Diagnostik und Behandlung der Rechenstörung
Evidenztabelle

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

Bereich „Risiko und Diagnostik der Rechenstörung“
Unterscheiden sich Personen mit Rechenstörung, deren Diagnosen auf dem einfachen IQ-Diskrepanzkriterium, doppelten Diskrepanzkriterium oder der Alters-/Klassennormdiskrepanz beruht?
Wie soll der Prozess zur Diagnostik einer Rechenstörung gestaltet sein?

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)

Vergleich IQ-Diskrepanzkriterium und Alters-/Klassennormdiskrepanz

<table>
<tr><th>Referenz</th><th>Studientyp</th><th colspan="2">Stichprobe
Kriterien</th><th>Ergebnis</th><th>SIGN</th></tr>
<tr><td rowspan="3">Maehler and Schuchardt (2011)</td><td rowspan="2">QS</td><td colspan="2">Intelligenz: IQ > 80 (verbal und nonverbal)
Mathematik: T < 40 (Basiskompetenzen, Grundrechenarten, Textaufgaben)</td><td rowspan="2">Arbeitsgedächtnis:
ES: 0,05

Phonologische Schleife:
ES: -0,01

Visuell-räumlicher Notizblock:
ES: 0,04

Zentrale Exekutive:
ES: 0,15</td><td rowspan="2">3</td></tr>
<tr><td>Gruppe mit Diskrepanz
N: 19 (26,3 % männlich)
Alter: 103 (9,09) Monate
Klasse: 2 bis 4

IQ-Diskrepanz >= 1,2 SD</td><td>Gruppe ohne Diskrepanz
N: 19 (47,4 % männlich)
Alter: 112 (13,5) Monate
Klasse: 2 bis 4

IQ-Diskrepanz < 1,2 SD</td></tr>
<tr><td colspan="5">The criterion of discrepancy is used to distinguish children with learning disorders from children with intellectual disabilities. The justification of the criterion of discrepancy for the diagnosis of learning disorders relies on the conviction of fundamental differences between children with learning difficulties with versus without discrepancy to intelligence. But the open question is whether these two groups are really characterised by different cognitive functioning. This question was examined in three studies in which several functions of working memory according to Baddeley were explored. A working memory battery with tasks for the phonological loop, the visual–spatial sketchpad and central executive skills was presented in individual sessions to children with learning disabilities (dyslexia or dyscalculia or mixed disorders of scholastic skills) and normal IQ, to children with the same problems but lower IQ, and to control groups of children with regular school achievement and normal IQ. Results reveal specific deficits in working memory in the groups with learning disabilities compared with the control groups. However, there were no differences between the disabled groups with normal versus lower intelligence. These findings do not support the notion of discrepant cognitive functioning due to differences in intelligence of the groups, and therefore lead to doubts about the validity of the criterion of discrepancy. (PsycINFO Database Record (c) 2013 APA, all rights reserved). (journal abstract)</td></tr>
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<tr><th>Referenz</th><th>Studientyp</th><th colspan="2">Stichprobe
Kriterien</th><th>Ergebnis</th><th>SIGN</th></tr>
<tr><td rowspan="3">Klesczewski et al. (2015)</td><td rowspan="3">QS</td><td colspan="2">Intelligenz: IQ > 85 (nonverbal)
Mathematik: T < 40 (Basiskompetenzen, Grundrechenarten, Textaufgaben)</td><td rowspan="3">Arbeitsgedächtnis:
ES: 0,45

Phonologische Schleife:
ES: 0,33

Visuell-räumlicher Notizblock:
ES: 0,61

Zentrale Exekutive:
ES: 0,52</td><td rowspan="3">2-</td></tr>
<tr><td>Gruppe mit Diskrepanz</td><td>Gruppe ohne Diskrepanz</td></tr>
<tr><td>N: 17 (11,8 % männlich)
Alter: 108,5 (3,81) Monate
Klasse: 3

IQ-Diskrepanz >= 1,2 SD</td><td>N: 17 (23,5 % männlich)
Alter: 111,9 (6,43) Monate
Klasse: 3

IQ-Diskrepanz < 1,2 SD</td></tr>
<tr><td></td><td colspan="4">Previous research on working memory (WM) in children with poor mathematical skills has yielded heterogeneous results, possibly due to inconsistent consideration of the IQ–achievement discrepancy and additional reading and spelling difficulties. To examine the impact of both, the WM of 68 average-achieving and 68 low-achieving third-graders in mathematics was assessed. Preliminary analyses showed that poor mathematical skills were associated with poor WM. Afterwards, children with isolated mathematical difficulties were separated from those with additional reading and spelling difficulties. Half of each group fulfilled the IQ–achievement discrepancy, resulting in a 2 (additional reading and spelling difficulties: yes/no) by 2 (IQ–achievement discrepancy: yes/no) factorial design. Analyses revealed that not fulfilling the IQ–achievement discrepancy was associated with poor visual WM, whereas additional reading and spelling difficulties were associated with poor central executive functioning in children fulfilling the IQ–achievement discrepancy. Therefore, WM in children with poor mathematical skills differs according to the IQ–achievement discrepancy and additional reading and/or spelling difficulties. (PsycINFO Database Record (c) 2015 APA, all rights reserved). (journal abstract)</td></tr>
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<tr><th>Referenz</th><th>Studientyp</th><th colspan="2">Stichprobe
Kriterien</th><th>Ergebnis</th><th>SIGN</th></tr>
<tr><td rowspan="3">Kuhn, Raddatz, Holling, and Dobel (2013) (Studie 1)</td><td rowspan="2">QS</td><td colspan="2">Intelligenz: IQ > 80 (verbal und nonverbal)
Mathematik: T <= 37 (Basiskompetenzen, Grundrechenarten, Textaufgaben)</td><td rowspan="2">Arbeitsgedächtnis:
ES: 0,15

Visuell-räumlicher Notizblock:
ES: 0,15

Mathematik:
ES: 0,06

Basiskomptenzen:
ES: 0,06

Verarbeitungsgeschwindigkeit:
ES: -0,11</td><td rowspan="2">2-</td></tr>
<tr><th>Gruppe mit Diskrepanz</th><th>Gruppe ohne Diskrepanz</th></tr>
<tr><td></td><td>N: 27 (22,2 % männlich)
Alter: 103,08 (12,6) Monate
Klasse: 2 bis 4

IQ-Diskrepanz >= 1,5 SD</td><td>N: 21 (28,6 % männlich)
Alter: 96,6 (12,24) Monate
Klasse: 2 bis 4

IQ-Diskrepanz < 1,5 SD</td><td></td><td></td></tr>
<tr><td colspan="5">Ausgehend vom Diskrepanzkriterium für die Diagnose einer Dyskalkulie hatte die vorliegende Arbeit zum Ziel, mögliche Unterschiede zwischen dyskalkulischen und rechenschwachen Kindern ohne Diskrepanz zwischen der allgemeinen kognitiven Leistungsfähigkeit und der Leistung in einem Mathematiktest sowie einer Kontrollgruppe in der basisnumerischen Verarbeitung zu prüfen. Zur Identifikation einer Dyskalkulie bzw. Rechenschwäche wurden entweder (a) ein Testverfahren mit basisnumerischem Schwerpunkt (ZAREKI-R) oder (b) Tests zur Erfassung von Rechenfertigkeiten (ZAREKI-R Kopfrechnen und Textaufgaben, HRT 1-4 Addition und Subtraktion, WISC-IV rechnerisches Denken) verwendet. Insgesamt bearbeiteten 68 Kinder eine Batterie von basisnumerischen Aufgaben: Simultanerfassung, Abzählen, Mengenvergleich, Transkodieren, Number sets und Zahlenstrahl (0-100). Zusätzlich wurde die Arbeitsgedächtniskapazität mit einer visuell-räumlichen Aufgabe (Matrixspanne) überprüft. Laut Klassifikation nach ZAREKI-R unterschieden sich rechenschwache und dyskalkulische Kinder in fast allen basisnumerischen Aufgaben klar von der Kontrollgruppe, jedoch nicht untereinander. Bei Klassifikation nach Rechenfertigkeiten konnten rechenschwache und dyskalkulische Kinder ebenfalls nicht differenziert werden, allerdings unterschieden sich nur rechenschwache Kinder von der Kontrollgruppe (bei den Aufgaben Simultanerfassung, Abzählen, symbolischer Mengenvergleich, Transkodieren, Zahlenstrahl). Die Befunde werden vor dem Hintergrund der Verwendung basisnumerischer Fertigkeiten für die Diagnose und Therapie von Dyskalkulie diskutiert.</td></tr>
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<tr><th>Referenz</th><th>Studientyp</th><th colspan="2">Stichprobe
Kriterien</th><th>Ergebnis</th><th>SIGN</th></tr>
<tr><td rowspan="2">Kuhn et al. (2013) (Studie 2)</td><td rowspan="2">QS</td><td colspan="2">Intelligenz: IQ > 80 (verbal und nonverbal)
Mathematik: T <= 37 (Grundrechenarten, Textaufgaben)</td><td rowspan="2">Arbeitsgedächtnis:
ES: 0,61

Visuell-räumlicher Notizblock:
ES: 0,61

Mathematik:
ES: 0,29

Basiskomptenzen:
ES: 0,29

Verarbeitungsgeschwindigkeit:
ES: 0,52</td><td rowspan="2">2-</td></tr>
<tr><td>Gruppe mit Diskrepanz
N: 27 (22,2 % männlich)
Alter: 103,08 (12,6) Monate
Klasse: 2 bis 4

IQ-Diskrepanz >= 1,5 SD</td><td>Gruppe ohne Diskrepanz
N: 21 (28,6 % männlich)
Alter: 96,6 (12,24) Monate
Klasse: 2 bis 4

IQ-Diskrepanz < 1,5 SD</td></tr>
<tr><td colspan="5">Ausgehend vom Diskrepanzkriterium für die Diagnose einer Dyskalkulie hatte die vorliegende Arbeit zum Ziel, mögliche Unterschiede zwischen dyskalkulischen und rechenschwachen Kindern ohne Diskrepanz zwischen der allgemeinen kognitiven Leistungsfähigkeit und der Leistung in einem Mathematiktest sowie einer Kontrollgruppe in der basisnumerischen Verarbeitung zu prüfen. Zur Identifikation einer Dyskalkulie bzw. Rechenschwäche wurden entweder (a) ein Testverfahren mit basisnumerischem Schwerpunkt (ZAREKI-R) oder (b) Tests zur Erfassung von Rechenfertigkeiten (ZAREKI-R Kopfrechnen und Textaufgaben, HRT 1-4 Addition und Subtraktion, WISC-IV rechnerisches Denken) verwendet. Insgesamt bearbeiteten 68 Kinder eine Batterie von basisnumerischen Aufgaben: Simultanerfassung, Abzählen, Mengenvergleich, Transkodieren, Number sets und Zahlenstrahl (0-100). Zusätzlich wurde die Arbeitsgedächtniskapazität mit einer visuell-räumlichen Aufgabe (Matrixspanne) überprüft. Laut Klassifikation nach ZAREKI-R unterschieden sich rechenschwache und dyskalkulische Kinder in fast allen basisnumerischen Aufgaben klar von der Kontrollgruppe, jedoch nicht untereinander. Bei Klassifikation nach Rechenfertigkeiten konnten rechenschwache und dyskalkulische Kinder ebenfalls nicht differenziert werden, allerdings unterschieden sich nur rechenschwache Kinder von der Kontrollgruppe (bei den Aufgaben Simultanerfassung, Abzählen, symbolischer Mengenvergleich, Transkodieren, Zahlenstrahl). Die Befunde werden vor dem Hintergrund der Verwendung basisnumerischer Fertigkeiten für die Diagnose und Therapie von Dyskalkulie diskutiert.</td></tr>
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<tr><th>Referenz</th><th>Studientyp</th><th colspan="2">Stichprobe
Kriterien</th><th>Ergebnis</th><th>SIGN</th></tr>
<tr><td rowspan="2">González and Espínel (1999)</td><td rowspan="2">QS</td><td colspan="2">Intelligenz: IQ > 80 (verbal und nonverbal)
Mathematik: PR < 25 (Grundrechenarten)</td><td rowspan="2">Arbeitsgedächtnis:
ES: -0,18

Zentrale Exekutive:
ES: -0,18

Mathematik:
ES: -0,08

Textaufgaben;
ES: -0,08</td><td rowspan="2">3</td></tr>
<tr><td>Gruppe mit Diskrepanz
N: 60 (40 % männlich)
Alter: - (-) Monate
Klasse: -

IQ-Diskrepanz > 1 SD</td><td>Gruppe ohne Diskrepanz
N: 44 (50 % männlich)
Alter: - (-) Monate
Klasse: -

IQ-Diskrepanz < 1 SD</td></tr>
<tr><td colspan="5">Tested whether the criterion based on the IQ–achievement discrepancy is useful in the definition of arithmetic learning disabilities (ALD). A sample of children (aged 7–9 yrs) with ALD, garden-variety (G-V) poor mathematics performance (i.e., the poor arithmetic performance of children of below-average intelligence is believed to be nondiscrepant, or in accordance with their lower cognitive capabilities) and normally achieving children were selected using the standard-score discrepancy method (i.e., the differences between IQ and achievement standard scores). All the groups were compared to determine whether there were differences in solving addition and subtraction word problems and in other cognitive abilities related to mathematics such as working memory. There were no significant differences between children with ALD and children with G-V poor mathematics performance in solving arithmetic word problems or on working memory tasks. The performance of both groups with arithmetic disabilities was significantly below that of normally achieving children. This means that the criterion based on the IQ–achievement discrepancy does not seem to be relevant for differentiating between children with ALD and children with G-V poor mathematics performance. (PsycINFO Database Record (c) 2012 APA, all rights reserved)</td></tr>
</table>

Vergleich bei Alters-/Klassennormdiskrepanz zwischen PR<= 10 und PR > 10 und <= 25

<table>
<tr><th>Referenz</th><th>Studientyp</th><th colspan="2">Stichprobe</th><th>Ergebnis</th><th>SIGN</th></tr>
<tr><th></th><th></th><th colspan="2">Kriterien</th><th></th><th></th></tr>
<tr><td rowspan="3">Murphy, Mazzocco, Hanich, and Early (2007) (Studie 1)</td><td rowspan="3">KS</td><td colspan="2">Intelligenz: -
Mathematik: PR <= 10 oder oder PR > 10 und <= 25 (Basiskompetenzen, Grundrechenarten)</td><td rowspan="3">Mathematik:
ES: -1,1

Sprache:
ES: -0,46

Wahrnehmung:
ES: -0,30</td><td rowspan="3">2+</td></tr>
<tr><td>PR <= 10</td><td>PR > 10 und <= 25</td></tr>
<tr><td>N: 22 (68,18 % männlich)
Alter: 69,24 (5,88) Monate
Klasse: Kindergarten</td><td>N: 42 (38,1 % männlich)
Alter: 70,32 (3,84) Monate
Klasse: Kindergarten</td></tr>
<tr><td colspan="5">Tested whether the criterion based on the IQ–achievement discrepancy is useful in the definition of arithmetic learning disabilities (ALD). A sample of children (aged 7–9 yrs) with ALD, garden-variety (G-V) poor mathematics performance (i.e., the poor arithmetic performance of children of below-average intelligence is believed to be nondiscrepant, or in accordance with their lower cognitive capabilities) and normally achieving children were selected using the standard-score discrepancy method (i.e., the differences between IQ and achievement standard scores). All the groups were compared to determine whether there were differences in solving addition and subtraction word problems and in other cognitive abilities related to mathematics such as working memory. There were no significant differences between children with ALD and children with G-V poor mathematics performance in solving arithmetic word problems or on working memory tasks. The performance of both groups with arithmetic disabilities was significantly below that of normally achieving children. This means that the criterion based on the IQ–achievement discrepancy does not seem to be relevant for differentiating between children with ALD and children with G-V poor mathematics performance. (PsycINFO Database Record (c) 2012 APA, all rights reserved)</td></tr>
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<tr><th>Referenz</th><th>Studientyp</th><th colspan="2">Stichprobe
Kriterien</th><th>Ergebnis</th><th>SIGN</th></tr>
<tr><td rowspan="3">Murphy et al. (2007)
(Studie 2)</td><td rowspan="2">KS</td><td colspan="2">Intelligenz: -
Mathematik: PR <= 10 oder oder PR > 10 und <= 25 (Basiskompetenzen, Grundrechenarten)</td><td rowspan="2">Exekutive Funktionen:
ES: -0,66

Inhibition & Shifting:
ES: -0,66

Mathematik:
ES: -1,31

Basiskompetenzen:
ES: -0,67

Sprache:
ES: -0,66

Wahrnehmung:
ES: -0,20</td><td rowspan="2">2+</td></tr>
<tr><td>PR <= 10
N: 22 (68,18 % männlich)
Alter: 81,12 (5,64) Monate
Klasse: 1</td><td>PR > 10 und <= 25
N: 42 (38,1 % männlich)
Alter: 82,2 (3,72) Monate
Klasse: 1</td></tr>
<tr><td colspan="5">Tested whether the criterion based on the IQ–achievement discrepancy is useful in the definition of arithmetic learning disabilities (ALD). A sample of children (aged 7–9 yrs) with ALD, garden-variety (G-V) poor mathematics performance (i.e., the poor arithmetic performance of children of below-average intelligence is believed to be nondiscrepant, or in accordance with their lower cognitive capabilities) and normally achieving children were selected using the standard-score discrepancy method (i.e., the differences between IQ and achievement standard scores). All the groups were compared to determine whether there were differences in solving addition and subtraction word problems and in other cognitive abilities related to mathematics such as working memory. There were no significant differences between children with ALD and children with G-V poor mathematics performance in solving arithmetic word problems or on working memory tasks. The performance of both groups with arithmetic disabilities was significantly below that of normally achieving children. This means that the criterion based on the IQ–achievement discrepancy does not seem to be relevant for differentiating between children with ALD and children with G-V poor mathematics performance. (PsycINFO Database Record (c) 2012 APA, all rights reserved)</td></tr>
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<tr><th>Referenz</th><th>Studientyp</th><th colspan="2">Stichprobe
Kriterien</th><th>Ergebnis</th><th>SIGN</th></tr>
<tr><td rowspan="3">Murphy et al. (2007)
(Studie 3)</td><td rowspan="3">KS</td><td colspan="2">Intelligenz: -
Mathematik: PR <= 10 oder oder PR > 10 und <= 25
(Basiskompetenzen, Grundrechenarten)</td><td rowspan="3">Mathematik:
ES: -1,01

Basiskompetenzen:
ES: -0,78

Sprache:
ES: -0,66

Wahrnehmung:
ES: -0,47</td><td rowspan="3">2+</td></tr>
<tr><th>PR <= 10</th><th>PR > 10 und <= 25</th></tr>
<tr><td>N: 22 (68,18 % männlich)
Alter: 93,12 (5,88) Monate
Klasse: 2</td><td>N: 42 (38,1 % männlich)
Alter: 94,08 (3,72) Monate
Klasse: 2</td></tr>
<tr><td></td><td colspan="4">Tested whether the criterion based on the IQ–achievement discrepancy is useful in the definition of arithmetic learning disabilities (ALD). A sample of children (aged 7–9 yrs) with ALD, garden-variety (G-V) poor mathematics performance (i.e., the poor arithmetic performance of children of below-average intelligence is believed to be nondiscrepant, or in accordance with their lower cognitive capabilities) and normally achieving children were selected using the standard-score discrepancy method (i.e., the differences between IQ and achievement standard scores). All the groups were compared to determine whether there were differences in solving addition and subtraction word problems and in other cognitive abilities related to mathematics such as working memory. There were no significant differences between children with ALD and children with G-V poor mathematics performance in solving arithmetic word problems or on working memory tasks. The performance of both groups with arithmetic disabilities was significantly below that of normally achieving children. This means that the criterion based on the IQ–achievement discrepancy does not seem to be relevant for differentiating between children with ALD and children with G-V poor mathematics performance. (PsycINFO Database Record (c) 2012 APA, all rights reserved)</td></tr>
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<tr><th>Referenz</th><th>Studientyp</th><th colspan="2">Stichprobe
Kriterien</th><th>Ergebnis</th><th>SIGN</th></tr>
<tr><td rowspan="3">Murphy et al. (2007)
(Studie 4)</td><td rowspan="3">KS</td><td colspan="2">Intelligenz: -
Mathematik: PR <= 10 oder oder PR > 10 und <= 25
(Basiskompetenzen, Grundrechenarten)</td><td rowspan="3">Exekutive Funktionen:
ES: -0,23

Inhibition & Shifting:
ES: -0,23

Mathematik:
ES: -1,74

Sprache:
ES: -0,41

Wahrnehmung:
ES: -0,74</td><td rowspan="3">2+</td></tr>
<tr><td>PR <= 10</td><td>PR > 10 und <= 25</td></tr>
<tr><td>N: 22 (68,18 % männlich)
Alter: 104,4 (4,8) Monate
Klasse: 3</td><td>N: 42 (38,1 % männlich)
Alter: 104,76 (3,12) Monate
Klasse: 3</td></tr>
<tr><td colspan="5">Tested whether the criterion based on the IQ–achievement discrepancy is useful in the definition of arithmetic learning disabilities (ALD). A sample of children (aged 7–9 yrs) with ALD, garden-variety (G-V) poor mathematics performance (i.e., the poor arithmetic performance of children of below-average intelligence is believed to be nondiscrepant, or in accordance with their lower cognitive capabilities) and normally achieving children were selected using the standard-score discrepancy method (i.e., the differences between IQ and achievement standard scores). All the groups were compared to determine whether there were differences in solving addition and subtraction word problems and in other cognitive abilities related to mathematics such as working memory. There were no significant differences between children with ALD and children with G-V poor mathematics performance in solving arithmetic word problems or on working memory tasks. The performance of both groups with arithmetic disabilities was significantly below that of normally achieving children. This means that the criterion based on the IQ–achievement discrepancy does not seem to be relevant for differentiating between children with ALD and children with G-V poor mathematics performance. (PsycINFO Database Record (c) 2012 APA, all rights reserved)</td></tr>
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<tr><th>Referenz</th><th>Studientyp</th><th colspan="2">Stichprobe
Kriterien</th><th>Ergebnis</th><th>SIGN</th></tr>
<tr><td rowspan="3">Stock, Desoete, and Roeyers (2010)</td><td>KS</td><td colspan="2">Intelligenz: durchschnittlich (verbal und nonverbal)
Mathematik: PR <= 10 oder oder PR > 10 und <= 25 (Grundrechenarten)</td><td rowspan="2">Mathematik:
ES: -0,54

Basiskompetenzen:
ES: -0,54</td><td rowspan="2">2+</td></tr>
<tr><td>PR <= 10</td><td>PR > 10 und <= 25</td></tr>
<tr><td></td><td>N: 16 (62,5 % männlich)
Alter: - (-) Monate
Klasse: 2</td><td>N: 27 (51,9 % männlich)
Alter: - (-) Monate
Klasse: 2</td><td></td><td></td></tr>
<tr><td></td><td colspan="4">In a 3-year longitudinal study, 471 children were classified, based on their performances on arithmetic tests in first and second grade, as having persistent arithmetic disabilities (AD), persistent low achieving (LA), persistent typical achieving, inconsistent arithmetic disabilities (DF1), or inconsistent low achieving in arithmetic. Significant differences in the performances on the magnitude comparison in kindergarten (at age 5—6) were found between the AD and LA and between the AD and DF1 groups. Furthermore, the percentage of true-positive AD children (at age 7—8) correctly diagnosed in kindergarten by combination of procedural counting, conceptual counting, and magnitude comparison tasks was 87.50%. When composing clinical samples, researchers should pay attention when stipulating restrictive or lenient cutoffs for arithmetic disabilities and select children based on their scores in 2 consecutive years, because the results of studies on persistent low achievers or children with inconsistent disabilities cannot be generalized to children with persistent arithmetic disabilities. (PsycINFO Database Record (c) 2012 APA, all rights reserved). (journal abstract)</td></tr>
</table>

González, J. E. J., & Espínel, A. I. G. (1999). Is IQ–achievement discrepancy relevant in the definition of arithmetic learning disabilities? *Learning Disability Quarterly, 22*(4), 291-301. doi:10.2307/1511263

Klesczewski, J., Brandenburg, J., Fischbach, A., Grube, D., Hasselhorn, M., & Büttner, G. (2015). Working memory functioning in children with poor mathematical skills: Relationships to IQ–achievement discrepancy and additional reading and spelling difficulties. *Zeitschrift für Psychologie, 223*(2), 83-92. doi:10.1027/2151-2604/a000206

Kuhn, J.-T., Raddatz, J., Holling, H., & Dobel, C. (2013). Dyskalkulie vs. Rechenschwäche: Basisnumerische Verarbeitung in der Grundschule. [Dyscalculia vs. severe math difficulties: Basic numerical capacities in elementary school]. *Lernen und Lernstörungen, 2*(4), 229-247. doi:10.1024/2235-0977/a000044

Maehler, C., & Schuchardt, K. (2011). Working Memory in Children with Learning Disabilities: Rethinking the criterion of discrepancy. *International Journal of Disability, Development and Education, 58*(1), 5-17. doi:http://dx.doi.org/10.1080/1034912X.2011.547335

Murphy, M. M., Mazzocco, M. M., Hanich, L. B., & Early, M. C. (2007). Cognitive characteristics of children with mathematics learning disability (MLD) vary as a function of the cutoff criterion used to define MLD. *Journal of Learning Disabilities, 40*(5), 458-478.

Stock, P., Desoete, A., & Roeyers, H. (2010). Detecting children with arithmetic disabilities from kindergarten: Evidence from a 3-year longitudinal study on the role of preparatory arithmetic abilities. *Journal of Learning Disabilities, 43*(3), 250-268. doi:10.1177/0022219409345011