**Table 1.** Study, Sample, and Intervention Characteristics of the 23 Studies Included in the Meta-Analysis

| **Citation** | **Sample** | **Recruitment**  **and**  **Country** | **Control** | **Intervention Details** | **Primary Study Outcome(s)** | **Meta-analysis Outcomes and Measures** | **Assessment**  **(weeks)ª** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Psychological** | | | | | | | |
| Bose et al. (2016) | N = 103 (81%); 31% F; *M*age = 71; NYHA II-III (16% III) | Outpatient; Stockholm, Sweden | *SC.* Outpatient services through a nurse-led HF clinic, cardiologist, or primary care provider | *Coping Effectiveness Training.* Seven, 90-minute weekly group sessions focusing on increasing awareness of, and skills related to, coping with stress. Topics included a stress and coping overview, appraisal and coping strategies, problem-focused coping, emotion-focused coping, challenging negative thoughts, adaptive vs maladaptive coping, and social support, Participants received a workbook with a session summary and HW assignments. Participants also continued SC. **Theory-driven:** Stress and Coping Theory. **Facilitator(s):** Cardiac nurse specialized in HF (supervised by a psychologist)**. Tailoring:** Translated into Swedish and adapted for patients with HF | Emotional well-being assessed via affect, anxiety, and depression | Anxiety: HADS  Depressive Symptoms: HADS  QoL: RAND 36 | 0, 6, 26,  52, 152 |
| Cajanding (2016) | N = 123 (81%); 33% F; *M*age = 56; NYHA I-IV (45% III/IV) | Inpatient ; Philippines | *SC.* HF risk factor modification recommendations from the cardiologist and medical/pharmacological treatment | *CBT.* Twelve weekly 1-2 hour sessions of CBT which included rapport-building, patient education, self-monitoring, self-care, stress management, coping skills training, cognitive restructuring, and increasing social support. Sessions began with a progressive muscle relaxation exercise. HW assigned following each session. Participants also received SC. **Theory-driven:** CM. **Facilitator(s)**: Nurse. **Tailoring**: Adapted to the Filipino context and used a disease-specific CBT handbook | Depressive symptoms  QoL  Self-esteem | Depressive symptoms: CDS  QoL: MLHF | 1 |
| Chang et al. (2005)    *\*excluded education condition* | N = 59 (100%); *M*age = 69; NYHA II-III (50% III/IV); LVEF ≤40% | Outpatient; United States | *SC. (no additional details reported)* | *Relaxation Response.* Fifteen weekly 90-minute group sessions that covered eight relaxation techniques designed to elicit the relaxation response. Techniques included breathing awareness, mental word/sound/phrase/prayer repetition, mindfulness meditation, guided body scan, progressive muscle relaxation, guided countdown, autogenic, and guided imagery. Participants encouraged to practice twice daily for approximately 20 minutes using provided tapes. **Theory-driven**: NR. **Facilitator(s):** Clinical psychologists. **Tailoring:** NR | QoL | QoL: MLHF | 0 |
| (Curiati et al., 2005) | N = 19 (79%); 74% F; *M*age = 75; NYHA I-II | Outpatient; Brazil | *Active control with relevant content.* Weekly stress discussion meeting | *Meditation.* After attending two 60-minute training sessions, participants attended weekly group meditation and were encouraged to practice meditation twice daily using a 30-minute audiotape and maintain a practice log for 12 weeks. The seated meditation practice included three 10-minute segments: (1) controlled breathing, an adapted body scan, (2) mental repetition of the word “peace” with spontaneous breathing, and (3) guided imagery of a healthy heart. **Theory-driven:** NR. **Facilitator(s):** NR. **Tailoring:** NR | QoL | QoL: MLHF | 0 |
| Dekker et al. (2012) | N = 42 (81%); 45% F; *M*age = 66; NYHA II-IV (81% III/IV) | Inpatient with mild to moderate depressive symptoms; United States | *SC.* Individual discharge HF education including written information about the emotions associated with living with HF and option of receiving support from chaplain services. | *CT.* One 30-minute session of Cognitive Therapy prior to hospital discharge. Session followed a script and used a flip chart to guide participants through intervention components (e.g., depression and heart failure; thoughts, feelings and behaviors; description of a recent stressor; thought stopping and affirmation instruction). Participants received HW recommendations and a color booklet with content to take home. Participants received one 5-10-minute telephone booster one-week post-discharge which included review and reinforcement of techniques. **Theory-driven:** CM. **Facilitator(s):** Master’s prepared nurse specialist and advance practice nurse in collaboration with a doctoral-prepared psychiatric nurse specialist**. Tailoring:** NR | Depressive symptoms | Depressive symptoms:  BDI-II  QoL: MLHF | 1, 13 |
| Freedland et al. (2015) | N = 158 (75%); 46% F; *M*age = 56; NYHA I-III (42% III/IV) | Outpatient with a current Major Depressive Episode and BDI-II ≥ 14; United States | *EDU.* HF self-care education provided by a cardiac nurse during the initial visit and three 30-minute telephone calls. | *CBT*. Participants attended weekly 60-minute CBT sessions with weekly HW assignments for up to 6 months depending on progress towards treatment goals. Sessions focused on addressing depression and self-care deficits and barriers via standard CBT techniques (e.g., cognitive restructuring, environmental cues, behavioral activation). Participants transitioned to biweekly and monthly follow-ups and were provided up to four 20-30 minute relapse prevention telephone follow-ups. **Theory-driven:** CM. **Facilitator(s):** Masters and doctoral level therapists. **Tailoring:** Included supplemental manual on CBT for cardiac patients, treatment plans adjusted as needed | Depressive symptoms  HF Self-care Confidence and Maintenance | Anxiety: BAI, PROMIS  Depressive symptoms: BDI-II, HAM-D, PROMIS  Exercise Capacity: 6MWT | 0, 13 26,  39, 52 |
| Gary et al. (2010)  *\*excluded exercise and exercise/CBT conditions* | N = 36 (89%); 58% F; *M*age = 66; NYHA II-III (57% III); LVEF ≥15% | Outpatient with minor or major depression; United States | *SC.* Usual care from healthcare providers. | *CBT.* Twelve 60-minute sessions of CBT with relevant HW. Sessions focused on rapport-building, CM and depression psychoeducation, identification of automatic thinking patterns, activity scheduling, and establishing collaborative therapeutic goals. **Theory-driven:** CM. **Facilitator(s):** Psychiatric clinical nurse specialist or clinical psychology doctoral students (supervised by a psychologist). **Tailoring:** NR | Depressive Symptoms  Exercise Capacity  QoL | Depressive Symptoms: HAM-D  Exercise Capacity: 6MWT  QoL: MLHF | 0, 13 |
| Jayadevappa et al. (2007)  . | N = 31 (74%); 61% F; *M*age = 64 | Outpatient; United States | *EDU* Nurse-led HF education sessions plus instruction to read or listen to music for 20 minutes daily. | *Transcendental Meditation.* To learn Transcendental Meditation, participants completed an introductory session, a personal interview, a personal instruction session, and three group sessions. Technique involves mental repetition of a mantra while seated with closed eyes. Participants were invited to attend follow-up sessions biweekly for 3 months and monthly for the subsequent 3 months. Participants recommended to complete 15-20 minutes of daily practice and maintain a daily diary. **Theory-driven:** NR. **Facilitator(s):** Certified instructor. **Tailoring:** NR. | Exercise capacity | Depressive Symptoms: CES-D  QoL: MLHF  Exercise capacity: 6MWT | 12, 25 |
| Powell et al. (2010) | N = 902 (70%); 47% F; *M*age = 64; NYHA II-III (32% III); LVEF ≤ 40% or > 40% | Inpatient/ Outpatient;  United States | *EDU.* Participants mailed 18 HF educational tip sheets and given the opportunity to ask questions via telephone with a member of the research team. Education included self-management-focused topics including adherence, daily weighing, sodium, physical activity, and stress management. | *Self-management Counseling plus Education.* Eighteen group sessions of self-management training over 1 year emphasizing problem-solving, self-monitoring, environmental restructuring, social support, cognitive restructuring, and relaxation. Education included self-management-focused topics including adherence, weight monitoring, sodium restriction, physical activity, and stress management. **Theory-driven:** SCT. **Facilitator(s):** Health professionals with advanced degrees. **Tailoring:** NR | Death or HF hospitalization | Exercise capacity: 6MWT | 0, 133 |
| Sherwood et al. (2017) | N = 180 (94%); 27% F; *M*age = 58; NYHA II-III; LVEF ≤40% | Outpatient; United States | *EDU.* Physician’s Assistant-delivered HF education about health behaviors (e.g., symptom monitoring, daily weighing, medication adherence, physical activity and diet) via ≤ 30-minute weekly telephone calls. Content included information and discussion about medical topics but did not include instruction in behavioral coping skills. | *Coping Skills Training.* Sixteen weekly 30-minute phone sessions which included cognitive-behavioral techniques and motivational interviewing related to health behaviors (e.g., diet, daily weighing, physical activity, adherence), relaxation training, cognitive restructuring, visualization, problem solving, activity pacing, depression (optional) and assertiveness training (optional). **Theory-driven:** CM. **Facilitator(s):** Clinical psychologist. **Tailoring:** CBT techniques adapted based on prior studies of cardiac and pulmonary patients;order of health behavior content determined by participant priority; optional modules on depression and assertiveness covered based on patient needs/interventionist discretion | QoL  HF biomarkers  Time to death or hospitalization | Anxiety: STAI  Depressive symptoms: BDI-II  Exercise capacity: 6MWT | 1, 156 |
| **Psychological/Physical** | | | | | | | |
| Barrow et al. (2007) | N = 65 (80%); 18% F; *M*age = 68; NYHA II-III | Outpatient;  United Kingdom | *SC.* Standard medical supervision and pharmacotherapy via outpatient support from HF nurses and healthcare providers every 3 months. | *Tai Chi Chuan and Chi Kung*. Thirty-two biweekly 55-minute sessions for 16 weeks. Sessions included Chi Kung exercises (20 minutes; Orchid Hand 21 Style and Wu’s Chi Kung) and Tai Chi Chuan exercises (20 minutes; Wu Chian Chuan style) with five minutes of rest in between. Sessions ended with a five minute cool down and stretching period. Participants encouraged to practice at home and log practice time. **Theory-driven:** NR. **Facilitator(s):** Trained Tai Chi instructor; sessions also attended by a cardiac rehabilitation nurse. **Tailoring:** Work rate based on patient self-assessment of moderate perceived exertion | Exercise capacity | Anxiety: SCL-R  Depressive Symptoms: SCL-R  Exercise Capacity: ISWT  QoL: MLHF | 0 |
| Huang et al. (2016) | N = 60 (87%); 33% F; *M*age = 60; NYHA I-IV (44% III/IV) | Outpatient; Taiwan | *SC (no additional details reported)* | *Biofeedback-assisted Relaxation.* Six weekly sessions of Biofeedback-assisted Relaxation training that used visual and auditory signals to cue participant’s to skin temperature changes. Participants encouraged to practice and complete a practice diary. Participants also continued SC. **Theory-driven:** NR. **Facilitator(s):** Nurse specialist with heart failure and psychiatric counseling expertise.  **Tailoring:** Sessions individualized to participant needs, including teaching, demonstration, and practice. | NR | Anxiety: BSI  Depressive symptoms: BSI  QoL: MLHF | 7, 46 |
| Krishna et al. (2014) | N = 130 (71%); 30% F; *M*age = 50; NYHA I-II;  LVEF 30-50% | Outpatient; India | *SC(no additional details reported)* | *Yoga.* Following 2 weeks of supervised training, participants completed 60-minute supervised yoga sessions 3 times a week for 12 weeks (36 total sessions). Participants instructed to practice yoga at home 3 days a week. Participants also continued SC. **Theory-driven:** NR. **Facilitator(s):** Yoga therapist with cardiac rehabilitation expertise. **Tailoring:** Exercises developed with consultation with a cardiologist experienced with yoga and a yoga therapist with cardiac rehabilitation expertise. Individual modifications were made for medical or orthopedic needs; meditation and relaxation in a supine or seated position depending on participant comfort. | Cardiac function  NT pro-BNP | Exercise Capacity: 6MWT  QoL: MLHF | 0 |
| Pen (2016) | N=61 (100%); 43% F; *M*age = 67; NYHA II-III (41% III); LVEF ≤45% | Inpatient  China | *SC.* Low-salt, low-fat dietary recommendations and pharmacotherapy | *Tai Chi.*  Simplified 24-form Tai Chi daily for 30 minutes for 6 months and education on diet and pharmacotherapy (standard care). **Theory-driven:** NR. **Facilitator(s)**: NR. **Tailoring:** Patients trained to exercise at 60-80% maximum heart rate. | Cardiac function | Exercise capacity: 6MWT | 0 |
| Pullen et al. (2008) | N = 19 (100%); 58% F; *M*age = 51; NYHA II-III (37% III); LVEF ≤50% | Outpatient; United States | *SC.* HF patient education and a brochure on following a home walk progression. | *Yoga.* Two 70-minute yoga sessions each week for 8 weeks (16 total sessions). Eighteen Hatha yoga postures with forward and backward bends, twists, and balance poses were included. After 4 sessions, participants were provided an instructional handout and encouraged to practice at home 3 times per week. Participants also given a home walk progression brochure (standard care). **Theory-driven:** NR. **Facilitator(s):** Registered yoga teacher/clinical exercise physiologist with cardiac rehabilitation expertise. **Tailoring:** Individual modifications made for medical or orthopedic needs including use of chairs/wall, and relaxation in a supine or seated position. | Cardiovascular endurance  Inflammatory markers  QoL | QoL: MLHF | 1-2 |
| Pullen et al. (2010) | N = 40 (85%); 43% F; *M*age = 54; NYHA I-III (33% III);  LVEF ≤ 45 or ≥ 45 | Outpatient; United States | *SC.* HF patient education and a brochure on following a home walk progression. | *Yoga*. Two 60-minute yoga sessions each week for 8- to 10 weeks (16 total sessions). Hatha yoga postures with forward and backward bends, twists, and balance poses were included After 4 sessions, participants were provided an instructional handout and encouraged to practice at home 3 times per week. Participants also given a home walk progression brochure (standard care). **Theory-driven:** NR. **Facilitator(s):** Registered yoga teacher/clinical exercise physiologist with cardiac rehabilitation expertise. **Tailoring:** Individual modifications made for medical or orthopedic needs including use of chairs, wall, and relaxation in a supine or seated position | Change in estimated VO2peak and time to peak exertion | QoL: MLHF | 1 |
| Redwine et al. (2019)  \**excluded Resistance Band condition* | N = 48 (84%); 10% F; *M*age = 65; HFpEF or HFrEF | Outpatient; United States | *SC.* Visits with cardiologists, primary chare physicians, and/or other healthcare providers as usual. | *Tai Chi.* Two 60-minute Yang-style Tai Chi Chuan-Short Form(first third) sessions per week for 16 weeks (32 sessions total). Participants were asked to practice 10-20 minutes per day on non-class days and given written materials to support home practice. Participants also continued SC. **Theory-driven:** NR. **Facilitator(s):** Certified holistic health practitioner and Asian Bodywork therapist with experience teaching tai chi to chronically ill and older adults. **Tailoring:** NR**.** | Exercise capacity  Depressive symptoms | Depression: BDI  Exercise capacity: 6MWT | 0 |
| Seo et al. (2016) | N = 36 (75%); 31% F; *M*age = 66; NYHA II-IV (49% III/IV) | United States | *EDU.* Four telephone calls to review general health promotion topics (e.g., lipids, healthy eating, cancer screening, visiting other healthcare providers). Topics directly related to HF (e.g., sodium intake, exercise) were excluded. | *Home-Based Diaphragmatic Breathing Retraining.* One face-to-face orientation and four telephone follow-up calls. Participants provided with audio CDs and written script to guide diaphragmatic paced-breathing (six breaths/minute) at home. Audio CDs included instructions and soothing music that allowed for varied amounts of instruction. Participants also encouraged to set DBR practice goals and log practice. Intervention design structured to increase DBR self-efficacy through mastery, vicarious experience, verbal encouragement, and physiological response monitoring. **Theory-driven:** Social Cognitive Theory. **Facilitator(s):** NR. **Tailoring:** Male participants provided CD with male voice and female participants provided CD with female voice | Dyspnea | Exercise capacity: 6MWT | 0, 14 |
| Swanson et al. (2009) | N = 35 (89%); 21% F; *M*age = 55; NYHA I-III  LVEF≤50% | Outpatient; United States | *Attention Placebo.* Participants instructed to increase and decrease brainwave activity during “quasi-false alpha-theta EEG biofeedback training” with auditory feedback cues while listening to music/nature sounds (p. 77) and encouraged to practice 20 minutes per day at home. | *HRV Biofeedback.* Six 45-minute HRV biofeedback sessions which included breath retraining and cardiac and respiratory feedback via visual physiological monitoring while listening to music/nature sounds. Training emphasized breathing at peak respiratory sinus arrythmia. Participants provided with home monitoring equipment and asked to practice at least 20 minutes a day and maintain a practice log. **Theory-driven:** NR. **Facilitator(s):** NR. **Tailoring:** NR | Exercise Capacity  HRV  QoL | Depressive Symptoms: CES-D  Exercise Capacity: 6MWT  QoL: MLHF | 0, 12 |
| Wang et al. (2014) | N = 142 (94%); 58% F; *M*age = 62; NYHA II or III (62% III) | Inpatient; China | *Sleep hygiene EDU with room temperature adjustment and light and sound control.* | *Biofeedback-assisted Relaxation.* Daily 20-minute in-hospital sessions of Biofeedback-assisted relaxation with an audio-recorded guided imagery exercise. During the initial five minutes of the recording, participants received visual peripheral sin temperature feedback. Intervention participants randomized to receive intervention in the morning (6 total session), night (6 total session), or morning and night (12 total sessions). Participants were also provided sleep hygiene education with room temperature adjustment and light and sound control (standard care) **Theory-driven:** NR. **Facilitator(s):** Nurse**. Tailoring:** NR | Sleep  Anxiety  Sleep aid use | Anxiety: SAS | 0 |
| Yeh et al. (2004) | N = 30 (100%); 37% F; *M*age = 64; NYHA I-IV (33% III/IV)  LVEF ≤40% | Outpatient; United States | *SC.* Pharmacotherapy plus diet and exercise counseling. | *Tai Chi.* Two 60-minute Tai Chi classes each week for 12 weeks (24 total sessions). The Tai Chi classes included meditative warm-up exercises (weight shifting, arm swinging, visualization, and gentle stretches) and five simplified tai chi movements that included (based on Master Cheng Man-Ch’ing’s Yang-style short form). Participants were encouraged to practice three times a week with a 35-minutes video. Participants also received pharmacotherapy and diet/exercise counseling (usual care). **Theory-driven:** NR. **Facilitator(s):** Tai Chi instructor. Classes supervised by a physician. **Tailoring:** Exercise selection based on prior tai chi trials for individuals who are older and with mobility limitations. Participants encouraged to progress at their own pace; provided chairs for resting at any time | QoL  Exercise capacity | Exercise capacity: 6MWT  QoL: MLHF | 0 |
| Yeh et al. (2011) | N = 100 (96%); 36% F; *M*age = 67; LVEF ≤40%; NYHA I-III (17% III) | Outpatient; United States | *EDU.* Two weekly nurse practitioner-led group HF education classes (24 total sessions) on diet, exercise, emotions related to HF, suggestions for family/friends, lifestyle change, advanced directives, heart rhythm, HF treatment, and cholesterol | *Tai Chi.* Two 60-minute Tai Chi group classes each week for 12 weeks (24 total sessions). The Tai Chi classes included meditative warm-up exercises (weight shifting, arm swinging, visualization, and gentle stretches, breathing) and five simplified tai chi movements that included (based on Master Cheng Man-Ch’ing’s Yang-style short form). Participants also received same educational pamphlets as EDU group and a 5-minute review of the education content following tai chi instruction. Participants were encouraged to practice Tai Chi 3 times a week with a 35-minutes video. **Theory-driven:** NR. **Facilitator(s):** Certified Tai Chi instructors. **Tailoring:** Exercise selection based on prior tai chi trials for individuals who are older and with mobility limitations. Participants encouraged to progress at their own pace; provided chairs for resting at any time. | QoL  Exercise capacity | Exercise Capacity: 6MWT  QoL: MLHF | 0 |
| Yu, Lee and Woo (2007) | N = 15 (77%); 50% F; *M*age = 76; NYHA I – IV (36% III/IV) | Inpatient; Hong Kong (China) | *Attention placebo.* Eight bi-weekly telephone calls from a research nurse limited to “general greetings” | *Progressive Muscle Relaxation.* Two 60-minute weekly progressive muscle relaxation training sessions and one skills revision workshop 4 weeks later. The training invited participants to systematically tense and relax 16 muscle groups while maintain a regular breathing pattern. Participants were asked to practice twice daily using an audio recording and picture guide and maintain a practice log. Participants also received biweekly phone calls to encourage practice. **Theory-driven:** NR. **Facilitator(s):** Nurse. **Tailoring:** PMR tension timeframe shortened to prevent precipitating arrythmia. | Psychological distress (anxiety and depression)  Dyspnea  Fatigue | Anxiety: HADS  Depressive  Symptoms: HADS  QoL: WHOQOL-BREF-HK | 0, 6 |

N (%), number of participants who consented to participate in the study (% retained); F, female; Mage = mean age; NYHA, New York Heart Association classification; LVEF, left ventricular ejection fraction; HFrEF, heart failure with reduced ejection fraction; HFpEF, heart failure with preserved ejection fraction; SC, standard care; EDU, education-only; HW, homework; CBT, cognitive behavioral therapy; CM, Cognitive Model; SCT, Social Cognitive Theory, QOL, disease-related quality of life; HRV, heart rate variability, NR, not/none reported; BAI, Beck Anxiety Inventory; BDI, Beck Depression Inventory; BSI, Brief Symptom Inventory; CDS, Cardiac Depression Scale; CES-D, Center for Epidemiological Study Depression Scale; HADS, Hospital Anxiety and Depression Scale; HAMD, Hamilton Rating Scale for Depression; SAS, Zung’s Self-Rating Anxiety Scale; SCL-R, Symptom Check List-Revised; STAI, Speilberger State-Trait Anxiety Inventory; WHOQOL-BREF-HK, World Health Organization Quality of Life; EOT, end-of-treatment

ª The number of weeks between intervention completion and follow-up assessment(s); the number of weeks may differ from the number of weeks reported in the original source.

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