Evidenztabellen

S3-Leitlinie Rückenschmerz bei Kinder und Jugendlichen

Kapitel 3, 4, 6-10

Stand: Januar 2021

DEUTSCHE GESELLSCHAFT
FÜR KINDER- UND JUGENDMEDIZIN e.V.

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DEUTSCHE GESELLSCHAFT FÜR KINDER- UND JUGENDMEDIZIN e.V.

1 Evidenztabellen

1.1 Kapitel 3: Ursachen, Risikofaktoren und Prognose

1.1.1 Aggregierte Evidenz: Syst. Reviews zu Risikofaktoren

Studien-typ	Quelle	Untersuchte Studien	Abhän-gige Variable	Ergebnisse	Methodische Bemerkungen	Literaturbelege	Evidenz-niveau (CEBM Oxford 2011)
SR	Calvo-Munoz, I.; Kovacs F. M.; Roque, M.; Gago Fernandez, I.; Seco Calvo, J. (2018) Risk factors for low back pain in childhood and adolescence. A systematic review. The Clinical Journal of Pain. doi:10.1097/AJP.0000000000000558	61 Studien (hauptsächlich Querschnittstudien (50/61)) **Einschlusskriterien** 1) publizierte Beobachtungs-studien mit Fokus auf Risikofaktoren für Rücken-schmerzen (2) Einschluss von ≥ 50 Teil-nehmern, 9 -16 J (3) assessment of at least one of the following risk factors: age; body mass index (BMI); physical activity or sport (type and frequen-cy); sedentary habits (eg, time spent watching TV, using computers or video-games); satisfaction with school; deformity (eg; scolio-sis, kyphosis, differences in leg length); or data related to backpacks (eg, weight, way to carry it, duration)	LBP Prävalenz	**Alter**: höheres Risiko mit steigendem Alter (9 Studien) **Geschlecht:** Höheres Risiko für Mädchen (9 Studien); lediglich je 1 Studie zeigte höheres Risiko für Jungs oder keinen Unterschied **Sport**: höheres Risiko durch Sport (7 Studien, davon 2 zu Leistungssport); 1 Studie zeigte niedrigeres Risiko und 7 zeigten keinen Unterschied **Zeit sitzende Tätigkeiten:** Computer: kein Zusammenhang (7 Studien) Fernsehen: höheres Risiko bzw. kein Zusammenhang je 5 Studien Nicht spezifiziert: höheres Risiko bei längerem Sitzen (3 Studien), kein Zusammenhang: 2 Studien **Sonstige:** LBP in Familie (4 Studien), kein Zusammenhang in 1 Studie) BMI: kein Zusammenhang (14 Studien), Zusammenhang bei höherem BMI: lediglich 2 Studien Tragemethode Rucksack: kein Zusammenhang (9 Studien) Gewicht Rucksack: höheres Risiko je schwerer (4 Studien), aber kein Zusammenhang in 6 Studien Rauchen: Zusammenhang 1 Sudie, kein Zusammenhang 2 Studien	Limitation: *viele Querschnittstudien nur Ergebnisse der Sensitivitätsanalysen berichtet, in die nur die besten Studien eingingen: *mind. moderate quality (50/100) * Sample >500 * multivariate Analysen **Risk of bias**: **AMSTAR-2** overall rating: Low confidence in results of the review (1 critical flaw : no list of excluded studies)	Längsschnitt-studien: Balagué 2010, Burton 1996, Feldman 2001, Jones 2003 + 2009, Kujala 1996, Mikkonen 2016, Newcomer 1996, Nissinen 1994, Sano 2015, Szpalski 2002	2
SR of SR	Kamper, S. J.; Yamato T. P.; Williams, C. M.	**15 systematische Reviews** (laut Text, laut Tabelle 17) *AMSTAR rating:	Rücken-schmerz	N=2706 -1.109.055, verschiedene Länder + Stichproben Alter 0-23	* Primärstudien sind hauptsäch-lich Querschnittstudien * nicht jede Studie erfasst alle	Balague 1999, Cardon 2004, Dockrell 2013,	2

	(2016) The prevalence, risk factors, prognosis and treatment for back pain in children and adolescents: An overview of systematic reviews. Best Practice & Research Clinical Rheumatology. doi.org/10.1016/j.berh.2017.04.003	**4x high quality** **3x moderate** **8x low quality** **Einschlusskriterien** * Systematische Reviews publiziert in peer-reviewed Journal * untersucht Personen im Alter von 18 Jahren oder jünger (oder getrennte Daten zu der Altersgruppe) * untersucht unspezifische Rückenschmerzen **AUSSCHLUSS:** * reported on back pain due to cancer, systemic, infectious or inflammatory disease, fracture, acute neurological condition, included subjects post-surgery, reported on patients with scoliosis or thoracic pain		**Geschlecht:** Höheres Risiko für Mädchen (1 high quality SR: 6 Studien, davon 2 nicht eindeutig); lediglich je 1 Studie zeigte keinen Unterschied (1 high quality SR) **Körpergröße/Gewicht:** höheres Risiko für größere Kinder (1 high quality SR), unklarer Zusammenhang: 3 low quality SR höheres Risiko bei höherem BMI: 1 high quality SR, unklarer/kein Zusammenhang: 1 high quality SR, 3 low quality SR **Emotionale Belastung:** Zusammenhang (1 high quality SR) **Sport**: höheres Risiko durch Leistungssport (3 low quality SR); 1 Studie zeigte niedrigeres Risiko und 7 zeigten keinen Unterschied **Sonstige:** Muskelkraft / Beweglichkeit/ Körperhaltung: unklarer Zusammenhang (8 Studien) bzw. kein Zusammenhang (1 high quality SR) Rauchen: Zusammenhang (5 Studien, davon 2 high quality SR), unklarer Zusammenhang (1 low quality SR) Gewicht Rucksack: unklarer Zusammenhang in 7 Studien Rückenschmerzen Eltern: Zusammenhang (2 Studien, low quality) Frühere Rückenschmerzepisoden: Zusammenhang (1 moderate, 1 low quality Studie)	potentiellen Risikofaktoren * reporting bias (z.B. Autoren berichten nicht alle nicht signifikanten Zusammenhänge) * Risikofaktoren unterschiedlich erfasst * Die meisten Studien fokussieren Jugendliche >10 Jahre, Ergebnisse eher für Jugendliche * Unstimmigkeiten im Review: - Suchzeitraum passt nicht zu Publikationsdatum (Suche bis Januar 2017, ABER: Dezember 2016 publiziert) - Anzahl der eingeschlossenen Studien weicht im Text von Tabelle ab **Risk of bias**: **Corrected Cover Area** (Pieper et al. 2014): CCA=0,018, slight overlap of risk factor studies in included SR **Fazit 4-item-checklist** (Ballard & Montgomery 2017): schwierig zu interpretieren, trotz einzelner Schwächen gut gemacht, Autor vertrauenswürdig	Duggleby 1997, Hill 2010, Huguet 2016, King 2011, Lardon 2014/15, Lindstrom-Hazel 2009, Louw 2007, Paulis 2014, Shiri 2010, Sitthipornvorakul 2011, Smith 2007, Trevelyan 2006	
SR	Yamato, T., Maher, C., Traeger, A., Wiliams, C. & Kamper, S. (2018) Do schoolbags cause back pain in children and adolescents? A systematic review. British Journal of Sports Medicine. doi:10.1136/bjsports-2017-098927	69 Studien* **4 Längsschnitt* 1 RCT*** 63 Querschnitt* 1 case-control (retrospektiv) **Einschlusskriterien** * prospektive längsschnittliche Kohorten-Studien, Querschnittstudien, RCTs* Rückenschmerzen als Haupt-Outcome* Kinder und Jugendliche im Schulalter* Infos zum Tragen eines Rucksacks	Rücken-schmerz-episode	N=72.627* **Längsschnitt: 1.743, * RCT: 108,** *Querschnitt: 70.720, *case-control: 56 Bevölkerungsstichprobe aus Italien, England, Norwegen, Belgien (Längsschnitt + RCT) **Gewicht Schulranzen:** kein Zusammenhang (2 moderate quality studies) höheres Risiko bei gefühlt schwerem Ranzen bzw. Trageschwierigkeiten (2 low quality studies) **Tragemethode oder Art der Tasche** (Design): kein Zusammenhang (je 1 low quality study)	Hier nur Ergebnisse der Längsschnittstudien und RCTs berichtet Eingeschlossene Studien haben moderate to high risk of bias → LoE 3 **Risk of bias**: **AMSTAR-2** overall rating: Low confidence in results of the review (1 critical flaw : no list of excluded studies, 1 non-critical: funding of included studies not reported)	Jones 2003 + 2009, Negrini 2004, Sjolie 2004, Szpalski 2002	3

1.1.2 Einzelstudien (Längsschnitt) zu Risikofaktoren

Quelle/ Studientyp	Population	Abhängige Variable	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
Auvinen, J., Tammelin, T., Taimela, S., Zitting, P., Järvelin, M., Taanila, A. & Karppinen, J. (2010) Is insufficient quantity and quality of sleep a risk factor for neck, shoulder and low back pain? A longitudinal study among adolescents. Eur Spine J. doi:10.1007/s00586-009-1215-2 **Studientyp** : Geburtskohorte	N=1.773, TN der Geburtskohorte von 1986, Oulu, Finnland Alter : M=16, 55% weiblich Befragung und Untersuchung mit 16 und 18 Jahren	mit 18J : LBP in den letzten 6 Monaten	Risikofaktoren (erfasst mit 16J) : OR (KI) Geschlecht : höheres Risiko für Mädchen (p<.001) Schlafdauer ≤ 7 Std : Mädchen 1,55 (1,04-2,31) ; Jungen 1,53 (0,96-2,44) Oft müde : Mädchen 2,61 (1,37-4,99), Jungen 2,36 (1,04-5,39) Schlafprobleme : Mädchen 1,63 (1,09-2,44), Jungen 1,39 (0,83-2,34) →Insufficient sleep quantity or quality was an independent risk factor for LBP among girls.	Qualitativ gut gemachte Kohortenstudie, große Fallzahl alle Ergebnisse kontrolliert für körperliche Aktivität, sitzende Tätigkeiten, Rauchen, BMI, depressive Stimmung, sozioökonomischer Status **Risk of bias** (Quips°): low • Participation : low risk • Attrition : moderate risk • Progn. Factor measurement : low risk • Outcome measurement : low risk • Confounding: low risk • Analysis : low risk	2
Barke, A.; Gaßmann J.; Kröner-Herwig, B. (2014) Cognitive processing styles of children and adolescents with headache and back pain: A longitudinal epidemiological study. J Pain Research. doi: 10.2147/JPR.S64334 **Studientyp** : Kohortenstudie	N=2.040, Inception Cohort Study, repräsentativ, KiJuKo-Studie Wave 2 (2004) + Wave 3 (2005); Alter : M=11,25 (8-15J), 50,5% weiblich Deutschland	Rückenschmerzen mindestens manchmal in den letzten 6 Monaten (Inzidenz)	Risikofaktoren für LBP erfasst bei Wave 2 (2004) : OR (KI) Weibliches Geschlecht : 1,81 (1,05-3,09) Alter : Mädchen n.s., Jungen 1,17 (1,08-1,25) Dysfunktionales Stress-Coping : Mädchen 1,36 (0,68-2,72), Jungen 1,44 (1,06-1,97) Somatosensorische Verstärkung : Mädchen 1,78 (1,04-3,05), Jungen 1,22 (0,91-1,62) Anxiety sensitivity increased the risk that boys would report BP after 1 year by 50% and dysfunctional stress coping increased the risk by 40%. For girls, somatosensory amplification increased the risk of the incidence of BP 1 year later by 80%, whereas pain catastrophizing reduced the risk by 50%.	**Risk of bias** (Quips&): moderate • Participation : high risk • Attrition : high risk • Progn. Factor measurement : low risk • Outcome measurement : low risk • Confounding: low risk • Analysis : low risk	1
Dunn K.M.; Jordan K.P.; Mancl L.; Drangsholt M.T.; Le Resche L. (2011): Trajectories of pain in adolescents: A prospective cohort study.	Stichprobengröße : n = 1337 **Rekrutierungszeitraum** : Mai 2000 – April 2001 **Charakteristika** : 11 Jahre, USA **Einschlusskriterien** : 11 Jahre,	Rückenschmerzen mind. an 50% der Tage in den letzten 3 Monaten *Cluster 1: keine Rückenschmerzen (78%)	Signifikante Unterschiede : Geschlecht : mehr Mädchen in painful clusters Lebenszufriedenheit : geringste Lebenszufriedenheit im Cluster 6 'durchgehend hohe Wahrscheinlichkeit von Rückenschmerzen' Somatisierung : höhere Somatisierungsscores in painful clusters	Methodische Schwächen : - evtl. Systematischer Dropout : 1/3 der Teilnehmer ausgeschlossen wegen fehlender Werte ; berichten häufiger Schmerzerfahrungen und	2

Quelle/ Studientyp	Population	Abhängige Variable	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
Pain. doi: 10.1016/j.pain.2010.09.006 **Studientyp** : Kohortenstudie	registriert auf der Group Health Enrollment Database (Washington State), wohnhaft in der näheren Umgebung **Ausschlusskriterien** : unzureichende Englischkenntnisse	*Cluster 2: geringe, steigende Rücken-schmerzwahrscheinlichkeit (10%) *Cluster 3: später Anstieg in Rückenschmerz-wahrscheinlichkeit (4%) *Cluster 4: früher Anstieg in Rückenschmerz-wahrscheinlichkeit (4%) *Cluster 5: höchste Wahrscheinlichkeit nach 2 Jahren (2%) *Cluster 6: durchgehend hohe Wahrscheinlichkeit (1,3%)	Höhere Depressivitäts-Scores in painful clusters Pubertätsentwicklung : höherer Score für painful clusters <u>Keine</u> Gruppenunterschiede : Anstrengende körperliche Aktivität im letzten Jahr BMI	höhere Werte in psychologischen Fragebogen, sind eher männlich - teilweise geringe Stichprobengröße in den Clustern - nur Gesamtunterschiede über alle Cluster hinweg berechnet, keine Einzelvergleiche der Cluster **Risk of bias** (Quips#): high • Participation : low risk • Attrition : moderate risk • Progn. Factor measurement : low risk • Outcome measurement : high risk • Confounding: high risk • Analysis : moderate risk → LoE : 2	
Gill, D. K.; Davis M. C.; Smith, A. J.; Straker, L. M. (2014): Bidirectional relationships between cigarette use and spinal pain in adolescents accounting for psycho-social functioning. Br J Health Psychol. doi.org/10.1111/bjhp.12039 **Studientyp** : Geburtskohorte	Stichprobengröße : n = 1091 (n=721 in back pain Analysen) **Charakteristika und Einschlusskriterien** : Teilnehmer der Western Australian Pregnancy Cohort (Raine) Study 14 und 17 Jahre Australien	LBP mit 17 Jahren	Risikofaktoren erfasst mit 14 Jahren Geschlecht : signifikant mehr Mädchen mit LBP Family functioning : OR=0,689 (KI 0,48-0,99) (je höher der Wert für family functioning, desto schlechter) Keine Zusammenhänge : Rauchen OR : 2,687 (KI 0,91-7,90) (kontrolliert für Geschlecht, Nacken/Schulterschmerzen mit 14 J u. psychosoz. Variablen) Internalisierendes/externalisierendes Verhalten: OR 1,00 (KI 0,99-1,01) Depressivität : OR : 1,02 (KI 0,99-1,04) Selbstwert : OR : 0,98 (KI : 0,72-1,34) Selbstwirksamkeit : OR 0,92 (KI : 0,72-1,78) Sozioökonomischer Status : OR 0,99 (KI : 0,99-1,00)	*nur wenige Raucher mit 14 Jahren **Risk of bias** (Quips#): moderate • Participation : moderate risk • Attrition : moderate risk • Progn. Factor measurement : low risk • Outcome measurement : moderate risk • Confounding: moderate risk • Analysis : low risk	2
Hestbaek L.; Leboeuf-Yde C.; O Kyvik K. (2006): Is comorbidity in adolescence a predictor for adult low back pain? A	Stichprobengröße : n = 6554 Rekrutierungszeitraum : 1994 **Charakteristika** : Zwillinge, 12-22 Jahre, 52% weiblich,	Anzahl an Tagen mit LBP im letzten Jahr - persistierend : >30 Tage	Bei der Nachbefragung 2002 berichten insgesamt 10% der Teilnehmer LBP persistierend im letzten Jahr Von denen, die 1994 LBP persistierend berichten, berichten 26% LBP persistierend in 2002	Stärken : - Große Stichprobengröße **Risk of bias** (Quips#): moderate	2

Quelle/ Studientyp	Population	Abhängige Variable	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
prospective study of a young population. BMC Musculoskeletal Disorders. doi :10.1186/1471-2474-7-29 **Studientyp** : Geburtskohortenstudie mit Zwillingen	Dänemark **Einschlusskriterien** : geboren 1972-1982, Zwilling Ausschlusskriterien : -	- überhaupt : >0 Tage Verlauf : Nachbefragung 2002 nach 8 Jahren	Prädiktoren (1994) zur Vorhersage von LBP persistierend in 2002 : - LBP persistierend : OR=3,53 - LBP überhaupt : OR=1,98 - Kopfschmerzen persistierend : OR=2,12 - Kopfschmerzen überhaupt : OR=1,56 - Asthma : OR=1,44 - Atopische Dermatitis : n.s. - LBP + Kopfschmerzen überhaupt + Asthma : OR=1,87 / 1,85* - LBP + Kopfschmerzen persistierend + Asthma : OR=4,22 / 6,56* * Mädchen / Jungen	• Participation : moderate risk • Attrition : moderate risk • Progn. Factor measurement : moderate risk • Outcome measurement : low risk • Confounding: low risk • Analysis : low risk	
Jones, G. T.; Watson K. D.; Silman, A. J.; Symmons, D. P. M.; Macfarlane, G. J. (2003). Predictors of low back pain in British schoolchildren: A population-based prospective cohort study. Pediatrics DOI: 10.1542/peds.111.4.822 **Studientyp** : Kohortenstudie	Stichprobengröße : n = 933 (ohne LBP zu baseline) Rekrutierungszeitraum : 199-2001 **Charakteristika** : 11-14 Jahre baseline, Nordwesten England **Einschlusskriterien** : *Schüler der 7. bis 9. Klasse in 39 randomisiert ausgewählten Schulen im Nordwesten Englands (je 1-3 Klassen pro Schule ausgewählt) Ausschlusskriterien : kein LBP zur Baseline	LBP mind. 1 Tag im letzten Monat Nachbefragung nach 1 Jahr	Risikofaktoren erfasst zur Baseline : signifikante Zusammenhänge : Alter : steigende Prävalenz mit zunehmendem Alter (p<.001) Sport : Viel (>18x) versus wenig (<5x) Sport / Woche : relative risk 1,6 (KI : 1,1-2,7) kein Zusammenhang für Vergleich wenig Sport (<5x die Woche) vs. 6-8x, 9-11x, 12-17x Verhaltensprobleme high versus low : relative risk : 2,5 (KI : 1,7-3,7) Psychosoziale Probleme insg. High versus low : relative risk : 1,6 (KI : 1,1-2,3) Bauchschmerzen >7d/Monat versus keine : relative risk : 1,8 (KI : 1,1-3,0) (kein Zusammenhang für Vergleich 1-7 Tage vs. Keine) Keine Zusammenhänge zwischen Geschlecht, materielle Deprivation, Schulart, Körpergröße, Gewicht, BMI, Schulranzengewicht, -art, -Tragemethode, Dauer Schulsport, Prosoziales Verhalten, Probleme mit Gleichaltrigen, Hyperaktivität, emotionale Probleme, Kopf- oder Halsschmerzen	**Risk of bias** (Quips#): moderate • Participation : moderate risk • Attrition : moderate risk • Progn. Factor measurement : moderate risk • Outcome measurement : moderate risk • Confounding: low risk • Analysis : low risk	1
Mikkonen, P., Leino-Arjas, P., Remes, J., Zitting, P., Taimela, S., & Karppinen, J. (2008) Is smoking a risk factor for low back pain in adolescents? A prospective cohort study. Spine DOI: 10.1097/BRS.0b013e318	Stichprobengröße : n = 1987 Rekrutierungszeitraum : 2002+2004 **Charakteristika** : 16 und 18 Jahre, 54% weiblich, Finnland **Einschlusskriterien** : Teilnehmer der Northern Finland Birth Cohort 1986 und	LBP=LBP in den letzten 6 Monaten LBP **Inzidenz**: kein LBP mit 16, aber mit 18; LBP **Persistenz**: LBP mit 16 und 18 Jahren	Risikofaktoren erfasst mit 16 J (1 pack year=1 J lang 1 Schachtel / Tag) **LBP Inzidenz Mädchen** (Ergebnisse kontrolliert für SES, körperliche Aktivität, BMI, Depressivität) regelmäßiges Rauchen (5-7 Tage/Woche) : OR 1,83 (KI 0,98-3,43) Anzahl Zigaretten pro Tag (>9 vs. 0) : OR 2,80 (KI 1,11-7,09) (kein Zusammenhang für Vergleich 1-9 Zigaretten vs. 0) pack years bis 18 Jahre (>1,5 vs. 0) : OR 2,20 (KI : 1,13-4,28) (kein	**Risk of bias** (Quips°): moderate • Participation : moderate risk • Attrition : high risk • Progn. Factor measurement : low risk • Outcome measurement : low risk • Confounding: low risk • Analysis : low risk	2

Quelle/ Studientyp	Population	Abhängige Variable	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
1657d3c **Studientyp** : Kohortenstudie	Teilnehmer der Oulu Back Study Ausschlusskriterien : -		Zusammenhang für Vergleich 0,1-1,5 pack years vs. 0) **LBP Inzidenz Jungen** (Ergebnisse kontrolliert für SES, körperliche Aktivität, BMI, Depressivität) regelmäßiges Rauchen (5-7 Tage/Woche) OR: 1,38 (KI 0,71-2,67) Anzahl Zigaretten pro Tag : kein Zusammenhang pack years bis 18 Jahre (0,1-1,5 vs. 0) : OR 2,09 (KI 1,08-4,06) (kein Zusammenhang für Vergleich >1,5 vs. 0) **LBP Persistenz Mädchen** (Ergebnisse kontrolliert für SES, körperliche Aktivität, BMI, Depressivität) regelmäßiges Rauchen (5-7 Tage/Woche) OR 2,52 (KI 1,40-4,53) Anzahl Zigaretten pro Tag (1-9 vs. 0) OR 2,39 (KI 1,40-4,08) Anzahl Zigaretten pro Tag (>9 vs.0) OR 2,57 (KI 1,03-6,46) pack years bis 18 Jahre (0,1-1,5 vs. 0) OR 1,77 (KI 1,01-3,11) pack years bis 18 Jahre (>1,5 vs. 0) OR 2,89 (KI 1,54-5,45) **LBP Persistenz Jungen** (Ergebnisse kontrolliert für SES, körperliche Aktivität, BMI, Depressivität) regelmäßiges Rauchen (5-7 Tage/Woche) OR 1,86 (KI 0,98-3,53) Anzahl Zigaretten pro Tag (1-9 vs. 0) OR 2,68 (KI 1,35-5,32) (kein Zusammenhang für Vergleich >9 Zigaretten vs. 0) pack years bis 18 Jahre (0,1-1,5 vs. 0) OR 2,92 (KI1,48-5,77) pack years bis 18 Jahre (>1,5 vs. 0) OR 2,52 (KI 1,39-4,57)		
Sjolie A. N. (2004) Persistence and change in nonspecific low back pain among adolescents: A 3-year prospective study. Spine DOI: 10.1097/01.brs.0000143666.58758.8b **Studientyp** : Kohortenstudie	Stichprobengröße : n = 85 Rekrutierung: 1997, 2000 **Charakteristika** : 14 und 18 J, 45% weiblich, Norwegen **Einschlusskriterien** : alle Schüler 8.+9. Klasse, 2 Regionen **Ausschlusskriterien** : schwere Erkrankung, die die körperliche Leistungsfähigkeit einschränken oder zu LBP führen könnte; niemand ausgeschlossen.	LPB im letzten Jahr 1: kein LBP 2: LBP 1 bis 30 Tage 3: LBP 31 Tage bis täglich	Risikofaktoren zu Baseline erfasst (kontrolliert für Geschlecht und soziale Klasse) LBP jemals : OR 2,6 (KI 0,9-7,2) jemans wegen LBP in Behandlung : OR 2,6 (KI 0,8-9,3) LBP im letzten Jahr : OR 6,3 (KI 2,1-19,0) LBP > 7 Tage : OR 11,7 (KI 4,0-34,3) LBP durch manuelle Arbeit : OR 7,1 (KI 2,4-20,9) LBP durch Sitzen in der Schule : OR 6,2 (KI 2,2-17,3) LBP durch körperliche Aktivität in der Freizeit : OR 2,0 (KI 0,7-5,9) LBP durch TV/Computer OR 0,7 (KI 0,2-2,6) LBP durch Hausaufgaben : OR 4,0 (KI 1,2-13,1)	- kleine Stichprobe - nach Baseline-Erhebung wurde eine kurze Intervention durchgeführt (Rückenschule) **Risk of bias**§: reporting bias was suspected due to questions of one-year prevalence of LBP. Overall, the quality of the study was rated as poor ➔ LoE 2	2

Quelle/ Studientyp	Population	Abhängige Variable	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
Smith, A.; Beales D.; O'Sullivan, P.; Bear, N.; Straker, L. (2017) Low back pain with impact at 17 years of age is predicted by early adolescent risk factors from multiple domains: Analysis of the Western Australian Pregnancy Cohort (Raine) Study. J Orthop Sports Phys Ther doi: 10.2519/jospt.2017.7464 **Studientyp** : Kohortenstudie	Stichprobengröße : n = 1088 Rekrutierungszeitraum : 2003-2006 **Charakteristika** : 14 und 17 Jahre, 52,1% weiblich, Australien **Einschlusskriterien** : alle Schüler der 8.+9. Klasse in 2 Regionen **Ausschlusskriterien** : schwere Erkrankung, die die körperliche Leistungsfähigkeit einschränken oder zu LBP führen könnte; niemand wurde ausgeschlossen.	LBP im letzten Monat mit 17 Jahren 1) kein LBP 2) LBP ohne/mit geringen Auswirkungen 3) LBP mit Auswirkungen	Risikofaktoren erfasst mit 14 J (ORs beziehen sich auf Vergleich 1) vs. 3); abweichende Ergebnisse (Signifikanz) für Vergleich 1) vs. 2) Geschlecht : signifikant mehr Mädchen in LBP Gruppen 2), 3) LBP : signifikant mehr LBP mit 14 in Gruppe 3) Ergebnisse kontrolliert für Geschlecht und Alter : Nacken/Schulterschmerzen : OR 1,75 (KI 1,21-2,54) wenig Ausdauer Rückenmuskulatur : OR 1,92 (KI 1,21-3,04() (nicht signifikant für Vergleich 1) vs. 2)) Wurfweite : OR 1,03 (KI 1,00-1,05) (nicht signifikant Vergleich 1) vs. 2)) somatische Beschwerden : OR 1,30 (KI 1,10-1,54) (nicht signifikant, wenn kontrolliert für alle signifikanten Prädiktoren; nicht signifikant für Vergleich 1) vs. 2)) aggressives Verhalten : OR 1,37 (KI 1,16-1,62) (nicht signifikant für Vergleich 1) vs. 2)) sozioökonomischer Status : OR 0,82 (KI 0,67-1,00) (nicht signifikant für 1) vs. 3), wenn kontrolliert für alle signifikanten Prädiktoren) Bewegung außerhalb der Schule : OR 1,86 (KI 1,24-2,79) (nicht signifikant für Vergleich 1) vs. 2)) Keine Zusammenhänge : Ernährung, Rauchen, Alkohhol, PC-, TV-Gebrauch, psychosoziale Faktoren u. Verhalten außer Aggressvität, körperliche Faktoren außer o.g.	*sehr viele Faktoren analysiert --> Gefahr der Alphafehler-Kumulierung **Risk of bias** (Quips#): low • Participation : low risk • Attrition : high risk • Progn. Factor measurement : low risk • Outcome measurement : low risk • Confounding: low risk • Analysis : low risk	2
Stanford, E. A., Chambers, C. T., Biesanz, J. C. & Chen, E. (2008). The frequency, trajectories and predictors of adolescent recurrent pain: A population-based approach. Pain doi.org/10.1016/j.pain.2007.10.032	N: 2488 (Zeitpunkt 1); 1415 (Zeitpunkt 5) --> unklar, wieviele an allen 5 Befragungen teilgenommen haben Rekrutierungszeitraum : 1994/95 alle 2 Jahre 5x **Charakteristika** : 10/11-18/19 J, ca. 49% weiblich, Kanada **Einschlusskriterien** : Teilnehmer des National Longi-tudinal Survey of Children and Youth (NLSCY), Bevölkerung Ausschlusskriterien : -	Rückenschmerzverlauf Zeitpunkt 2-5 Verlauf 1: häufige Rückenschmerzen zu allen Zeitpunkten Verlauf 2: zunehmende Schmerzhäufigkeit über die Zeit	Risikofaktoren erfasst mit 10/11 Jahren (Zeitpunkt 1) Verlauf 1: häufige Rückenschmerzen zu allen Zeitpunkten : Weibl. Geschlecht : Pfadkoeffizient β 0,16 / 0,22 (start-/end-point intercept) Ängstlichkeit &/oder Depressivität (Selbsbericht) : Pfadkoeffizient β 0,32 / 0,16 (start-point / end-point intercept) Ängstlichkeit &/oder Depressivität (Elternbericht) : Pfadkoeffizient β 0,18 / 0,12 (start-point / end-point intercept) Keine Zusammenhänge zwischen Pubertätsstadium, chronische Schmerzen Eltern, Verletzung, Kreankeit, kritische Lebensereignisse, Ängstlichkeit/Depressivität Verlauf 2: zunehmende Schmerzhäufigkeit über die Zeit Keine Zusammenhänge zwischen allen o.g. Variablen	**Risk of bias** (Quips#): moderate • Participation : low risk • Attrition : low risk • Progn. Factor measurement : low risk • Outcome measurement : moderate risk • Confounding: low risk • Analysis : low risk	2

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° Risk of Bias Einschätzung übernommen aus: Øiestad et al. (2020) Risk factors for episodes of back pain in emerging adults. A systematic review. Eur J Pain. doi.org/10.1002/ejp.1474

& Risk of Bias Einschätzung übernommen aus: Huguet et al. (2016) Systematic review with meta-analysis of childhood and adolescent risk and prognostic factors for musculoskeletal pain. Pain. doi.org/10.1097/j.pain.0000000000000685

Risk of Bias Einschätzung übernommen aus : Beynon et al. (2020) Chronic physical illnesses, mental health disorders, and psychological features as potential risk factors for back pain from childhood to young adulthood: a systematic review with meta-analysis. Eur Spine J. doi.org/10.1007/s00586-019-06278-6

§ Risk of Bias Einschätzung übernommen aus: Junge et al. (2019) The natural course of low back pain from childhood to young adulthood – a systematic review. Chiropr Man Therap. doi.org/10.1186/s12998-018-0231-x

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1.1.3 Aggregierte Evidenz: Syst. Reviews zu Prognose

Studien-typ	Quelle	Untersuchte Studien	Abhäng. Variable + Beobachtungen im Verlauf	Ergebnisse	Methodische Bemerkungen	Literaturbelege	Evidenz-niveau (CEBM Oxford 2011)
SR	Johansson M. S.; Jensen Stochkendahl, M.; Hartvigsen, J.; Boyle, E.; Cassidy, J. D. (2017) : Incidence and prognosis of mid-back pain in the general population: A systematic review. Eur J Pain doi:10.1002/ejp.884	**Studientyp**: RCTs, Kohortenstudien, Fall-Kontroll-Studien **Suchzeitraum**: bis Januar 2015 **Datenbanken**: CINAHL, PEDro, PsycINFO, Scopus **Einschlusskriterien**: Selbstbericht Schmerzen im mittleren Rücken (MBP) mit/ohne Ausstrahlen in Brustbereich **Ausschlusskriterien**: Systematic reviews, Querschnittstudien, Fallbericht, /-serie, Studien mit Erwerbstätigen, spezifische Schmerzen	MBP Prävalenz innerhalb letzte - 3 Monate - 1 Monat - 1 Woche Schmerzprävalenz 1-4 Jahre später	**Studienanzahl**: 7, davon 3 bei Kindern u. Jugendlichen mit Rückenschmerz **Population**: insgesamt N=1910 ; 48-53% weiblich; Dänemark, Finnland ; Grundschüler und Jugendliche Persistieren/wieder auftreten : Bei 30-35% der 9-13jährigen persistieren die Schmerzen oder treten wieder auf nach 1 und 4 J 18% der 9jährigen haben noch Schmerzen mit 12 Jahren ; 47% der 12jährigen haben noch Schmerzen mit 15 Jahren Fluktuierender Verlauf : Prävalenz 9J : 20% ; 12 J: 13%, 15 J: 28% Häufige Ausweitung auf andere Bereiche im Rücken über 2 Jahre	Methodische Schwächen/Limitationen: - Risk of bias eingeschlossene Studien : moderat - Unterschiedliche Definitionen von MBP und unterschiedliche Prävalenzzeiträume **Risk of bias**: **AMSTAR-2** overall rating: Low confidence in results of the review (1 critical flaw: no list of excluded studies, 2 non-critical: funding of included studies not reported, research question not includes PICO)	Aartun 2014 BMC Musculoskelet DIsord El-Metwally 2004 Pain Kjaer 2011 BMC Musculoskelet Disord	2
SR of SR	Kamper, S.; Yamato T.; Williams, C. (2016) The prevalence, risk factors, prognosis and treatment for back pain in children and adolescents: An overview of systematic reviews. Best Practice & Research Clinical Rheumatology. doi. org/10.1016/j.berh. 2017.04.003	**1 systematische Review zu Prognose** (Huguet 2016: 4 Einzelstudien) *AMSTAR rating: 1x high* quality (8/11) *andere Autoren werten dies als moderate **Einschlusskriterien** * Systematische Reviews in peer-reviewed Journal * Alter von 18 J oder jünger * unspezifische Rückenschmerzen **AUSSCHLUSS:** * spezifische Rückenschmerzen	Muskuloskelettale Schmerzen	Keine der eingeschlossenen Einzelstudien bei Huguet berichtete Daten zum natürlich oder klinischen Verlauf von Rückenschmerzen bei Kindern.	**Risk of bias**: **Corrected Cover Area** (Pieper et al. 2014): CCA=0,00, no overlap of prognostic studies in included systematic reviews **Fazit 4-item-checklist** (Ballard & Montgomery 2017): schwierig zu interpretieren, trotz einzelner Schwächen gut gemacht, Autor vertrauenswürdig	-	-

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1.1.4 Einzelstudien zu Prognose

Quelle/ Studientyp	Population	Abhäng. Variable + Beobachtungen im Verlauf	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
Coenen P.; Smith A.; Paananen M.; O´Sullivan P.; Beales D.; Straker L. (2017) : Trajectories of Low Back Pain From Adolescence to Young Adulthood. Arthritis Care & Research doi : 10.1002/acr.22949 **Studientyp** : Geburtskohortenstudie	Stichprobengröße : n = 1249 **Rekrutierungszeitraum** : Geburtsjahrgänge 1989-1991 mit 17 Jahren **Charakteristika** : 17 Jahre, 53% weiblich, Australien **Einschlusskriterien** : Mutter hat an der Western Australian Pregnancy Cohort (Raine) Study (1989 -1991) teilgenommen Ausschlusskriterien : -	LBP Prävalenz im letzten Monat, Arztbesuch aufgrund der Schmerzen, Medikamenteneinnahme aufgrund der Schmerzen, Beeinträchtigung aufrund der Schmerzen Verlauf : mit 17 Jahren, 20 Jahren, 22 Jahren	4 Cluster: 1) geringe Wahrscheinlichkeit für u. Beeinträchtigung durch LBP : 53% 2) Zunahme der Schmerzen und Beeinträchtigung über die Zeit : 22% 3) Rückgang der Rückenschmerzen : 15% 4) persistierende starke Schmerzen und Beeinträchtigung : 10% Vergleiche zu Cluster 1 : Geschlecht : höhere Wahrscheinlichkeit für Mädchen in Cluster 2 (OR=1,91) oder 4 (OR=3,82) zu sein Taillenumfang : kein Zusammenhang mit Cluster Migräne/Kopfschmerzen : höhere Wahrscheinlichkeit für Cluster 4 (OR=2,84-3,47), aber auch für Cluster 3 (OR=3,18-5,84) Nackenschmerzen : höhere Wahrscheinlichkeit für Cluster 2 (OR=5,37-8,19), Cluster 4 (OR=6,79-13,42), aber auch für Cluster 3 (OR=2,45-6,97) Körperliche gesundheitsbezogene Lebensqualität : signifikant niedriger in Cluster 4 als in allen anderen Clustern, signifikant niedriger in Cluster 2 und 3 als in Cluster 1 Psychische gesundheitsbezogene Lebensqualität : signifikant niedriger in Cluster 2, 3 und 4 als in Cluster 1	Methodische Schwächen : - Hohe Dropout-Rate : 56,6% **Risk of bias** (Quips[#]): moderate • Participation : moderate risk • Attrition : high risk • Progn. Factor measurement : low risk • Outcome measurement : low risk • Confounding: low risk • Analysis : low risk	2
Dunn K.M.; Jordan K.P.; Mancl L.; Drangsholt M.T.; Le Resche L. (2011): Trajectories of pain in adolescents: A prospective cohort study. Pain doi : 10.1016/j.pain.2010.09.006 **Studientyp** : Kohortenstudie	Stichprobengröße : n = 1337 **Rekrutierungszeitraum** : Mai 2000 – April 2001 **Charakteristika** : 11 Jahre, USA **Einschlusskriterien** : 11 Jahre, registriert auf der Group Health Enrollment Database (Washington State), wohnhaft in der näheren Umgebung **Ausschlusskriterien** : unzureichende Englischkenntnisse	Rückenschmerzen in den letzten 3 Monaten Verlauf : alle 3 Monate über 3 Jahre	6 Cluster: 1) geringe Wahrscheinlichkeit für Rückenschmerzen : 78% 2) niedrige, abnehmende Wahrscheinlichkeit für Rückenschmerzen : 10% 3) später Anstieg der Schmerzwahrscheinlichkeit : 4% 4) früher Anstieg der Schmerzwahrscheinlichkeit : 4% 5) geringe Schmerzwahrscheinlichkeit zu Beginn und Ende, Ansteg im 2. Jahr : 2% 6) Hohe Schmerzwahrscheinlichkeit über alle Zeitpunkte : 1,3% Cluster 6 hat den größten Anteil an Mädchen (83,3%), die höchsten Werte in der Pubertätsentwicklung, die höchsten Somatisierungs- und Depressionswerte und die niedrigste Lebenszufriedenheit	Methodische Schwächen : - evtl. Systematischer Dropout : 1/3 der Teilnehmer ausgeschlossen wegen fehlender Werte ; berichten häufiger Schmerzerfahrungen und höhere Werte in psychologischen Fragebogen, sind eher männlich - teilweise geringe Stichprobengröße in den Clustern **Risk of bias** (Quips[#]): high • Participation : low risk • Attrition : moderate risk • Progn. Factor measurement : low	2

Quelle/ Studientyp	Population	Abhäng. Variable + Beobachtungen im Verlauf	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
			Cluster 4 hat einen vergleichbar hohen Anteil an Mädchen (83,0%) und hohe Somatisierungs- und Depressionswerte	risk • Outcome measurement : high risk • Confounding: high risk • Analysis : moderate risk → LoE : 2	
Hestbaek L.; Leboeuf-Yde C.; O Kyvik K. (2006): Is comorbidity in adolescence a predictor for adult low back pain? A prospective study of a young population. BMC Musculoskeletal Disorders. doi :10.1186/1471-2474-7-29 **Studientyp** : Geburtskohortenstudie mit Zwillingen	Stichprobengröße : n = 6554 Rekrutierungszeitraum : 1994 **Charakteristika** : Zwillinge, 12-22 Jahre, 52% weiblich, Dänemark **Einschlusskriterien** : geboren 1972-1982, Zwilling Ausschlusskriterien : -	Anzahl an Tagen mit LBP im letzten Jahr - persistierend : >30 Tage - überhaupt : >0 Tage Verlauf : Nachbefragung 2002 nach 8 Jahren	Bei der Nachbefragung 2002 berichten insgesamt 10% der Teilnehmer LBP persistierend im letzten Jahr Von denen, die 1994 LBP persistierend berichten, berichten 26% LBP persistierend in 2002 Prädiktoren (erfasst 1994) zur Vorhersage von LBP persistierend in 2002 : LBP persistierend : OR=3,53 LBP überhaupt : OR=1,98 Kopfschmerzen persistierend : OR=2,12 Kopfschmerzen überhaupt : OR=1,56 Asthma : OR=1,44 Atopische Dermatitis : n.s. LBP überhaupt + Kopfschmerzen überhaupt + Asthma : OR=1,87 / 1,85* LBP + Kopfschmerzen persistierend + Asthma : OR=4,22 / 6,56* * Mächen / Jungen	Stärken : - Große Stichprobengröße **Risk of bias** (Quips#): moderate • Participation : moderate risk • Attrition : moderate risk • Progn. Factor measurement : moderate risk • Outcome measurement : low risk • Confounding: low risk • Analysis : low risk	2
Kröner-Herwig B.; Gorbunova A.; Maas J. (2017) : Predicting the occurrence of headache and back pain in young adults by biopsychological characteristics assessed at childhood or adolescence. Adolescent Health, Medicine and Therapeutics doi:10.2147/AHMT.S12	Stichprobengröße : n = 1522 **Rekrutierungszeitraum** : 2003 (Baseline), 2015 **Charakteristika** : 7-14 Jahre bei Baseline, 56,5% weiblich, Deutschland **Einschlusskriterien** : zufällige Auswahl von Familien mit Kindern im Alter von 7-14 Jahren bei Baseline, Teilnahme an vorherigen Befragungen **Ausschlusskriterien** : mehr als 50% fehlende Werte	Rückenschmerzen in den letzten 6 Monaten - Niemals/selten : keine Rückenschmerzen - Mehrfach/immer : Rückenschmerzen Verlauf : Baseline 2003 (S1), jährliche Befragung bis 2006 (S4), Nachbefragung in 2015 (S5)	43% der Teilnehmer berichten Rückenschmerzen bei Nachbefragung S5 Prädiktoren zur Vorhersage von Rückenschmerzen zu S5 : - Geschlecht : OR=1,58 (höheres Risiko für Mädchen) - Rückenschmerzen der Eltern : OR=1,33 - Eigene Rückenschmerzen zu S4 : OR=2,40 - Psychologische Parameter (Internalisieren, Angstsensitivität, Somatosensorische Amplifikation, dysfunktionales Stresscoping, Katastrophisieren) : n.s.	Methodische Schwächen : - evtl. systematischer Dropout Jungen zu S5 - keine validierten Messinstrumente für psychologische Parameter (Änderungen, Kürzungen) **Risk of bias** (Quips°): moderate • Participation : moderate risk • Attrition : moderate risk • Progn. Factor measurement : moderate risk	1

Quelle/ Studientyp	Population	Abhäng. Variable + Beobachtungen im Verlauf	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
7501 **Studientyp** : Kohortenstudie				• Outcome measurement : low risk • Confounding: low risk • Analysis : low risk	
van Gessel H.; Gaßmann J.; Kröner-Herwig B. (2011) : Children in Pain: Recurrent Back Pain, Abdominal Pain, and Headache in Children and Adolescents in a Four-Year-Period. The Journal of Pediatrics. doi : 10.1016/j.jpeds.2010.11.051 **Studientyp** : Kohortenstudie	Stichprobengröße : n = 2025 Rekrutierungszeitraum : 2003 (Baseline) **Charakteristika** : 9-14 Jahre bei Baseline, 50,3% weiblich, Deutschland **Einschlusskriterien** : zufällige Auswahl von Familien mit Kindern im Alter von 7-14 Jahren bei Baseline, ≥9 Jahre bei Baseline, Teilnahme an allen Befragungen **Ausschlusskriterien** : mehr als 50% fehlende Werte	Rückenschmerzen in den letzten 6 Monaten - Niemals/selten : keine Rückenschmerzen - Manchmal oder häufiger: wiederkehrende Rückenschmerzen Verlauf : Baseline 2003 (S1), dann jährliche Befragung über 4 Jahre (S4)	Prävalenz wiederkehrender Rückenschmerzen über die Zeit : S1: 20,6% ; S2: 26,0% ; S3: 27,4% ; S4: 30,8% Ca. 28% der Teilnehmer mit wiederkehrenden Rückenschmerzen zur Baseline berichten wiederkehrende Rückenschmerzen über alle Zeitpunkte ; das entspricht 5,8% der Gesamtstichprobe Mädchen (72,7%) berichten signifikant häufiger von persistierenden Verläufen als Jungen (27,3%) Ältere Kinder berichten signifikant häufiger persistierende Verläufe als Kinder, die zur Baseline noch jünger sind Teilnehmer mit persistierenden Verläufen berichten signifikant höhere Schmerzintensität und Beeinträchtigung	Methodische Schwächen : evtl. Systematischer Dropout in Richtung höhere Schmerzprävalenz Diesselbe Kohorte wie Kröner-Herwig et al., 2017 **Risk of bias** (Quips): moderate • Participation : moderate risk • Attrition : moderate risk • Progn. Factor measurement : moderate risk • Outcome measurement : low risk • Confounding: low risk • Analysis : low risk	1

Risk of Bias Einschätzung übernommen aus : Beynon et al. (2020) Chronic physical illnesses, mental health disorders, and psychological features as potential risk factors for back pain from childhood to young adulthood: a systematic review with meta-analysis. Eur Spine J. doi.org/10.1007/s00586-019-06278-6
° Risk of Bias Einschätzung übernommen aus: Øiestad et al. (2020) Risk factors for episodes of back pain in emerging adults. A systematic review. Eur J Pain. doi.org/10.1002/ejp.1474

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1.2 Kapitel 4: Diagnostik

1.2.1 Aggregierte Evidenz: Syst. Reviews zu Diagnostik

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Diagnostik	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenzni-veau (CEBM Oxford 2011)
SR	Grødahl, L.; Fawcett L.; Nazareth, M.; Smith, R.; Spencer, S.; Heneghan, N.; Rushton, A. (2016) : Diagnostic utility of patient history and physical examination data to detect spondylolysis and spondylolisthesis in athletes with low back pain: A systematic review. Manual Therapy DOI:10.1016/j.math.2016.03.011	Study type: any study design using primary diagnostic accuracy data Search period: from date of inception to 13th November 2015 Databases: MEDLINE, Cochrane Library, AMED, CINAHL, Sport Discus, Pub Med Central, Web of Science **Exclusion criteria**: no comparison of patient history and/ or physical examination data against diagnostic imaging (plain radiograph, MRI, CT); full text not in English	Diagnosis: spondylolysis, spondylolisthesis Diagnostic tests: comparison of patient history and/or physical examination data against diagnostic imaging (plain radiograph, MRI, CT)	Spondylolisthesis : No studies specifically investigated a young/athletic population. Spondylolysis : Number of studies: 3 (2 studies at risk of bias) Population: N: 178 Gregg2009: N=82, 66% <20 years, 52% male, New Zealand Masci2006: N=71, age 10-30 years, Australia Sundell2013: N=25, M=15.3 years, 56% male, Sweden Results: Patient history: 1 study (Gregg2009 - at risk of bias) Physical examination: all 3 studies. Only one test was investigated in all studies, the one-legged hyperextension test. The low sensitivity value and low/moderate to low specificity values from one study with low ROB (Masci2006), confirms low diagnostic utility of the one-legged hyperextension test for spondylolysis. Overall for spondylolysis, no patient history or physical examination data have diagnostic utility to inform clinical practice. Limitations by risk of bias.	Weaknesses/limitations: Risk of bias assessment: "at risk" for Gregg2009 and Sundell2013) no meta-analysis due to heterogeneity of studies: - limited numbers of studies - differences in study design (case-series, retrospective cohort, prospective cohort non-experimental cross-sectional) - ROB assessment - difference in reference standard utilised - difference in physical examination and patients history data utilised ➔ LoE 2 **Risk of bias**: AMSTAR-2 overall rating: low confidence in results of the review (1 critical flaw : no list of excluded studies, 3 non-critical: selection of included studies designs not explained, funding of included studies and funding/conflict of interests not reported)	Gregg 2009 Physical Therapy in Sport, Masci 2006 British Journal of Sports Medicine, Sundell 2013 International Journal of Sports Medicine	2
SR (guideline)	Grossman, D.; Curry S.; Owens, D.; Barry, M.; Davidson, K.; Doubeni, C.; Epling, J.; Kemper, A.; Krist, A.; Kurth, A.; Landefeld, C.; Mangione, C.; Phipps, M.;	update of recommen-dations of 2004 Study type: randomized trials, controlled trials, cohort studies (for harm assessment: case series, case-control studies) Search period: 1966 to	Diagnosis:Adolescent Idiopathic Scoliosis (Cobb angle of 10° or greater) Diagnostic tests: all available screening tests	Number of studies: 7 fair-quality studies (13 articles) Population: N=447.243; ages 8 to 16 years; United States, Singapore, Hong Kong, Greece, Ireland, Norway; 6 studies in school-based settings, 1 study in clinic setting Results: Detection: Currently available screening tests can accurately detect adolescent idiopathic scoliosis. Accuracy increased with the number of screening tests used. Best results were achieved for a combination of 3 tests (forward bend test,	Weaknesses/limitations - heterogeneity in screening modality, screeners, and screening procedures in included studies - limited feasibility of Moiré topography as a population- or school-based screening modality - review limited to persons with mild-to-moderate AIS (major curve <50°) at	Yawn 1999 JAMA, Wong 2005 Spine (Phila Pa 1976), Karachalios 1999 Spine (Phila Pa 1976), Luk 2010 Spine (Phila Pa 1976), Lee 2010 Spine	2

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Diagnostik	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenzni-veau (CEBM Oxford 2011)
	Silverstein, M.; Simon, M.; Tseng, C. (2018) : Screening for adolescent Idiopathic Scoliosis US preventive services task force recommendation statement. JAMA - Journal of the American Medical Association DOI:10.1001/jama.2017.19342	10.2016 Databases: Cochrane Central, Ovid MEDLINE, ERIC, PubMed, CINAHL **Inclusion criteria**: asymptomatic children (10-18 y); screening studies in primary care or school-based; all screening tests; English articles; x-ray confirmation **Exclusion criteria**: case reports; poor quality studies; qualitative or cost-effectiveness studies; screening by single person, screening practitioner not well described; referral criteria not quanti-tatively described; flow of participants incompletely de-scribed; less than 60 percent of those who screened positive received x-ray		scoliometer measurement, and Moiré topography) Sensitivity/specificity: highest accuracy of screening (93.8% sensitivity [95% CI, 93.3%-94.3%]; 99.2% specificity [95% CI, 99.2%-99.2%]) for combination of 3 tests; sensitivity lower with just 1 or 2 screening tests (eg, 71.1% for the forward bend test and scoliometer measurement and 84.4%for the forward bend test alone) False-positive rate: lowest false-positive rate (0.8%) for combination of 3 tests; higher rates for 1 or 2 screening tests (2.9% - 21.5%) Positive predictive value: highest positive predictive value (81.0% [95% CI, 80.3%-81.7%]) for combination of 3 tests; lower rates for 1 or 2 screening tests (5.0%-54.1%) Benefits of screening: no direct evidence regarding the effect of screening for adolescent idiopathic scoliosis on patient-centered health outcomes. Harms of screening: The USPSTF found no studies on the direct harms of screening, such as psychological harms or harms associated with confirmatory radiography. (False-positive results are an important potential harm, with rates ranging from 0.8% to 21.5%. Potential harms of false positive results include unnecessary follow-up visits, increased cancer risk attributable to radiation exposure, overtreatment with bracing, or psychosocial effects associated with the diagnosis of clinically nonsignificant scoliosis.) Conclusion: The current evidence is insufficient to assess the balance of benefits and harms of screening for adolescent idiopathic scoliosis in children and adolescents aged 10 to 18 years. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.	diagnosis - This recommendation does not apply to children and adolescents presenting for evaluation of back pain ➔ LoE 2 Strengths - exclusion of poor quality studies **Risk of bias**: AMSTAR-2 overall rating: high confidence in results of the review (1 non-critical flaw: funding of included studies not reported)	(Phila Pa 1976), Goldberg 1995 Spine, Goldberg 1993 Eur Spine J, Goldberg 1993 Spine (Phila Pa 1976), Fong 2015 Spine J, Soucacos 1997 J Bone Joint Surg Am, Soucacos 1998 Eur Spine J, Soucacos 2000 Orthopedics, Adobor 2011 Scoliosis	
SR	Tofte, J. N.; CarlLee T. L.; Holte, A. J.; Sitton, S. E.; Weinstein, S. L. (2017) : Imaging Pediatric Spondylolysis: A	Database: Pubmed, Cochrane **Inclusion criteria**: English language; published in the past 15 years; titles and	Diagnosis: spondylolysis Diagnostic tests: physical examination, plain	*Physical examination (2 studies) : No recommendation in favor of the use of physical examination findings for definitive diagnosis. *Imaging (10 studies) : Average sensitivity of MRI vs. CT as the gold standard: 81.4% (kappa value of 0.83). Average sensitivity with SPECT as reference standard: CT:	Weaknesses/limitations - mostly retrospective studies - lack of high-quality studies makes it difficult to formulate concrete recommendations for clinical practice - inconsistency in the various ways in which	Campbell 2005 Skeletal Radiol, Miller 2013 J Pediatr Orthop, Yang 2013 Clin Nucl Med,	2

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Diagnostik	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenzni-veau (CEBM Oxford 2011)
	Systematic Review. Spine (Phila Pa 1976) DOI:10.1097/BRS.0000000000001912	content related to the diagnostic imaging of pediatric spondylolysis; inclusion of a comparison of imaging modalities or recommendation concerning a diagnostic imaging algorithm; level III evidence or better (Journal of Bone and Joint Surgery criteria)	films, MRI, CT, SPECT	85% sensitivity; MRI: 80% sensitivity (kappa 0.79). Two studies found MRI to be a superior to CT in performance for early lesions and CT superior to MRI for longitudinal follow-up. CT and MRI were found to be comparable to SPECT in terms of sensitivity, making the ability of all 3 modalities to detect spondylolysis on imaging relatively similar. Sensitivity plain films: inferior but still clinically useful threshold of 75% sensitivity compared with CT and bone scan. *Diagnostic algorithm (12 studies) : No consistent recommendations for a diagnostic algorithm Recommendation: Due to efficacy, low cost, and low radiation exposure, two-view plain films seem to be the best initial study. Clinical examination of patients with suspected spondylolysis is an unreliable indicator of bony spinal pathology and imaging therefore must be the primary means of diagnostic confirmation. If plain films do not yield a diagnosis or the patient does not improve clinically, advanced imaging can be undertaken if clinically warranted. MRI should be used in early diagnosis and CT in more persistent courses. We discourage serial follow-up with CT, as the radiation burden sustained as a result of this approach would be substantial. We find the radiation burden of SPECT to be prohibitive in light of the availability of alternatives that perform similarly. *Radiation exposure (1 study) : 4 plain films and CT: approximately double the dose of two-view plain film studies; bone scans: 7-9 times the effective dose of two-view plain films studies. *Costs (1 study): two-view plain films $350; four-view plain films $500; CT $2000; bone scan $1650; MRI $2900	imaging study performance is reported and measured - heterogeneous patient cohorts - variable study protocols - lack of the identification of a risk population of children with back pain **Risk of bias**: AMSTAR-2 overall rating: Critically low confidence in results of the review (3 critical flaws : no protocol, no list of excluded studies, RoB not satisfactorily assessed ; 3 non-critical: selection of included studies designs not explained, funding of included studies and funding/conflict of interests not reported) ➔ LoE 2	Dunn 2008 Skeletal Radiol, Rush 2015 J Pediatr Orthop, Bhatia 2008 J Pediatr Orthop, Kobayashi 2013 Am J Sports Med, Ganiyusufoglu 2010 Clin Radiol, Yamaguchi 2012 J Child Orthop, Goda 2014 Eur spine J, Sairyo 2006 Spine (Phila Pa 1976) Masci 2006 Br J Sports Med, Gregory 2005 Clin J Sport Med	
SR	Wilne, S.; Collier J.; Kennedy, C.; Koller, K.; Grundy, R.; Walker, D. (2007): Presentation of childhood CNS tumours: a	*Study type: cohort studies, case series *Search period: January 1991 to August 2005 *Database: Medline, Embase, PubMed	*Diagnosis: childhood CNS tumours *Diagnostic tests: the clinical presentation of childhood CNS	Only symptoms and signs that occurred in 5% or more of the meta-analysis population are reported. Back pain was only mentioned for spinal cord tumours. Spinal cord tumours *Number of studies: 6 *Population: N=162, age 0-18 years	Strengths - better evidence for rankings of symptoms/ signs by age, tumour location, and neurofibromatosis status than previous reports - Weaknesses/limitations - unpublished data not sought	Constantino 1996 J Neurosurg, Parker 1996 Arch Dis Child, Przybylski 1997 Childs Nerv Syst, Bouffet 1998	2

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Diagnostik	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenzni-veau (CEBM Oxford 2011)
	systematic review and meta-analysis. Lancet Oncology doi:10.1016/S1470-2045(07)70207-3	***Inclusion criteria**: case-series or cohort studies describing symptoms and signs at diagnosis for a minimum of 10 children diagnosed with a CNS tumour; all languages (non-English language papers were translated) ***Exclusion criteria**: unrelated to CNS tumours; discussing an area unrelated to clinical presentation	tumours (signs and symptoms)	*Results: Figure 4 Inidcation that symptoms linked to raised intracranial pressure are present in about 7% of spinal cord tumours. Recognition that specific combinations of symptoms and signs indicate a focal CNS lesion is crucial to the diagnosis of many CNS tumours. Assessment of any child who presents with symptoms and signs that could result from a CNS tumour should include a thorough visual and motor system examination, assessment of growth (including head circumference in children under 4 years), and pubertal status. Specific multiple symptoms and signs should alert the clinician to the possibility of a CNS tumour.	- publication bias could have led to overrepresentation of rare tumours or those with an unusual presentation - accuracy of data depends on history given by patients / families or carers and the signs detected by the examining health-care practitioners - variation in data detail between studies - analysis addresses sensitivity but not specificity of symptoms and signs to the presence of an underlying CNS tumour - most identified studies done in 1 centre - many multi-institutional + multinational trials done in paediatric neuro-oncology, although the studies, while reporting survival, rarely report symptoms + signs - generalizability of findings is limited for adolescents: little published information for adolescents and young adults (these show a different tumour epidemiology to children and often have disturbances of growth and puberty) ➔ LoE 2 **Risk of bias**: AMSTAR-2 overall rating: Critically low confidence in results of the review (4 critical flaws : no protocol, no list of excluded studies, RoB not satisfactorily assessed or accounted for ; 4 non-critical: stduy selection not in duplicate, included studies not sufficiently described, no RoB assessed in meta-analysis, funding of included studies not reported)	Cancer, Lonjon 1998 Pediatr Neurosurg, Young 1999 Pediatr Radiol	

1.2.2 Einzelstudien zu Diagnostik

Quelle/ Studientyp	Population	(verglichene) Diagnostik	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
Aartun E, Hartvigsen J, Hestbaek L. (2016) : Validity of Commonly Used Clinical Tests to Diagnose and Screen for Spinal Pain in Adolescents: A School-Based Cohort Study in 1300 Danes Aged 11-15 Years. Journal of Manipulative and Physiological Therapeutics. doi:10.1016/j.jmpt.2016.01.007 **Study type:** prospective cohort study, reference standard, blinded	*Number of patients: N=1224 (Follow-up N=963) *Recruiting period: Baseline: April to June 2010, Follow-up: April to June 2012 *__Characteristics__: Denmark; 11 to 13 years; 51% male *__Inclusion criteria__: 5th and 6th grade students from Southern Denmark *__Exclusion criteria__: missing spinal pain data in the questionnaire; no participation in any of the tests	*Diagnosis: mid back pain, low back pain (lfetime prevalence: once or twice; "frequent pain" defined as a report of "often" vs "sometimes/once or twice/never") *Diagnostic tests: 22 selected clinical tests to detect or predict mid back pain (MBP), and low back pain (LBP) Assessment of scoliosis: Adam's forward bend test; shoulder height difference Assessment of general hypermobility: extension of knees, elbows, fifth fingers, abduction/ opposition of thumbs, and flexion of the trunk/ hip; Beighton score Assessment of global mobility: fingertip-to-floor distance (FFD) in forward and lateral flexion; Schober test Assessment of intersegmental mobility: restriction in cervical, thoracic, lumbar, and sacroiliac joints; pain response in cervical, thoracic, lumbar, and sacroiliac joints respectively Assessment of pain at end range in active range of motion: flexion, extension, and rotation of the cervical spine; flexion, extension, and lateral flexion of the lumbar spine Assessment of isometric endurance of the back extensors:Sorensen test	Diagnostic and predictive value Lifetime prevalence: The sensitivity was low, and specificity was high for all tests at both baseline (age, 11-13 years) and followup (age, 13-15 years). Thus, the tests could not correctly classify those with a history of pain and neither could they predict future pain. However, some associations between tests involving a pain response from the participant were found, whereas tests based on observation and measurements alone were not associated with spinal pain. When all tests were evaluated collectively in 1 model, the ability to correctly classify the participants with MBP and LBP was still poor, as the area under the curve (AUC) ranged from 0.60 to 0.65. Frequent pain: Low sensitivity and high specificity; tests that were combined with a pain response were associated with pain, whereas tests based on observations or measurements alone were not. When evaluating all tests in 1 model, AUC showed generally higher values (0.81 for frequent MBP, and 0.74 for frequent LBP) compared to the poor values for lifetime prevalence. Prediction of incident cases None of the selected tests could predict incident cases of MBP or LBP. When all the tests were included in 1 model, the AUC was poor, ranging from 0.61 to 0.69. Clinical tests commonly used in spinal screening in adolescents could not detect present spinal pain or predict future spinal pain.However, some statistically significant associations between spinal pain and tests involving a pain response from the participant were found.	Weaknesses/limitations - lifetime prevalence and frequency of MBP and LBP as "reference standards." --> results of this study reflect the associations between the tests and those specific outcomes - generalizability of results for other outcomes (e.g., disability) is unclear - study sample limited to children aged 11 to 13 years whose spines are still developing Strengths - school-based design - longitudinal design	2
Buttermann G R, Mullin WJ. (2008): Pain and disability correlated with disc degeneration via magnetic resonance imaging in scoliosis patients. Eur Spine J.	*Number of patients: N=60 n=30 consecutive pediatric scoliosis patients n=30 age- and gender-matched controls *__Characteristics__: idiopathic scoliosis, USA, M=14 years (11 to 17 y), 77% female	*Diagnosis: idiopathic scoliosis *Diagnostic tests: MRI (specifically assessed for disc dehydration, herniated nucleus pulposus (HNP), Schmorl's nodes, and inflammatory endplate changes)	Patients in the pediatric idiopathic scoliosis group - had back pain (Visual Analog Scale; VAS) significantly worse than those in the control group (P<0.001) - had a pain area significantly greater than that control group (P<0.001) - had disability scores (Oswestry Disability Index) significantly greater (i.e., worse) than the control group (P = 0.001) - considered their appearance significantly more deformed than	Weaknesses/limitations - study should be considered preliminary in nature (small sample etc) - no detailed description of control group - differentiation from	2

Quelle/ Studientyp	Population	(verglichene) Diagnostik	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
doi:10.1007/s00586-007-0530-8 **Study type**: cross-sectional, reference standard, blinded	*__Inclusion criteria__: patients: minimum curve magnitude of 40°; progression to surgical treatment (spinal arthrodesis) controls: asymptomatic (for a minimum of 1 y); had never been treated for back pain by any health provider; denied taking medication for pain *__Exclusion criteria__: de novo, degenerative, and other non-idiopathic scoliosis patients; idiopathics with prior surgical treatment of their deformity; pregnancy; medical conditions precluding surgical intervention; acute disc herniation.		controls (P<0.001) MRI findings : - The total number of degenerated discs per subject in the scoliosis and asymptomatic control groups were similar - Schmorl's nodes most common at thoracolumbar junction - No significant relationship of MRI-revealed disc dehydration to outcome parameters (see above) - Pediatric scoliosis patients with Schmorl's nodes had back pain significantly greater than those adolescent scoliosis patients without Schmorl's nodes (mean VAS pain = 3.2 vs. 1.1, respectively;P = 0.01) -Pediatric patients with Schmorl's nodes had an area of pain greater than those without Schmorl's nodes (mean pain drawing score = 2.5 vs. 0.8, respectively; P<0.01) -The presence of Schmorl's nodes in patients in the pediatric scoliosis group was significantly correlated with back pain (r = 0.53) and pain drawing (r = 0.60; P = 0.015)	patients with unspecific back pain unclear	
Feldman DS, Straight JJ, Badra MI. (2006) : Evaluation of an Algorithmic Approach to Pediatric Back Pain. J Pediatr Orthop. doi:10.1097/01.bpo.0000214928.25809.f9 **Study type**: cross-sectional, reference standard, no blinding, but diagnostic algorithm	*Number of patients: N=87 *Recruiting period: January 1995 to January 2002 *__Characteristics__: United States, M=13,4 years (4 to 18 years), 54% girls *__Inclusion criteria__: chief complaint of thoracic and/or lumbar back pain *__Exclusion criteria__: referral for scoliosis evaluation; history of trauma (fall, motor vehicle injury) within 3 weeks of initial visit	*Presentation with thoracic and/or lumbar back pain *Diagnostic tests: diagnostic algorithm (see Figure 1)	*specific diagnosis: 31/87 patients (36%), positive finding on initial radiographs: 21/31 patients (68%) 19 (29%) of the 66 patients with negative radiographs reported constant pain, night pain, radicular pain, and/or demonstrated an abnormality on neurological examination --> MRI, negative radiographs, specific diagnosis by MRI: n=10 (of 19 obtaining MRI), *nonspecific pain: 56 / 87 patients (64%); Follow-up (2 to 8 years after initial visit): no patients with nonspecific back pain had a change in their symptoms The predicted probability of having a specific diagnosis using 4 predictors (constant pain, night pain, radicular pain, and abnormal neurological examination) was 100% when having 3 of the predictors, 85.7% for 2 predictors, 61.1% for 1 predictor, and 18.6% for zero predictors. The study suggests that history and physical examination with plain radiographs and an MRI when indicated should be the evaluation for back pain. A child with back pain without established diagnosis based on history, physical examination, and plain radiographs should be further evaluated with MRI of the spine provided that he/she shows certain clinical markers, including constant, night or radicular pain, and/or abnormal neurological examination.	Weaknesses/limitations - no control group - physician bias (a single physician oversaw the examinations of each patient) - MRI studies only in selected patients -->possibility that some specific diagnoses were missed	2

Quelle/ Studientyp	Population	(verglichene) Diagnostik	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
Özyürek S, Genc A, Kul Karaali H, Algun Z C. (2017): Three-dimensional evaluation of pelvic posture in adolescents with and without a history of low back pain. Turk J Med Sci . DOI:10.3906/sag-1607-12 **Study type**: cross-sectional study, reference standard, blinding not necessary	*Number of patients: N=32 (LBP: n=13, Control group: n=19) ***Characteristics**: 63% female; Median: 14 years ***Inclusion criteria**: students (12-17 y), schools clustered (elementary + high schools). From each cluster two schools were randomly selected out of a total of 25 schools (8 elementary, 17 high schools), Turkey ***Exclusion criteria**: history of any spinal fracture or violent back; spinal surgery; skeletal disorders (leg length discrepancy, spondylolisthesis, scoliosis); neurologic conditions; rheumatic disorders; symptomatic complaints of upper and lower extremity musculoskeletal pain; metabolic or endocrine diseases; LBP radiating to legs; LBP in the preceding 3 months or LBP at the time of assessments (to eliminate effects of acute pain on pelvic posture)	*Diagnosis: LBP (lifetime prevalence; aching, pain, or discomfort in the low back not related to trauma or menstrual pain) *Diagnostic tests: 3D evaluation of pelvic posture PosturePrint system; 3 digital photographs were obtained in an upright stance (anteroposterior, left and right lateral) and analyzed. Postural displacements of the pelvis were calculated as rotations in degrees and translations in millimeters. The posture index, which is the total postural abnormality score, was recorded (severity of postural displacements: slight = 1–10, significant = 11–20, moderate = 21–30, serious = 31–40, severe = 41–96)	3D profile of pelvic posture: No significant differences between groups in anterior and lateral views (P > 0.05); the majority of participants had nonoptimal pelvic posture in the lateral view and anterior view Postural displacements of pelvis: No significant differences between the groups (P > 0.05); 12.5% of all participants had “slight”, 68.8% had “significant”, and 18.7% had “moderate” displacements in their posture. Total postural abnormality profile and posture index scores were similar between the groups (P > 0.05). The findings suggest that adolescents with LBP have a profile of pelvic posture similar to those of healthy adolescents without a history of LBP.	Weaknesses/limitations - small number of participants (majority of the students were not willing to participate in photographic evaluation) - lack of sex-specific analysis due to the small sample size - use of photographic measurements to assess posture --> palpation and marker placement external to the body can affect the results	2
Ramirez N, Flynn JM, Hill BW, Serrano JA, Calvo CE, Bredy R, Macchiavelli RE (2015) : Evaluation of a Systematic Approach to Pediatric Back Pain: The Utility of Magnetic Resonance Imaging. J Pediatr Orthop. DOI: 10.1097/BPO.00000	*Number of patients: N=261 *Recruiting period: September 2006 to September 2008 ***Characteristics**: presentation to Concepcion Hospital Orthopaedic clinic in San German, Puerto Rico; M=13,9 years (4 to 18 years); 68% female ***Inclusion criteria**: patients >4 and <18 years of age; chief complaint of back pain (>4 weeks duration); without history of trauma; without	Presentation with a chief complaint of back pain (>4weeks duration) - Diagnostic tests: diagnostic algorihtm (see Feldman et al., 2006; Figure 1)	*specific diagnosis: 89 / 261 patients (34%) - positive finding on initial radiographs: 23/89 patients (26%) 142 of the 238 patients (60%) with negative radiographs had a history of constant pain (140), night pain (47), showed evidence of abnormal neurological examination (26), or a combination of these --> MRI; 11 patients did not return for MRI (unclear diagnosis) --> negative radiographs, specific diagnosis by MRI: n=66 herniated disks (28), degenerative disk disease (17), spondylolysis (10), Sheuermann kyphosis (9), spondylolisthesis (5), leg length discrepancy over 2 cm (4), cord lipoma (4), bilateral ovarian cyst (2), hydronephosis (2), tethered cord (1), facet arthritis (1), sacroilitis (1), juvenile osteoporosis (1), perineural cyst (1), annular tear (1), giant cell	Weaknesses/limitations - no control group - MRI studies only in selected patients --> possibility that some specific diagnoses were missed	2

Quelle/ Studientyp	Population	(verglichene) Diagnostik	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
00000000190 **Study type**: cross-sectional, reference standard, blinding not necessary	previous definitive diagnosis and treatment ***Exclusion criteria**: definite known source of back pain; cervical pain; history of trauma; pain <4 weeks; <4 years or >18 years of age		tumor (1), ependymoma (1); disk protrusion wasn't considered as positive finding as it is prevalent among children (7) *nonspecific back pain: 161 / 261 patients (61%) Follow-up (36 to 60 months): 2 patients originally diagnosed with nonspecific pain were found to have a specific diagnosis (JVA (1), spondylolysis (1)) significantly associated with specific diagnosis: sex (male patient), constant pain, abnormal neurological examination, duration of pain <3 months ; not significantly associated with specific diagnosis:age (<10 y or >10 y), night pain, location of pain (thoracic vs. lumbar), pain intensity (VAS; 0 to 5 or 6 to 10), presence of scoliosis, Cobb angle (<25 or >25 degrees) Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV): Constant pain showed the highest sensitivity and NPV followed by lumbar pain. The abnormal neurological examination showed the highest specificity and PPV The results support the use of a systematic algorithm that utilizes MRI as an efficient, well-organized methodology to evaluate back pain in children. The clinician should be aware that the presences of constant pain or lumbar pain are red flags for the presence of underlying pathology.		
Saint-Maurice PF, Welk GJ, Burns R, Plowman SA, Corbin CB, Hannon JC. (2015) : The criterion-referenced validity of the FITNESSGRAM Trunk-Extension test. J Sports Med Phys Fitness. PMID: 25303074 **Study type:** cross sectional, reference standard, blinding not necessary	*Number of patients: N=375 (only N=259 for analyses; n=62 with LBP, n=197 without LBP) ***Characteristics**: 4th through 10th grade students; 53% male; United States	*Diagnosis: LBP (aching, pain or discomfort in the low-back during the preceding year, not related to trauma (injury) or menstrual pain) --> individuals that indicated presence of LBP on at least 7 or more of the 14 LBP items were classified as having LBP. Individuals that identified LBP in no more than 2 items were used as the reference group (classified as not having LBP) *Diagnostic tests: FITNESSGRAM tests: trunk extension test (lay on the prone position and lift trunk as high as possible in a controlled manner (students scores were set at a maximum of 12 inches)), dynamic curl-up test, back saver sit-and-reach test Additional tests: lateral plan test (hold body (right	Elementary girls: highest AUC for sit-and-reach test (AUC=0.80, 95% CI: 0.66 to 0.90, P=0.001); cutpoint: 24.8 cm (Sensitivity:75.0; Specificity: 81.4) Middle-school girls: highest AUC for static curl-up test (AUC=0.71, 95% CI: 0.56 to 0.84, P=0.01); cutpoint: ≤ 306 seconds (Sensitivity: 82.4;Specificity: 64.3) High-school girls: highest significant AUC for the static curl-up test (AUC=0.73, 95% CI: 0.54 to 0.88, P=0.02); higher (nonsignificant) AUC for a composite score using the combined static curl-up and dynamic curl-up tests (AUC=0.78, P=0.08); cutpoint for composite score: ≤ 297 seconds/curl-ups (Sensitivity: 85.7, Specificity: 59.1) Elementary + Middle-school boys: no significant AUCs High-school boys: highest AUC for dynamic curl-up test (AUC=0.75, P=0.03); cutpoint:48 curl-ups (Sensitivity: 75.0, Specificity: 74.1) The reasonable sensitivity values from the ROC analyses indicate that individual and aggregate indicators of musculoskeletal fitness can	Weaknesses/limitations - single binary outcome variable (e.g. LBP vs no LBP) - recall bias - no causation since occurrences of LBP events were not time matched with the fitness assessments	2

Quelle/ Studientyp	Population	(verglichene) Diagnostik	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
		side down) in a straight line, perpendicular to elbow (90 degrees) for the longest time possible), plank test (maintain a 90-degree angle between elbows and the trunk in a prone position), static curl-up test	potentially identify girls that had LBP in the past. However, the low values for Specificity indicates that girls with "No LBP" can be misclassified as being at risk for LBP. The current FITNESSGRAM trunk extension test was not able to discriminate between students with and without LBP. Therefore, the utility of this test for fitness assessment in youth should be revisited.		
Salminen, J.; Erkintalo-Tertti, M.; Paajanen, H. (1993) : Magnetic resonance imaging findings of lumbar spine in the young: Correlation with leisure time physical activity, spinal mobility, and trunk muscle strength in 15-year-old pupils with or without low-back pain. J of Spinal Disorders. PMID: 8274805 **Study type:** randomized case control study	*Number of patients: N=76 (n=38 with LBP, n=38 asymptomatic controls) ***Characteristics**: Finland; 15 years, 55% female ***Inclusion criteria**: all pupils in 8th grade of the comprehensive schools in the municipality of Turku; randomized selection of individuals with LBP and matching of asymptomatic case controls (matched for sex, age, school class)	*Diagnosis: continuous or recurrent LBP *Diagnostic tests: MRI lumbar spine Mobility tests: lumbar sagittal mobility (flexicurve technique), spinal flexion mobility (Macrae' and Wright's modification of Schober's test), forward-bending test, side bending, flexibility of the hip flexor muscles (hydrogoniometer), flexibility of the hamstring muscles (hydrogoniometer) Muscle strength: dynamic strength of abdominal muscles (curl-up test), endurance strength of abdominal muscles (curl-up test), endurance strength of the back muscles	36 of discs (10%) were degenerated; degeneration of one or more discs: 32% of participants; disc protrusion: 12%, Scheuermann-type changes: 15%, atrophy of spinal muscles: 33% Associations between MRI findings and tests for mobility and trunk muscle strength Disk protrusion: significantly decreased lumbar flexion (flexicurve) (61.4° vs. 69.1°, p=0.043) Atrophy of spinal muscles: significantly decreased side bending (205mm vs. 223mm, p=0.039) No other significant associations between mobility tests, tests for trunk muscle strength and MRI findings In all mobility and strength tests, the correlation with MRI findings was the same in boys and girls, and the association was not modified by LBP.	Weaknesses/limitations - small number of subjects	2
Young JA, Cuff SC, Yang J, Pommering TL. (2016) : Comparison of spinal and pelvic posture and muscle flexibility in those with spondolytic and non-spondolytic low back pain. Journal of Musculoskeletal Research. doi.org/10.1142/S021	Number of patients: N=61 (n=31 with non-spondylolytic low back pain (NSLBP), n=30 with spondylolytic low back pain (SLBP)) **Characteristics**: United States; M=15,1 years; 54% female **Inclusion criteria**: patients aged 12 to 21 years presenting to a Pediatric Sports Medicine Clinic having low back pain for greater than two weeks **Exclusion criteria**: prior spine or	*Diagnosis: non-spondylolytic low back pain (NSLBP) and spondylolytic low back pain (SLBP) *Diagnostic tests: standing lateral lumbar spine radiographs advanced imaging: SPECT bone scans or CT scans hip flexor flexibility (HFF): Thomas Test (TT; Kendall et al. 2000), inclinometer hamstring flexibility (HSF): 90-90 test (de Weijer et al. 2003), digital inclinometer pelvic incidence (PI): angle between the line	After adjusting for age, sex, and sport, SLBP subjects had significantly less flexible right and left hamstrings (p=0.02, p=0.01), greater pelvic incidence (p < 0.001), and greater sacral slope (p < 0.001) when compared to NSLBP (see Table 2 and 3)	Weaknesses/limitations - measurements were taken from subjects who had already presented with low back pain -->no conclusion possible that these patients had the same measurements before the development of their pain. However, PI is a relatively stable	2

Quelle/ Studientyp	Population	(verglichene) Diagnostik	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
8957716500111 **Study type**: cross sectional, reference standard, blinding	pelvis surgery; preexisting spinal conditions; such as disc degeneration, tumor, or infection	perpendicular to the midpoint of the sacral plate and the line connecting the center of the femoral head and the midpoint of the sacral plate pelvic tilt (PT): angle between the vertical and the line connecting the center of the femoral head and the midpoint of the sacral plate sacral slope (SS): angle between the horizontal and the line along the sacral plate of S1 lumbar lordosis (LL): angle formed by the cephalad endplate of L1 and cephalad endplate of L5		measurement and not much change would be expected before the onset of pain. - generalizability of results (patients recruited from Sports Medicine Clinic) Strengths - researchers were blinded to group until measurements were recorded	

DEUTSCHE GESELLSCHAFT FÜR KINDER- UND JUGENDMEDIZIN e.V.

1.3 Kapitel 6: Nicht-medikamentöse Therapie

1.3.1 Aggregierte Evidenz: Syst. Reviews zu nicht-medikamentöser Therapie

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literaturbelege	Evidenz-niveau (CEBM Oxford 2011)
SR	Bonvanie, I. J., Kallesøe, K. H., Janssens, K. A., Schröder, A., Rosmalen, J. G., & Rask, C. U. (2017). Psychological interventions for children with functional somatic symptoms: a systematic review and meta-analysis. The Journal of Pediatrics. doi.org/10.1016/j.jpeds.2017.03.017	Study type: RCTs Search period: 1975-Nov 2015 Database: Cochrane, PubMed, PsycINFO, EMBASE, CINAHL **Inclusion criteria**: RCT; peer review journal; <18J, functional somatic symptoms, psychological therapy **Exclusion criteria**: no FSS, no psychological intervention, >18y, no RCT, low number of patients Studies focused on functional abdominal symptoms (12/27), chronic fatigue syndrome (6/27), tension-type headache (4/27), fibro-myalgia (2/27), or mixed pain complaints (3/27).	CBT, biofeedback, relaxation training, guided imaginary therapy, hypnotherapy, written self-disclosure, ACT controls: waiting list conditions (7/27), CAU (9/27), placebo conditions (7/27), and active treatments (4/27)	*Number of studies: 21 RCTs included in meta-analyses Psychological treatments reduced symptom load (Hedges g = −0.61), disability (Hedges g = −0.42), and school absence (Hedges g = −0.51) post-treatment in children suffering from various functional somatic symptoms. Effects were maintained at follow-up.	Type and duration of symptoms, age, and treatment dose did not explain heterogeneity in effect-sizes between studies. Effect-sizes should be interpreted with caution because of the variety in outcome measures, unexplained heterogeneity in found effects and potential publication bias. **Risk of bias**: AMSTAR-2 overall rating: Low confidence in results of the review (1 critical flaw : no list of excluded studies, 1 non-critical: funding of included studies not reported) ➔ LoE 2	Al Hagger 2006, Bussone 1998, Chalder 2010, Groß 2013, Gulewitsch 2013, Kashikar-Zuck 2005, Kashikar-Zuck 2012, Larsson 1997, Larsson 1990, Larsson 1996, Levy 2010 / 2013, Nijhof 2012, Palermo 2009, Palermo 2015, Robins 2005, Sanders 1994, Stulemeijer 2005, Van der Veek 2013, Van Tilburg 2009, Vlieger 2007, Wallander 2011	2
SR	Fisher E, Law E, Dudeney J, Palermo TM, Stewart G, Eccleston C (2018). Psychological therapies for the management of chronic and recurrent pain in	*Study type : RCTs *Search period: Jan 2014 - May 2018 *Database: CENTRAL ; MEDLINE, EMBASE; PsycINFO ***Inclusion criteria**: RCT in peer reviewed scientific journal, ≥10 participants in each arm, <18 y with chronic	* psychological intervention * comparator : acrive treatment, treatment as usual, or waiting list control Primary outcomes :	*Number of studies included in meta-analysis: 47 N=2884 (mean age 12.65 y, SD 2.21 y): 23 studies for headache (including migraine); 10 abdominal pain; 2 abdominal pain or irritable bowel syndrome, 2 fibromyalgia, 2 temporomandibular disorders, 3 sickle cell disease, 2 inflammatory bowel disease, 3 mixed pain conditions. The included studies were judged to be at unclear or high RoB. Psychological therapies reduced pain frequency post-treatment for children and adolescents with headaches (risk ratio (RR) 2.35, 95% (CI 1.67 to 3.30, P < 0.01), number needed to treat for	- quality of evidence is judged low or very low, mostly downgraded for unexplained heterogeneity, limitations in study design, imprecise and sparse data, or suspicion of publication bias. This means our confidence in the effect estimate is limited → LoE 2 - high quality review	Abram 2007, Alfven 2007, Barakat 2010, Barry 1997, Bussone 1998, Chen 2014, Cottrell 2007, Daniel 2015, Duarte 2006, Fichtel 2001, Gil 1997, Greenley 2015, Griffiths 1996, Grob 2013, Gulewitsch	2

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literaturbelege	Evidenz-niveau (CEBM Oxford 2011)
	children and adolescents. Cochrane Database of Systematic Reviews, Issue 9. Art. No.: CD003968. DOI: 10.1002/14651858.CD003968.pub5	or recurrant pain, psychological treatment ***Exclusion criteria** : remotely delivered therapy, pain associated with life-limiting conditions	- pain intensity - pain-related disability Secondary outcomes : - depression - anxiety - adverse events	an additional beneficial outcome (NNTB) = 2.86), but these effects were not maintained at follow-up. No beneficial effect of psychological therapies on reducing disability in young people post-treatment (SMD -0.26, 95% CI -0.56 to 0.03), but beneficial effect in a small number of studies at follow-up (SMD -0.34, 95% CI -0.54 to -0.15). No beneficial effect of psychological interventions on depression or anxiety symptoms. Psychological therapies reduced pain intensity post-treatment for children and adolescents with mixed pain conditions (SMD -0.43, 95% CI -0.67 to -0.19, P < 0.01), but these effects were not maintained at follow-up. Beneficial effects of psychological therapies on reducing disability for young people with mixed pain conditions post-treatment (SMD -0.34, 95% CI -0.54 to -0.15) and at follow-up (SMD -0.27, 95% CI -0.49 to -0.06). No beneficial effect of psychological interventions on depression symptoms. Beneficial effect on anxiety at post-treatment in children with mixed pain conditions (SMD -0.16, 95% CI -0.29 to -0.03), but this was not maintained at follow-up. Adverse events were reported in 7 trials across all pain conditions, 2 reported adverse events that were study-related. Conclusion: BT and CBT should be considered as part of standard care for children and adolescents with chronic pain conditions to improve pain and reduce disability.	**Risk of bias**: AMSTAR-2 overall rating: High confidence in results of the review (no flaws)	2013, Hechler 2014, Hickman 2015, Humphreys 2000, KashikarZuck 2005, 2012 (2013), Kroe-ner-Herwig 2002, Labbe 1984, 1995, Larsson 1987a, b, 1990, 1996, Levy 1010, 2016, 2017, McGrath 1988, 1992, Osterhaus 1997, Palermo 2016, Passchier 1990, Powers 2013, Richter 1986, Robins 2005, San-ders 1994, Sartory 1998, Scharff 2002, Van der Veek 2013, Van Tilburg 2009, Vlieger 2007, Wahlund 2003, 2015, Wicksell 2009	
SR of SR	Kamper, S. J., Yamato, T. P., & Williams, C. M. (2016). The prevalence, risk factors, prognosis and treatment for back pain in children and adolescents: an overview of systematic reviews. Best Practice &	Study type: Systematic Reviews Search period: -2017 Database: MEDLINE, Embase, Cochrane **Inclusion criteria**: SR; peer review journal; < 18y, non-specific back pain **Exclusion criteria**: back pain due to cancer, systemic, infectious, inflammatory disease, fracture, acute neurological condition; post-	1) physical conditioning or exercise 2) manual therapy interventions 3) educational interventions	*Number of studies: 4 SR included for treatment of non-specific back pain < 18J (2 high-quality reviews) Two high-quality reviews found that interventions involving physical conditioning or exercise are effective in reducing back pain, and the effect sizes appear clinically meaningful. Two low-quality reviews found no evidence regarding the effectiveness of manual therapy interventions and conflicting evidence for educational interventions.	Quality of this evidence is not strong (mainly due to the small number of treatment studies that have been conducted in this population) - Several reviews included non-randomised and, in several cases, uncontrolled studies that do not provide good quality evidence --> bias - Of the RCTs included in the systematic reviews, only one had a sample size of more than 100 --> estimates of the effectiveness of interventions will be imprecise - lack of research activity: evidence	Calvo-Muñoz 2013, Michaleff 2014, Cardon 2004, Hestbaek 2010	2

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literaturbelege	Evidenz-niveau (CEBM Oxford 2011)
	Research Clinical Rheumatologyy doi.org/10.1016/j.berh.2017.04.003	surgery; scoliosis or thoracic pain.			gap means that clinicians responsible for treating children with back pain must rely on lower quality forms of evidence to guide their practice. ➔ LoE 2 **Risk of bias**: Corrected Cover Area (Pieper et al. 2014): CCA=0,93, slight overlap of therapeutic studies in included systematic reviews **Fazit 4-item-checklist** (Ballard & Montgomery 2017): schwierig zu interpretieren, trotz einzelner Schwächen gut gemacht, Autor vertrauenswürdig		
SR	Parnell Prevost, C., Gleberzon, B., Carleo, B., Anderson, K., Cark, M., & Pohlman, K. A. (2019). Manual therapy for the pediatric population: a systematic review. BMC complementary and alternative medicine doi:10.1186/s12906-019-2447-2	Study type: RCTs Search period: 2001-Mrch 2018 Database: PubMed, Cochrane Library, Medline complete, CINAHL complete, ScienceDirect, McCoy Press, Index to Chiropractic Literature, and National Guideline Clearinghouse **Inclusion criteria**: RCTs or observational studies; english; < 18J,; manual therapy; health care professional; outcome measures Exclusion criteria: case reports Conditions evaluated were: attention deficit hyperactivity disorder (ADHD), autism, asthma, cerebral palsy,	Manual Therapy (MT), Chiropractic Manipulative Therapy (CMT) for back pain (different kinds of manual therapy for different conditions - not reported in this evidence table)	*Number of studies: 32 RCTs and 18 observational studies included in qualitative synthesis 4 studies investigated 4 use of manual therapy for LBP in children. Two studies looked at the use of CMT; one high quality RCT, the other a medium quality before-after study. The other two looked at the use of MT; a medium quality interrupted time-series, the other a medium quality RCT: Evans et al. presented a high quality RCT with a comparison group between CMT with exercise against solely focusing on exercise therapy. N=185 (12 to 18 years). Results: adding CMT with exercise therapy, resulted in a larger reduction in the primary outcome (visual analog scale) of pain severity over the course of 1 year. Minor self-limiting adverse events were about equal frequency in both groups. Walston / Yake conducted a medium quality interrupted time-series without a comparison group of 3 patients (13 to 15 years). They showed feasibility and safety of lumbar manipulation with exercise in the adolescent population with LBP. All outcomes showed improvement with no adverse reactions to manipulation. The medium quality RCT of 35 patients (13–17 years) with mechanical LBP of less than 90 days, was conducted to evaluate the clinical effects of MT in addition to an exercise program. 18	Strength: systematic review of different kinds of MT in different kinds of conditions, clearly presented and quality assessed Limitation: Risk of bias due to mix of study designs, small samples and assumed publication bias --> LoE 2 **Risk of bias**: AMSTAR-2 overall rating: Critically low confidence in results of the review (2 critical flaws: no list of excluded studies, RoB not satisfactorily accounted for ; 1 non-critical: no explanation for heterogen results)	(for LBP): Evans 2018, Walston 2016, Selhorst 2015, Hayden 2003	2

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literaturbelege	Evidenz-niveau (CEBM Oxford 2011)
		clubfoot, constipation, cranial asymmetry, cuboid syndrome, headache, infantile colic, low back pain, obstructive apnea, otitis media, pediatric dysfunctional voiding, pediatric nocturnal enuresis, postural asymmetry, preterm infants, pulled elbow, suboptimal infant breastfeeding, scoliosis, suboptimal infant breastfeeding, temporomandibular dysfunction, torticollis, and upper cervical dysfunction. Musculoskeletal conditions, including low back pain and headache, were evaluated in 7 studies.		children received MT and 17 received a sham manipulation, which consisted of the child lying on their side and a therapist passively flexing both hips until slight lumbar flexion. Patient centered outcomes: Patient Specific Functional Scale and Numerical Pain Rating Scale, Global Rating of Change scales. Both groups of patients reported improvements in LBP. There was no additional risk for lumbar manipulation, as both groups reported the same number of adverse events. Hayden et al. conducted a medium quality before-after cohort study without control group that investigated the effectiveness of CMT for LBP for 54 patients (4 to 18 years). The majority of the patients responded favorably and there were no reported adverse events. A causal relationship between CMT and improvements in pediatric LBP could not be established due to both the small study size and the observational design of the study itself. Overall Summary: Moderate (positive) evidence for the use of CMT for adolescent LBP. Inconclusive (unclear) evidence for the use of MT for pediatric mechanical LBP. Summarized Conclusion: Moderate-positive overall assessment was found for 3 conditions: low back pain, pulled elbow, and premature infants. Inconclusive unfavorable outcomes were found for 2 conditions: scoliosis (OMT) and torticollis (MT). All other condition's overall assessments were either inconclusive favorable or unclear. Adverse events were uncommonly reported.			

1.3.2 Einzelstudien zu nicht-medikamentöser Therapie

Quelle/ Studientyp	Population	(verglichene) Interventionen	Outcomes	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
Dissing KB, Hartvigsen J, Wedderkopp N, et al.	Study type: pragmatic parallel observer-blinded RCT nested in a school-based open cohort * Number	*Intervention (N=122): advice, excercises and soft-tissue treatment plus manual therapy (MT)	1. Primary outcomes - number of recurrences as measured via weekly	Clinically meaningful improvements in both groups (change of pain intensity of 2.3), but no differences between groups except for global	Strengths - sample size - school-based design likely	2

Quelle/ Studientyp	Population	(verglichene) Interventionen	Outcomes	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
(2018) : Conservative care with or without manipulative therapy in the management of back and/ or neck pain in Danish children aged 9–15: a randomised controlled trial nested in a school-based cohort. BMJ Open. doi:10.1136/bmjopen-2017-021358 Study type: RCT	of patients: N=238 * Recruiting period: 2012 - 2014 * **Characteristics**: 63,4% female; mean (CI) age: 12,6 (12,3-12,9) years; member of a Danish longitudinal school-based open cohort study including approxima-tely 1400 children aged 9–15 years from 13 public schools * **Inclusion criteria**: spinal pain (neck or back) which was present at time of interview; pain intensity greater than 3 (NRS) for more than 3 days; parent had agreed, on behalf of the child, to join the RCT; child had not had any manual treatment of the spine during the previous 2 months * **Exclusion criteria**: serious pathology (cancer, inflammatory diseases, vertebral fractures, cauda equina syndrome); manual treatment for the past 2 months (for this particular complaint); handicap preventing normal physical activity	*Control (N=116): advice, excercises and soft-tissue treatment Frequency / content of treatments was determined by the treating chiropractor at each visit, similar to what is normal in clinical practice, and continued until the child no longer had any symptoms related to the musculoskeletal complaint, or until chiropractor / parent decided further treatment was not indicated. Advice : activity level, ergonomics, cold packs etc. Exercises : stretching and/or strengthening excercises Soft-tissue treatment : manual trigger point theray or massage MT (high velocity, low amplitude manipulation and/or mobilisation of the joints to restore segmental spinal motion, delivered by chiropractors) : joint manipulation and/or mobilisation Follow-Up: 3-27 months	SMS messages (defined as new episode of spinal pain occuring after at least 1 week without spinal pain following the end of the previous episode) - pain intensity (Numeric Pain Rating Scale; NPRS) 2. Secondary outcomes - average duration of spinal pain episodes - total duration of complaint time in relation to individual follow-up time - global perceived effect after 2 weeks (dichtom: "much better" and "the same or worse") - change in pain intensity after 2 weeks (NRS)	perceived effect: 1. Primary outcome During the follow-up period, 175 (74%) of the children had a total of 592 recurrences, ranging from 1 to 21 recurrences per child. The median number of recurrences was 2 (IQR 0–4) for the MT group and 1 (IQR 1–3) for the non-MT group, revealing no statistically significant difference between groups, incidence rate ratio 1.26 (95% CI 0.98 to 1.61), p=0.07. 2. Secondary outcomes No significant difference in the average episode length, total number of pain weeks or change in pain intensity between the two groups. Children in the MT group reported a higher Global Perceived Effect: OR 2.22, (95% CI 1.19 to 4.15), that was statistically significant. Adverse effents were not reportet by children of any group.	minimized social bias Weaknesses - pain was reportet by parents (SMS) and might be underreportet by parents (child-parent-discrepancy) - high amount of missing data (no group differences) **Risk of bias**: Cochrane RoB: • Selection: low risk • Performing: low risk • Detection: low risk • Attrition: low risk • Reporting: low risk • Other: unclear risk	
Dudoniene, V., Varniene, L., Aukstikalnis, T., Lendraitiene, E., Cerkauskas, J., & Raistenskis, J. (2016). Effect of vibroacoustic therapy on pain management in adolescents with low back pain. *Journal of Vibroengineering*.	* Number of patients: N=40 * **Characteristics**: 67.5% female; mean ± SD age: 15.38 ± 1.55 y; patients from a Children's hospital; Lithuania * **Inclusion criteria**: 13-18 y; ambulatory rehabilitation due to non-specific LBP; written consent of the parents; pain intensity not > than moderate * **Exclusion criteria**: prescription of medications for pain management;	Intervention (N=20): performed exercise + vibroacoustic therapy Control (N=20): performed exercise Performed exercise 3-week physiotherapy program for low back pain management 16 procedures, 30-minute exercise session every working day core stabilization exercises	Outcome measures - disability (Oswestry Low Back Pain Disability Questionnaire) - low back pain intensity (Visual Analogue Pain Scale (VAS))	After the 3-week intervention, both groups demonstrated a significant decrease in low back pain and Oswestry disability index ($P < 0.05$). There were no significant differences between groups before and after the intervention in low back pain score, with both groups displaying a similar improvement post-intervention.	Weaknesses - sample size - short duration of study - no long-term effects - no blinded group allocation - no control group without intervention – both groups receive physical therapy - AEs not reported **Risk of bias**: Cochrane RoB: • Selection/ random	2

Quelle/ Studientyp	Population	(verglichene) Interventionen	Outcomes	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
doi.org/10.21595/jve.2016.17165 Study type: RCT	contraindications to vibration exposure (pacemaker, current kidney or gall stones, acute lower back pain, blood clot or thrombosis within the last six months, fracture or joint replacement within the past 12 months, vibration-related injuries, amputation of lower extremities other than toes, diabetes mellitus, tumours)	Vibroacoustic therapy 16 treatment sessions with duration of 20 min on a special vibro chair set at 4-8 Hz frequency Music was heard through the headphones Follow-Up: after the intervention			sequence: low risk • Selection/ allocation: unclear risk • Performing: unclear • Detection: unclear risk • Attrition: low risk • Reporting: unclear risk • Other: unclear risk	
Evans, R., Haas, M., Schulz, C., Leininger, B., Hanson, L., & Bronfort, G. (2018). Spinal manipulation and exercise for low back pain in adolescents: a randomized trial. Pain. doi:10.1097/j.pain.0000000000001211 **Study type**: multicenter RCT, parallel group design	* Number of patients: N=185 * Recruiting period: 2010-2012 * **Characteristics**: adolescents 12 to 18 y with chronic LBP; 69% female; mainly recruited from the general population; USA; duration of back pain was > 1 year in 72%; mean severity was moderate (5.3); 11% had radiating pain to leg; 54% reported having treatment for BP in the past * **Inclusion criteria**: 12-18 y; subacute recurrent or chronic, nonspecific LBP (severity ≥ 3/10) with or without leg pain. (Subacute recurrent LBP: current episode of 2- to 12-week duration with a history of at least one additional 2-week episode of BP in the past year. Chronic LBP: duration of the current episode of ≥ 12 weeks.) Participants were allowed to use over-the-counter medication as needed. * **Exclusion criteria**: SMT, ET, or changes in prescription pain medications within the past month, other concurrent provider-based	Intervention (N=93): 12 weeks of spinal manipulative therapy (SMT) combined with exercise therapy (ET) Control (N=92): 12 weeks of ET alone Exercise therapy (ET) Self-care education, supervised exercise, and instructions for home exercise 8 to 16, 45 minutes sessions with an exercise therapist or licensed chiropractor no more than 2 times per week Instructions to perform the same exercises at home and to engage in 20 to 40 minutes of aerobic activity twice per week Spinal manipulation (SMT) treatment to the lumbar vertebral or sacroiliac joints to increase mobility and decrease pain 8- to 16-, 10- to 20- minute study visits with experienced licensed chiropractors, no more than 2 times per week (preferred technique: high-	1. Primary outcome: - typical level of LBP severity over the past week (11-box numerical rating scale; 0 = no pain, 10 = worst pain possible) 2. Secondary outcomes: - patient-rated disability - quality of life - improvement - frequency of medication use for LBP - patient satisfaction with care - health care utilization - home exercise compliance - side effects and adverse events	1. Primary outcome SMT+ ET group experienced significantly greater changes in the long-term profile of pain severity (P = 0.007), but not in the short-term profile (P = 0.55); advantage of 0.5 for SMT +ET over ET alone at the end of 12 weeks of treatment (P = 0.083), 1.1 at week 26 (P = 0.001), and 0.8 at week 52 (P = 0.009); Responder analysis: on average, the difference in proportions for reduction of LBP severity across all possible thresholds for improvement favored SMT + ET by approximately 7% at 12 weeks (95% CI -3% to 17%), 17% at 26 weeks (95% CI 8%-27%), and 10% at 52 weeks (95% CI 0.1%-20%) 2. Secondary outcomes Longitudinal profiles significantly favored SMT + ET for disability (P = 0.048), improvement (P = 0.03), and satisfaction (P = 0.003) over the long term. Quality of life (P = 0.12) and medication use (P = 0.22) did not significantly differ over the 1-year period. 91% of study participants attended their prescribed treatment visits: 96% in the SMT 1 ET group and 87% in the ET alone group.	Strengths - sample size - internal validity - systematic collection of side effects Weaknesses - no blinding of group allocation - no differentiation between specific and nonspecific treatment effects (e.g. patient-provider interactions and the differential time and attention given to the combined SMT + ET group) - generalizability (rate of enrollment; 185 enrolled of 457 screened) **Risk of bias**: Cochrane RoB: • Selection: low risk • Performing: high risk • Detection: low risk • Attrition: low risk	2

Quelle/ Studientyp	Population	(verglichene) Interventionen	Outcomes	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
	treatment for LBP, contraindications to study treatment (eg, clinical spinal instability, inflammatory arthropathies, etc.), benign joint hypermobility syndrome, and other serious physical or mental health conditions	velocity, lowamplitude SMT; lowvelocity low-amplitude SMT, mobilization, flexion–distraction manipulation, or drop-table–assisted SMT could also be used) Follow up: 4, 8, 12, 26, and 52 weeks after enrollment		Compliance with home exercise instruction was similar between groups and declined over time from around 2 d/wk at the end of treatment to 1 d/wk at 1 year. The most commonly reported adverse events were unusual or increased soreness (51%-54%) and different type of pain (31%-34%)	• Reporting: low risk • Other: high risk	
Jung, K. S., Jung, J. H., In, T. S., & Cho, H. Y. (2020). The Effectiveness of Trunk Stabilization Exercise Combined with Vibration for Adolescent Patients with Nonspecific Low Back Pain. International Journal of Environmental Research and Public Health doi:10.3390/ijerph17197024 Study type: RCT	* Number of patients: N=50 * Recruiting period: n.r. * **Characteristics**: 44% female; mean age: 18 years; participants live in Gimcheon City, Korea * **Inclusion criteria**: LBP for 3 months or longer, age between 10 and 19 years, had a visual analogue scale score of 3 or higher, able to perform sit to stand flexions (STS) without assistance * **Exclusion criteria**: severe osteoporosis (T-score-2.5 and below with history of a fracture) or severe cardiovascular, progressive endocrine, or nervous disease; previous experiences with vibration training; medical history of fracture or surgery within 2 years; LBP caused by a specific disease	*Intervention (N=25): excercises on vibration machine *Control (N=25): advice, excercises and soft-tissue treatment Treatment lasted 25 min a day, three times a week for 12 weeks (36 sessions). Subjects in the Vibration group received trunk stabilization exercise with vibratory stimulation for 25 min while those in the placebo group received trunk stabilization exercise without vibratory simulation for the same amount of time. Vibration : Whole-body vibration machine (TT2590X7, TurboSonic Co., Seoul, Korea), frequency of 15 Hz and amplitude of 2 mm Exercises : Six excercises (squat, bridge, single bridge, bridge and knee flex, side bridge, and plank) for 15 min with 5 min warm-up and cool down before and after exercise Participants were evaluated before and 1–2 days after training for 2 weeks by three well-trained physical therapists	- pain intensity (Numeric Pain Rating Scale; NPRS) - trunk proprioception (repositioning error of the trunk: ability of a person to recognize body orientation in space and to adjust and maintain posture, and to measure this, the di erence in the angle actively performed by the subject compared to the target angle presented to the subject is measured), measured by the Dualer IQ— digital inclinometer (J-TECH medical, Salt Lake City, UT, USA) - Lumbar kinematics and lumbar-hip coordination during STS (motion capture system with 10 infrared cameras, video-motion analysis software)	Significant improvement in pain compared to placebo group *Changes of pain intensity after training more significant decrease in pain in vibration group (mean change, -2.20 ± 1.00) than in placebo group (mean change, -1.54 ± 1.14) ($p < 0.05$) *Changes of proprioception after training : After training, proprioception of the trunk was more significantly increased in the vibration group. The changeable amount before and after training was -1.32 ± 0.56° and -0.64 ± 0.57°, respectively (n.s.) *Changes of LS Kinematics during STS after Training : During the flexion phase of STS, maximum ROM and mean angular velocity of LS significantly increased in vibration group (mean change, each 9.77 ±3.34° , 6.14 + 6.28° s-1) ; placebo (mean change, each 5.13 ±2.79° , 2.10 ± 5.29° s-1). During the extension phase of STS, mean angular velocity of LS significantly increased in the vibration group (mean change, 5.73 ± 4.51 s-1) ; placebo (mean change, 2.33 ±4.04 s-1). The mean ratios of lumbar to hip movements in the sagittal plane significantly improved in vibration group (mean change, 0.09 ± 0.08) ; placebo (mean change, 0.05 ± 0.0). *Changes of Lumbar-Hip Coordination during STS after Training : max + min relative phase	Weaknesses - small numbers - sports activity as possible confounding factor was not assessed **Risk of bias**: Cochrane RoB: • Selection: low risk • Performing: unclear risk • Detection: unclear risk • Attrition: low risk • Reporting: unclear risk • Other: unclear risk	2

Quelle/ Studientyp	Population	(verglichene) Interventionen	Outcomes	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
				difference between hip and LS during STS significantly improved in vibration group (mean change, each -6.30 ± 4.07, -5.56 ±5.31); placebo (mean change, each -3.29 ± 3.82, -1.77 ± 6.34).		
Ng L, Caneiro JP, Campbell A, Smith A, Burnett A, O'Sullivan P. (2015) : Cognitive functional approach to manage low back pain in male adolescent rowers: a randomised controlled trial. British journal of sports medicine. doi.org/10.1136/bjsports-2014-093984 Study type: RCT	* Number of patients: N=36 * Recruiting period: summer rowing season between 2009 and 2011 * **Characteristics**: adolescent male rowers reporting LBP; aged between 14 and 19 y; between 1 and 4 y of school-level rowing experience; LBP related to rowing at the time of data collection; recruited from school and community rowing clubs (Western Australia). * **Inclusion criteria**: rowing competitively in local rowing regattas; selfreported LBP intensity > than 3/10 VAS, which must be reached during a typical rowing training session; pain location within the lumbar region as drawn on a diagram * **Exclusion criteria**: specific causes of LBP, including inflammatory diseases, radicular pain or neurological deficits; musculoskeletal injuries to the extremities limiting rowing training 6 weeks prior to baseline data collection; any rowing-specific postural training during previous rehabilitation of LBP	Intervention group (N=19): Cognitive functional approach Control group (n=17): Usual care from their coaches Cognitive functional approach targeting cognitions, movement patterns, conditioning and lifestyle factors relevant to each rower 8 weeks (initial session: approximately 1 h; follow-up appointments: 30 min; fortnightly) directed by a sports physiotherapist with training in cognitive functional approach and 5 years experience with the Australian Rowing Team Control group rowing skills and conditioning exercises free to seek treatment from healthcare providers external to the project Follow-Up: after the intervention (8-weeks), 4 weeks later (12-week follow-up)	1. Primary outcome - pain intensity (Numeric Pain Rating Scale; NPRS) 2. Secondary outcomes - disability (Patient Specific Functional Scale; Roland Morris Disability Questionnaire) - muscle endurance (back, lower limb) - regional lumbar kinematics (static sitting; ergometer)	1. primary outcome: Following the intervention, rowers in the intervention group had a significantly lower rate of increase in pain during the ergometer trial (0.15 points per minute, 95% CI 0.07 to 0.23 vs 0.27 points per minute, 95% CI 0.19 to 0.36, p<0.001). There was a significant difference in the slope coefficient between groups (−0.12, 95% CI −0.24 to −0.01, p=0.035). Rowers in the intervention group reported significantly lower NPRS from the 3rd minute of the trial onward (3rd min: −0.9, 95% CI −1.8 to −0.1, p=0.048), with the difference between groups increasing throughout the 15 min (15th minute: −2.4, 95% CI −4.1 to −0.63, p<0.01). 2. secondary outcomes: Rowers in the intervention group had significantly less disability immediately following intervention (P = 0.013; P = 0.003) compared to the control group, which was maintained at the 12-week follow-up (P = 0.014; P = 0.013). They also had significantly improved lower limb muscle endurance (P = 0.031), and postured their lower lumbar angle during static sitting in less flexion (P = 0.007) following intervention compared with the control group. No statistically significant difference was observed in back muscle endurance (P = 0.054), upper lumbar angle during static sitting (P = 0.417), and regional lumbar angle kinematics during rowing (P > 0.2) between the intervention and control group.	Weaknesses - no active control group - no blinding group allocation - no documentation of treatments the controls received (outside project) - no documentation of other types and intensity of sports activities - not all rowers were able to complete ergometer trials before and after the intervention due to LBP - work rate during ergometer testing was only standardised between groups using self-reported rating of perceived exertion, rather than objective criteria. **Risk of bias**: Cochrane RoB: • Selection: low risk • Performing: high risk • Detection: low risk • Attrition: low risk • Reporting: high risk • Other: high risk	2

Quelle/ Studientyp	Population	(verglichene) Interventionen	Outcomes	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
Selhorst M, Selhorst B. (2015) : Lumbar manipulation and exercise for the treatment of acute low back pain in adolescents: a randomized controlled trial. The Journal of manual & manipulative therapy. doi.org/10.1179/2042618614Y.0000000099 Study type: RCT	* Number of patients: N=34 * Recruiting period: May 2012 to April 2014 * **Characteristics**: consecutive patients with acute LBP; USA * **Inclusion criteria**: age 13–17 years; mechanical LBP; duration of symptoms < 90 days. * **Exclusion criteria**: contraindications to manipulation (previous lumbar surgery; signs consistent with nerve root compression (positive straight-leg test of <45 grade, diminished reflexes, sensation, or lower extremity strength); pregnancy; diagnosed with, or suspected of having, a spondylolysis or spondylolisthesis)	Intervention (N=17): lumbar manipulation + exercise Control (N=17): sham manipulation + exercise The total number of treatment sessions: 8 visits for both groups (manipulation or sham only during the first two treatments) Lumbar Manipulation A manual therapist performed the lumbar manipulation technique described by Flynn et al. Exercise lumbar stabilization, range of motion, postural training, core strengthening, and stretching 4 weeks of exercise provided by the exercise therapist (blinded to the manual intervention) Follow-Up: 1 week, 4 weeks, 6 months	1. Primary outcomes - function (patient-specific functional scale) - pain intensity (Numeric Pain Rating Scale; NPRS) 2. Secondary outcomes - adverse events - patients' perceived improvement - recurrence of symptoms - additional treatment sought at 6-month follow-up.	Significant improvement over time in all measures in both groups; no differences between groups 1. Primary outcome No statistically significant between-group differences for function and pain intensity (mean difference between groups: 0.04 (P = 0.90)) Statistically and clinically significant improvement of both groups at the 6-month follow-up 2. Secondary outcomes No differences in number of patients experiencing a worsening of symptoms between groups At 1 week, 2 of 17 patients in both groups had an adverse reaction, no adverse reactions at either the 4-week or 6-month follow-up. No patients reported having significant discomfort during or immediately after the manipulation or sham interventions. The relative risk of performing a lumbar manipulation is 1 (95% CI, 0.16–6.30) --> no additional risk of having an adverse reaction. No differences between treatment groups for perceived improvement (P = 0.938) No significant differences between treatment groups for recurrence of LBP (P = 0.320) or additional treatment sought (P = 0.213)	Weaknesses - The methodology does not necessarily reflect standard care: use of a single, prescribed MT does not reflect typical manual therapy practice; therapists use a variety of techniques guided by clinical experience and patient response to best treat their patients with manual therapy. **Risk of bias**: Cochrane RoB: • Selection: low risk • Performing: low risk • Detection: low risk • Attrition: low risk • Reporting: unclear risk • Other: low risk	2

1.4 Kapitel 7: Medikamentöse Therapie

1.4.1 Aggregierte Evidenz: Syst. Reviews zu medikamentöser Therapie

Studien-typ	Quelle	Untersuchte Studien	Outcomes	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenz-niveau (CEBM Oxford 2011)
SR	Cooper, T., Fisher, E., Anderson, B., Wilkinson, N., Williams, D., & Eccleston, C. (2017). Paracetamol (acetaminophen) for chronic non-cancer pain in children and adolescents. *The Cochrane Database of Systematic Reviews*, *8*, CD012539. doi:10.1002/14651858.CD012539.pub2	*Study type: RCTs *Search period: - 2016 *Database: Cochrane CENTRAL, MEDLINE, EMBASE; clinicaltrials.gov ; apps/who.int/trailsearch/ ***Inclusion criteria**: RCT; < 18y ; chronic/ recurrent pain (lasting for 3 months or longer) arising from genetic conditions, neuropathic or other conditions (musculoskeletal pain included); prescribed paracetamol by any route/dose, with comparison to placebo or any active comparator; pain assessment ***Exclusion criteria**: no RCTs, studies of experimental, acute, perioperative, disease related or cancer pain, headache, migraine; studies of interventions with more than 1 drug.	1. Primary outcomes (patient reported) - pain relief of ≥ 30% - pain relief of ≥ 50% - Global impression of change much or very much improved (Patient global impression of change scale PGIC) 2. Secondary outcomes - Carer gobal impression of change - sleep duration and quality - acceptability of treatment - physical functioning - quality of life - adverse events - withdrawals due to adverse events - any serious adverse event	- Paracetamol for the relief of chronic non-cancer pain -Placebo or any active comparator	No studies identified which met inclusion criteria	High quality SR **Risk of bias**: AMSTAR-2 overall rating: High confidence in results of the review (no flaws)	No studies included	n/a (no studies)
SR	Cooper, T., Fisher, E., Gray, A., Krane, E., Sethna, N., Al van Tilburg, M., ... &	*Study type: RCTs *Search period: - Sep 2016	1. Primary outcomes (patient reported) - pain relief of ≥ 30%	- Opioids for the relief of chronic non-cancer pain	No studies identified which met inclusion criteria	High quality SR **Risk of bias**:	No studies included	n/a (no studies)

Studien-typ	Quelle	Untersuchte Studien	Outcomes	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenz-niveau (CEBM Oxford 2011)
	Wiffen, P. (2017). Opioids for Chronic Non-Cancer Pain in Children and Adolescents. *The Cochrane database of systematic reviews*, *7*(7), CD012538. doi: 10.1002/14651858.CD012538.pub2	*Database: Cochrane CENTRAL, MEDLINE (Ovid), EMBASE (Ovid) ; online clinical trials registries ***Inclusion criteria**: RCT; < 18 y; chronic non-cancer pain, opioids compared with placebo or any other comparator; pain assessment. ***Exclusion criteria**: no RCTs, studies of experimental pain; , studies of perioperative, acute, cancer pain, headache, migraine, and disease related pain.	- pain relief of ≥ 50% - Global impression of change much or very much improved (Patient global impression of change scale PGIC) 2. Secondary outcomes - Carer gobal impression of change - requirement for rescue analgesia - sleep duration / quality - physical functioning - quality of life - adverse events - withdrawals due to adverse events - serious adverse event	-Placebo or any active comparator		AMSTAR-2 overall rating: High confidence in results of the review (no flaws)		
SR	Eccleston, C., Cooper, T., Fisher, E., Anderson, B., & Wilkinson, N. (2017). Non-steroidal Anti-Inflammatory Drugs (NSAIDs) for Chronic Non-Cancer Pain in Children and Adolescents. *The Cochrane database of systematic*	*Study type: RCTs *Search period: - Sep 2016 *Database: Cochrane CENTRAL, MEDLINE (Ovid), EMBASE (Ovid) ; online clinical trials registries ***Inclusion criteria**: RCT; < 18J ; chronic non-cancer pain, NSAIDs compared with placebo or any other comparator; pain assessment.	1. Primary outcomes (patient reported) - pain relief of at least 30% - pain relief of at least 50% - Global impression of change much or very much improved (Patient global impression of change scale PGIC)	- NSAIDs for the relief of chronic non-cancer pain -Placebo or any active comparator	*Number of studies included in meta-analysis: 0 *Number of studies included in qualitative analysis: 7 *Number of participants (aged 2 to 18 y): 1074 *compared combinations of NSAIDs: aspirin, celecoxib, fenoprofen, ibuprofen, indomethacin, ketoprofen, meloxicam, naproxen, and rofecoxib. No studies compared the intervention drug with placebo. *conditions evaluated were : juvenile chronic / rheumatoid / idiopathic arthritis or juvenile chronic polyarthritis (no other condition could be identified) Primary outcomes 3 studies reported participant-reported pain relief of 30% or	*High quality SR, but overall quality of included studies is low to very low quality *The amount and quality of evidence around the use of NSAIDs for treating chronic non-cancer pain is very low. * Authors are	Bhettay 1978, Brewer 1982, Foeldvari 2009, Giannini 1990, Moran 1979, Reiff 2006, Ruperto 2005	1

Studien-typ	Quelle	Untersuchte Studien	Outcomes	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenz-niveau (CEBM Oxford 2011)
	reviews, *8*(8), CD012537. doi: 10.1002/14651858.CD012537.pub2	*__Exclusion criteria__: no RCTs , studies of perioperative, acute, cancer pain, headache, migraine, and disease related pain.	2. Secondary outcomes - Carer gobal impression of change - requirement for rescue analgesia - sleep duration and quality - acceptability of treatment - physical functioning - quality of life - adverse events - withdrawals due to adverse events - any serious adverse event		greater, showing no significant difference in pain scores between meloxicam and naproxen, celecoxib and naproxen, or rofecoxib and naproxen (P > 0.05) (low-quality evidence). One study reported participant-reported pain relief of 50% or greater, showing no statistically significant difference in pain scores between low-dose meloxicam (0.125 mg/kg) and high-dose meloxicam (0.25 mg/kg) compared to naproxen 10 mg/kg (P > 0.05) (low-quality evidence). One study reported Patient Global Impression of Change, showing 'very much improved' in 85% of ibuprofen and 90% of aspirin participants (low-quality evidence). Secondary outcomes Participants reporting an adverse event (one or more per person) by drug were: aspirin 85/202; fenoprofen 28/49; ibuprofen 40/45; indomethacin 9/30; ketoprofen 9/30; meloxicam 18/47; naproxen 44/202; and rofecoxib 47/209 (7 studies, very low-quality evidence). Participants withdrawn due to an adverse event by drug were: aspirin 16/120; celecoxib 10/159; fenoprofen 0/49; ibuprofen 0/45; indomethacin 0/30; ketoprofen 0/30; meloxicam 10/147; naproxen 17/285; and rofecoxib 3/209 (7 studies, very low-quality evidence). Participants experiencing a serious adverse event by drug were: aspirin 13/120; celecoxib 5/159; fenoprofen 0/79; ketoprofen 0/30; ibuprofen 4/45; indomethacin 0/30; meloxicam 11/147; naproxen 10/285; and rofecoxib 0/209 (7 studies, very low-quality evidence).	unable to comment on efficacy because they could'nt untertake a meta-analysis **Risk of bias**: AMSTAR-2 overall rating: High confidence in results of the review (no flaws)		
SR of SR	Eccleston, C., Fisher, E., Cooper, T., Grégoire, M., Heathcote, L., Krane, E., ... & Zernikow, B. (2019). Pharmacological interventions for chronic pain in children: an	*Study type : Systematic Reviews *Search period: - Mrch 2018, DARE to 2015 *Database: Cochrane Database of Systematic Reviews, MEDLINE, EMBASE; DARE *__Inclusion criteria__: SR of	1. Primary outcomes (patient reported) - pain relief of at least 30% - pain relief of at least 50% - Global impression of change much or very much improved	Pharmacologic treatment Vs. placebo or any active comparator	There is no high-quality evidence and we are uncertain of the efficacy or safety of any pharmacological treatments for paediatric CNCP. There is no evidence from RCTs for paediatric cancer pain. *Number of studies included in meta-analysis: 0 *Number of studies included in qualitative analysis: 23, only 6 of these evaluated pharmacologic treatment in children with CNCP *Antidepressants vs active control	*high quality overview of SR *Overall, the quality of evidence was very low, and we have very little confidence in the effect estimates. The state of evidence of	Cooper 2017, Kaminsky 2011, Korterink 2015, Martin 2017, Saps 2015, Weydert 2003	2

Studien-typ	Quelle	Untersuchte Studien	Outcomes	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenz-niveau (CEBM Oxford 2011)
	overview of systematic reviews. *Pain*. doi: 10.1097/j.pain.0000000000001609	RCTs; < 18J ; chronic non-cancer (CNCP) or cancer related (CCRP) pain, pharmacologic treatment compared with placebo or any other comparator; pain assessment. *__Exclusion criteria__: no RCTs , studies of perioperative, acute, headache, migraine, and disease related pain (except of cancer pain).	(Patient global impression of change scale PGIC) 2. Secondary outcomes - Carer gobal impression of change - requirement for rescue analgesia - sleep duration and quality - acceptability of treatment - physical functioning - quality of life - adverse events - withdrawals due to adverse events - any serious adverse event		one trial (n=34): The decrease in pain intensity in each group exceeded the minimally important difference of 1/10 on the coloured analogue scale (decrease of 1.16 ± 2.26 for amitriptyline and 1.56 ± 2.27 for gabapentin). Three adverse events were reported, but the authors reported that they were not linked to the study drugs and there were no serious adverse vents.Regarding secondary outcomes, children in both conditions reported better sleep quality. *Antidepressants vs placebo control Three trials (n= 238) compared amitriptyline or citalopram with placebo. Each study reported no difference between groups on reduction of pain intensity and therefore there is no evidence of a beneficial effect of taking an antidepressant over a placebo for reducing pain symptoms. *Antiepileptic drugs vs placebo control A study (n=107) did not find differences between groups for 30 or 50% reduction in pain when pregabalin was compared with placebo. in the treatment group, patient global impression of change was significantly higher, carer global impression of change was much higher. no significant difference for sleep quality and physical functioning. more adverse events and withdrawals due to adverse events in the treatment group. 1 serious adverse event in the treatment group.	randomized controlled trials in chronic pediatric pain is poor. → LoE 2 **Risk of bias**: **Corrected Cover Area** (Pieper et al. 2014): CCA=0,225, slight overlap of studies in included systematic reviews		

1.5 Kapitel 8: Invasive Therapie

Studien zur invasiven Therapie bei Kindern und Jugendlichen mit nichtspezifischen Rückenschmerzen - oder mit chronischen Schmerzen als indirekte Evidenz - konnten in der systematischen Literaturrecherche und durch Handsuche nicht identifiziert werden.

1.6 Kapitel 9: Interdisziplinäre Behandlungsprogramme

1.6.1 Aggregierte Evidenz: Syst. Reviews zu multimodalen Behandlungsprogrammen

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenz-niveau (CEBM Oxford 2011)
SR	Hechler, T., Kanstrup, M., Holley, A. L., Simons, L. E., Wicksell, R., Hirschfeld, G., & Zernikow, B. (2015). Systematic review on intensive interdisciplinary pain treatment of children with chronic pain. Pediatrics. DOI: 10.1542/peds.2014-3319	*Study type : RCTs + non-randomised treatment studies *Search period: not available *Database: Cochrane, MEDLINE, PsycINFO, PubPsych, Web of Science ***Inclusion criteria**: RCT or non-randomized treatment study, intervention was coordinated by ≥3 different health professionals, <22 years, severe and disabling chronic pain, English, ≥10 participants post-treatment ***Exclusion criteria** : reviews, case studies, pain associated with life-threatening malignant disease	Treatment effects of intensive interdisciplinary pain treatment were evaluated post-treatment, short-term follow-up (2-6 months) and long-term follow-up (12 months) - pain intensity - pain-related disability - school functioning - depression - anxiety	*Number of studies: 10 (1 RCT and 9 non-randomised trials) N=1020 participants (13.9 years SD 1.5) IIPT may be effective in immediately reducing disability and in maintaining this reduction. Small to moderate improvements for pain intensity and depressive symptoms. The positive effects were maintained at short-term follow-up. *pain intensity : After treatment (5 studies, n=379): The RCT showed a significant small effect (d = –0.38; 95% confidence interval [CI] –0.67 to –0.10]). The meta-analysis of the 4 NRSs showed a small and nonsignificant effect (d = –0.32, 95% CI –0.70 to 0.06, z = –1.64, P = .101, I2 = 90%). Short-term follow up (6 studies, n=440): 1 RCT: large + significant effect (d = –1.19; 95% CI –1.56 to –0.82]). Within the 5 NRSs large and significant effect (d = –1.33, 95% CI –2.28 to –0.38, z = –2.74, P = .01,I2 = 98%). *disability: After treatment (7 studies, n=498): large effect of IIPT for improved disability in the RCT (d = –0.80; 95% CI –1.13 to –0.47) and across 6 NRSs (d = –1.09, 95% CI –1.71 to –0.48, z = –3.47, P , .001, I2 = 96%). Short-term follow-up: 8 studies (n=463): large effect of IIPT in the RCT (d = –1.47; 95% CI –1.87 to –1.07) and across 7 NRSs (d = –1.35, 95% CI –1.90 to –0.79, z = –4.73, P , .001, I2 = 94%). *School functioning: 1 RCT and 1 NRS : large effects on school functioning at posttreatment. The RCT and 4 NRSs : moderate to large effects on school functioning at short-term follow-up with effect sizes ranging between 0.53 (school sessions attended) and –1.0 (school days missed). *Anxiety: Within the RCT, no beneficial effect of IIPT on measures of anxiety at posttreatment was observed. Four of 6 NRSs found evidence for beneficial effects of IIPT on measures of anxiety with large effect sizes ranging from –0.82 (Pain Catastrophizing Scale for Children) to –1.14 (Fear of Pain Questionnaire for Children). At short-term follow-up, the RCT and 4 NRSs found positive effects of IIPT on the anxiety measures with effects ranging from moderate (–0.38, general anxiety) to large effect sizes (–1.57, pain-specific anxiety). *Depressive symptoms: Post treatment (6 studies, n=458): Within the RCT, no	*few studies *methodological weaknesses within the included studies *Findings demonstrated extreme heterogeneity, results should be interpreted with caution → LoE 2 **Risk of bias**: AMSTAR-2 overall rating: critically low confidence in results of the review (2 critical flaws : no list of excluded studies, publication bias not investigated ; 1 non-criticalfunding of included studies not reported)	Chalkiadis 2001, Eccleston 2003, Gauntlett-Gilbert 2013, Hechler 2010 and 2014, Hirschfeld 2013, Logan 2012, Maynard 2010, Simons 2012, Weiss 2013	2

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenz-niveau (CEBM Oxford 2011)
				beneficial effect of IIPT on depressive symptoms was observed (d = –0.22, 95% CI –0.51 to 0.07]). Across 5 NRSs, we found a small beneficial effect (d = –0.37, 95% CI –0.64 to –0.11], z = –2.81, P , .001, I2 = 84%). Short-term follow-up (5 studies, n=325): moderate effect within the RCT (d = –0.59, 95% CI –0.93 to –0.26) and a small effect of IIPT in the 4 NRSs (d = –0.40, 95% CI –0.68 to –0.12], z = –2.77, P = .001, I2 = 81%).			
SR	Liossi C, Johnstone L, Lilley S, Caes L, Williams G, Schoth DE (2019): Effectiveness of interdisciplinary interventions in paediatric chronic pain management: a systematic review and subset meta-analysis. Br J Anaesth. 123(2): e359-e371. doi:10.1016/j.bja.2019.01.024	*Study type : RCTs + non-randomised treatment studies *Search period: until Mrch 2018 *Database: MEDLINE, PsycINFO, CINAHL, Web of Science, Scopus, PubMed, PubSpych, OpenGrey ***Inclusion criteria**: reported effects of intervention co-ordinated by ≥2 healthcare professionals of different disciplines, inpatient or outpatient setting, reported pain frequency, intensity, sample <22 years, primary or secondary chronic pain, English, studies using single-group pre-test to post-test, parallel-group, crossover designs and randomised or non-randomised trials ***Exclusion criteria** : no pain intensity or	*interdisciplinary interventions in paediatric chronic pain treatment : - Biofeedback - Multimodal, multidisci-plinary acupuncture and hypnosis - Residential / inpatient interdisciplinary (reha-bilitation) programmes - ACT-based, group residential pain management program - ACT-based interdisciplinary outpatient intervention - Intensive interdisciplinary paediatric pain rehabilitation (day) programs - Multidisciplinary evaluation by neurologist and clinical psychologist in tertiary care clinic - Integrated multidisci-plinary foot care program - Outpatient multidisciplinary headache treatment - Outpatient (group) rehabilitative program	*Number of studies: 28 (7 RCT, 2 randomized clinical trials, 12 pre-post intervention trials and 7 retrospective studies) ; 21 provided data for inclusion in between- and withingroups meta-analyses *participants (13.8 years,range 3-22) with with mixed chronic pain diagnoses, with chronic headache, abdominal pain, and complex regional pain syndrome; total number not reported Overall, interdisciplinary interventions show promise in providing a range of clinical benefits for children with chronic pain. *Between* groups analyses: *pain intensity : 0-1 month follow up (4 studies, n=194): effect size -1.07; 95% CI: -2.12 to -0.01 ; 3 months follow up (2 studies, n=60): effect size -1.12; 95% CI: -2.68 to 0.44 ; 12 months follow up (2 studies, n=54): effect size -0.20; 95% CI: -1.62 to 1.22 *Anxiety: 0-1 month follow up (2 studies, n=134): effect size -0.06; 95% CI: -0.40 to 0.28 *Catastpohising: Immediate post (2 studies, n=133): effect size -0.23; 95% CI: -0.57 to 0.11 *functional disability: Immediate post (2 studies, n=133): effect size 0.34; 95% CI: -1.71 to 2.39 *Within* groups analyses: significant improvements pre- to post-intervention in pain intensity, functional disability, anxiety, depression, catastrophising, school attendance, school functioning, and pain acceptance. Few differences were found between interventions delivered in inpatient vs outpatient settings. *pain intensity immediate pre-post (11 studies, n=698): overall effect size 0.42; 95% CI: 0.14 to 0.69 ; 0-1 month post (4 studies, n=299): overall effect size 0.93; 95% CI: 0.58 to 1.28 ; 3 months post (7 studies, n=396): overall effect size 0.945; 95% CI: 0.39 to 1.50 ; 6 months post (2 studies, n=67): overall effect size 0.78; 95% CI: -0.30 to 1.87 ; 12 months post (4 studies, n=334): overall effect size 1.45; 95% CI: 0.70 to 2.20	*high quality SR *Even though the evidence is promising, most evaluations are limited, however, because of small sample sizes and geographically constrained samples, thereby preventing strong conclusions and generalisability. Furthermore, support for the beneficial impact of interdisciplinary treatments stems mostly from within-group analyses. → LoE 2 because of indirectness **Risk of bias**: AMSTAR-2 overall rating: low confidence in results of the review (1 critical flaw : no list of excluded	Benore 2015 Bussone 1998 Claar 2013 DeBécourt 2008 Delivet 2018 Eccleston 2003 Elnaggar 2016 El-Shamy 2018 Evans 2016 Gauntlett-Gilbert 2012 Hechler 2010, 2014 Hendry 2013 Hirschfeld 2013 Kanstrup 2016 Kempert 2017a, b Kroner 2016 Logan 2012 Przekop 2016 Simons 2012, 2018 Soee 2013 vanDijk-Lokkart 2016	2

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literatur-belege	Evidenz-niveau (CEBM Oxford 2011)
		frequency outcomes ; conference abstracts, case studies, qualitative studies	- Combined resistive underwater exercises and interferential current therapy - Combined psychosocial-physical intervention - CBT combined with amitriptyline - Multimodal headache treatment - Therapeutic education program including medicine, psychological support, and self-hypnosis training - Traditional physical therapy programme, incl. hot packs, muscle stret-ching, strengthening exercises, proprioceptive training, balance and gait training combined with high intensity laser therapy	*functional disability immediate pre-post (10 studies, n=869): overall effect size 1.11; 95% CI: 0.70 to 1.51 ; 3 months post (4 studies, n=271): overall effect size 0.77; 95% CI: 0.01 to 1.53 ; *anxiety immediate pre-post (3 studies, n=164): overall effect size 0.30; 95% CI: -0.10 to 0.70 ; 3 months post (3 studies, n=204): overall effect size 0.46; 95% CI: 0.32 to 0.60 ; 12 months post (2 studies, n=156): overall effect size 0.57; 95% CI: 0.40 to 0.74 *depression immediate pre-post (8 studies, n=564): overall effect size 0.36; 95% CI: 0.17 to 0.55 ; 3 months post (3 studies, n=230): overall effect size 0.31; 95% CI: -0.04 to 0.66 ; 12 months post (2 studies, n=152): overall effect size 0.31; 95% CI: -0.03 to 0.33 *catastrophising immediate pre-post (5 studies, n=328): overall effect size 0.75; 95% CI: 0.53 to 0.97 ; 3 months post (3 studies, n=132): overall effect size 0.76; 95% CI: 0.30 to 1.22 *school attendance 3 months post (4 studies, n=304): overall effect size 0.64; 95% CI: 0.11 to 1.17 ; *school functioning/aversion 3 months post (2 studies, n=188): overall effect size 0.35; 95% CI: 0.20 to 0.49 *acceptance 3 months post (2 studies, n=206): overall effect size 0.91; 95% CI: 0.75 to 1.07	studies)	Weiss 2013 Westendorp 2017 Wicksell 2009 Zeltzer 2002	

DEUTSCHE GESELLSCHAFT FÜR KINDER- UND JUGENDMEDIZIN e.V.

1.7 Kapitel 10: Prävention nicht-spezifischer Rückenschmerzen

1.7.1 Aggregierte Evidenz: Syst. Reviews zu Prävention

Studien-typ	Quelle	Untersuchte Studien	(verglichene) Interventionen	Ergebnisse	Methodische Bemerkungen	Literaturbelege	Evidenz-niveau (CEBM Oxford 2011)
SR of SR	Kamper, S. J., Yamato, T. P., & Williams, C. M. (2016). The prevalence, risk factors, prognosis and treatment for back pain in children and adolescents: an overview of systematic reviews. Best Practice & Research Clinical Rheumatologyy doi.org/10.1016/j.berh.2017.04.003	Study type: Systematic Reviews Search period: to January 2017 Database: MEDLINE, Embase, Cochrane **Inclusion criteria**: systematic review; peer review journal; ≤18 years; non-specific back pain **Exclusion criteria**: back pain due to cancer, systemic, infectious or inflammatory disease, fracture, acute neurological condition; subjects post-surgery; patients with scoliosis or thoracic pain.	school-based intervention (education + postural advice) physiotherapy interventions	*Number of studies: 3 SR included for prevention of non-specific back pain (all high-quality reviews) Two high-quality reviews reported that school-based interventions involving education and postural advice improved back care knowledge and may have an effect on behaviours such as manual handling. Two high-quality reviews that assessed pain prevalence found that preventative interventions were either ineffective or marginally effective. (Please note: The study of Cardon et al., 2004 was included for preventative studies in this guideline, but for treatment studies in the Kamper review. Results were as follows: One low-quality review found conflicting evidence regarding the effectiveness of educational interventions for reducing back pain.)	Evaluation of the effectiveness of an intervention aimed at preventing back pain requires measurement of back pain! Very few studies aimed at reducing prevalence of back pain in children, actually measured pain prevalence as an outcome --> limited capacity to inform preventative efforts in this field → LoE 2 The paucity of randomised trials evaluating the effectiveness of preventative interventions is a barrier to providing evidence-based care to children with back pain. The lack of research activity in this area is completely out of proportion with the prevalence and burden of the condition and contrasts with the number of studies conducted on the condition in adults. **Risk of bias**: **Corrected Cover Area** (Pieper et al. 2014): CCA=0, no overlap of prognostic studies in included systematic reviews **Fazit 4-item-checklist** (Ballard & Montgomery 2017): schwierig zu interpretieren, trotz einzelner Schwächen gut gemacht, Autor vertrauenswürdig	Calvo-Muñoz 2012, Michaleff 2014, Steele 2006, (Cardon 2004)	2

1.7.2 Einzelstudien zu Prävention

Quelle/ Studientyp	Population	(verglichene) Interventionen	Outcomes	Ergebnisse	Bemerkungen	Evidenz-niveau (CEBM Oxford 2011)
Hill J.J.; Keating , J. L. (2015): Daily exercises and education for preventing low back pain in children: Cluster randomized controlled trial. DOI: 10.2522/ptj.20140273 **Study type:** Cluster RCT	* Number of patients: N=708 Intervention group: n=469 Control group: n=239 * Recruiting period: April 2011 * **Characteristics**: 49% girls; M=9.4 years; recruited from 7 primary schools in the North Shore City district of the Auckland North region of New Zealand (schools were randomly allocated to groups) * **Inclusion criteria**: 8 to 11 years; ablility to follow simple instructions and complete a child-friendly survey * **Exclusion criteria**: inability to do the exercises due to spinal pathologies, neurological disorders, injuries, or physical disabilities for which movement was a contraindication or prevented standing on one leg safely and independently	Intervention (N=469; 4 schools): education + exercise Control (N=239; 3 schools): education Education: back awareness, taking responsibility for "MySpine", habits thought to keep the spine healthy, principles underpinning recommended behaviors; 7 sessions (day 1: 25 min; days 7, 21, 49, 105, 161: 5 min; day 270: 10 min) Exercise: 4 exercises designed to encourage movement of the lumbar spine through flexion, extension, and lateral flexion practiced in each session (instruction to repeat each of the exercises 3 times in one session daily at a suitable time) Follow up: days 7, 21, 49, 105, 161, 270	1. Primary outcome: episode of LBP during the study period Baseline: lifetime prevalence of LBP Follow-Up: no episode of LBP in the previous week in any survey --> no back pain during the study period 2. Secondary outcomes: -lifetime first episode of LBP during study period (without previous history of LBP prior to the study) -duration of LBP (1–2 days; ≥3 days) -severity of LBP (school absence, missed school sports, health care utilization) -adherence (frequency of exercise)	1. Primary outcome -47% of participants had a previous episode of LBP at baseline (no difference between groups, P=.94) -no significant differences between groups in the odds of reporting no LBP in the previous week during the study period (intervention group: 35%, control group: 28%; OR=0.72; 95% CI=0.46, 1.14; P=.16) -significantly fewer episodes of LBP during the study for the intervention group (OR=0.54; 95% CI=0.39, 0.74; P<.001) -higher probability of reporting an episode of LBP (regardless of group) in participants with a history of LBP at baseline than in participants with no history of LBP prior to participation in the study (OR=4.21; 95% CI=3.07, 5.78; P<.001) - decreasing number of episodes of reported LBP for both groups across time (OR=0.89; 95% CI=0.84, 0.95; P<.001) 2. Secondary outcomes -significantly fewer reports of lifetime first episode of LBP for the intervention group over the study period (OR=0.60; 95% CI=0.39, 0.91; P=.02) -no significant differences between groups for: *duration of reported LBP episodes (OR=1.27; 95% CI=0.88, 1.86; P=.20) *reports of missed sport (OR=1.03; 95% CI=0.49, 2.18; P=.941) *days off from school (OR=0.87; 95% CI=0.40, 1.86; P=.710) *visits to a health care practitioner (OR=0.80; 95% CI=0.36, 1.80; P=.593) -no effect of adherence on LBP episodes	Weaknesses - researcher who analyzed the data was not blinded to groups - low power to detect differences (0.73) - generalizability (schools with high social status) **Risk of bias**: Cochrane RoB: • Selection: low risk • Performing: low risk • Detection: high risk • Attrition: low risk • Reporting: unclear risk • Other: high risk	2

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2 Abkürzungsverzeichnis

Abkürzung	Erläuterung
ACT	Activity and commitment therapy
AE	Adverse events
AUC	Area under the curve
BT	Behavoural therapy
CAS	Colour analogue scale
CBT	Cognitive behavioural therapy
CCRP	Chronic cancer-related pain
CEBM	(Oxford) Center for evidence-based medicine
CI	Confidence interval
CMT	Chiropractic manipulative therapy
CNPC	Chronic non-cancer pain
CNS	Central nervous system
CRPS	Chronic regional pain syndrom
CST	Cranial-sacral therapy
CT	Computerized tomography
ET	Excercise therapy
FPS-R	Faces pain scale revised
FSS	Functional somatic symptoms
IIPT	Intensive interdisciplinary pain treatment
IQR	Interquartile range
J	Jahr(e)
KI	Konfidenzintervall
LBP	Low back pain
LoE	Level of evidence
LS	Lumbar spine
M	Mean (Mittelwert)
MBP	Mid back pain
MRI	Magnetic resonance imaging
MT	Manual / manipulative therapy
N	Number
n.r.	Not reported
n.s.	Not significant

Abkürzung	Erläuterung
NNTB	Number needed to treat for additional beneficial outcome
NPRS	Numeric pain rating scale
NPV	Negative predictive value
NRS	Numeric rating scale
NRSs	Non-randomized treatment studies
NSAID	Nonsteriodal anti-inflammatory drug
NSLBP	Non-spondylolytic low back pain
OMT	Osteopathic manipulative therapy
OR	Odds ratio
P	Probability
PPV	Positive predictive value
ROB	Risk of bias
ROC	Receiver operating characteristic
ROM	Range of motion
RR	Risk reduction
SD	Standard deviation
SLBP	Spondylolytic low back pain
SMD	Standardised mean difference
SMS	Short message service
SPECT	Single photon emission computed tomography
SR	Systematic review
STD	Standardised
STS	Sit to stand (flexion)
VAS	Visual analogue scale
VOMT	Visceral osteopathic manipulation
Y	years

3 Literaturverzeichnis

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Versionsnummer: **1.0**

Erstveröffentlichung: **12/2021**

Nächste Überprüfung geplant: **12/2026**