen des Programms "Mengen, zählen, Zahlen" (MZZ) gefördert wurde. Die andere Hälfte absolvierte als Kontrollgruppe im selben Zeitraum das konventionelle Förderangebot der Schule. Für die Trainingsgruppe wurden im Verlauf und drei Monate nach Abschluss der Förderung signifikant größere Zugewinne in den mathematischen Kompetenzen als für die Kontrollgruppe ermittelt. Darüber hinaus zeigte sich langfristig eine verbesserte Rechenleistung bei Kindern der MZZ-Gruppe. Dieser Transfereffekt trat erst nach einer zeitlichen Verzögerung zutage und wird dahingehend interpretiert, dass die MZZ-geförderten Risikokinder aufgrund ihrer trainingsbedingt verbesserten Basiskompetenzen nachfolgend auch vom regulären Mathematikunterricht besser profitieren konnten. Auf der Grundlage der Ergebnisse werden Implikationen für die Praxis diskutiert.						

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Fuchs et al. (2005)	RCT	Intelligenz: - Mathematik: PR <= 25 (Grundrechenarten)			Dauer in Wochen: 16 Einheiten pro Woche: 3 Einheiten insgesamt: 48 Einheit kürzer als 30 Min.: nein durchschn. Gruppenanzahl: 2,5 Setting: Schule Interventionsleiter: nicht-akademisch	Mathematik: ES: 0,84 Grundrechenarten: ES: 0,94 Textaufgaben: ES: 0,59	1-
		VG		**KG**			
		N: 64 (46,88 % männlich) Alter: - (-) Monate Klasse: 1 **Förderung:** Intensive Förderung des Lehrstoffs der 1. Klasse (Basiskompetenzen, Grundrechenarten)		N: 63 (52,38 % männlich) Alter: - (-) Monate Klasse: 1 **Förderung:** Keine Förderung			

This study examined the efficacy of preventive 1st-grade tutoring in mathematics, estimated the prevalence and severity of mathematics disability, and explored pretreatment cognitive characteristics associated with mathematics development. Participants were 564 first graders, 127 of whom were designated at risk (AR) for mathematics difficulty and randomly assigned to tutoring or control conditions. Before treatment, all participants were assessed on cognitive and academic measures. Tutoring occurred 3 times weekly for 16 weeks; treatment fidelity was documented; and math outcomes were assessed. Tutoring efficacy was supported on computation and concepts/applications, but not on fact fluency. Tutoring decreased the prevalence of math disability, with prevalence and severity varying as a function of identification method and math domain. Attention accounted for unique variance in predicting each aspect of end-of-year math performance. Other predictors, depending on the aspect of math performance, were nonverbal problem solving, working memory, and phonological processing. (PsycINFO Database Record (c) 2012 APA, all rights reserved). (journal abstract)

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Powell, Driver, and Julian (2015)	RCT	Intelligenz: - Mathematik: PR <= 10 (Grundrechenarten)			Dauer in Wochen: 4 Einheiten pro Woche: 3 Einheiten insgesamt: 12 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: - Setting: - Interventionsleiter: nicht-akademisch	Mathematik: ES: 0,69 Grundrechenarten: ES: 0,69	1-
		VG		**KG**			
		N: 37 (35,14 % männlich) Alter: 94,54 (-) Monate Klasse: 2 **Förderung:** Additionstraining		N: 14 (50 % männlich) Alter: 98 (-) Monate Klasse: 2 **Förderung:** Keine Förderung			

Students often misinterpret the equal sign (=) as operational instead of relational. Research indicates misinterpretation of the equal sign occurs because students receive relatively little exposure to equations that promote relational understanding of the equal sign. No study, however, has examined effects of nonstandard equations on the equation solving and equal-sign understanding of students with mathematics difficulty (MD). In the present study, second-grade students with MD (n = 51) were randomly assigned to standard equations tutoring, combined tutoring (standard and nonstandard equations), and no-tutoring control. Combined tutoring students demonstrated greater gains on equation-solving assessments and equal-sign tasks compared to the other two conditions. Standard tutoring students demonstrated improved skill on equation solving over control students, but combined tutoring students' performance gains were significantly larger. Results indicate that exposure to and practice with nonstandard equations positively influence student understanding of the equal sign. (PsycINFO Database Record (c) 2015 APA, all rights reserved). (journal abstract)

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Van Luit and Schopman (2000)	CT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen)			Dauer in Wochen: 4 Einheiten pro Woche: 3 Einheiten insgesamt: 12 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: - Setting: - Interventionsleiter: nicht-akademisch	Mathematik: ES: 0,75 Basiskompetenzen: ES: 0,67 Textaufgaben: ES: 0,90	2++
		VG	**KG**				
		N: 62 (64,52 % männlich) Alter: 75,6 (6) Monate Klasse: - **Förderung:** Förderung Zählfertigkeit	N: 62 (66,13 % männlich) Alter: 73,2 (6) Monate Klasse: - **Förderung:** Keine Förderung				
	Difficulties with early numeracy can interfere with the acquisition of mathematics skills in later childhood. Early math intervention is therefore an important issue. Sixty-two 5–7 yr old pupils from kindergartens for children with special educational needs were given early mathematics intervention. The early numeracy program was specifically developed for young children with special educational needs and early numeracy difficulties by basing the instruction on perceptual gestalt theory. The results showed that the 62 children in the experimental group performed better at posttest than the 62 children in the comparison group, The children failed, however, to transfer their knowledge to novel math problems. (PsycINFO Database Record (c) 2012 APA, all rights reserved)						

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Kroesbergen and van Luit (2002) (Studie 1)	CT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen)			Dauer in Wochen: 17 Einheiten pro Woche: 2 Einheiten insgesamt: 34 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 5 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: 0,95 Grundrechenarten: ES: 0,99	2++
			VG	**KG**			
			N: 20 (- männlich) Alter: 104,4 (10,8) Monate Klasse: - **Förderung:** Multiplikationstraining durch Interventionsleiter	N: 9 (- männlich) Alter: - (-) Monate Klasse: - **Förderung:** Keine Förderung			
		The results of an intervention program for students with difficulties learning mathematics are reported. Two kinds of math intervention, guided versus structured instruction, were compared to regular math instruction. A total of 75 students from regular and special education, aged 7 to 13 yrs, participated. Ability and automaticity multiplication tests were administered before and after the 4-mo training period. The results show that the students in both of the experimental conditions improved more than the students in the control condition. Some additional differences were found between the 2 experimental interventions. Guided instruction appeared to be more effective for low performing students than structured instruction and especially for those students in regular education. Special education students appear to benefit most from structured instruction for the automaticity of multiplication problems. A 3-mo follow-up test shows the acquired knowledge to be well-established in both groups. (PsycINFO Database Record (c) 2012 APA, all rights reserved)					

Referenz	Studientyp	Stichprobe		Intervention	Ergebnis	SIGN
		Kriterien				
Kroesbergen and van Luit (2002) (Studie 2)	CT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen)		Dauer in Wochen: 17 Einheiten pro Woche: 2 Einheiten insgesamt: 34 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 5 Setting: Schule Interventionsleiter: nicht-akademisch	Mathematik: ES: -0,02 Grundrechenarten: ES: -0,10	2++
		VG	**KG**			
		N: 10 (- männlich) Alter: 104,4 (10,8) Monate Klasse: - **Förderung:** Multiplikationstraining durch Selbstinstruktion und Diskussion mit Interventionsleiter	N: 9 (- männlich) Alter: - (-) Monate Klasse: - **Förderung:** Keine Förderung			
	The results of an intervention program for students with difficulties learning mathematics are reported. Two kinds of math intervention, guided versus structured instruction, were compared to regular math instruction. A total of 75 students from regular and special education, aged 7 to 13 yrs, participated. Ability and automaticity multiplication tests were administered before and after the 4-mo training period. The results show that the students in both of the experimental conditions improved more than the students in the control condition. Some additional differences were found between the 2 experimental interventions. Guided instruction appeared to be more effective for low performing students than structured instruction and especially for those students in regular education. Special education students appear to benefit most from structured instruction for the automaticity of multiplication problems. A 3-mo follow-up test shows the acquired knowledge to be well-established in both groups. (PsycINFO Database Record (c) 2012 APA, all rights reserved)					

Referenz	Studientyp	Stichprobe		Intervention	Ergebnis	SIGN
		Kriterien				
Kroesbergen and van Luit (2002) (Studie 3)	CT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen)		Dauer in Wochen: 17 Einheiten pro Woche: 2 Einheiten insgesamt: 34 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 5 Setting: Schule Interventionsleiter: akademisch	Mathematik: ES: -0,18 Grundrechenarten: ES: -0,64	2++
		VG	**KG**			
		N: 10 (- männlich) Alter: 128,4 (15,6) Monate Klasse: - **Förderung:** Multiplikationstraining durch Interventionsleiter	N: 4 (- männlich) Alter: - (-) Monate Klasse: - **Förderung:** Keine Förderung			

The results of an intervention program for students with difficulties learning mathematics are reported. Two kinds of math intervention, guided versus structured instruction, were compared to regular math instruction. A total of 75 students from regular and special education, aged 7 to 13 yrs, participated. Ability and automaticity multiplication tests were administered before and after the 4-mo training period. The results show that the students in both of the experimental conditions improved more than the students in the control condition. Some additional differences were found between the 2 experimental interventions. Guided instruction appeared to be more effective for low performing students than structured instruction and especially for those students in regular education. Special education students appear to benefit most from structured instruction for the automaticity of multiplication problems. A 3-mo follow-up test shows the acquired knowledge to be well-established in both groups. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Referenz	Studientyp	Stichprobe		Intervention	Ergebnis	SIGN
		Kriterien				
Kroesbergen and van Luit (2002) (Studie 4)	CT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen)		Dauer in Wochen: 17 Einheiten pro Woche: 2 Einheiten insgesamt: 34 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 5 Setting: Schule Interventionsleiter: nicht-akademisch	Mathematik: ES: 0,54 Grundrechenarten: ES: 0,43	2++
		VG	**KG**			
		N: 10 (- männlich) Alter: 128,4 (15,6) Monate Klasse: - **Förderung:** Multiplikationstraining durch Selbstinstruktion und Diskussion mit Interventionsleiter	N: 4 (- männlich) Alter: - (-) Monate Klasse: - **Förderung:** Keine Förderung			

The results of an intervention program for students with difficulties learning mathematics are reported. Two kinds of math intervention, guided versus structured instruction, were compared to regular math instruction. A total of 75 students from regular and special education, aged 7 to 13 yrs, participated. Ability and automaticity multiplication tests were administered before and after the 4-mo training period. The results show that the students in both of the experimental conditions improved more than the students in the control condition. Some additional differences were found between the 2 experimental interventions. Guided instruction appeared to be more effective for low performing students than structured instruction and especially for those students in regular education. Special education students appear to benefit most from structured instruction for the automaticity of multiplication problems. A 3-mo follow-up test shows the acquired knowledge to be well-established in both groups. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Sinner and Kuhl (2010)	CT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen)			Dauer in Wochen: 6 Einheiten pro Woche: 2 Einheiten insgesamt: 12 Einheit kürzer als 30 Min.: nein durchschn. Gruppenanzahl: 3,5 Setting: Schule Interventionsleiter: nicht-akademisch	Mathematik: ES: 0,34 Basiskompetenzen: ES: 0,46 Grundrechenarten: ES: -0,03	2++
			VG	**KG**			
			N: 22 (50 % männlich) Alter: 106,44 (9,6) Monate Klasse: 1 bis 4 **Förderung:** Förderung Basiskompetenzen	N: 18 (77,8 % männlich) Alter: 107,76 (10,2) Monate Klasse: 1 bis 4 **Förderung:** Denktraining			
		Die Effektivität einer mathematischen Fördermaßnahme bei Kindern mit sonderpädagogischem Förderbedarf wird untersucht. An 6 Lernhilfeschulen wurden insgesamt 87 Kinder im Alter von 7 bis 11,5 Jahren im Hinblick auf ihre mathematischen Basiskompetenzen vorgetestet. Anhand dieser Vortestwerte wurden die 40 rechenschwächsten Kinder auf zwei Versuchsgruppen verteilt. Hierbei durchlief die Experimentalgruppe (N=22; durchschnittlicher IQ=81) eine Förderung mit dem Programm "Mengen, zählen, Zahlen" (MZZ; Krajewski, Nieding & Schneider), während die Kontrollgruppe (N=18; durchschnittlicher IQ=77) mit dem "Denktraining für Kinder I" (Klauer) trainiert wurde. Beide Gruppen erhielten zwölf Förderstunden à 40 Minuten in einem Zeitraum von sechs Wochen. Insgesamt konnte gezeigt werden, dass sich die Experimentalgruppe in ihren mathematischen Basiskompetenzen nach der Förderung im Vergleich zur Kontrollgruppe signifikant stärker verbessert hatte (d=0.56). Insbesondere fand eine Steigerung im Bereich des Anzahlkonzepts (Kardinalzahlverständnis) statt. Die Effekte blieben allerdings nicht über einen Zeitraum von vier Monaten bestehen. Auch ein Transfer auf einfache Rechenoperationen fand nicht statt.					

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Jitendra et al. (2013)	RCT	Intelligenz: - Mathematik: PR <= 25 (Basiskompetenzen, Grundrechenarten, Textaufgaben)			Dauer in Wochen: 12 Einheiten pro Woche: 5 Einheiten insgesamt: 60 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 3 Setting: Schule Interventionsleiter: nicht-akademisch	Mathematik: ES: 0,11 Textaufgaben: ES: 0,11	1-
		VG		**KG**			
		N: 24 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** Förderung Grundrechenarten und Textaufgaben		N: 30 (- männlich) Alter: - (-) Monate Klasse: 3 **Förderung:** Keine Förderung			
	This study compared the effects of delivering a supplemental, small-group tutoring intervention on the mathematics outcomes of third-grade students at risk for mathematics difficulties (MD) who were randomly assigned to either a schema-based instruction (SBI) or control group. SBI emphasized the underlying mathematical structure of additive problems. All students at risk for MD identified through screening received a mathematics intervention in groups of 2–4 for 12 weeks across the school year. Results revealed that students in the SBI group outperformed students in the control group on a word problem solving (WPS) posttest (g = 0.46). The effect of SBI proved to be equivalent for students in both high and low at-risk subgroups. On a district-administered mathematics achievement test, SBI students scored significantly higher than control students (g = 0.34); however, there were no significant effects on the WPS retention test (8 weeks later). (PsycINFO Database Record (c) 2015 APA, all rights reserved). (journal abstract)						

Referenz	Studientyp	Stichprobe			Intervention	Ergebnis	SIGN
		Kriterien					
Kuhn (2016)	RCT	Intelligenz: IQ >= 80 (verbal und nonverbal) Mathematik: PR < 12 (Basiskompetenzen, Grundrechenarten, Textaufgaben), IQ-Diskrepanz >= 1,5 SD			Dauer in Wochen: 4 Einheiten pro Woche: 5 Einheiten insgesamt: 30 Einheit kürzer als 30 Min.: ja durchschn. Gruppenanzahl: 1 Setting: - Interventionsleiter: -	Mathematik: ES: 0,32 Grundrechenarten: ES: 0,62 Basiskompetenzen: ES: 0,11	1-
		VG		**KG**			
		N: 20 (30 männlich) Alter: 97,2 (11,64) Monate Klasse: 2 bis 4 **Förderung:** Computertraining vor Basiskompetenzen und Grundrechenarten		N: 27 (33,3 männlich) Alter: 106,24 (13,2) Monate Klasse: 2 bis 4 **Förderung:** Keine Förderung oder Denktraining			
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