Mirror Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Altschuler et al., 1999 PEDro: 4/10 (cross-over design study) Country: USA	9 patients with chronic stroke	Mirror therapy Vs. Bilateral exercises *Treatment details:* 15 minutes/session, two sessions/day, 6 days/week for 4 weeks. *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing bilateral symmetrical arm and hand movements. *Bilateral exercises:* participants followed the same treatment regime while watching the paretic arm through transparent plastic.	**At mid-treatment (2 weeks):** (-) Upper limb speed – 7 point Likert scale (-) Accuracy of cardinal upper limb movements – 7 point Likert scale (-) Range of motion (ROM) – 7 point Likert scale **At post-treatment (4 weeks):** (+) Upper limb speed (+) Accuracy of cardinal upper limb movements (-) ROM **At follow-up (6 weeks, 8 weeks):** (-) Upper limb speed (-) Accuracy of cardinal upper limb movements (-) ROM Note: no statistical data is provided, however participants in the mirror therapy group demonstrated better outcomes than participants in the bilateral exercises group at all timepoints.
Amasyali & Yaliman, 2016 PEDro: 5/10 Country: Turkey	24 patients with subacute/chronic stroke	Mirror therapy (n=9) Vs. Electrostimulation (n=7) Vs. No additional treatment (n=8) *Treatment details:* 30 minutes/session, 5 days/week for 3 weeks. *Mirror therapy:* participants watched the non-paretic limb in a mirror box while performing unilateral wrist and hand flexion/extension and forearm supination/pronation and circumduction.	**At post-treatment (3 weeks):** *Mirror therapy vs. no additional treatment:* (+) Fugl-Meyer Assessment – Upper Extremity (FMA-UE) (-) Range of motion (ROM) – wrist (-) Grip force (-) Box and Block Test *Mirror therapy vs. electrostimulation:* (-) FMA-UE (-) ROM – wrist

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Electrostimulation: participants received time-matched intervention using EMG-triggered stimulation on wrist extension to promote activity in the wrist and finger extensor muscles; pulse duration at 200us and frequency at 50Hz. All groups also received conventional rehabilitation for up to 2 hours/day that comprised range of motion, stretching and strengthening exercises and approximately 30 minutes of occupational therapy.	(-) Grip force (-) Box and Block Test *Electrostimulation vs. no additional treatment:* (-) FMA-UE (-) ROM – wrist (-) Grip force (-) Box and Block Test **At follow-up (3 months):** *Mirror therapy vs. no additional treatment:* (-) Fugl-Meyer Assessment – Upper Extremity (FMA-UE) (+) ROM – wrist (-) Grip force (+) Box and Block Test *Mirror therapy vs. electrostimulation:* (-) FMA-UE (-) ROM – wrist (-) Grip force (+) Box and Block Test *Electrostimulation vs. no additional treatment:* (-) FMA-UE (+) ROM – wrist (-) Grip force (-) Box and Block Test
Arya et al., 2015 PEDro: 8/10 Country: India	33 patients with chronic stroke	Mirror therapy (n=17) Vs. Conventional occupational therapy (n=16) *Treatment details:* 90 minutes/session, 5 sessions/week for 8 weeks.	**At post-treatment (8 weeks):** (+) Fugl-Meyer Assessment – Upper Extremity (-) Fugl-Meyer Assessment – Upper Arm (+) Fugl-Meyer Assessment – Wrist/hand

Mirror Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Mirror therapy: participants used a mirror box while performing goal-directed, task-based movements with the non-paretic limb only. Movements of the elbow, forearm, wrist and fingers were performed using everyday objects to promote forearm supination, wrist dorsiflextion, finger dexterity, mass grasp/finger flexion and release/finger extension. Participants engaged in mirror therapy for 45 minutes/session and conventional occupational therapy for 45 minutes/session. *Conventional occupational therapy:* participants performed standard motor rehabilitation using Brunnstrom and Bobath approaches for the affected upper limb only.	
Arya et al., 2018 PEDro: 7/10 Country: India	31 patients with chronic stroke	Mirror therapy (n=17) Vs. Standard motor and sensory rehabilitation (n=14) *Treatment details:* 40 minutes/session, 5 days/week for 6 weeks. *Mirror therapy:* participants used a mirror frame or mirror box to receive bilateral sensory stimulation (light touch, vibration, tactile localization, stereognosis, recognition of texture) for 20 minutes/session and to perform wrist/finger motor movements (wrist dorsiflexion/palmar flexion, circumduction, finger flexion/extension) for 20 minutes/session. Participants also received 50 minutes/session conventional occupational therapy. *Standard motor and sensory rehabilitation:* participants received time-matched rehabilitation.	**At post-treatment (6 weeks):** (+) Fugl-Meyer Assessment – Wrist/Hand (-) Semmes-Weinstein Monofilaments – Fingers (-) Semmes-Weinstein Monofilaments – Palm (-) 2-Point Discrimination Test* * Reliable assessment not achieved as only 26% of participants (n=4, 4 respectively) responded to touch discrimination testing on the affected side.

Mirror Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Bae, Jeong & Kim, 2012 PEDro: 4/10 Country: Korea	20 patients with subacute stroke	Mirror therapy (n=10) Vs. Unilateral exercises (n=10) *Treatment details:* 30 minutes/session, 5 days/week for 4 weeks. *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing 5 repetitions of 5 bilateral exercises – (i) glenohumeral flexion/extension, (ii) radial/ulnar deviation, (iii) supination/pronation, (iv) digit metacarpophalangeal and proximal interphalangeal flexion/extension, and (v) thumb flexion/extension. *Unilateral exercises:* participants followed the same treatment regime using the non-paretic limb only, while watching the non-paretic limb. Both groups also received conventional rehabilitation (duration not specified).	**At post-treatment (4 weeks):** (+) Manual Function Test
Cacchio et al., 2009a PEDro: 7/10 Country: Italy	48 patients with subacute stroke and complex regional pain syndrome type 1	Mirror therapy (n=24) Vs. Sham mirror therapy (n=24) *Treatment details:* 30-60 minutes/session, 5 days/week for 4 weeks. *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing shoulder, elbow and wrist flexion and extension; forearm pronation-supination. *Sham mirror therapy:* participants followed the same treatment regime, with the mirror covered with paper. Both groups also received conventional rehabilitation for 1 hour/session, 5 days/week that comprised	**At post-treatment (4 weeks) + 1 week:** (+) Visual analogue scale (VAS) – Pain at rest (+) VAS – Pain on movement (+) VAS – Tactile allodynia (+) Wolf Motor Function Test – Functional Ability (WMFT-FA) (+) WMFT – Performance Time (WMFT-PT) (+) Motor Activity Log – Quality of Movement (MAL-QOM) **At 6 months (follow-up):** (+) VAS – Pain at rest (+) VAS – Pain on movement (+) VAS – Tactile allodynia

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		neurorehabilitation techniques, occupational therapy and speech pathology (if needed).	(+) WMFT-FA (+) WMFT-PT (+) MAL-QOM
Cacchio et al., 2009b PEDro: 8/10 Country: Italy	24 patients with chronic stroke and complex regional pain syndrome type 1	Mirror therapy (n=8) Vs. Sham mirror therapy (n=8) Vs. Mental imagery (n=8) *Treatment details:* 30 minutes/day for 4 weeks. *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing bilateral proximal to distal movements. *Sham mirror therapy:* Participants followed the same treatment regime, while viewing a covered mirror. *Mental imagery:* not specified.	**At 4 weeks (post-treatment):** *Mirror therapy vs. Sham mirror therapy* (+) Visual analogue scale (VAS) – Pain *Mirror therapy vs. Mental imagery* (+) VAS – Pain *Mental imagery vs. Sham mirror therapy* (-) VAS – Pain
Cho & Cha, 2015 PEDro: 5/10 Country: Korea	30 patients with chronic stroke	Mirror therapy (n=14) Vs. Sham mirror therapy (n=13) *Treatment details:* 45 minutes/session, 3 times/week for 6 weeks. *Mirror therapy:* participants watched the non-paretic limb while performing 10 sets of 20 repetitions of movement/set: bilateral elbow flexion/extension, wrist pronation/supination and flexion/extension, digit flexion/extension.	**At 6 weeks (post-treatment):** (+) Box and Block Test (+) Jamar dynamometer – grip strength (-) Jebsen-Taylor Test of Hand Function (-) Fugl-Meyer Assessment

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Sham mirror therapy: participants followed the same treatment regime, using a mirror that did not show the non-paretic arm. All participants received transcranial direct current stimulation for 20 minutes (+ 5 minutes rest) prior to mirror therapy/sham mirror therapy.	
Colomer, Noe & Llorens, 2016 PEDro: 8/10 Country: Spain	34 patients with chronic stroke	Mirror therapy (n=17) Vs. Passive mobilisation (n=17) *Treatment details:* 45 minutes/session, 3 days/week for 8 weeks. *Mirror therapy:* participants observed the non-paretic limb in a mirror while performing exercises that consisted of a series of shoulder flexion/extension, forearm pronation/supination, and gross/fine movements of the wrist, hand and fingers; transitive/intransitive movements and gross motor tasks were performed with and without objects. *Passive mobilisation:* participants performed time-matched passive range of motion exercises of the paretic upper limb where no active motion was detected. Both groups received physical therapy for balance and gait training for 1 hour/session, 5 days/week.	**At post-treatment (8 weeks):** (-) Wolf Motor Function Test – Performance Time (-) Wolf Motor Function Test – Functional Ability (-) Fugl-Meyer Assessment – Upper Extremity (-) Nottingham Sensory Profile – Kinaesthetic (-) Nottingham Sensory Profile – Stereognosis (+) Nottingham Sensory Profile – Tactile (light touch) (-) Nottingham Sensory Profile – Tactile (pressure) (-) Nottingham Sensory Profile – Tactile (pinprick) (-) Nottingham Sensory Profile – Tactile (temperature) (-) Nottingham Sensory Profile – Tactile (tactile localisation) (-) Nottingham Sensory Profile – Tactile (bilateral simultaneous touch)

Mirror Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Dohle et al., 2009 PEDro: 7/10 Country: Germany	36 patients with subacute stroke	Mirror therapy (n=18) Vs. Upper extremity training performed while watching the affected arm (n=18) *Treatment details:* 30 minutes/session, 5 days/week for 6 weeks. *Mirror therapy:* participants watched the non-paretic arm in a mirror while performing bilateral arm, hand and finger exercises in response to verbal commands. *Upper extremity exercises:* participants followed the same treatment regime, with direct view of the affected arm.	**At 6 weeks (post-intervention)** (-) Fugl-Meyer Assessment (FMA) – Proximal arm (-) FMA – Hand (-) FMA – Finger* (+) FMA – Light touch (-) FMA – Proprioception (-) FMA – Range of motion (-) FMA – Pain (-) Action Research Arm Test (ARAT) – Grasp (-) ARAT – Grip (-) ARAT – Pinch (-) ARAT – Gross movement (-) Functional Independence Measure – Motor score (+) Non-validated 5-point scale of hemineglect A significant difference was seen in a subgroup of patients with distal plegia.
Gurbuz et al., 2016 PEDro: 5/10 Country: Turkey	31 patients with subacute stroke	Mirror therapy (n=16) vs. Sham mirror therapy (n=15) *Treatment details:* 20 minutes/session, 5 days/week for 4 weeks *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing flexion and extension of the non-paretic wrist and fingers. *Sham mirror therapy*: participants followed the same treatment regime while using the non-reflective face of the mirror.	**At 4 weeks (post-treatment):** (-) Brunnstrom stages of motor recovery – Upper extremity (-) Brunnstrom stages of motor recovery – Hand (+) Fugl-Meyer Assessment – Upper Extremity score (-) Functional Independence Measure

Mirror Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Both groups also received conventional rehabilitation that comprised range of motion and strengthening exercises and occupational therapy for 60-120 minutes/session, 5 days/week for 4 weeks.	
Invernizzi et al., 2013 PEDro: 5/10 Country: Switzerland	26 patients with acute stroke	Mirror therapy (n=13) vs. Sham mirror therapy (n=13) *Treatment details:* 30-60 minutes/session, 5 times/week for 4 weeks *Mirror therapy*: participants watched the non-paretic limb in a mirror while performing unilateral flexion/extension of the shoulder, elbow and wrist, and forearm supination/pronation. *Sham mirror therapy*: participants followed the same treatment regime with the reflective surface of the mirror covered by paper. Both groups also received conventional rehabilitation that comprised neurorehabilitative techniques, electrical stimulation and occupational therapy for 60 minutes/session, 5 times/week for 4 weeks.	**At post-treatment (4 weeks):** (+) Action Research Arm Test (+) Motricity Index – Upper extremity score (+) Functional Independence Measure
Ji, Cha & Kim, 2014 PEDro: 6/10 Country: Korea	35 patients with chronic stroke	Mirror therapy (n=11) Vs. Mirror therapy + rTMS (n=12) Vs. Sham mirror therapy (n=12) *Treatment details:* 15 minutes/session, 5 days/week for 6 weeks.	**At post-treatment (6 weeks):** *Mirror therapy vs. Sham mirror therapy:* (+) Fugl-Meyer Assessment (+) Box and Block Test *Mirror therapy + rTMS vs. Mirror therapy:* (+) Fugl-Meyer Assessment (+) Box and Block Test

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Mirror therapy: participants watched the less-affected limb in a mirror while performing unilateral finger flexion/extension. *Sham mirror therapy:* participants followed the same treatment regime with the mirror covered by white cloth. *rTMS:* 70 mm coil and a Magstim Rapid; 10 Hz rTMS was applied to the hotspot of the lesional hemisphere in 10 second trains, with 50 second intervals between trains, for 15 minutes. All participants also received conventional physical therapy using neurodevelopmental techniques for 30 minutes/day, 5 days/week.	*Mirror therapy + rTMS vs. Sham mirror therapy:* (-) Fugl-Meyer Assessment (-) Box and Block Test
Kim et al., 2016 PEDro: 5/10 Country: Korea	25 patients with chronic stroke	Mirror therapy (n=12) Vs. Conventional rehabilitation: (n=13) *Treatment details:* 30 minutes/session, 5 days/week for 4 weeks *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing 10 repetitions of the following exercises using the non-paretic limb – (i) reaching, (ii) grasping, (iii) manipulation, (iv) fold towel, (v) wipe table, (vi) squeeze sponge, (vii) pegboard, (viii) turn cards over, (ix) typing. *Conventional rehabilitation:* participants received a time-matched intervention comprising repetitive performance of the following exercises - (i) arm bicycling, (ii) pegboard, (iii) skateboard supported exercises on tabletop, (iv) kneading putty, (v) double curved arch, (vi) placing cones	**At 4 weeks (post-treatment):** (+) Action Research Arm Test (+) Box and Block Test (+) Fugl-Meyer Assessment – Upper Extremity (+) Functional Independence Measure

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		bimanually, (vii) stacking blocks, (viii) cone stacking, (ix) shoulder curved arch.	
Kim, Lee & Song, 2014 PEDro: 7/10 Country:	23 patients with subacute stroke	Mirror therapy + functional electrical stimulation (FES) (n=12) Vs. Sham mirror therapy + FES (n=11) *Treatment details:* 30 minutes/session, 5 days/week for 4 weeks. *Mirror therapy + FES:* participants watched the non-paretic hand in a mirror while performing bilateral simultaneous wrist and finger extension to turn on an FES switch placed in front of the non-affected hand. Electrodes placed at the proximal and distal ends of the forearm induced extension of the affected wrist and fingers by stimulation of the extensor muscles of digits, extensor carpi radialis longus and extensor carpi radialis brevis (frequency 20 Hz, pulse rate 300us, intensity to allow muscle contraction resulting in complete extension of the wrist and fingers). *Sham mirror therapy + FES:* not specified. Both groups also received conventional rehabilitation for 60 minutes/session, 5 days/week for 4 weeks, which included muscle facilitation through the neurodevelopmental treatment approach, muscle strengthening, balance training, gait training, task-specific repetitive functional training, strengthening, motor control training using resistance, and activities of daily living (ADL) training.	**At post-treatment (4 weeks):** (-) Fugl-Meyer Assessment (FMA) – Shoulder/elbow/forearm (+) FMA – Wrist (+) FMA – Hand (-) FMA – Coordination (-) Brunnstrom stages of motor recovery – Upper extremity (+) Brunnstrom stages of motor recovery – Hand (-) Manual Function Test – Shoulder (+) Manual Function Test – Hand (-) Box and Block Test

Mirror Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
Lee, Cho & Song, 2012 PEDro: 5/10 Country: Korea	28 patients with subacute stroke	Mirror therapy (n=14) vs. No mirror therapy (n=14) *Treatment details:* 25 minutes/session, 5 days/week for 4 weeks. *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing repetitive movements 30 times: (i) lifting both arms with elbows extended, (ii) moving both arms side-to-side with elbows extended, (iii) elbow flexion/extension, (iv) pronation, (v) wrist extension, (vi) wrist internal/external flexion, (vii) clenching/opening the fist, (viii) right hand holding left fingers, (ix) left hand holding right fingers, (x) tapping on the table. Both groups also received conventional stroke rehabilitation 5 days/week for 4 weeks that comprised therapeutic exercise for lower extremity muscle strength and gait for 30 minutes/session, 2 sessions/day + upper limb training for activities of daily living for 30 minutes/session + functional electrical stimulation to the upper and lower extremities simultaneously for 15 minutes/session.	**At 4 weeks (post-treatment):** (+) Fugl-Meyer Assessment (FMA) – Shoulder/elbow/forearm (+) FMA – Wrist (+) FMA – Hand (-) FMA – coordination (+) Brunnstrom stages of motor recovery – Upper extremity (+) Brunnstrom stages of motor recovery – Hand (+) Manual Function Test – Upper limb (+) Manual Function Test – Hand
Lim et al., 2016 PEDro: 6/10 Country: Korea	60 patients with subacute stroke	Mirror therapy (n=30) Vs. Sham mirror therapy (n=30) *Treatment details:* 20 minutes/session, 5 days/week for 4 weeks *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing functional bilateral tasks at	**At 4 weeks (post-treatment):** (-) Brunnstrom stages of motor recovery – Upper extremity (-) Brunnstrom stages of motor recovery – Hand (+) Fugl-Meyer Motor Function Assessment (+) Modified Barthel Index

Mirror Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		20 times/set for 3 sets; tasks included pronation/supination, wrist flexion/extension, finger flexion/extension, thumb opposition, tapping, picking up coins, flipping cards, placing pegs, drawing/colouring. *Sham mirror therapy:* participants followed the same treatment regime, using a wood block to obstruct vision of the paretic hand.	
Lin et al., 2014 PEDro: 7/10 Country: Taiwan	43 patients with chronic stroke	Mirror therapy (n=14) Vs. Mirror therapy + electrical stimulation (n=14) Vs. Conventional rehabilitation (n=15) *Treatment details:* 90 minutes/session, 5 days/week for 4 weeks *Mirror therapy:* participants performed 10 minute warm-up + 60 minutes mirror box training + 20 minutes functional task-oriented practice; mirror therapy comprised symmetrical bilateral simultaneous movements to perform tasks such as reaching to put a cup on a shelf, picking up marbles, pronation/supination, finger opposition. *Mirror therapy + electrical stimulation:* participants followed the same treatment regime while wearing a mesh glove with afferent stimulation to the affected hand. *Conventional rehabilitation:* participants performed functional task practice using task-oriented treatment principles at the same duration and intensity.	**At 4 weeks (post-treatment):** *Mirror therapy vs. conventional rehabilitation:* (+) Fugl-Meyer Assessment – Upper Extremity (FMA-UE) (-) Myoton-3 myometer – biceps (-) Myoton-3 myometer – flexor carpi radialis (-) Myoton-3 myometer – flexor carpi ulnaris (-) Box and Block Test* (-) 10-Meter Walk Test (10MWT) – self-paced – velocity* (-) 10MWT – self-paced – stride length* (-) 10MWT – quick – velocity* (-) 10MWT – quick – stride length (-) Motor Activity Log – Amount of Use (MAL-AOU) (-) Motor Activity Log – Quality of Movement (MAL-QOM) (-) ABILHAND (-) Wrist nMT (normalized movement time) (-) Wrist nMU (normalized movement units) (-) Normalized shoulder flexion*

Mirror Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(-) Normalized elbow extension (+) Max shoulder abduction Significant between-group difference seen in favour of conventional rehabilitation vs. mirror therapy *Mirror therapy vs. Mirror therapy + electrical stimulation:* (-) FMA-UE (-) Myoton-3 myometer – biceps (-) Myoton-3 myometer – flexor carpi radialis (-) Myoton-3 myometer – flexor carpi ulnaris (-) Box and Block Test** (-) 10MWT – self-paced – velocity** (-) 10MWT – self-paced – stride length** (-) 10MWT – quick – velocity** (-) 10MWT – quick – stride length (-) MAL-AOU (-) MAL-QOM (-) ABILHAND (-) Wrist nMT (-) Wrist nMU (-) Normalized shoulder flexion (-) Normalized elbow extension (-) Max shoulder abduction ** significant between-group difference seen in favour of mirror therapy + electrical stimulation vs. mirror therapy *Mirror therapy + electrical stimulation vs. conventional rehabilitation:* (+) FMA-UE

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(-) Myoton-3 myometer – biceps (-) Myoton-3 myometer – flexor carpi radialis (-) Myoton-3 myometer – flexor carpi ulnaris (-) Box and Block Test (-) 10MWT – self-paced – velocity (-) 10MWT – self-paced – stride length (-) 10MWT – quick – velocity (-) 10MWT – quick – stride length (-) MAL-AOU (-) MAL-QOM (-) ABILHAND (-) Wrist nMT (-) Wrist nMU (-) Normalized shoulder flexion (-) Normalized elbow extension (+) Max shoulder abduction
Michielsen et al., 2010 PEDro: 8/10 Country: The Netherlands	40 patients with chronic stroke	Mirror therapy (n=20) Vs. Bimanual exercises with sight of both hands (n=20) *Treatment details:* Supervised during physical therapy session one day/week + 1 hour/session at home, 5 days/week for 6 weeks. *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing bimanual exercises. *Bimanual exercises:* participants followed the same treatment regime, with sight of both hands.	**At 6 weeks (post-treatment):** (+) Fugl-Meyer Assessment (FMA) (-) Jamar handheld dynamometer – grip force (-) Tardieu scale (-) Visual analogue scale (VAS) – pain (-) Action Research Arm Test (ARAT) (-) ABILHAND (-) Stroke-ULAM (ratio between the amount of use of the unaffected and affected arms) (-) EQ-5D **At 6 months (follow-up):** (+) FMA (-) Jamar handheld dynamometer – grip force

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(-) Tardieu scale (-) VAS – pain (-) ARAT (-) ABILHAND (-) EQ-5D Note: The Stroke-ULAM was not re-administered at follow-up.
Mirela et al., 2015 PEDro: 5/10 Country: Romania	15 patients with subacute stroke	Mirror therapy (n=7) Vs. No mirror therapy (n=8) *Treatment details:* 30 minutes/session, 5 days/week for 6 weeks. *Mirror therapy:* participants watched their non-paretic limb in a mirror while performing bilateral movements – shoulder flexion/extension, elbow flexion/extension, wrist flexion/extension, forearm pronation/supination. Both groups also received conventional rehabilitation for 30 minutes/session, 5 days/week that consisted of neurorehabilitation techniques, electrical stimulation and occupational therapy.	**At post-treatment (6 weeks):** (+) Fugl-Meyer Assessment – Upper Extremity (-) Brunnstrom stages of motor recovery (-) Modified Ashworth Scale – shoulder (-) Modified Ashworth Scale – elbow (+) Modified Ashworth Scale – wrist (+) Bhakta Test – Finger flexion scale
Nagapattinam et al., 2015 PEDro: 4/10 Country: India	60 patients with subacute stroke	Mirror therapy (n=20) Vs. Functional electrical stimulation (FES) (n=20) Vs. Mirror therapy + FES (n=20) *Treatment details:* 30 minutes/session, 12 sessions, 2 weeks.	**At post-treatment (2 weeks):** (-) Action Research Arm Test (ARAT) – Grasp (-) ARAT – Grip (-) ARAT – Pinch (-) ARAT – Gross movement (-) ARAT – Total

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Mirror therapy: participants watched the non-paretic limb in a mirror while performing bilateral upper limb movements – active wrist extension/finger extension and task-specific grasp/release. *FES:* electrodes were placed over the extensors extensor digitorum communis, extensor carpi radialis brevis, extensor carpi radialis longus of the paretic limb; stimulation was applied at a frequency of 35 Hz, pulse width of 250 µs during two movements: active wrist extension/finger extension and task specific grasp/releasing. *Mirror therapy + FES:* participants followed the same mirror therapy treatment regime while watching the non-paretic limb in a mirror; FES was applied at the same frequency. All participants also received conventional rehabilitation targeting range of motion, functional upper limb tasks and activities of daily living, balance and mobility.	
Pandian et al., 2014 PEDro: 8/10 Country: India	48 patients with acute stroke	Mirror therapy (n=27) vs. Sham mirror therapy (n=21) *Treatment details:* 1 hour/session, 5 days/week for 4 weeks. *Mirror therapy:* participants watched the non-paretic hand in a mirror box while performing simultaneous bilateral flexion/extension movements of the wrist and fingers. *Sham mirror therapy*: participants followed the same treatment regime with the non-reflective surface of the	**At 1 month (post-treatment):** (+) Star cancellation test (+) Line bisection test (+) Picture identification task **At 3 months (follow-up):** (+) Star cancellation test (+) Line bisection test (+) Picture identification task **At 6 months (follow-up):** (+) Star cancellation test

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		mirror box facing the non-paretic limb and the paretic limb hidden from sight. Both groups received limb activation of the upper and lower extremities and functional activities for 1 hour/session, 5 days/week for 4 weeks.	(+) Line bisection test (+) Picture identification task
Park et al., 2015a PEDro: 3/10 Country: Korea	30 patients with chronic stroke	Mirror therapy (n=15) Vs. Sham mirror therapy (n=15) *Treatment details:* 30 minutes/session, 5 days/week for 4 weeks. *Mirror therapy:* participants watched the non-paretic upper limb in a mirror while performing unilateral movements – forearm pronation/supination, wrist/finger flexion/extension. *Sham mirror therapy:* participants followed the same treatment regime with the non-reflective side of the mirror facing the non-paretic limb.	**At post-treatment (4 weeks):** (+) Fugl-Meyer Assessment (+) Box and Block Test (+) Functional Independence Measure (FIM) – Total (+) FIM – Self-Care (-) FIM – Sphincter control (-) FIM – Transfer (-) FIM – Locomotion (-) FIM – Communication (-) FIM – Social cognition
Park et al., 2015b PEDro: 5/10 Country: Korea	30 patients with chronic stroke	Mirror therapy (n=15) Vs. Sham mirror therapy (n=15) *Treatment details:* 5 sessions/week for 6 weeks (duration of sessions not specified). *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing tasks with the non-affected hand – (i) reach to press switch, (ii) reach to grasp cone, (iii) grasp small bean bag, (iv) grasp cup, (v) lift plastic bottle, (vi) lift cup, (vii) put coins in money box, (viii) pick	**At post-treatment (6 weeks):** (+) Functional Independence Measure (+) Manual Function Test Note: results reflect significant difference in change scores from baseline to post-treatment.

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		up and place Baduk stone in palm with thumb and index finger. *Sham mirror therapy:* participants followed the same treatment regime, with the non-reflective side of the mirror facing the non-paretic limb.	
Purvane Vural et al., 2016 PEDro: 6/10 Country: Turkey	30 patients with subacute/chronic stroke and complex regional pain syndrome type 1	Mirror therapy (n=15) Vs. No mirror therapy (n=15) *Treatment details:* 30 minutes/day, 5 days/week for 4 weeks *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing unilateral movements – elbow flexion/extension, forearm supination/pronation, wrist flexion extension, finger flexion/extension, abduction/adduction, opposition. Both groups received conventional rehabilitation for 2-4 hours/day, 5 days/week that comprised neurodevelopmental techniques, occupational therapy, physical therapy and speech pathology (if needed).	**At 4 weeks (post-treatment):** (-) Brunnstrom stages of motor recovery – Upper extremity (-) Brunnstrom stages of motor recovery – Hand (-) Functional Independence Measure – motor (+) Fugl-Meyer Assessment – Upper Extremity (wrist) (+) Fugl-Meyer Assessment – Upper Extremity (hand) (-) Modified Ashworth Scale (+) Pain – visual analogue scale
Radajewska et al., 2013, 2017 PEDro: 4/10 Country: Poland	60 patients with subacute stroke	Mirror therapy (n=30) Vs. No mirror therapy (n=30) *Treatment details:* 15 minutes/session, 2 sessions/day, 5 days/week for 21 days. *Mirror therapy:* participants watched the non-paretic hand in a mirror while performing symmetrical movements of both hands.	**At 21 days (post-treatment):** (-) Functional Index 'Repty' (+) Frenchay Arm Test (-) Motor Status Score

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Both groups received conventional rehabilitation that comprise gymnastics, fitness exercises, gait training, arm training and massage for 2-5 hours/day, 5 days/week for 21 days.	
Rajappan et al., 2015 PEDro: 3/10 Country: Malaysia	30 patients with subacute/chronic stroke	Mirror therapy (n=15) Vs. Sham mirror therapy (n=15) *Treatment details:* 30 minutes/session, 5 days/week for 4 weeks *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing bilateral movements – finger flexion/extension and abduction/adduction, wrist flexion/extension and ulnar/radial deviation, and task-specific movements facilitating power and prehension grip. *Sham mirror therapy:* participants followed the same treatment regime, using the non-reflective side of the mirror. All participants received conventional rehabilitation for 1 hour/day, 5 days/week.	**At post-treatment (4 weeks):** (+) Upper Extremity Functional Index (+) Fugl-Meyer Assessment (FMA) – total (+) FMA – Upper Extremity (+) FMA – Wrist (+) FMA – Hand (+) FMA – Speed
Rehani, Kumari & Midha, 2015 PEDro: 4/10 Country: India	20 patients with subacute stroke	Mirror therapy (n=10) Vs. Motor relearning principles exercise program (n=10) *Treatment details:* 60 minutes/session, 6 days/week for 4 weeks *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing bilateral movements – wrist	**At post-treatment (4 weeks):** (-) Chedoke Arm and Hand Activity Inventory

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		flexion/extension, forearm pronation/supination, hand sliding. *Motor relearning principles exercise program:* participants performed wrist extension, forearm supination, thumb opposition, hand cupping and object manipulation. All participants also received conventional physiotherapy with electrical stimulation, included in the intervention time.	
Rodrigues et al., 2016 PEDro: 7/10 Country: Brazil	16 patients with chronic stroke	Mirror therapy (n=8) Vs. Sham mirror therapy (n=8) *Treatment details:* 1 hour/session, 3 times/week for 4 weeks. *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing object-related bilateral symmetrical training with systematic progression, incorporating principles of task-oriented training including functional movements, manipulation of objects from real life and multiple joint movement planes. *Sham mirror therapy:* participants followed the same treatment regime, with the mirror covered with paper.	**At post-treatment (4 weeks):** (-) TEMPA – Total (-) TEMPA – Unilateral tasks (-) TEMPA – Bilateral tasks (-) Fugl-Meyer Assessment – Upper Extremity (FMA-UE) – Total (-) FMA-UE – Proximal (-) FMA-UE - Distal
Samuelkamaleshkumar, et al., 2014 PEDro: 6/10 Country: India	20 patients with subacute stroke	Mirror therapy (n=10) Vs. No mirror therapy (n=10) Treatment details: 1 hour/session, 5 days/week for 3 weeks. Mirror therapy: participants watched the non-paretic limb in a mirror box while performing bilateral movements	**At post-treatment (3 weeks):** (+) Fugl-Meyer Assessment – Upper Extremity (+) Brunnstrom stages of motor recovery – Upper extremity (+) Brunnstrom stages of motor recovery – Hand

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		that facilitated arm/hand dexterity (e.g. squeezing, placing beads/pegs, turning cards) and finger dexterity (e.g. placing pins, counting marbles, fine shape sorting). Both groups received conventional rehabilitation that included physical therapy, occupational therapy and speech pathology (as needed) for 6 hours/day, 5 days/week for 3 weeks.	(+) Box and Block Test (-) Modified Ashworth Scale
Thieme et al., 2012 PEDro: 8/10 Country: Germany	60 patients with subacute stroke	Individual mirror therapy (n=18) Vs. Group mirror therapy (n=21) Vs. Sham group mirror therapy (n=21) *Treatment details:* 30 minutes/session, 5 times/week for 5 weeks (up to 20 sessions). *Individual mirror therapy:* participants watched the non-paretic limb in a mirror while performing isolated movements of the fingers, wrist, lower arm, elbow and shoulder in all degrees of freedom using object-related bilateral movement. *Group mirror therapy:* participants followed the same protocol as individual mirror therapy, with 2-6 participants per group. *Sham group mirror therapy:* participants followed the same treatment protocol as individual mirror therapy, with a wooden board in place of the mirror to restrict view of the affected hand. All participants also received conventional rehabilitation.	**At post-treatment (5 weeks):** *Individual mirror therapy vs. group mirror therapy:* (-) Fugl-Meyer Assessment (FMA) – Motor score (-) FMA – Sensory (-) FMA – Range of motion (-) FMA – Pain (-) Action Research Arm Test (ARAT) (-) Barthel Index (BI) (-) Stroke Impact Scale (SIS) (-) Star Cancellation Test (SCT) (+) Modified Ashworth Scale (MAS) – Finger flexors (-) MAS – Wrist flexors *Individual mirror therapy vs. Sham group mirror therapy.* (-) FMA – Motor score (-) FMA – Sensory (-) FMA – Range of motion (-) FMA – Pain (-) ARAT

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
			(-) BI (-) SIS (+) SCT (-) MAS – Finger flexors (-) MAS – Wrist flexors *Group mirror therapy vs. Sham group mirror therapy:* (-) FMA – Motor score (-) FMA – Sensory (-) FMA – Range of motion (-) FMA – Pain (-) ARAT (-) BI (-) SIS (-) SCT (-) MAS – Finger flexors (-) MAS – Wrist flexors
Wu et al., 2013 PEDro: 6/10 Country: Taiwan	33 patients with chronic stroke	Mirror therapy (n=16) Vs. Task-oriented training (n=17) *Treatment details:* 1.5 hours/day, 5 days/week for 4 weeks. *Mirror therapy:* participants watched the non-paretic limb in a mirror during repetitive, bimanual, symmetrical practice of (i) transitive fine motor movements, (ii) gross motor tasks, and (iii) intransitive movements for 60 minutes/session, followed by an additional 30 minutes/session of task-oriented functional practice.	**At post-treatment (4 weeks):** (+) Fugl-Meyer Assessment – Upper Extremity (FMA-UE) – Total score (-) FMA-UE – Proximal score (+) FMA-UE – Distal score (-) Revised Nottingham Sensory Assessment (rNSA) – Light touch (+) rNSA – Temperature (-) rNSA – Pinprick (-) rNSA – Pressure (-) rNSA – Tactile localization (-) rNSA – Bilateral simultaneous touch

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Task-oriented practice: participants performed a time-matched intervention to improve coordination and motor control in the affected upper extremity using unilateral/bilateral fine motor tasks as well as static/dynamic standing, sitting, balance and functional tasks.	(-) rNSA – Tactile total (-) Motor Activity Log – Amount of Use (MAL-AOU) (-) Motor Activity Log – Quality of Movement (MAL-QOM) (-) ABILHAND *Upper extremity kinematics* (+) Reaction time (-) Normalized movement time (+) Normalized total displacement (-) Normalized shoulder flexion (-) Normalized elbow extension (-) Maximum shoulder abduction (+) Maximum shoulder-elbow cross-correlation **At follow-up (6 months):** (-) MAL-AOU (-) MAL-QOM (-) ABILHAND
Yavuzer et al., 2008 PEDro: 8/10 Country: Turkay	40 patients with subacute/chronic stroke	Mirror therapy (n=20) Vs. Sham mirror therapy (n=20) *Treatment details:* 30 minutes/day, 5 days/week for 4 weeks. *Mirror therapy:* participants watched the non-paretic limb in a mirror while performing unilateral wrist and finger flexion/extension. *Sham mirror therapy:* Participants followed the same treatment regime, while watching the non-reflective side of the mirror.	**At 4 weeks (post-treatment):** (+) Brunnstrom stages of motor recovery – Upper extremity (+) Brunnstrom stages of motor recovery – Hand (+) Functional Independence Measure (FIM) – Self care items (-) Modified Ashworth Scale **At 6 months (follow-up):** (+) Brunnstrom stages of motor recovery – Upper extremity

Mirror Therapy – upper extremity

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		Both groups also received conventional rehabilitation for 2-5 hours/day, 5 days/week for 4 weeks.	(+) Brunnstrom stages of motor recovery – Hand (+) Functional Independence Measure (FIM) – Self care items (-) Modified Ashworth Scale Note: results reflect significant differences in change scores.
Yeldan et al., 2015 PEDro: N/A (non-randomized study) Country: Turkey	8 patients with acute stroke	Mirror therapy (n=4) Vs. No mirror therapy (n=4) *Treatment details:* 20 minutes/session, 5 days/week for 3 weeks. *Mirror therapy:* treatment regime not specified. Both groups also received neurodevelopmental treatment for 40 minutes/session, 5 days/week for 3 weeks.	**At post-treatment (3 weeks):** (-) Fugl-Meyer Assessment – Upper Extremity (-) Motricity Index – Upper extremity score (-) Stroke Upper Limb Capacity Scale (-) Ayres Southern California Sensory Integration Test (-) Barthel Index
Yun et al., 2011 PEDro: 4/10 Country: Korea	60 patients with subacute stroke	Mirror therapy (n=20) Vs. Mirror therapy + Neuromuscular electrical stimulation (NMES) (n=20) Vs. NMES (n=20) *Treatment details:* 30 minutes/session, 5 days/week for 3 weeks. *Mirror therapy:* participants watched the non-paretic hand in a mirror while performing unilateral movements including wrist flexion/extension, at intervals of 5 seconds.	**At post-treatment (3 weeks):** *Mirror therapy vs. NMES:* (-) Modified Ashworth Scale (-) Power – Hand flexion (-) Power – Hand extension (-) Power – Wrist flexion (-) Power – Wrist extension (-) Fugl-Meyer Assessment (FMA) – Wrist (-) FMA – Hand (-) FMA – Coordination (-) FMA – Combined score *Mirror therapy + NMES vs. Mirror therapy:* (-) Modified Ashworth Scale

Author, Year PEDro Score, Country	Sample size	Intervention	Outcome and significance: (+) significant (-) not significant
		NMES: electrical stimulation was applied to the common extensor digitorum muscle and extensor polliics brevis of the paretic arm at 30-70 mZ intensity, 250 µsec amplitude and 35 Hz frequency for 5 seconds and then stopped for 5 seconds. At the same time, patients actively practiced paretic-side wrist and hand flexion and extension to electrical stimuli. Participants performed simultaneous bilateral movements while looking into an opaque wooden board.	(-) Power – Hand flexion (+) Power – Hand extension (-) Power – Wrist flexion (-) Power – Wrist extension (+) Fugl-Meyer Assessment (FMA) – Wrist (+) FMA – Hand (+) FMA – Coordination (+) FMA – Combined score *Mirror therapy + NMES vs. NMES:* (-) Modified Ashworth Scale (-) Power – Hand flexion (+) Power – Hand extension (-) Power – Wrist flexion (-) Power – Wrist extension (+) Fugl-Meyer Assessment (FMA) – Wrist (+) FMA – Hand (+) FMA – Coordination (+) FMA – Combined score