**Supplemental Digital Content 4: short intervention description**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Study**  **Country**  **Study design**  **Etiology** | **Intervention content and setting** | **Comparator content** | **Community-based group(s) dose and duration** | **Key findings** |
| **Holistic interventions** | |  |  |  |
| \*Behn et al.47  United Kingdom  non-RCT  mixed etiology | A project-based intervention to increase recovery in communication skills and improve QoL. Included communication-based goal setting, peer feedback in group, and project completion. **Setting:** Multiple community locations | Wait list | 6 weeks treatment program encompassing ten 2-hours sessions. | A medium effect size found in the treatment group for the primary outcome measure that rated the conversational skills of the injured person, compared with the control group post treatment. A large size effect was found for the secondary outcome measure that rated the skills of the communication partner, all other outcomes had small effect sizes. Evaluating effects after cross-over showed medium to large effect sizes for measures of conversation, perceived communicative ability and quality of life. All other measures had small effect sizes. |
| Bell et al.28  USA  RCT  TBI | A telephone counseling and educational intervention to improve general outcome. Included motivational interviews, goal setting, problem solving, counselling, education, facilitation of usual care and therapy prescription. **Setting:** Home | Treatment as usual in line with recommendation from acute rehabilitation treatment team for medical and therapy follow-up post discharge. | Up to 9 months post discharge from acute rehabilitation, with telephone contacts at 2 and 4 weeks, and 2-,3-,5-,7-, and 9 months. Each telephone session lasted 30-45 min. | At 1-year follow-up, the scheduled telephone intervention group did significantly better on the primary composite outcome index compared to control group, as well as on the specific composites measuring functional status and quality of well-being. There were no significant differences on vocational status or community integration status. |
| Bell et al.29  USA  RCT  TBI | A telephone counseling and educational intervention to improve general outcome. Included motivational interviews, goal setting, problem solving, counselling, education, decision of problem level and need for treatment referral. **Setting:** Home | Treatment as usual consisting of medical and therapy follow-up in the community. | Up to 21 months post discharge from acute rehabilitation, with telephone contacts at 3 to 4 days, 2-, 4-, 8-, and 12- weeks, and 5-, 7-, 9-, 12-, 15-, 18-, and 21 months post discharge. | No significant differences noted between the groups at year 1 or 2 for the primary composite outcome index, nor the specific composite measures with regard to functional status, community participation, quality of well-being or vocational status. |
| Grill et al.32  Germany  non-RCT  mixed etiology | A coordinated advisory intervention to improve functioning and decreased readmission to acute hospital. Included discharge planning, training of caregivers, home visits with training of both patient and caregiver, phone-calls and workshops for caregivers. Program adapted to the severity of impairment. **Setting:** Both home and in facility not community-based | Control group received standard aftercare consisting of outpatient rehabilitation with ambulatory services offering physical therapy, occupational therapy, and speech therapy. | Depending on the functional status at discharge, patients and caregivers received one or several components of the coordinated advisory program during 2 years after discharge. Patients with lower scores received increased intervention. | Patients in the intervention group experienced a moderate gain in FIM. Rate of days in hospital was 15.4 per 1000 person days (intervention) and 15.5 per 1000 person days (control). A total of 16.0% of patients in the intervention group and 19.3% in the control group died during follow-up. |
| Hanks et al.34  USA  RCT  TBI | A peer mentoring intervention to promote emotional well-being and higher level of community integration. Included mentoring sessions focusing on: emotional well-being, quality of life, and community integration. Mentors provided social and emotional support, access to community resources, and discussion of TBI topics. **Setting:** Home | Treatment as usual with the usual socialization that occurs after discharge from inpatient rehabilitation. | Weekly meetings first month, biweekly the next 2-3 months, then monthly for the remainder of the first year. Mentees were encouraged to continue the relationship with their mentors during the second year. | Among persons with TBI, individuals who received mentoring had significantly better behavioral control and less chaos in the living environment, lower alcohol use, less emotion-focused and avoidance coping, and better health-related quality of life, compared with controls. Among significant others, mentored individuals demonstrated greater community integration than control group. There were no significant group differences regarding community integration and levels of depression or anxiety. |
| Hartman-Maeir et al.42  Israel  non-RCT  stroke | A community day-program intervention to improve functional outcome, level of leisure activity and satisfaction. Included day-program with a wide range of group treatments provided by multidiciplinary rehabilitation professionals. **Setting:** Local health care facility | Controls were not participating in any ongoing rehabilitation program. | Day center treatment 2–4 days a week. Duration for participants not specified. | At follow-up, participants in the intervention group were even more disabled in basic activities of daily living than participants in the control group. Also, the intervention group showed lower mean scores on functional measures compared to the control group. Life satisfaction rates were significantly higher in the interventions group compared to controls, with regard to “life as a whole” and from their leisure situation. (Intervention group and control group were not compared on outcome measures at study inclusion). |
| \*Mayo et al.39  Canada  RCT  stroke | A structured intervention to enhance life participation. Included project-based activities and exercise in groups to promote learning, leisure, and social activities. Goal formulation targeted life goals. Physical exercise included aerobics, strength of peripheral and core musculature, balance, flexibility, and rapidity of movements. **Setting:** Other local community facility | Wait list for three to four months, until entering the program. | 3- hour group meetings twice a week, in a total of 3 blocks. Exercise component in weekly meetings lasted 45 minutes. 12 months total program duration. (controlled outcome assessment conducted after first block). | No significant differences between the two groups on the outcome measures at 3 months. Statistically significant increases over time found in all study outcomes on average over all persons enrolled in the program. Over 45% of people met or exceeded the pre-specified target of a three hour per week increase in meaningful activity, which often took a full year of intervention to achieve. |
| \*Ownsworth et al.46  Australia  RCT  mixed etiology | An "individualized occupation-based support" intervention and a "Combined group and individualized support" intervention, to improve goal attainment and psychosocial functioning. The first intervention included use of client-centered goals and occupational activities. The combined group included both group-based support sessions and individualized occupation-based sessions. **Setting:** Mainly home-based, minority in facility not community-based | Wait list groups for three different interventions. The group-intervention was conducted in a hospital. | The "individualized occupation-based support" group received 3-hour visits once a week, for 8 weeks. The "Combined group" received same total hours over 8-week period), 12 hours spent in group sessions and 12 hours spent in individualized sessions. | Improvement in self and relative ratings of performance and satisfaction for formulated goals found in the combined and in the individual intervention between the pre- and post-assessment, but not for the group intervention (control). Gains in behavioral competency and psychological well-being occurred more frequently following the individual and group interventions than after the combined intervention. |
| \*Ownsworth et al.45  Australia  RCT  Brain tumor | A structured intervention to improve psychosocial functioning. Included core and modular components, with the latter tailored to people’s goals, life situation and cognitive capacity. The first sessions focused on goal formulation. Following sessions included psychoeducation, neuropsychological feedback, cognitive rehabilitation, psychotherapy, and family support. **Setting:** Home | Wait list, receiving usual care, before entering the program. | 10 weeks program with weekly therapy sessions lasted 1 hour each. | Significantly lower levels of depression and higher levels of existential well-being, functional well-being and global quality of life found in treatment group compared to waitlist group. No significant between-group differences found on social/family well-being, emotional well-being, overall quality of life, anxiety, and stress. At 6-month late follow-up, participants in treatment group reported significantly lower levels of depression and stress and higher existential well-being and QoL relative to pre-intervention. |
| Powell et al.40  United Kingdom  RCT  TBI | An outreach treatment intervention to improve independence, inactivity, participation, and psychosocial well-being. Included individualized treatment tailored to the diversity of impairments and psychosocial problems presented by people after TBI, delivered within a goal planning framework. Goals valued by participants and their carers were formed as written goals. **Setting:** Home | All study participants received assessment, limited treatment, and support from outreach team for 1 month immediately after discharge hospital. Control information group not given further outreach support, only advice and limited assistance with pursuing referrals to outpatient service. Treatment as usual not recorded. | 2-6 hours weekly meetings with therapist(s), for an average of 27.3 weeks. Duration of outreach treatment averaged 28.1 (SD 19.1) weeks. It exceeded a year for six clients, completed by 15 months for all but one. | Outreach participants were significantly more likely to show gains on the Barthel Index and the BICRO-39 total score, and also self-organization and psychological well-being subscales, compared to controls. Differential improvements were not seen for indices of socializing, productive employment, anxiety, or depression. |
| Rotenberg-Shpigelman et al.41  Israel  RCT  stroke | A neurofunctional occupation-based intervention to enhance participation. Included use of a compensatory approach. Individualized occupational goals achieved through task-specific training and environmental supports. **Setting:** Local health care facility | Wait list, with standard treatment. | 3 months intervention, with 4 hours training 1-3 times a week. (median treatment sessions = 7 (range 2-20). | Significant differences between the groups were found on occupational performance measures, but not on measures for quality of life. |
| Trexler et al.30  USA  RCT  mixed etioloy | A resource facilitation intervention to improve return to work/school. Included support from facilitation team, assessment, goal setting, psycho­­education, access community resources, monitoring status plan, coordination, and guideline. **Setting:** multiple community locations | Treatment as usual; acute and outpatient rehabilitation services, depending on funding | 15 months intervention, individual doses unknown. | Participants in the resource facilitation group showed a significant advantage in rate and timing of return to productive community-based work relative to control participants. 69% of the resource facilitation group returned to competitive work (not school), compared to 50% of the control participants. No effect found on psychological distress or home/community re-entry. |
| \*Wang et al.43  Taiwan  RCT  stroke | A caregiver-mediated intervention to enhance physical functioning and social participation. Included teaching personalized rehabilitation skills, teaching skills for training patient’s body functions, and task-specific restorative and compensatory methods to participate in restorative outdoor leisure activities. **Setting:** Home | Study-based treatment with weekly contact with therapist to talk about their rehabilitation progress, daily activities, and general health conditions. Control group not given specific instructions or guidance related to rehabilitation skills, | 12 weeks program with 90-min. sessions once weekly. | A significant group difference found in improvement on all the domain on Stroke Impact Scale, except from memory and emotion. There was a significant group difference in improvement on walking velocity, 6-minute Walking Test, Berg Balance Scale, and Barthel Index. The intervention did not significantly increase caregiver burden. |
| \*Winter et al.44  USA  RCT  TBI | A three-phase intervention to promote integration, managing TBI symptoms and daily functioning. Included clinical assessment, identification of problem areas leading to an Action Plan, and strategy training for managing TBI problems. **Setting:** Both home and in facility not community-based | Two telephone calls to maintain contact with participants, in addition to standard care offered at TBI veteran clinic for all participants. | 8 sessions; 6 home visits and 2 telephone calls. Each session 1-2 hours duration, with intervention over 4 months. | Participants in intervention group had significantly higher community re-integration scores and less difficulty managing targeted outcomes, compared to controls. Self-rated functional competence did not differ between groups. |
| **Physical interventions** | |  |  |  |
| \*Arkan et al.48  Turkey  non-RCT  stroke | A muscle training intervention to improve urinary incontinence, healthcare outcomes and caregiver burden. Included pelvic muscle floor exercises (PMFE) and guidance to both patient and caregiver. **Setting:** Home | Baseline assessment and follow up. No information about PFME given before follow-up assessment. | 12 weeks PFME training including 4 home visits (45-60 min. each), as well as telephone calls once a month. | Significant difference found between the experiment group and control group in terms of incontinence quality of life, severity and frequency of urine incontinence, pad test after intervention, and increase in self-efficacy in the experimental group, but no significant difference on caregiver burden. |
| \*Aydin et al.49  Turkey  RCT  stroke | A neurological intervention to improve social rehabilitation outcome. Included balance coordination training, hand rehabilitation, exercises in stretching, relaxation, walking, and posture. **Setting:** Home | Standard treatment with neurological rehabilitation delivered by physiotherapist, including training of balance and hand, exercises for stretching, relaxation, walking, and posture. | Twice a week for 3 months. | The average FIM motor scores did not differ significantly between the two groups. Both groups had significant changes in FIM score between baseline and 3 months follow-up. |
| \*Barzel et al.58  Germany  RCT  stroke | A two-phase intervention to improve upper limb dysfunction. Included constraint-induced motor therapy towards goals related to everyday participation, and supervision arm exercise to patient and caregiver. **Setting:** Home | Study based treatment of upper limb impairment after stroke by a physical/ occupational therapist. Therapy content did not include resting glove. | 4 weeks program with 5 home visits of 50–60 min. by therapist. Pluss home exercise by patient and caregiver coach for 2 hours each weekday during the intervention period. | Patients in both groups improved in quality of hand movement of affected arm, but home CIMT group improved more than control group. Both groups also improved in motor function performance time, but the extent of improvement did not differ between groups. No difference found on secondary outcomes. |
| \*Bellon et al.59  USA  RCT  TBI | A walking intervention to improve coping with stress and depressive symptoms. Included individualized walking goal with gradual increase of steps from baseline, with a 40% total increase for the last 4 weeks. **Setting:** Home | Study-based treatment with a nutrition intervention to learn about eating healthy, identifying eating habits to be improved during the program. | 12 weeks walking program. The coach contacted participants 3 times a week for the first 3 weeks, twice a week for the next 5 weeks, once a week for the remaining 4 weeks of the study. | A main effects of time indicated that perceived stress and depression symptoms significantly improved following the walking intervention, showing improvements at follow-up, but there were no significant between -groups differences. |
| \*Brouwer et al.50  Canada  RCT  stroke | A “Tune-Up” intervention to improve community reintegration, mobility, and QoL. Included physical mobility training based on individualized goals, with focus on strength, balance, cardiovascular endurance, motor coordination, and education about community resources. **Setting:** Home | Treatment as usual with standard post-stroke care. Exposure to same assessments as intervention group, but no “tune-up”. Blinded to being part of the trial. | 1 hour treatment session delivered 3 times over a period of 2 weeks. Intervention introduced both at 6 months and at 12 months post discharge. | At 12 and 15 months, both groups showed significant improvement in community reintegration, but no difference between groups. A main effect of time reflected improvement in mobility-related and quality of life outcomes for both groups, but no group differences. |
| \*Chan & Tsang64  Hong Kong  RCT  stroke | A Tai Chi-based intervention to improve dual-tasking performance. Included exercises for posture, weight shifting, and sequential movement of body segments when turning. **Setting:** Both local community facility and facility not community-based | The "conventional exercise group" received study-based treatment with walking and performing joint mobilization, and stretching, mainly performed seated. Control group received no intervention, but treatment as usual. | 12 weeks training program, with 1 hour session twice a week, with a total of 24 sessions. Instructions to practice exercises outside of training sessions for at least 30 minutes per week. | There were no significant differences in the outcome measures between any of the groups after the intervention or at the follow-up. Within-group comparisons showed improvements in dual-tasking performance after Tai Chi training and further improvement during the follow-up period. |
| \*Chen et al.56  China  RCT  stroke | A comprehensive exercise program to improve recovery of motor function of lower limb spasticity. Included strengthening of lower limb muscle groups, such as joint training, sit-ups, balance training while standing, bending to pick things up, straight leg lifting, and climbing stairs. **Setting:** Home | Standard treatment with conventional rehabilitation after discharge from hospital, including issuing a rehabilitation manual for stroke, telephonic follow-up, and f medical appointments for assessment of recovery at 3, 6, and 12 months. | 12 months program. 3 sessions per week during first 3 months. 1 session per week next 3 months, thereafter once a month, and once every other month, up to 12 months. Session lasting 30 min. | Significantly greater improvements in motor performance, spasticity, walking ability, and ability to perform ADL (all outcome measures) found at 6 and 12 months after discharge between the control and intervention groups. The study found both within-group and interaction effects on all four outcomes, but non-significant results between groups effects. |
| \*Clanchy et al.51  Australia  non-RCT  mixed etiology | An activity intervention to increase recovery in physical activity participation. Included stage-matched lifestyle behavior change activities, exercise prescription, community access facilitation, and relapse prevention strategies. **Setting:** Home | Study-based treatment with a program promoting sun safety, healthy sleep, and oral health. | 10 sessions over 12 weeks period, each session 1 hour duration. | The increase in daily counts per minute and minutes of moderate-to-vigorous-intensity in physical activity was significantly greater among intervention participants than controls at end of treatment. Group difference in the change from baseline to follow-up was non-significant, and no significant between-group differences were found on secondary outcome measures. |
| \*Donnelly et al.63  USA  non-RCT  mixed etiology | A Yoga intervention to increase QoL. Program tailored to individuals with brain injury, using simple, slow, and repeated pose sequences. Included brain injury themes, such as acceptance, positive thinking, and resilience. **Setting:** Other local community facility | Unknown | 8 weeks program with 1 hour training session twice weekly. | No significant differences found between intervention and control group on the QOLIBRI pre- or post-intervention. There were significant improvements on overall quality of life and on Emotions and Feeling sub-scales for the intervention group only. |
| \*Gordon et al.60  Jamaica  RCT  stroke | A walking intervention to increase recovery in functional status and improve QoL. Included supervised walking program with gradually increased walking time and speed up to 30 minutes, performed in their home or community. **Setting:** Home | Study-based treatment with light massage to the affected limbs. | 12 weeks program with up to 30 min. walking exercise 3 times per week. | In the intervention group, there was a trend toward a significantly greater increase in Physical Health Component scores over time. Significantly higher overall mean score was found for Physical Health Component scores in the intervention group compared with control. There were no group differences for the Mental Component Summary score or on functional status measures. |
| \*Graef et al.52  Brazil  RCT  stroke | A functional strength intervention to improve activity of upper extremity. Included exercises while seated in chair performing reaching-to-grasp movements against resistance, using objects that varied in size and shape. Weight remained at 60% of maximum strength, starting with range of motion at 60° of shoulder flexion, progressing to 90° by the eighth session. **Setting:** Home | Study-based treatment with analytical strengthening program including therapist-supervised training. Exercises done seated in a chair. Upper extremity strengthening while using repetitive movements without a functional goal. | 5 weeks program with 30 min. functional strengthening exercises 3 times per week, with a total of 15 sessions. | Statistically significant difference found between the Functional strengthening group and the Analytical strengthening group for the upper extremity unilateral task analysis after treatment and for the combined upper extremity unilateral and bilateral task scores both after treatment and at 10-month follow-up. Upper extremity performance significantly improved in both groups throughout the intervention period and in the follow-up. No significant difference was observed between groups in the other outcomes. |
| \*Hesse et al.37  Germany  RCT  Stroke | A physiotherapy intervention to increase recovery of motor functions. Included intermittent high-intensity program delivered in three blocks, applying an eclectic treatment approach to train reduced motor functions nominated by patient and caregiver as relevant for their daily life. **Setting:** Home | Standard treatment with regular physiotherapy program for home-based chronic stroke patients by local physiotherapist. | 3 blocks of 2 months duration (months 1&2, months 5&6, months 9&10), consisting of 4 therapy sessions every week, each session lasted 30 to 45 min. Self-therapy program between treatment blocks. | The primary variable measuring mobility improved significantly over time in both groups, but between-group difference was not found. Between-group difference was not found at secondary outcomes, but functional improvement over time was found in both groups. |
| Hoffman et al.67  USA  RCT  TBI | A structured aerobic intervention to improve mood. Included exercise sessions with15 minutes education, 15 minutes of exercise warm-up, 30 minutes of aerobic exercise, and 15 minutes cool-down and planning for home-exercise program. Subjects could choose from a selection of aerobic exercise for each session. **Setting:** Other local community facility | Wait list, but not given any specific recommendations regarding abstention from exercise. Control group offered the aerobic intervention after the 10-week follow up. | 10 weeks program, with 75 min. weekly exercise session. | Between-group comparisons showed no group difference on the Beck Depression Inventory. For secondary outcomes, the exercise group reported less pain interference and greater improvement on the Brief Pain Inventory compared to the control group. No significant between-group differences found for head injury symptoms, perceived quality of life, sleep, general health status, heart rate, or ability to walk. For the groups divided by minutes exercised per week, the high-activity group had significantly better depression scores than the low-activity group. |
| \*Huijgen et al.36  Multicentre (Italy, Spain, Belgium)  RCT  mixed etiology | A telerehabilitation intervention to increase recovery of arm and hand function. Included use of a portable Home Care Activity Desk, with sensorized tools to perform functional activity exercises for upper limb while recorded with web camera. Video information used for videoconference supervision by therapist. **Setting:** Home | Control group received standard treatment, heterogenous in approach and intensity, with average frequency three times a week, with average session duration 45 min. | 1-month usual care, then 4 supervised training sessions with portable device. Then home training with portable activity desk for 1 month. 30 min. training 5 days a week and weekly videoconference supervision. | There were no significant differences between the two groups on the outcome measures. In both groups, patients maintained or even improved their arm/ hand function. The training with portable Home Care Activity Desk was found to be as feasible as usual care in terms of clinical outcomes. |
| \*Jeong et al.66  South Korea  RCT  stroke | A rhythmic-music intervention to promote physical- and psychosocial functioning and QoL. Included rhythmic music combined with specialized rehabilitation movements, with feedback from instructor on motion performance. Educational booklets provided with information about stroke, rehabilitation process and intervention goal. **Setting:** Local health care facility | Control group received treatment as usual and given only referral information about usual care available in the surrounding community. | 8 weeks intervention, 2 hours per week. | Participants in the experimental group gained a wider range of motion and flexibility, had more positive moods, and reported increased frequency and quality of interpersonal relationships, compared to controls. No significant group differences were found on range of motion regarding shoulder flexion, ankle flexion, and no differences found on quality of life. |
| \*Lima et al.38  Brazil  RCT  stroke | A modified constraint-induced movement therapy (mCIMT) intervention to improve strength, function, and quality of life. Use of trunk restraint in addition to constraint-induced movement therapy, while application of motor activity log, with four shaping tasks and a practice task. Task difficulty adjusted individually, and task difficulty increased over successive sessions. **Setting:** Home | Study-based treatment with the same intervention, but without the trunk restraint. | 2 weeks program with mCIMT plus trunk restraint training with training 5 times per week, 3 hours daily. Also, the participants were required to wear a glove, which restricted their non- paretic hand 90% of the awake time for the 2 weeks. | Both groups demonstrated significant improvements in the motor activity log scores and in the time to perform bimanual activities, and gains maintained during the follow-ups. However, no between-group differences were observed. Trunk restraints associated with home-based mCIMT was not superior to home-based mCIMT, as no significant interaction effects were found. No significant training effects were found for the other secondary outcomes. |
| \*Llorens et al.61  Spain  RCT  stroke | A virtual reality-based tele-intervention to increase balance recovery. Applied a virtual environment consisting of a checkered floor that facilitated the perception of depth. Exercise included stepping on various items placed on the floor around a circle, while maintaining one foot within the boundaries of the circle, thus practicing balance. **Setting:** Home | Study-based treatment with the same virtual reality telerehabilitation program in balance recovery, but conducted in hospital setting. Both groups received in addition conventional physical therapy in the clinic. | Twenty 45-minute training sessions 3 times a week. Weekly interviews by therapist. | A significant improvement was found in both groups from the initial to the final assessment in all outcome balance scales. No significant group-by-time interaction was detected in any scale. |
| \*Pang et al.53  Canada  RCT  stroke | A fitness and mobility intervention to enhance cardiorespiratory fitness, mobility, leg muscle strength, balance, and hip bone mineral density. Included protocol for three training stations with specific exercises and prescribed duration and intensity to be increased as tolerated throughout trial progression. **Setting:** Other local community facility | Study-based treatment with a seated upper extremity program, containing three training stations with specific exercises for upper extremity, with no aerobic exercises, leg strengthening, or balance training. | 19 weeks exercise program, with 1-hour sessions, 3 sessions per week. | The intervention group had significantly more gains in cardiorespiratory fitness, mobility, and paretic leg muscle strength than controls. Femoral neck bone mineral density of the paretic leg was maintained in the intervention group, but significantly declined in controls. No significant time-by-group interaction found for balance, activity and participation, nonparetic leg muscle strength, or nonparetic femoral neck bone mineral density. |
| Patterson et al.54  Australia  non-RCT  stroke | A maintenance exercise intervention to improve motor deficits. Included both physical exercise training and peer support. Physical exercises in balance, gait re-education, strength, endurance, coordination, and fine motor tasks. Peer support component consisted of active participation from participants regarding personal experience and adjusting to daily life, supervised by therapist. **Setting:** Local health care facility | Study-based treatment with only peer support incorporating personal achievement, planning leisure activities, community-based participation and personal experience/ adjusting to daily life. The mode was active participation facilitated by a key group member. Participants had been involved in this program for at least 3 months prior to recruitment. | 3 months program with weekly 60-min. sessions. | No significant differences found between the groups, suggesting that the study did not find maintenance exercise treatment superior compared to only peer support in improving daily task participation, quality of life and health status. |
| \*Piron et al.62  Italy  RCT  stroke | A virtual reality-based system delivered via telerehabilitation system to treat arm motor deficits. The system provided motor tasks to the patients, with five virtual tasks comprising simple arm movements. The patient moved a real object in accordance to a virtual object displayed on the computer screen. Therapist supervision provided through video-conference system. **Setting:** Home | Study-based treatment with conventional physical therapy. Asked to do specific exercises for the upper limb with progressive complexity. | 1 month program with virtual-reality exercises conducted 1 hour a day, 5 days a week. | Both groups significantly improved all outcome scores after treatment, but only the Fugl-Meyer Upper Extremity scale showed differences in the comparison between the groups. In the follow-up phase, both groups maintained the benefits achieved. |
| Stuart et al.57  USA  RCT  stroke | An Adaptive Physical Activity exercise program to reduce deconditioning and improve mobility. Comprised a progressive group exercise regimen tailored to hemiparesis that included walking, strength, and balance training, and home exercises. **Setting:** Other local community facility | Study-based treatment with a "Sittercise" program, consisting of a seated, non-progressive aerobic upper body general exercise program, designed for general range-of-motion and minor strengthening for trunk, arms and legs. | 6 months program with 1h sessions 3 times weekly. | No significant between-group effects found on any of the outcome variables measured. The intervention group improved significantly on the primary outcome (6 Minutes Walking Test), while control group did not show improvement on this outcome. Completion rates were only 58% for the intervention group, and 70% for the control group. |
| Xie et al.65  China  RCT  stroke | A Tai Chi Yunshou intervention to promote physical and mental health. Training in wave hands in the cloud exercises, requesting participants to stand straight, move arms and legs with the waist at the axis, and breathe in a relaxed manner. **Setting:** Local health care facility | Study-based treatment with balance rehabilitation training. It included balance training, bobath training, and walking training, adjusted to the patient’s functional level and condition, and in accordance with Chinese medical guidelines. | 12 weeks program, with sessions 5 times a week. Each session comprised 45 min. of exercise plus a 15 min. warm-up and cool-down. | No significant difference found between the two groups on the improvement of balance ability and mobility. A significant difference found between the two groups on improvement of motor function, fear of falling and depression. |
| \*Yoo et al.55  South-Korea  RCT  stroke | A multidisciplinary supervised exercise intervention to improve motor performance and QoL. Included a structured and graded exercise program focusing on functional upper-extremity tasks. **Setting:** Local health care facility | Study-based treatment with self-monitored conditioning exercise program, with same setting and intensity as intervention group, but no clinician and no instruction exercises provided. | 24 weeks program, with 1.5-hour sessions performed 3 days per week. | Both groups showed improvement in motor capacity and quality of life, but the improvements achieved by the multidisciplinary supervised group were greater than the self-monitored group, but no between group analysis was conducted. |
| **Specific interventions** | |  |  |  |
| \*Bèdard et al.74  Canada  RCT  TBI | A mindfulness-based cognitive therapy intervention to improve depression symptoms. Included meditation techniques, breathing exercises, yoga, awareness of thoughts and feelings, acceptance, and staying in the present. **Setting:** Local community facility | Wait list and treatment as usual | 10 weeks intervention with 1 1/2-hour weekly sessions. Daily meditation home practice for 20-30 minutes. | There was a significant reduction in Beck Depression Inventory-II scores for the intervention group compared to the control group, also maintained at 3 months follow-up post intervention. Improvements were not measured at the two other depression symptom scales, and there was no difference between groups regarding change in mindfulness. |
| \*Bourgeois et al.68  USA  non-RCT  TBI | An errorless training intervention to improve memory problems. Included the technique Spaced Retrieval training to increase learning and memory, while working with memory-related goals. **Setting:** Home | Study-based treatment using didactic strategy instructions with discussion of common memory strategies, such as association, verbal rehearsal, imagery and written reminders. Three goals related to memory problems established, and strategies discussed. | Thirty-minute training session phone calls with client scheduled on 4 or 5 days each week, with continued training until all goals mastered at three consecutive sessions. Mean number of sessions 11.8(4.7). | Participants in the intervention group had significantly more treatment goal mastery and strategy use compared to controls, immediately and at 1 month follow-up. There were no significant between-group differences in generalized strategy use or reported memory problems at either time point, and there was no change in perceived quality of life in either group. |
| \*Brown et al.35  USA  RCT  TBI | A curriculum-based advocacy intervention to promote advocacy behavior. Included introduction to concepts of TBI and advocacy, discussion of community organizing and influencing policy-makers. **Setting:** Multiple community locations | Study-based treatment with self-directed advocacy training organized in self-directed support groups. Study coordinator elected group leader, provided materials, and introduced topics related to brain injury and self-advocacy. | Participants and their significant other received session 1 day per month for 4 consecutive months, that is, 4 sessions each lasting 6-hours. | Mean Advocacy Behavior Rating Scale scores increased after intervention in both groups, but there was no significant group differences. A main effect of time reflected improvement in mobility-related and quality of life outcomes for both groups, but no group differences. |
| Carnevale et al.76  USA  RCT  mixed etiology | A behavior management intervention to improve targeted behavioral problems. Included individualized treatment plan to targeted behavioral challenges and use of videotaped observations to identify applicable strategies to be used. **Setting:** Multiple community locations | Participants and their caregivers in the "education-only group" received education on common sequelae of brain injury and practical behavior management techniques. The second control group received no intervention. | First phase: 2 hours education once a week for a 4- week period. Second phase: 2 hours session once a week for a 8- week period. | Significant treatment effect of the behavior management intervention was found only at the main outcome at 3 months after termination of treatment, showing rates of disruptive or aggressive behaviors declined significantly in the main intervention group. Differences in caregiver-rated stress, burden, and aggression were not statistically significant. |
| \*Das Nair & Lincoln69  United Kingdom  RCT  Mixed etiology | An intervention to improve memory problems. Included two memory programs, both applying internal memory aids and errorless learning techniques. The main intervention “compensation group” used external memory aids, while “restitution group” used encoding and retrieval. **Setting:** Both multiple community locations and facility not community-based | Study-based treatment with self-help group that were not taught any memory strategies, but taught relaxation techniques and ways in which they could cope with their condition. | 2 individual and 10 weekly group sessions. Each session lasted approximately 1.5 hours. | There were no significant effects of either compensation or restitution memory group treatment as compared with a self-help group control on the main outcome Everyday Memory Questionnaire, nor any differences between the groups on measures of mood, adjustment and activities of daily living. A significant difference between groups on the Internal Memory Aids Questionnaire was found, but no statistically significant differences on measures of mood, adjustment and activities of daily living. |
| Efstratiadou et al.72  Greece  non-RCT  stroke | A "elaborated semantic feature analysis" training program to improve aphasia; participants chose a picture from a stimulus set and the therapist asked them to name it. Thereafter therapist prompted the participant to think of and say words related semantically with the target word. **Setting:** Both home and in facility not community-based | Wait list control group had no other speech and language therapy | 36 hours therapy for 12 weeks. | For the therapy versus control comparison, there was a significant main effect of time on the primary outcome naming task, no significant effect of group, but a significant interaction effect. Results for the secondary outcome measures showed the same trend, a significant effect of time, but no significant effect of group. |
| \*Fann et al.75  USA  RCT  TBI | A telephone intervention to improve major depression. Included cognitive behavioral therapy (CBT) with structured content and ingrediency tailored to persons living with TBI, workbook with exercises and homework and involvement of family member. **Setting:** Mainly home-based, plus some participants in facility not in community | Participants in control group received usual care, plus notified by phone about depression status and encouraged to continue using rehabilitation and primary services, plus given information of local mental health and TBI resources. | 12 weeks program with 1 session weekly, each session lasting for 30-60 min. | There were no statistically significant differences between CBT treatments overall (both delivered by telephone and in-person) compared with usual care on the primary outcomes. Participants completing eight or more CBT sessions, as well as those receiving CBT-by telephone, but not CBT-in-person, reported significantly greater improvement in patient-reported depressive symptoms compared with those receiving usual care. |
| Heinemann et al.33  USA  non-RCT  TBI | A comprehensive case management intervention to improve substance abuse. Included use of comprehensive case management strategies to enhance employment and health-related quality of life, in addition to coordinating substance abuse resources. **Setting:** not specified community-based. | Treatment as usual and without intensive case management recruited from a rehabilitation institute. | Intervention group received case management median total hours = 35.0 (31.9) and median number of appointments = 56.0 (43.0), over a 9-month period. | No significant changes found in substance use compared to baseline or differences between groups. Being employed at baseline and early referral to program predicted employment at 9 months. Community integration increased for both groups, but no significant differences between groups. Life satisfaction increased in intervention group and stable in controls. Note, the two groups differed significantly already at the time of inclusion, not corrected for in the statistical analysis. |
| Meltzer et al.70  Canada  RCT  stroke | A telerehabilitation intervention to improve language disorders. Included tablet-based homework exercises and realistic, customized treatment plans tailored to the needs of each participant, with part of session time devoted to communication partner for training in supported conversation techniques. **Setting:** Home | Study-based treatment with exposure to same treatment as intervention group, but delivery mode of therapy interactions was in-person meetings instead of tele-rehabilitation, and was not conducted in a community setting. | 10 weeks program with weekly therapy sessions lasted 1 hour each. For 3 sessions (week 3, 6, and 9), 30 min. was devoted to communication partner. | Participants improved significantly on all measures, with statistically equivalent gains between telerehabilitation and control group on all primary outcome measures, except from outcome scores on Communication Confidence Rating Scale for Aphasia showing an advantage for the in-patient group. |
| Raina et al.77  USA  RCT  TBI | A maximation energy intervention to promote fatigue management. Included targeting personal nominated problem areas with energy conservation strategies and methods for problem identification, goal setting, solution identification and evaluation, implementation, and outcome evaluation, all through manualized steps. **Setting:** Home | Attention control group given study-based treatment according to Health Education Intervention. Included reviewing workbook with information about fatigue, energy conservation, healthy eating, exercise, and relaxation. Not taught to apply the information to life situations. | 8 weeks program with 30 min. sessions twice a week. | No significant difference was found between the intervention group and the control for the outcome measures, but a moderate effect size was found for all measures, except one subscale, in the favor of the intervention group. |
| Rietdijk et al.73  Australia  non-RCT  TBI | A social communication skills training (TBIconneCT) to improve communication quality in people with traumatic brain injury and their communication partners. Included repeated trials, clinical modeling, feedback, rehearsal and role-play, strategy instruction, self-monitoring, self-correction, and education. **Setting:** Home | Treatment as usual and permission to continue with usual multidisciplinary rehabilitation, but received no concurrent speech pathology intervention nor any intervention in social communication training. | 10 training sessions of approximately 1.5-h. duration for both the intervention for both in-person and telehealth participants | Trained participants had significant improvements in participation in casual conversation compared to controls, and trained communication partners also had significant improvements compared to controls on ratings of support in casual conversations at end of intervention. 3 months follow- up showed that treatment effects were not maintained at follow-up for 2 of 8 measures. Comparisons between outcomes of in-person and telehealth in the trained intervention groups was not significant for 6 of 8 measures. |
| Woolf et al.71  United Kingdom  non-RCT  stroke | A videoconference-based intervention to improve spoken words. Included use of 50 words and workbook with pictures of the targeted words, where therapist gave tasks and cues to each word. **Setting:** Home | Study-based treatment with an attention control condition, receiving only remote supportive conversation sessions, but no specific training of spoken words. | 4 weeks program, with one-hour sessions of therapy delivered twice a week. Participants in remote therapy group received a technology training session in advance. | Participants who received therapy improved on picture naming significantly more than controls. There were no significant differences between groups in the assessment of conversation. |

SDC4: Characteristics of holistic, physical and specific interventions. Abbreviations: FIM, The Functional Independence Measure; TBI, traumatic brain injury; PMFE, pelvic muscle floor exercises; MSC, Adapted Measure of Support in Conversation; MPC, Adapted Measure of Participation in Conversation; QoL, quality of life; mCIMT, modified constraint-induced movement therapy; CBT, cognitive behavioral therapy. Studies marked with asterisk\* are included in the meta-analyses.