

Supplemental Table 1: Summary of U.S. randomized controlled trials examining the use of complementary health approaches for back pain^a

Complementary approach	Study	Participants	Methods	Interventions	Primary Measures	Primary Outcomes	Conclusion
Acupuncture & massage therapy	Cherkin et al. ¹⁵ , 2001	262 adults with cLBP; mean age = 45 (SD 11); gender = 58%; race = 84%; pain duration = 61% > 1year; pain intensity = 6.2 (NRS Bothersomeness); function = 12.2 (RMDQ)	RCT of acupuncture, massage, vs self-care/usual care.	Acupuncture = traditional Chinese medicine including manual acupuncture, electroacupuncture, moxibustion, cupping, and advice. Massage = Swedish massage, deep-tissue, trigger point. 10 sessions over 10 weeks. Self-care = book & videotapes on back care.	pain bothersomeness (NRS: 0 - 10) and RMDQ (0-23), with statistical power to detect 1.5 pt and 2.5 pt differences, respectively (MCID)	At 10 weeks for function, massage (-2.3 pts) > acupuncture > self-care; for pain: massage = acupuncture > self-care. At 52 weeks for pain & function, massage = self-care > acupuncture.	Supports use
Acupuncture	Cherkin et al. ¹⁶ , 2009	638 adults with cLBP; mean age = 47 (SD 13); gender = 62% female; race = 68% white, 8% Hispanic; pain duration = 68% > 1year; function = 10.6 (RMDQ)	RCT of 3 types of acupuncture vs. usual care alone.	Acupuncture: individualized, standardized, simulated (sham). Usual care is whatever else they received. 10 treatments over 7 weeks period - 2/wk for 3 weeks, then 1/wk for 4 weeks.	Pain bothersome (0 - 10) and modified RMDQ (0-23), with statistical power to detect 1.5 pt and 2.0 pt mean differences, respectively (MCID)	Supports use	Supports use

Acupuncture	Wang et al. ¹⁷ , 2009	152 adult, pregnant with LBP; mean age = 32; gender = 100% female; race = n/a; pain duration = n/a; pain intensity = 66 (VAS); disability = 61 (Disability Rating Index)	RCT of acupuncture, sham-acupuncture, no treatment control	Auricular acupuncture at 3 ear points specific for LBP stimulated "continuously" with "press needles" for 1 week. Sham-acupuncture was same press needles at valid ear points but not specific for LBP. Control received no treatment.	pain intensity (VAS 0 - 100 mm); Disability Rating Index (DRI: 0 - 100, with 100 = maximum disability) at 1 week. Statistically powered on 30% reduction in VAS (MCID) from baseline to 1 week.	Verum acupuncture (-45 mm) > sham acupuncture (-27 mm) > no treatment control (-20 mm). Significant reduction in pain and improvement in function for verum compared to sham & no treatment.	Supports use
Acupuncture	Wasan et al. ¹⁸ , 2010	40 adults with cLBP; mean age = 48; gender = 51% female; race = 75% white; pain duration = 7 years; pain intensity = 4.9 (NRS); disability = 38% (ODI).	Controlled, blinded, crossover trial of verum vs. sham acupuncture, with High or Low psychiatric comorbidity	Verum acupuncture = single needle placed and rotated at LI4 for 30 min. Sham acupuncture = retractable needle (Streitberger) at LI4 for 30 min. Participants shown both needles at visit 1; treatment on visits 2 & 3.	pain intensity (NRS) at conclusion of single treatment session; powered to detect 30% mean difference between groups (MCID).	Significant reduction in pain intensity for both verum and sham acupuncture (~30% reduction), with no significant difference between either group, nor between those with High or Low psychiatric co-morbidity.	Does not Support use

Massage therapy	Cherkin et al ¹⁹ , 2011	401 adults with nonspecific cLBP; mean age = 48 (SD = 11); duration of pain > 1 year for 78% of participants	Parallel group RCT of 2 types of massage and usual care	Structural massage, relaxation massage, usual care. Massage 10 weekly sessions each lasting 75 - 90 min.	RMDQ and pain bothersomenes s (0 - 10) at 10, 26, 52 weeks; statistically powered to detect mean group differences of 2 pt and 1.5 pt, respectively (MCID)	structural massage = relaxation massage > usual care at 10 weeks (-2.7 and - 1.5, respectively on RMDQ and bothersomenes s compared to usual care)	Supports use
Acupuncture, massage therapy, Spinal manipulation	Eisenberg et al. ²⁰ , 2007	444 adults with acute LBP; mean age = 43; gender = 52% female; race = 64% white, 20% black, 9% Hispanic; pain duration = < 21 days; pain intensity >= 3 (NRS: 0 - 10)	RCT of usual care vs. choice of complementary health approach (acupuncture, spinal manipulation, or massage).	Usual care = primary care with medication, advice, activity alterations. CAM = up to 10 sessions over 5 weeks at no-cost, = up to 5 more sessions at 50% cost.	Bothersomenes s of chief symptom (NRS for pain, numbness, or leg pain) and function (RMDQ), with statistical power to detect 2.5 pt (RMDQ) mean difference from baseline between groups (MCID).	Choice > usual care at 5 weeks for bothersomenes s (-1 pt) but not for function. Decreased pain statistically significant, but not considered clinically meaningful.	Not relevant
Massage therapy	Field et al. ²¹ , 2008	47 prenatally depressed women; mean age = 28; gender = 100% female, race = 59% Hispanic, 32% Black, & 9% White; pain duration = n/a;	RCT of massage vs. no treatment.	massage = 20-min session, 2/wk over 16 weeks. Control = undefined.	depression, anxiety, anger, relationship, LBP; statistical power not stated; MCID not stated	At 16 weeks, massage > no treatment for pain intensity (roughly -1.5 pts). NOTE - this is a very poorly reported study, with high risk of bias.	Does not Support use

		pain intensity = 4.6 (NRS)					
Massage therapy	Field et al. ²² , 2007	30 adults with LBP, mean age = 41; gender = 55% male; race = 67% white; pain duration = >6-months; pain intensity = 5.1	Randomized study of massage vs. relaxation. No description of randomization process.	massage = 2 30-min sessions over 2 weeks. Relaxation = 30-min sessions at home, 2/wk for 5 weeks.	VITAS = VAS with pain faces; but not designated as a "primary outcome"; MCID not stated; 70% power to detect "effects" on 5 outcomes, but no power calculations included	both groups improved over 5 weeks, no statistical comparison between groups.	Not relevant
Massage therapy	Hernandez-Reif et al. ²³ , 2001	24 adults with cLBP; mean age = 40; gender = 50% female; race = 75% white; pain duration = > 6 months; pain intensity = 5.6 (NRS); function = n/a	RCT of massage vs. progressive relaxation	massage = 2, 30-min sessions/week for 5 weeks of Swedish-like massage. Progressive relaxation = tensing & relaxing muscle groups done at home by participants, 2 30-min sessions/week for 5 weeks.	pain intensity (NRS and short-form McGill Pain Questionnaire); function = ROM for trunk flexion; statistical power not stated; MCID not stated	Both groups improved over 5 weeks, no statistical comparison between groups.	Not relevant

Massage therapy	Jacobson et al. ²⁴ , 2015	46 adults with chronic LBP; mean age = 44 (range 18 -54); mean duration = 8 yrs since onset;	RCT of structural integration (SI) + rehab vs. only rehab	SI = 10 sessions over 20 weeks; 10 sessions over 20 weeks	pain bothersome (VAS 0-100MM); 50% power to detect 17 mm mean difference between groups (MCID),	No significant differences.	Does not Support use
Massage therapy	Wilson et al. ²⁵ , 2003	19 adults with acute LBP; mean age = 31; gender = 50% female; race = n/a; pain duration 6 weeks; pain intensity = n/a; function = 20% - 60% (ODI)	RCT of Muscle Energy Therapy (MET) vs placebo manual therapy.	MET = patient activated muscle contraction against therapist counterforce, in a sequence of different muscle groups & positions. 2 sessions/week for 4 weeks. Placebo Manual Therapy = sidelying passive range of motion	ODI; converted to a "change score": [(pre - post)/pre]; statistical power not stated, MCID not stated	MET > Placebo at 4 weeks (ODI: -18% between group)	Supports use
Osteopathic manipulation	Andersson et al. ²⁶ , (1999)	155 adults with subacute LBP, mean age = 32, gender = 57% female, race = n/a; pain duration = >3 wk <6months; pain intensity = 48 (VAS), function = 24 (ODI)	RCT of OMT vs. usual care	OMT = HVLA-SM, muscle energy, counterstrain, articulation, and myofascial release. Usual care = advice, medication, physical therapy, corset, &/or elect. Stim. Up to 8 sessions over 12 weeks.	pain intensity (VAS) and RMDQ and ODI, and medication usage; statistical power not stated; MCID not stated	Both groups improved significantly, but no sig between group differences for pain or function; however OMT group used less medication than usual care.	Does not Support use
Osteopathic manipulation	Cruser et al. ²⁷ , (2012)	63 active duty military with acute LBP; mean age = 27 (SD 1);	RCT of OMT vs. usual care	4 sessions over 4 weeks. OMT = any combination of: soft tissue, myofascial	pain intensity (NRS 4-scales: now, typical, best, worst) and	At week 5, significant reduction in pain (-1.5 pts)	Supports use

		gender = 55% male, race = 56% white, pain duration = n/a; pain intensity = 5.4 (NRS), function = 12.4 (RMDQ)		release, counterstrain, muscle energy, sacroiliac articulation, & HVLA SM. Usual care = advice, medication	function (RMDQ); statistical power not stated; MCID = 30% reduction for pain and function	for OMT, but not for function.	
Osteopathic manipulation	Hensel et al. ²⁸ , 2015	400 adult, pregnant women with LBP; mean age = 24 (SD = 4), race = 25% white, 17% black, 55% Hispanic; pain duration = n/a; pain intensity = 50 (CPI); function = 6.5 (RMDQ).	RCT of usual care (UC), UC + osteopathic manipulative treatment (OMT), vs. UC + placebo ultrasound	OMT included 7 sessions over 9 weeks; placebo ultrasound was detuned US.	pain intensity (VAS => characteristic pain intensity [CPI: 0 - 100]) & Roland-Morris Pain and Disability Questionnaire; >80% power to detect 30% change in primary outcomes (MCID).	At week 9, OMT = PUT > UC; no significant differences between OMT & PUT, but either better than UC alone.	Supports use
Osteopathic manipulation	Licciardone et al. ²⁹ , 2010	144 pregnant women, mean age = 24, gender = 100% female, race = 33% white, 33% black, 32% Hispanic; pain duration = n/a; pain intensity = 4.9 (10-cm VAS); function - 8 (RMDQ)	RCT of usual obstetrical care (UOBC), UOBC + OMT, vs UOBC + sham-Ultrasound (SUT)	OMT = soft tissue, myofascial release, muscle energy, range-of-motion mobilization. SUT = de-tuned ultrasound. 7 sessions over 7 weeks.	pain intensity (10-cm VAS) and function (RMDQ); >70% power to detect between group difference of 1.25 cm (VAS) and 3 pts (RMDQ) (MCID)	At 8 weeks, for pain intensity, no sig between group differences; for function, all groups had INCREASED disability, but sig less so for OMT ~ SUT.	Does not Support use

Osteopathic manipulation	Licciardone et al. ³⁰ , 2013	455 adults with cLBP; mean age = 41 (range: 29 - 51); 62% female, pain duration > 1 year in ~50% of patients; pain intensity - 44 (VAS); function - 5 (RMDQ)	RCT, 2 x 2 factorial design: OMT, sham-OMT, US, sham-US	OMT included HVLA SM, MVMA SM, soft tissue manipulation, isometric muscle contraction; 6 sessions over 8 weeks.	Pain intensity (VAS 0-100); 82% power to detect between-group difference (OMT vs. sham-OMT) of 6.6 mm (pain VAS); MCID stated as 30% pain reduction	At week 12, no significant difference between OMT and US, nor US and sham-US, but OMT > sham-OMT (-9 mm difference VAS)..	Supports use
Osteopathic manipulation	Licciardone et al. ³¹ , 2003	91 adults with cLBP, mean age = 50, gender = 64% female, race = 84% white; pain duration = 53% > 1 yr; pain intensity = 3.5 (10 cm VAS); function = 7.5 (RMDQ)	RCT of OMT, sham-OMT, vs. no intervention control (randomized 2:1:1)	OMT = mofascial release, strin-counterstrain, muscle energy, soft tissue, HVLA-SM, &/or cranial-sacral. Sham-OMT = range-of-motion, light touch, simulated-OMT . 7 sessions over 5 months. No treatment = baseline assessment and follow-up assessments, but no intervention.	pain intensity (10 cm VAS), and function (RMDQ); 80% power to detect "moderate" changes on SF-36; MCID not stated for pain intensity nor function	At 1 & 3 months, OMT = sham-OMT > control (-1 cm VAS), but no sig diff between groups for function.	Does not Support use
Spinal manipulation	Bialosky et al. ³² , 2014	110 adults with LBP; mean age = 32 (SD 12); gender =70% female; race = n/a; mean duration of pain = 16 weeks (interquartile range = 153	RCT of SM, placebo SM, placebo SM with augmented expectation, vs no treatment	SM of 6 sessions over 2 weeks.	pain intensity (NRS, pain over last week); ODI. Study powered on reduction in experimentally-induced heat pain in response to SM; MCID not stated for pain	At 2 weeks, all groups improved, but no significant differences for pain or function. For 1st treatment, SMT > placebo SMT > no	Does not Support use

		weeks)			intensity & function	treatment	
Spinal manipulation	Brennan et al. ³³ , 2006	123 adults with acute - subacute LBP, mean age = 38, 45% female, race = n/a; pain duration = 16 days; pain intensity = 5.2 (NRS); function = 43 (ODI)	Pragmatic RCT of SM, specific exercise, vs. stabilization exercise. After study completion, patients were further characterized as to whether they fit a clinical prediction rule for appropriate treatment.	SM = HVLA &/OR LVLA SM + supervised exercise. Specific exercise = supervised directional exercise; Stabilization exercise = trunk strengthening and stabilization. All patients who improved by 33%, then received general exercise regime including aerobics.	function (ODI) and whether progressed to Stage II (i.e., improved by >33%); 80% power to detect difference of 6 pts (ODI) (MCID)	At 4 weeks: function improved in all groups (~-22 pts), though if the patient was "matched" there was significant greater improvement in ODI (-5 pts difference)	Not relevant
Spinal manipulation	Bronfort et al. ³⁴ , 2004	32 adults with sciatica & LBP, mean age = 49 yrs (SD 9), 43% female, race = n/a; pain duration = >50% with >1 year; pain intensity 4.9 (ODI), function = 46 (RMDQ)	Feasibility RCT of SM, epidural steroid injections, vs. self-care	SM = HVLA SM of variable # & frequency of sessions. Epidural = 3 injections over 12 weeks. Self-care = 2 1-hr sessions with physical therapy of advice + exercise recommendations	all outcomes exploratory; powered on feasibility outcomes rather than clinical outcomes; MCID not stated	no group comparisons reported; feasible to perform	Not relevant

Spinal manipulation	Bronfort et al. ³⁵ , 1996	174 adults with cLBP, mean age = 41 (SD 10); gender = 47% female; race = n/a; pain duration = 2.5 years; pain intensity = 5.4 (NRS); function = 34 (RMDQ)	RCT of 3 interventions: A. SM + Trunk strengthening exercise (TSE), b. SM + Trunk stretching exercise (TRE), c. non-steroidal anti-inflammatory drug (NSAID) + TSE	5 weeks of intervention, followed by 6 wk of supervised exercise alone	pain intensity (NRS) and disability (RMDQ); 80% power to detect 10% difference in primary outcomes; MCID not stated for pain intensity or function/disability	all groups improved on both outcomes, but no significant difference between groups at 5 and 11 weeks	Does not Support use
Spinal manipulation	Bronfort et al. ³⁶ , 2014	192 adults with LBP + radiculopathy (>4 weeks); mean age = 57 (SD = 12), gender = 64% female; race = 93% white; mean pain duration = 2 years; pain intensity = 5.4 (NRS); function = 10.2 (RMDQ)	RCT of SM + home exercise & advice (HEA) vs. HEA alone	HVLA SM; home exercise and advice; up to 20 sessions over 12 weeks. HEA = 4 face-to-face sessions over 12 weeks.	leg pain intensity (0 - 11 NRS) at 12 weeks, 52 weeks; 85% power to detect 8% pts mean difference between groups for leg pain intensity (MCID)	At 12 weeks, between group diff = -1 pt; at 52 weeks, non-significant difference.	Supports use
Spinal manipulation	Bronfort et al. ³⁷ , 2011	301 adults with cLBP, mean age = 45 (SD 11); gender = 60% female; race = n/a; median pain duration = 5 yrs; pain intensity = 5.3 (NRS); function = 8.5	RCT of high-dose, supervised exercise, SM, vs. home-exercise + advice	Supervised exercise = 20, 1-hr sessions, 2/wk; SM = HVLA, variable # & frequency of sessions; home exer = 2, 1-hour sessions + daily home practice	pain intensity (NRS) and function (RMDQ) at 12 & 52 weeks; 80% power to detect "medium effect size" between groups; MCID not stated	At 12 weeks, all 3 groups had -2 pt reduction in pain intensity, & -4 pt reduction in RMDQ, but no sig diff between groups. Pain intensity and	Does not Support use

		(RMDQ)				function sustained to 52 wk with no diff between groups.	
Spinal manipulation	Cherkin et al. ³⁸ , 1998	321 adults with LBP; mean age = 41; gender = 48% female; race = n/a; pain duration = 78% < 6 weeks; pain intensity = 5.7 (NRS Bothersomeness); function = 12 (RMDQ)	RCT of SM, physical therapy (PT), vs self-care book	SM = HVLA manipulation. PT = McKenzie method, up to 9 visits over 4 weeks. Self-care book = educational book on back pain.	pain intensity (NRS bothersomeness) and RMDQ; 80% power to detect 2.5 pt. and 1.5 pt. differences, respectively, for RMDQ and NRS (MCID).	At 4 and 12 weeks, for pain, all groups improved, but no significant differences (after adjusting for baseline variances); at 52 weeks, for function, SM = PT > self-care, but differences were small.	Does not Support use
Spinal manipulation	Cleland et al. ³⁹ , 2009	112 adults with acute - subacute LBP, mean age = 40 (SD 11), 52% female, race = n/a; pain duration = 45 days; pain intensity = 5.2 (NRS), function = 35.5 (ODI)	RCT of 3 types of SM: supine thrust, side-lying thrust, or non-thrust.	thrust SM = HVLA SM; non-thrust SM = LVLA SM; all groups received home exercise daily; 2 treatment sessions within 1 week.	pain intensity (NRS) and function (ODI); >90% power to detect 9% between group difference in ODI; MCID not stated	At 1 week: for pain intensity, significant reduction in supine (-2 pts) & side-lying thrust (-1.5 pts) vs. supine non-thrust; for function, sig reduction for supine (-11.5 pts) & side-	Not relevant

						lying thrust (-8 pts) vs. nonthrust; no sig. diff. between thrust SMs.	
Spinal manipulation	Cook et al. ⁴⁰ , 2013	154 adults with mechanical LBP; mean age = 48 (SD 15); gender = 53% female; race = 91% white; pain duration = 34 weeks (SD 100); pain intensity = 5.2 (NRS); function = 30 (ODI)	non-blinded, pragmatic RCT of thrust SM vs. non-thrust SM	thrust SM = HVLA SM; non-thrust SM = LVLA SM; both groups received home exercise daily	Pain intensity (NRS; MCID = 2 pts change); Fear Avoidance Beliefs Questionnaire; ODI (50% change from baseline = MCID); 80% power to detect "medium effect (0.30)" between groups	After 2 sessions, no significant difference between thrust vs. non-thrust SM.	Not relevant
Spinal manipulation	Fritz et al. ⁴¹ , 2015	220 adults with acute LBP (<16 days); mean age - 37.4 (range 18 - 60); gender = 58% female; race = 89% white; pain duration = <16 days; pain intensity = 5	RCT of SM + exercise vs. usual care	spinal manipulation plus home exercise; usual care = primary care. 4 sessions during 4 weeks.	change in ODI (range: 0 -100; MCID = 6 points) at 3 months; 86% power to detect 7-pt difference between groups in ODI.	At 3 months, between group difference = -3.2 [95% CI, -5.9 to -0.47], P = .02. At 12 months, between-group difference, -2.0 [95% CI, -5.0 to 1.0], P = .19.	Supports use

		(NRS); function = 41 (ODI); no treatment in prior 6 months					
Spinal manipulation	George et al. ⁴² , 2013	169 pregnant women with LBP; mean age = 27 (range 15-45); gender = 100% female; race = 43% black, 35% white; pain duration > 8 weeks; pain intensity = 5.8 (NRS); function = 4.8 (QDI)	RCT of usual obstetric care vs. UC + SM + home-exercise + education	SM and stabilization exercise. Weekly sessions for up to 6 weeks.	Pain intensity (NRS) and Quebec Disability Questionnaire (QDQ) at 6 - 8 weeks; 80% power to detect 2-pt difference on NRS (MCID), & 0.6 difference on QDQ	At 6 - 8 weeks, SM > UC with intergroup diff of -3 pts (NRS) and -1 pts (QDQ).	Supports use
Spinal manipulation	Goertz et al. ⁴³ , 2013	91 adults [active duty military] with acute LBP; mean age = 26 (SD 5); gender = 86% male; race = 73% white; duration of pain = 11.5 days (SD = 8), pain intensity = 5.8 (NRS); function = 12 (RMDQ)	pragmatic RCT of usual care vs. UC + SM	HVLA SM of up to 2 sessions/week for 4 weeks.	Pain intensity (NRS; MCID = 2.5 change) and RMDQ and Back Pain Functional Scale; 80% power to detect 3-pt diff on RMDQ, and 90% power for 2-pt diff on NRS	At 2 & 4 weeks, SM + UC > UC alone; NRS = -2.2, -1.2, respectively; RMQ = -3.9, -4.0, respectively	Supports use

Spinal manipulation	Gudavalli et al. ⁴⁴ , 2006	235 adults with cLBP; mean age = 41; gender = 37% female; race = 82% white, 6% hispanic, 6% black; pain duration = ??; pain intensity = 37 (VAS; function 7 (RMDQ)	RCT of SM vs. Physical Therapy/exercise	SM = LVVA, flexion-distraction (Cox Technique); Physical Therapy = PT guided exercise, strengthening, cardiovascular, ultrasound, cryotherapy for up to 45 min sessions. 2 - 4 sessions/week for up to 4 weeks.	pain intensity (VAS: 0-100 mm) and RMDQ; 80% power to detect "a change in perceived pain"; MCID not stated	SM > PT at 4 weeks for pain intensity (-8 mm), but not function.	Supports use
Spinal manipulation	Haas et al. ⁴⁵ , 2004	72 adults with cLPB; mean age = 48 (SD 14); gender = 54% female; race = 84% white; pain duration = > 3 months; MVK pain intensity = 49; MVK pain disability = 39	RCT of dose of SM (1, 2, 3, or 4 visits)/week for 3 weeks, and adding physical modalities (4x2 factorial design). All participants received 18 sessions total, comprised of some combination of SM & PM.	SM = HVLA to lumbar spine. Physical Modalities (PM) = heat/ice, ultrasound, electrotherapy, massage, trigger point therapy.	Modified von Korff (MVK) pain = average of 3 scales (NRS 0-10) of pain today, worst pain in last 4 weeks, and average pain during last 4 weeks. MVK Disability = average of 3 scales of interference with daily activities, social/recreational activities, and ability to work outside or in home; MCID = 25% change from baseline 72% power for	12 SM > 9 SM > 3 SM at 4 weeks for pain (-17.1 vs -11.4 compared to 3 SM), but no effect for function.	Supports use

					pain and 91% power for disability		
Spinal manipulation	Haas et al. ⁴⁶ , 2014	400 adults with cLBP; mean age = 41 (SD = 14); gender = 50%; race = 85% white; pain duration > 3 months; pain intensity = 52 (VAS); function = 45 (100 pt scale)	RCT of dose of SM (0, 6, 12, 18 sessions over 6 weeks) vs. light massage	SM of variable # of sessions; light massage of variable # sessions	pain intensity (modified vonKorf scale) and function at 12 and 24 weeks; 80% power to detect a between-group difference of 10 pts; pre-specified primary analysis of regression models to identify linear effect of SM dose.	At 12 weeks, 20 points improvement that was sustained to 52 weeks; maximum effect observed at 12 SM sessions (8.6 pain and 7.6 disability points); however at 52 weeks, max effect was for 18 visits	Supports use

Spinal manipulation	Hadler et al. ⁴⁷ , 1987	54 adults with acute LBP; age = (20 - 40); gender = 42% female; race = n/a; pain duration < 4 weeks; pain function (11, RMDQ)	RCT of SM vs. Mobilization	SM = HVLA; Mobilization = side-lying position with LVLA maneuver, which was not considered a "thrust". 2 treatment sessions over 2 weeks	function (RMDQ); power not specified, nor MCID	both groups improved (-7 pt change), but no sig diff between groups	Not relevant
Spinal manipulation	Hoehler et al. ⁴⁸ , 1981	95 adults with LBP (acute & chronic); mean age = 31; 59% male; pain duration = n/a; pain intensity = 3.5 (scale: 1-5 with 5 most severe)	Pragmatic RCT of SM vs massage.	SM = HVLA ; massage = Swedish type. Up to 8 sessions over 60 days.	pain intensity (5 pt scale); power not stated, MCID not stated	both groups improved, but no sig diff between groups	Not relevant

Spinal manipulation	Hoiriis et al. ⁴⁹ , 2004	192 adults with subacute LBP; mean age = 42; gender = 89% male; race = n/a; pain duration = 3.7 weeks; pain intensity 4.2 (VAS); function = 24 (ODI)	RCT of SM with placebo medicine, muscle relaxants with sham SM, vs. placebo medicine with sham SM, over 2 weeks	SM = HVLA to multiple regions of spine, as well as mechanically assisted manipulation to C1 vertebra. Sham-SM = positioned on drop table with hand pressure but no thrust, MAM but no thrust. Medication = clobenzaprine HCl, 5 mg; carisoprodol, 350 mg; methocarbamol, 750 mg. Placebo medicine = inactive medication with identical appearance to active medication. SM had 8 visits over 2 weeks.	pain intensity (VAS) and ODI; power not stated; MCID not stated	For pain intensity: SM > medication > placebo at 2 weeks; SM > medication = placebo at 4 weeks. For function: all groups improved and no significant differences.	Supports use
---------------------	-------------------------------------	--	---	---	---	---	--------------

Spinal manipulation	Hondras et al. ⁵⁰ , 2009	244 adults with LBP; mean age = 63; gender = 44% female; race = 96% white; pain duration = 12 years; pain intensity = ? ; function = 6.4 (RMDQ)	RCT of HVLA SM, LVVA SM, vs minimal conservative medical care (MCMC)	HVLA SM was side-lying diversified lumbar adjustment; LVVA was flexion-distraction or "Cox" technique; maximum of 12 sessions, 2 - 3/wk for 2 wk, then 2/wk for 2 wk, & then 1/wk for 2 wk. MCMC was primary care using medication and advice. All participants got recommendations for specific exercises for home.	RMDQ; 81% power to detect 2.2 pt difference on 24-item RMDQ.	HVLA & LVVA SM > MCMC at 6 weeks for RMDQ (-2.9 and 2.7 vs. -1.6 pts, respectively).	Supports use
Spinal manipulation	Hsieh et al. ⁵¹ , 2002	200 adults with subacute LBP; mean age = 49; gender = 67% male; race = 77% white, 13% asian, 6% hispanic; pain duration = 11 weeks; pain intensity = 3.7 (VAS 0 - 10cm); function = 7 (RMDQ)	RCT of back school, SM, myofascial therapy, vs. SM + myofascial therapy. Back school weekly sessions for 3 week. Others had 3 sessions/week for 3 weeks.	Back school = didactic presentation and individualized instruction in activities of daily living. SM = HVLA adjustments. Myofascial therapy = cold-stimulated muscle stretch/contraction, muscle compression/massage, hot packs.	pain intensity (NRS) and RMDQ; power not stated; MCID not stated	For pain and function, all groups improved at 3 weeks, with no significant differences between groups.	Not relevant

Spinal manipulation	Hurwitz et al. ⁵² , 2002	681 adults with LBP; mean age = 51 (SD 17); gender = 52% female; race = 60% white, 30% Hispanic, 4% Asian, 3 % black; pain duration = 26% acute, 16% subacute, 59% chronic; pain intensity = 5 (NRS); function = 11 (RMDQ)	Pragmatic, randomized, comparative effectiveness of SM, SM + modalities, Primary Care, PC + PT	SM = HVLA SM, diversified. SM + modalies = SM + heat, ice, ultrasound, and/or electrical stim. Primary care = advice, exercise recommendations, analgesic medication, muscle relaxants, NSAIDS. PC + PT = PC + physical therapist advice + heat, cold, US, electrical stim, manual therapy, traction, supervised exercise.	pain intensity (NRS) and RMDQ: MCID = 2 pt and 3 pt change, respectively; power not stated	For pain intensity, all groups improved compared to baseline at 2, 6, & 26 weeks, though majority of improvement was at 2 weeks. No clinically significant differences between groups. For function, all groups improved compared to baseline at 6 & 26 weeks, with the greatest improvement at 26 weeks, but no clinically significant differences between groups.	Does not Support use
---------------------	-------------------------------------	--	--	--	--	---	----------------------

Spinal manipulation	Pope et al. ⁵³ , 1994	164 adults with LBP, mean age = 32 (18-55); gender = 62% male; race = n/a; pain duration > 6 months for 61%; pain intensity = n/a; function = n/a	RCT of SM, massage, corset, vs. transcutaneous muscle stimulation (TMS)	SM = HVLA (3 sessions/wk for 3 weeks; massage = 15 min of Swedish massage, 3 sessions/wk for 3 weeks; TMS = 8 hrs/day continuous stim while mobile; corset = canvas corset with metal stays worn continuously while awake	pain intensity (VAS) and function (Range of Motion flx/ext); power not stated, MCID not stated	all groups improved on both outcomes, but no significant difference between groups at 3 weeks. Post-hoc calculation of statistical power indicated study was substantially under-powered.	Not relevant
Spinal manipulation	Schneider et al. ⁵⁴ , 2015	107 adults with subacute LBP (<12 weeks onset); mean age = 41 (SD = 14); gender = 63% female, race = 63% white; pain duration = <3 months; pain intensity = 5.7 (NRS); function = 34 (ODI).	RCT of HVLA SM, Mechanical Adjusting Device, vs. Usual Medical Care	HVLA SM; mechanical adjusting device (Activator); usual medical care; 8 treatments over 4 weeks. Usual care = advice, NSAIDs, stay active, avoid prolonged bed rest.	ODI; 80% power to detect MCID OF 10-pt difference on ODI	At 4 weeks, HVLA SM (-8 pts) > Activator = UC.	Supports use
Spinal manipulation	Sutlive et al. ⁵⁵ , 2009	60 adults with acute LBP, active duty military; mean age = 25; gender = 48% female; race = n/a; pain duration = 14	RCT of 2 types of SM: "lumbopelvic" and "lumbar neutral gap" SM.	SM was performed in a single session; both performed in a side-laying position by a therapist.	pain intensity (VAS) and function (ODI); power not stated, MCID not stated	Significant reduction in pain and improvement in function for both groups, but no sig diff between	Not relevant

		days; pain intensity = 5.9 (NRS); function = 39.5 (ODI)				groups.	
Yoga	Saper et al. ⁵⁷ , 2013	95 adults with cLBP, mean age = 47, gender = 76% female, race = 55% black, 18% white; pain duration >1 year = 76%; pain intensity = 6.9 (NRS); function = 13.7 (RMDQ)	RCT of dose of yoga, 1/wk vs. 2/wk for 12 weeks.	Hatha yoga = 75-min classes for 12 weeks, + home practice. Usual care for both groups.	pain intensity (NRS) and function (RMDQ); 80% power to detect MCID of 1.5 pts & 3.0 pts, respectively	No difference was seen between the two doses of yoga. At 12 weeks, both groups significant improved on pain (-2.2 pts NRS) and function (-5 pts RMDQ), but no significant between group differences.	Unknown
Yoga	Saper et al. ⁵⁸ , 2009	38 adults with cLBP; mean age = 44; gender = 83% female; race = 83% minority; pain duration > 12 weeks; pain intensity > 4 (NRS; actual = 7.1 mean); RMD = 15	RCT of yoga vs. wait list control	Hatha yoga = 12 weekly, 75 min classes; wait list group was offered yoga after 26 weeks; both groups had usual care & received a self-care pain management book.	pain intensity (NRS) and RMDQ at 12 weeks; MCID = 2 pts NRS, and 30% decrease RMDQ; statistical power not stated	Significant reduction in pain intensity (-2.3 vs 0.4 pts) and improved function (-6.3 vs. -3.7 pts) compared to wait list.	Supports use

Yoga	Sherman et al. ⁵⁹ , 2005	101 adults with cLBP; mean age = 44 (SD 13); gender = 66% female; race = 80% white; pain duration = 83% >1 year; pain intensity = 5.5 (bothersome 0 - 10); function = 8.4 (RMDQ)	RCT of yoga, exercise, vs usual care	Yoga = viniyoga, 12 weekly 75-min classes, with home practice. Exercise = 12 sessions of combination of strengthening and aerobic exercise. Usual care = self-care book	pain bothersomeness (0 - 10) and modified Roland Disability Questionnaire; MCID = 1.5 pts & 2.5 pts, respectively; 80% power to detect 2.7 pts on RMDQ	yoga > exercise > usual care at 12 weeks for function (-3.4 for yoga vs. UC; -1.8 for yoga vs. exercise), but not for bothersomeness.	Supports use
Yoga	Sherman et al. ⁶⁰ , 2011	228 adults with cLBP; mean age = 48 (SD = 10); gender = 64% female (yoga group = 67% female), race = 87% white; duration of pain = 11 yrs (SD 10); pain intensity = 4.7 (Bothersomeness); function = 9.1 (RMDQ)	RCT of yoga, stretching, and usual care	yoga = viniyoga: 1 hr sessions weekly for 12 weeks; stretching: 75 min sessions weekly for 12 weeks; usual care + self-care book on LBP	RMDQ and pain bothersomeness at 12 weeks; statistical power > 80% to detect MCID of 2.5 pts, or 1.7 pts, respectively, between groups	yoga = stretching > usual care at 12 weeks, with modest improvements in function (-2 pts) & pain bothersomeness (-1 pt)	Supports use
Yoga	Williams et al. ⁶¹ , 2009	90 adults with cLBP; mean age = 48; gender = 77% female; race = 93% white; pain duration = 63 months; pain intensity = 41 (VAS); function =	RCT of yoga vs. wait list control	Iyengar yoga = 24 weeks of 90-min classes, 2/week. Wait-list = self-directed medical care, & offered yoga at end of study period	pain intensity (VAS) and function (ODI); 89% power to detect 6-pt. change in ODI (pre-post); MCID not stated	significant difference for pain intensity (-13 mm) and function (-5 pts).	Supports use

		24 (ODI)					
Yoga	Williams et al. ⁶² , 2005	44 adults with LBP; mean age = 48; gender = 68% female; race = 96% white; pain duration => 3 months; pain intensity = 2.8 (VAS); function = 18 (PDI 0 - 70)	RCT of yoga vs. educational control	Yoga = Iyengar form, 16 90-min, weekly classes, Usual Care. Usual Care = Educational control = usual care + 16 weekly newsletters.	function = Pain Disability Index (PDI): 0 - 70, with higher scores => higher disability; statistical power not stated; MCID not stated	yoga > Usual care at 12 weeks. NOTE - hard to decipher actual change score.	Supports use

Footnotes

^a Abbreviations:

cLBP = chronic low back pain

HVLA = high velocity, low amplitude

LVLA = low velocity, low amplitude

MVLA = medium velocity, low amplitude

LBP = low back pain

MCID = minimal clinically important difference

NRS = numeric rating scale

ODI = Oswestry Disability index

OMT = osteopathic manipulative therapy

RCT = randomized clinical trial

RMDQ = Roland-Morris Disability Questionnaire

ROM = range of motion

SD = standard deviation

SM = spinal manipulation

VAS = visual analog scale