



# Enhancing Social Support Among People with Cardiovascular Disease: a Systematic Scoping Review

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## Abstract

**Purpose of Review** The presence of social support is a major determinant of positive health outcomes among people with cardiovascular disease (CVD); however, little is known about the most effective strategies for enhancing social support among this population. The aim of this scoping review was to describe the effectiveness of interventions seeking to enhance social support among people living with CVD and synthesize the evidence.

**Recent Findings** A systematic search for articles that (a) reported on interventions which may enhance social support and (b) included a measure of social support revealed 21 studies. Interventions to enhance social support were diverse and included cognitive behavioural therapy, mindfulness, peer support, and multi-faceted cardiac rehabilitation programmes. Most studies were of fair to good quality according to the PEDro criteria. With the exception of caregiver-oriented interventions, few studies reported significant changes in social support measures.

**Summary** Early evidence suggests that caregiver-oriented strategies may offer a promising avenue for enhancing social support; however, more research of higher quality is required to determine the optimal strategies to enhance support among those living with CVD.

**Keywords** Cardiovascular disease · Social support · Isolation · Cardiac rehabilitation

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## Introduction

Social support is well documented as having beneficial effects on health outcomes, including adjustment to disease and injury [1, 2]. Defined as the social resources an individual perceives as available (i.e. “perceived support”) or are actually provided to them (i.e. “received support”) in the context of supportive groups or informal relationships [3], social support has both structural and functional components. Whereas social structure refers to the size of one’s social network and the resources available within it, functional support comprises the emotional, informational, or instrumental supports an individual is able to draw upon. Examples of emotional support include experiences of love and affection from close others that may facilitate adaptive coping. Informational support denotes advice and knowledge shared with an individual from within their social network, whereas instrumental support describes tangible, concrete assistance (e.g. with life tasks) an individual receives [3]. It is further possible to distinguish between an individual’s natural social supports, such as friends, family, and peers, and formal supports, such as paid supportive professionals (e.g.

therapists and other health professionals), all of which may be meaningful sources of functional support [4].

In the context of cardiovascular disease (CVD), research shows clear associations between social support and health outcomes. For example, social support has been related to the development of CVD. A recent meta-analysis found that poor social relationships were associated with a 29% increased risk of congestive heart disease (CHD) and a 32% increased risk of stroke [5]. As well, a variety of studies have demonstrated less favorable CVD prognoses for those with lower social support, including higher hospital readmission rates [5–7] and mortality risk [8, 9, 10]. Moreover, research suggests that limited social support and social isolation may exert direct biological and indirect behavioural effects on the cardiovascular system [6]. For example, social isolation and loneliness have been associated with higher levels of stress and inflammation, which may contribute to the development of cardiac disease [7]. Thus, patients who are socially isolated, whether they are in small communities with little care resources or in larger urban areas but with a limited social network, are vulnerable to symptom progression which may lead to rehospitalization and possibly death. This may be especially true for older individuals as they have an increased risk of being socially isolated due to smaller social networks resulting from retirement, deaths of family and friends, and lower social participation rates.

While it has yet to be conclusively demonstrated that improvements in social support lead to improvements in cardiac outcomes, ensuring strong social support is an integral health management strategy among this population. Research shows that strong social integration may have a variety of positive effects on health via enhancing positive health-related behaviours [3]. For example, evidence exists suggesting positive social relationships facilitate adherence to more optimal CVD and health self-management [8]. Similarly, evidence indicates that social support-enhancing interventions may decrease depression [9], improve self-care behaviours, and enhance overall quality of life among people with heart failure [10, 11, 12].

Given existing evidence on the associations between social support and health and well-being outcomes among people with CVD, improving social support is a growing area of interest. Yet, no review has specifically examined interventions aimed at facilitating social support among people with CVD. Therefore, questions remain as to what interventional research exists in this area and the mechanisms used to enhance social support after CVD. Thus, the purpose of this study was to develop a greater understanding of the current state of evidence of interventions used to modify social support in people with CVD.

## Materials and Methods

To address our study purpose, we conducted a systematic scoping review. The multi-stage framework for scoping

reviews, established by Levac and colleagues [13], guided our review methods and syntheses of evidence, as follows:

**Stage 1—Identifying the Research Question** The primary research question driving this review was “What interventions have been tested to modify social support in people with CVD?” In answering this question, we sought to identify the types of interventions using social support as an outcome measure and synthesize the findings.

**Stage 2—Identifying Relevant Studies** We included studies for review if they (a) were peer-reviewed (including grey literature), (b) were conducted within a CVD population, and (c) assessed an intervention in which social support was an outcome measure. Studies were excluded if they (a) were case studies, books, book chapters, or editorials, (b) did not have pre–post measure of social support, (c) were interventions conducted exclusively for individuals with congenital heart disease, and (d) were not published in English.

To identify relevant studies, we developed a comprehensive search strategy in collaboration with the institute librarian as shown in the Appendix, Table 2. We searched the following five relevant electronic databases: MEDLINE (Ovid), EMBASE (Ovid), PsycINFO (EBSCO), Cumulative Index to Nursing and Allied Health Literature (CINAHL; EBSCO), and PubMed. The search strategy was developed first for MEDLINE using appropriate keywords and subject headings and adapted to the remaining databases. No time constraints were placed on the search. Manual reference checking of the included articles was conducted to ensure that all relevant articles were included.

**Stage 3—Study Selection** Study selection was undertaken by compiling all search results in an online reference manager (RefWorks) and deduplicating the results before exporting all the reference information (including titles and abstracts) into a detailed spreadsheet. Title and abstract screening was undertaken by two independent reviewers (CC, CM), and discrepancies were resolved through discussion. The full papers of those studies of interest were read by the first author to determine their final eligibility. Additional papers of interest found in the reference lists were obtained and read to determine eligibility.

**Stage 4—Charting the Data** A standardized data extraction table was developed for the extraction of key study characteristics and metrics for comparison. We extracted information related to the study design, experiment and control intervention, participant characteristics, social support measures, and salient results. In addition, we assessed the methodological quality of the included randomized controlled trials (RCTs) using the PEDro scale. The PEDro criteria were developed by experts in methodological quality and consist of 10 items

related to the study's internal validity [14]. Scores range from 0 to 10, with scores of 9–10 indicating “excellent” quality, 6–8 “good”, 4–5 “fair”, and below 4 considered “poor” [15, 16]. Quality assessment was independently performed by two reviewers (CC, CM). Discrepancies were resolved by discussion and consensus decision.

### Stage 5—Collating, Summarizing, and Reporting Results

Extracted study data and PEDro scores were tabulated and finalized collaboratively by the study team (CC, CM, BS). The results table (Table 1) was used for study analysis and comparison. To facilitate the exploration of which types of interventions have been effective at enhancing social support within this population, we grouped similar interventions into categories based on previous literature [4], discussion, and conceptual consensus.

## Results

After deduplication, the initial search yielded 2507 titles. Most studies were excluded because they were observational or did not include a social support outcome measure. Of the 38 articles read in detail, 21 met the inclusion criteria and included for review (Fig. 1). Studies were predominantly published within the past decade ( $n = 13$ ) and were conducted across several nations, including the United States ( $n = 9$ ), Iran ( $n = 4$ ), Canada ( $n = 2$ ), Poland, Germany, Turkey, Netherlands, and Sweden (each  $n = 1$ ). Sixteen studies were reports of controlled trials, one study reported on a prospective non-randomized controlled trial, and four studies reported on single group pre–post studies. Study samples varied in size from small feasibility studies of 13 participants to a large multi-centre randomized controlled trial of over 2480 participants. Of the 16 RCTs rated for quality, three were considered “poor”, six were considered “fair”, and seven were considered “good” quality studies (see Table 1 for scores). Participant ages ranged from 43 to 73 years. Three studies included female-only samples [17–19], while one study was male-only [20]. Participants had different types of CVD, including acute myocardial infarction (AMI), coronary artery bypass graft (CABG), HF, and undefined CVD. Three studies included participants with psychosocial challenges, including depression or anxiety and low perceived social support [21•, 22•, 23]. Measures of social support varied and predominantly focused on measuring functional social support, including the availability and perceived adequacy of emotional, informational, and instrumental support from close relationships. The most common measure used was the Multidimensional Scale of Perceived Social Support [24] or a version of it ( $n = 6$ ). Two studies included a measure of structural social support, the Berkman–Syme Social Network Index [25]. Social

support was a primary outcome in seven studies. Study details are further summarized in Table 1.

### Peer Support Interventions

Six studies focused on peer support interventions. Four used 1-on-1 telephone-based peer support or mentorship from trained volunteers matched on health and personal characteristics [20, 23, 26, 27]. These interventions ranged from six weeks to one year in duration. Calls were typically initiated by the peer support volunteer shortly after diagnosis or intervention for CVD (e.g. bypass surgery), with weekly to monthly follow-up. No significant between-group improvements were reported in any phone-based peer support study, and one reported a significant decrease in the social support domain of received “reciprocity” [26]. Similarly, no significant changes in social support were reported in a pre–post feasibility study of a six-week nurse-led weekly group education and support programme aimed to enhance knowledge, awareness, social support, and behaviour change [18]. Lastly, one pre–post feasibility study examined a mobile peer support app titled “Healing Circles”. The app placed participants into groups of 6–9 peers with the intent to support fellow group members towards good self-management through status updates, information sharing, group challenges, and commenting. Two different measures used in the study reported significant positive changes at follow-up in both perceived social support and social integration [28].

### Caregiver-Focused Interventions

Five studies used caregiver-oriented strategies to promote social support among “loved-ones” with CVD. Most ( $n = 4$ ) were educational interventions with caregiver and family participation. These interventions ranged in timing from a single education session for the patient and caregiver to multiple sessions over weeks. Only one of the studies, a single-session caregiver and patient discharge meeting, reported no improvements in social support [29]. One study reported on an educational and planning intervention to promote lifestyle physical activity following conventional cardiac rehabilitation. Two 1-on-1 motivational and planning sessions were conducted before a final session with a caregiver which was designed to enhance family support for exercise. At four months, the authors reported significant improvements in perceived family support for physical activity [30]. Another intervention provided multiple 1-on-2 (staff to patient and caregiver) education sessions near the time of discharge from CABG surgery. Education sessions were delivered one day prior to discharge, on the day of discharge, and one-week post-discharge. In addition, telephone support was provided at weeks six and ten to promote adherence to self-management behaviours. At three-month follow-up, significant between-

**Table 1** Clinical trials of interventions to enhance social support after cardiovascular disease

Author; year; country; sample size; study design; PEDro score	Sample characteristics	Intervention description	Social support strategies	Intervention duration and frequency	Social support outcome measure	Measurement timepoints	Results
<b>Peer support interventions (<i>n</i> = 6)</b>							
Riegel and Carlson (2004) [26]; US; <i>n</i> = 60; RCT; PEDro = 6	<i>Intervention</i> ( <i>n</i> = 31): Mean age (SD): 72.6 (13.0); Male: 42.2% <i>Control</i> ( <i>n</i> = 29): Mean age (SD): 73.3 (13.1); Male: 41.9%	<i>Intervention</i> : Ongoing contact (in person/ phone) from trained similar peer mentors with CVD <i>Control</i> : Usual care	1-on-1 peer mentorship	For 1 month: 1 × mentor-initiated contact per week; for months 2–3: ≥ 1 × mentor-initiated contact per month	UCLA Social Support Inventory	Baseline, 90 days	No significant differences in social support desired, social support sought, or satisfaction support received; intervention group experienced significant <i>decrease</i> in social support reciprocity relative to controls
Davidson et al. (2008) [18]; US; <i>n</i> = 48; Pre-post feasibility; PEDro = N/A	<i>Intervention</i> ( <i>n</i> = 48): Mean age (SD): 60.85 (9.1) All participants were women with CVD	CR nurse-facilitated weekly group support sessions promoting education, awareness, social support, and behaviour change strategies for CVD self-management	Group education and peer support sessions	6 × 2 h group sessions, delivered weekly	Multidimensional scale of perceived social support	Baseline, 6 weeks	No significant differences in social support at follow-up
Boese et al. (2013) (data only) [23]; Germany; <i>n</i> = 108 (all anxious or depressed women); RCT; PEDro = 3	<i>Intervention</i> <i>n</i> = 54 <i>Control</i> <i>n</i> = 54	<i>Intervention</i> : One clinical psychologist session; ongoing telephone-based contact with peer counsellors <i>Control</i> : Usual care	Formal support (clinical psychologist call); 1-on-1 telephone peer support	Frequency not given; intervention 1-year duration	F-SozU-K14	Baseline, 6 months, 12 months.	Significant within-group improvements in social support for both groups; no significant differences between groups
Heisler et al. (2013) [27]; US; <i>n</i> = 266; RCT; PEDro = 8	<i>Intervention</i> ( <i>n</i> = 135): Mean age (SD) = 70.4 (11.5); Male = 48.1% <i>Control</i> ( <i>n</i> = 131): Mean age (SD): 67.9 (12.6); Male = 48.1%	<i>Intervention</i> : Nurse-practitioner-led group HF education and communication skills session in which participants were paired with a peer mentor; weekly telephone calls with trained similar peer support volunteers with CVD; 3 × optional group support sessions <i>Control</i> : Usual care with one shortened nurse practitioner led self-management education group session	<i>Intervention</i> : Group education session; 1-on-1 telephone peer support; group support sessions (optional) <i>Control</i> : Group education session	Six-month programme with group education session at programme start; weekly peer support calls; group support sessions offered at 1 month, 3 months, and 6 months.	Diabetes Social Support Scale (modified for heart failure context)	Baseline, 3 months, 6 months, 12 months	No significant differences in social support at 6 months; 12-month results not reported
Sakakibara et al. (2016) [28]; Canada; <i>n</i> = 35;	<i>Intervention</i> <i>n</i> = 35; Median age (IQR): 57 (10)	Digital peer support app, (“Healing Circles”) that brings patients together	Digitally mediated education, group/peer support	Use as-desired (no specific timing of app-use)	Health Education Impact	Baseline, 10 weeks	Significant improvements in heIQ-social support domain and “social

**Table 1** (continued)

Author; year; country; sample size; study design; PEDro score	Sample characteristics	Intervention description	Social support strategies	Intervention duration and frequency	Social support outcome measure	Measurement timepoints	Results
pre-post feasibility; PEDro = N/A	All participants were women with CVD	into digital groups of 6–9 people with a peer facilitator to learn from and support each other in day-to-day management of their health <i>Intervention:</i> Weekly telephone calls with trained similar peer support volunteers with CVD <i>Control:</i> Usual care	(status updates, post-sharing, “challenges”) 1-on-1 telephone peer support	For 6 weeks: ≥ 1 phone call (initiated by peer support volunteer) starting within 3–4 days of hospital discharge	Questionnaire-Social support domain (heiQ); Medical Outcomes Study: Social Support Survey (MOS) Funch’s Shortened Social Support Scale (SSSS)	Baseline, 6 weeks, 12 weeks	“integration” domain of MOS post-intervention
Colella and King-Shier (2018) [20]; Canada; n = 185 (all male); RCT; PEDro = 7	<i>Intervention</i> (n = 61): Mean age (SD) = 63.6 (9.9) <i>Control</i> (n = 124): Mean age (SD) = 63.4 (10.7)	<i>Intervention:</i> Caregiver presence during patient-directed heart failure education session <i>Control:</i> Usual care	Formal support (1-on-2 staff education); caregiver presence during education with family support encouraged	1 × educational session	Berkman–Syme Social Support Questionnaire	Baseline, 6 months	No significant differences in social support
Caregiver-oriented interventions (n = 5) Rywik et al. (2013) (data only) [29]; Poland; n = 617; RCT; PEDro = 3	<i>Intervention</i> (n = 270) <i>Control</i> (n = 347)	<i>Intervention:</i> Three theory-informed educational and planning sessions designed to foster intention, planning and maintenance of prescribed physical activity regimen following formal CR; two sessions conducted 1-on-1 with patient, third session with caregiver designed to enhance family support for physical activity <i>Control:</i> Usual care	Formal support (1-on-1 and caregiver-present behaviour-change counselling); caregiver and family involvement in physical activity encouraged	3 × counselling sessions; length and duration not specified	“Family Support” dimension of HAPA questionnaire (family support for physical activity)	Baseline, 4 months	Intervention group experienced significant improvement in social support for physical activity relative to controls
Aliabad et al. (2014) [30]; Iran; n = 96; RCT; PEDro = 7	<i>Intervention</i> (n = 48): Mean age (SD) = 57.8 (8.7); Male = 83.3% <i>Control</i> (n = 48): Mean age (SD) = 56.7 (9.0); Male = 85.4%	<i>Intervention:</i> Caregiver presence during patient-directed heart failure education session <i>Control:</i> Usual care	Caregiver and family-focused education, social support skills training, and caregiver group support sessions	4 × 2 h caregiver education sessions, delivered weekly	Perceived social support questionnaire	Baseline, 1 month (intervention group measured only), 3 months	Loved-ones of caregivers in intervention group experienced significant improvement in social support relative to controls
Khaledi et al. (2015) [10]; Iran; n = 64; RCT; PEDro = 4	<i>Intervention</i> (n = 32): Mean age (SD) = 54.8 (7.8); Male = 68.8% <i>Control</i> (n = 32): Mean age (SD) = 54.3 (8.1); Male = 68.8%	<i>Intervention:</i> Caregiver-only group HF education sessions focused on supporting patient self-care; communication, practical, support and emotional support skills training; caregiver group support discussions					

**Table 1** (continued)

Author; year; country; sample size; study design; PEDro score	Sample characteristics	Intervention description	Social support strategies	Intervention duration and frequency	Social support outcome measure	Measurement timepoints	Results
Safabakhsh et al. (2016) [31]; Iran; $n = 80$ , RCT; PEDro = 3	<i>Total sample</i> ( $n = 80$ ): Mean age (SD) = not reported; Male = 67.5% No demographics reported for separate groups; sample evenly divided into groups	<i>Control</i> : Usual care <i>Intervention</i> : Individualized needs-based CVD lifestyle education sessions with caregiver present; nurse telephone phone follow-up <i>Control</i> : Relaxation training tapes	Formal support (1-on-2 staff instruction); telephone follow-up; caregiver presence during education with family support encouraged	3 × educational sessions with caregiver (one day before discharge, and 1 week later); 2 × telephone follow-up (weeks 6 & 10)	Health Promoting Lifestyle Profile II—“Interrelational” domain	Baseline, 3 months	Loved ones of caregivers in intervention group experienced significant improvement in social support relative to controls
Shahriari et al. (2016) [32]; Iran; $n = 64$ ; RCT; PEDro = 5	<i>Intervention</i> ( $n = 32$ ): Mean age (SD) = not given; Male = 56.2% <i>Control</i> ( $n = 32$ ): Mean age (SD) = not given; Male = 53.1%	<i>Intervention</i> : Caregiver-only group HF education sessions focused on supporting patient self-care; communication, practical, support and emotional support skills training; caregiver group support discussions <i>Control</i> : Usual care	Caregiver and family-focused education, social support skills training, and caregiver group support sessions	3 × 1.5 h group sessions, delivered weekly	Perceived support questionnaire (composite social support scale created from other scales and expert indications)	Baseline, 1 month	Loved ones of caregivers in intervention group experienced significant improvement in social support relative to controls
Multifaceted cardiac rehabilitation ( $n = 4$ ) Carlson et al. (2001) [36]; US; $n = 80$ ; RCT; PEDro = 5	<i>Intervention</i> ( $n = 38$ ): Mean age (SD) = 59 (10); Male = 84% <i>Control</i> ( $n = 42$ ): Mean age (SD) = 59 (10); Male = 80%	Both groups received conventional CR for 4 weeks <i>Intervention</i> : Replaced supervised CR exercise with weekly group education and group support designed to promote off-site exercise and enhance self-efficacy <i>Control</i> : Continued conventional CR, no emphasis on off-site exercise or self-efficacy	<i>Intervention</i> : Group exercise sessions, education; group support discussions <i>CR</i> : Group exercise sessions, education	<i>Intervention</i> : Weeks 1–4: 3 × 1 h supervised exercise sessions; weeks 6–12: 2 × 1 h supervised exercise sessions + 1 × 1 h education and group support forum; weeks 18–25: biweekly supervised exercise, continued 1 × 1 h group support forum <i>CR</i> : For 6 months: 3 × 1 h supervised exercise sessions per week Week 1: 3 × 4 h sessions; weeks 2–12: 2 × 4 h sessions; months	Custom developed questionnaire with items assessing significant-other and peer support for exercise	Baseline, 3 months, 6 months	Intervention group experienced significant decrease in social support for exercise at 6 months
Aldana et al. (2004) [33]; US; $n = 48$ ; Pre-post; PEDro = N/A	<i>Intervention</i> ( $n = 48$ ): Mean age (SD) = 59.9 (10.4); Male = 79.1%	Omish Programme; Multi-faceted CRP featuring group exercise sessions, strict diet	Group exercise, education, meals; group support discussions;	Week 1: 3 × 4 h sessions; weeks 2–12: 2 × 4 h sessions; months	Preferred support profile	Baseline, 3 months, 12 months	Significantly increased social support at 12 months but not 3 months

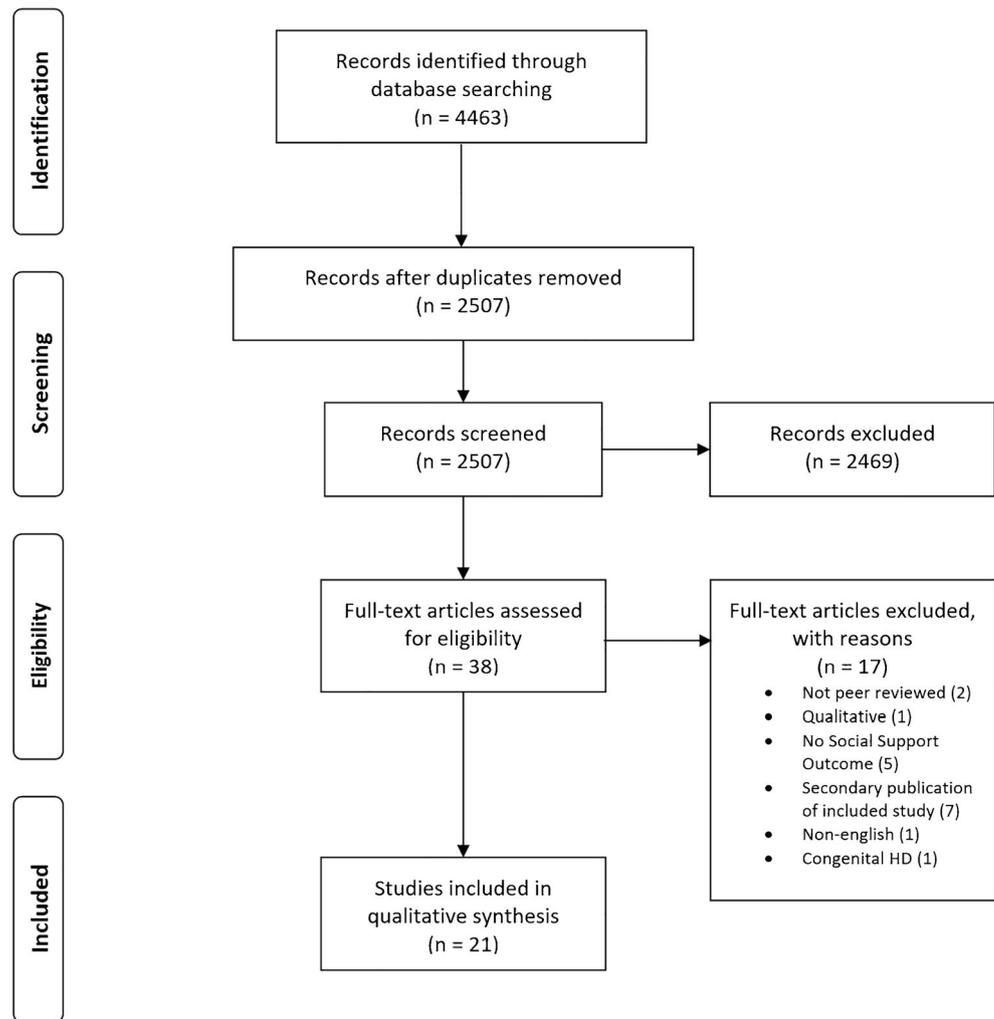
**Table 1** (continued)

Author; year; country; sample size; study design; PEDro score	Sample characteristics	Intervention description	Social support strategies	Intervention duration and frequency	Social support outcome measure	Measurement timepoints	Results
Aldana et al. (2006) [34]; US; n = 84; 3-arm prospective controlled trial (non-randomized); PEDro = N/A	Intervention (n = 28): Mean age (SD) = 56.7 (9.4); Male = 85.8% Conventional CR (n = 28): Mean age (SD) = 58.8 (12.5); Male = 89.4% Control (n = 28): Mean age (SD) = 59.9 (11.9); Male = 71.4%	recommendations, group support discussions, group meals Intervention: Ornish Programme; Multi-faceted CRP featuring group exercise sessions, strict diet recommendations, group support discussions, group meals Conventional CR: Standard exercise-focused cardiac rehabilitation Control: Usual care	case-manager phone follow-up Intervention: Group exercise, education, meals; group support discussions; case-manager phone follow-up Conventional CR: Group-based activities (exercise classes); group risk factor education	Intervention: Week 1: 3 × 4 h sessions; weeks 2–12: 2 × 4 h sessions; months 3–9: 1 × 4 h weekly sessions Conventional CR for 12 weeks; 3 × 1 h exercise sessions per week; 1 × 1 h risk factor education per week	Preferred support profile	Baseline, 3 months, 6 months	Groups significantly different at baseline; social support significantly improved within intervention group but no significant between-group differences
Pischke et al. (2008) [35]; US; n = 48; RCT; PEDro = 5	Intervention (n = 28): Mean age (SD) = 57 (8); Male = 96% Control (n = 20): Mean age (SD) = 59 (10); Male = 80%	Intervention: Ornish Programme; Multifaceted CRP featuring group exercise sessions, strict diet recommendations, group support discussions, group meals Control: Usual care	Intervention: Group exercise, education, meals; group support discussions; case-manager phone follow-up	Intervention: Week 1: 3 × 4 h sessions; weeks 2–12: 2 × 4 h sessions; months 3–9: 1 × 4 h weekly sessions	Social Support Questionnaire (Adapted Berkman–Syme; focused on instrumental support and perceived adequacy of social support)	Baseline, 1 yr, 5 yrs	No significant changes in social support
Stress management and mindfulness programmes (n = 4) Blom et al. (2009) [17]; Sweden; n = 247 (all female); RCT; PEDro = 5	Intervention (n = 113): Mean age (SD) = 61.5 (8.9) Control (n = 122): Mean age (SD) = 71.2 (9.7)	Intervention: Group stress management education, interpersonal and coping skills practice, with supportive discussion Control: Usual care	Group relaxation/stress management education and skill practice; supportive group discussions; encourage social network	Weeks 1–10: 1 × 2 h group education sessions; monthly group sessions for remainder of year	Interview Schedule for Social Interaction	Baseline, 6 months	No significant changes in social support
Young et al. (2015) [37] Gotink et al. (2017) [38] (1-yr follow-up paper); Netherlands; n = 324; RCT; PEDro = 8	Intervention (n = 215): Mean age (SD) = 43.2 (8.9); Male = 55.8% Control (n = 109): Mean age (SD) = 71.2 (9.7); Male = 49.5% Intervention (n = 13):	Intervention: Online mindfulness programme with focused on education and daily activities including meditations, self-reflection, yoga Control: Usual care	Individual mindfulness and compassion meditation practice	12-week weekly online mindfulness programme modules with daily meditations	Dutch Perceived Social Support Scale 12	Baseline, 3 months	No significant differences in social support

**Table 1** (continued)

Author; year; country; sample size; study design; PEDro score	Sample characteristics	Intervention description	Social support strategies	Intervention duration and frequency	Social support outcome measure	Measurement timepoints	Results
Heo et al. (2018) [22•]; US; <i>n</i> = 13; Pre-post pilot; PEDro = N/A	Mean age (SD) = 60.9 (12.8); Male = 27.3%	Mindfulness and compassion meditation programme (heart failure self-management emphasized)	Group mindfulness and compassion education and meditation sessions for self and others	For 12 weeks: 1 × 3 h meditation session per week	Multidimensional scale of perceived social support	Baseline, 6 months, annually for four years	Significantly increased within-group changes in social support
Individual counselling/psychological therapy ( <i>n</i> = 2)							
Berkman et al. (2003) [21••]; US; <i>n</i> = 2481 (depressed, low perceived social support, or both); RCT; PEDro = 8	Mean age (SD) = 61.0 (12.6); Male = 57.0%; Mean age (SD) = 61 (12.5); Male = 55.6%	<i>Intervention</i> : At least 3 individual CBT sessions, adding in group CBT/support sessions where appropriate; antidepressants prescribed where indicated <i>Control</i> : Usual care	Formal support (1-on-1 needs-based CBT aimed to modify behavioural and social skill deficits, cognitive factors that contribute to low perceived social support) and social network development; group CBT/support sessions	For 6 months: ≥ 1 × CBT (individual or group) per week	ENRICH social support instrument	Baseline, 6 months, annually for four years	Intervention group experienced significant (modest) improvement in social support relative to controls; group differences diminished over time; no significant differences in social support at 42 months
Bakan and Akyol (2008) [39]; Turkey; <i>n</i> = 44; RCT; PEDro = 5	<i>Intervention</i> ( <i>n</i> = 22): Mean age (SD) = 62.7 (not reported); Male = 38.1%; <i>Control</i> ( <i>n</i> = 22): Mean age (SD) = not reported; Male = 40.9%	<i>Intervention</i> : 1-on-1 counselling and heart failure education (caregivers invited) with encouragement and goal setting towards lifestyle change; telephone follow-up support; group education and support session <i>Control</i> : Usual care	Formal support (counselling, telephone follow up); spouse involvement; group support	Week 1: 2 × 1-on-1 counselling; week 2: 1 × telephone follow-up; week 2: 1 × telephone follow-up; week 5: 1 × group support session (3-month programme)	Interpersonal Support Evaluation List (ISEL)	Baseline, 3 months	Intervention group experienced significant improvement social support relative to controls

CBT, cognitive-behavioural therapy; CR, cardiac rehabilitation; HAPA, Health Action Process Approach, a health behaviour theory; HF, heart failure; RCT, randomized controlled trial; SD, standard deviation

**Fig. 1** Search strategy flow diagram

group improvements were reported in the intervention group on a general measure of perceived social support and social integration [31]. Two RCTs assessed the effects of caregiver-only interventions on perceived social support among people living with HF. The programmes were similar and included 3–4 weekly group sessions focused on HF education, communication skills, emotional support skills, and supportive group discussion for caregivers and family members of those with heart disease. Significant improvements in perceived social support were observed in the loved ones of these caregivers relative to controls at one [32] and three months [10•] follow-up.

### Multi-Faceted Cardiac Rehabilitation

Four studies assessed changes in social support resulting from multi-faceted cardiac rehabilitation programmes (CRP). Of these, three tested the Ornish programme, a comprehensive CRP that includes psychologist-facilitated supportive group discussions, group heart-healthy meals, and ongoing follow-

up from a case manager, in addition to typical CRP components of group exercise and education. While one single group pre–post study of the Ornish programme found significant improvements in perceived social support [33], two controlled studies found no between-group differences [34, 35]. The other (non-Ornish) study assessed a modified CRP that gradually replaced supervised exercise with group support sessions designed to motivate and support participants towards off-site exercise. This study measured changes in “social support for exercise”, specifically, rather than a measure of general functional support and observed a significant decrease in social support for exercise over six-month follow-up in the intervention group relative to conventional CRP controls [36].

### Mindfulness Training and Stress Management

Four studies examined the effects of mindfulness training or stress management programmes on social support. Heo et al. reported significant increases in social support resulting in a single group pilot study of a 12-week group-based

mindfulness and compassion meditation programme that provided education and emphasis on optimal self-management of HF [22•]. However, two studies reporting the effects of an online-delivered mindfulness programme for people with CVD found no significant differences in social support in the intervention group relative to the control group at immediate [37] or long-term [38] follow-up. Similarly, one study reporting on an RCT of a female-only six-month group stress management programme incorporating supportive discussion and encouragement of social network expansion observed no differences in social support relative to usual care [17].

### Patient Counselling and Psychological Interventions

Two studies reported on counselling and psychological interventions for people with CVD. One 3-month programme designed to facilitate adaptation to living with HF provided two 1-on-1 self-management education and counselling sessions, with telephone phone follow-up and a final group support session. The intervention group reported significant improvements in social support at three-month follow-up. It is worth noting that caregivers were invited to participate in all aspects of this intervention, but no data were provided on the level of participation [39]. Berkman and colleagues conducted a large, multi-centre trial of a six-month individual and, where possible, group-based cognitive behaviour therapy intervention to treat depression and low-perceived social support in those with CVD. The intervention group reported a marginal albeit significant improvement in perceived social support relative to controls at six-month follow-up. However, this difference diminished over time and was non-significant after 42 months [21••].

### Discussion

This systematic scoping review synthesized the existing evidence on interventions to enhance social support among people with CVD. Studies included both RCTs, prospective non-randomized controlled trials, and pre-post studies. Reports of RCTs were generally of fair to good quality, and the interventions were organized into the following five conceptual categories—peer support interventions, caregiver-focused interventions, multi-faceted CRPs, mindfulness training and stress management programmes, and patient counselling and psychological interventions. While most studies sought to enhance functional aspects of social support (e.g. emotional, informational, instrumental support), others examined social support in the context of facilitating specific behaviours, such as exercise.

Interestingly, relatively few studies in the present review were effective at enhancing measures of perceived social support. Previous work has indicated the effectiveness of interventions involving the provision of social support on a variety of psychosocial outcomes across diverse populations;

however, few of these studies have measured changes in the construct of social support itself [4]. Thus, it remains difficult to compare the effectiveness of social support interventions in terms of their impact on social support specifically.

As the standard of care in recovery after acute cardiac events, group-based CRPs may be uniquely positioned to expand CVD patients' social network and perceptions of support. Indeed, CRPs have evolved from their original exercise focus into comprehensive behavioural and psychosocial risk factor management programmes [40]. However, despite the inclusion of supportive group discussions, the present results suggest that multi-faceted CRPs have not been effective at improving social support. While it may be the case that CRPs offer opportunities to meet and interact with others in similar life circumstances, as currently designed they may not provide sufficient context or timeframe for supportive relationships to develop. Of note was the significant decline in perceptions of social support for exercise reported by Carlson and colleagues within both a traditional CRP and a modified CRP designed to enhance social support for exercise. The authors posited that this may have been due to the high baseline scores on their social support measure; however, it may indicate that social support for self-management from important others may be at a high point near the beginning of entering a CRP but may wane over time. This may partially explain the similarly waning adherence to lifestyle health behaviours following the conclusion of CRPs [41, 42]. Further research is needed to determine whether inclusion of other social support strategies in the context of CRPs (such as caregiver and family education components) may be effective.

Similarly, no controlled assessment of a peer support intervention (individual- or group-based) in our search yielded significant improvements in social support. Peer support is offered when similar peers who possess pragmatic knowledge from lived experiences provide health-related support to others. Such support may play an important supportive role for those with CVD, as it is common for people with CVD to report a lack of understanding by family and friends of their recovery needs, experiences, and unique challenges [43]. In these instances, members of one's prior social network may not always be able to provide the needed support [44]. Our results run counter to evidence suggesting peer support programmes may be effective for building social support among those with diabetes [45, 46], suggesting alternative strategies may be needed among those with CVD. Moreover, prior work suggests the efficacy of peer support programmes at improving risk factor control in diabetes patients [47, 48], mental health in people with brain injury [49], and quality of life in cancer patients [50]. While Colella and colleagues reported no significant differences in social support between groups after their peer support intervention, the intervention group did experience a significant decrease in use of healthcare services [20]. The reason for this difference is not clear; however, it may be the case that peer support interventions are able to provide important reassurances or improve health

outcomes despite showing no statistically different changes on measures of social support.

Interestingly, several stress management and mindfulness interventions assessed changes in social support outcomes. Effective stress management strategies, such as mindfulness, may benefit one's psychological state and one's relationships, enhancing perceptions of social support. Mindfulness has been defined as an ability to live with open awareness and non-judgment of one's present experience and is associated with decreased stress and improved psychosocial outcomes [51–54]. Evidence suggests that mindfulness is related to positive relationship practices and predicts relationship satisfaction [55–57]. It is thus postulated that mindfulness practices may be effective at enhancing social support. However, the mindfulness studies included for review appear not to be effective at enhancing social support for those with CVD when delivered in an online format [37, 38]. Indeed, recent evidence suggests that the social experience and support within a meditation group plays a major role in the positive outcomes seen in group mindfulness programmes [58]. This could explain the positive impacts on social support reported in the feasibility study of a group-based mindfulness and CVD intervention by Heo and colleagues [22•], but not in the online programmes.

The most consistent results at improving social support were from studies focusing on caregivers of those living with CVD. These results appear to be in line with recent work suggesting family-oriented interventions may be effective at enhancing social support among people living with cancer [59]. Partners and family members often become informal caregivers to those living with CVD, acting as central source of social support [4]. However, the various strains—physical, emotional, or financial—following cardiac events may contribute to reduced quality of life or depression among both patients and partners [60]. It is increasingly recognized that caregivers are at increased risk of poor mental and physical health outcomes [61, 62] and may require support themselves. Furthermore, evidence demonstrates that people with CVD living with caregivers experiencing significant physical, emotional, and financial burden have poorer adherence to positive health behaviours [63]. Thus, ensuring caregivers are knowledgeable, engaged, and well supported may be a promising strategy to support those living with CVD positive health outcomes.

Psychological interventions, such as CBT, are designed to address and retrain maladaptive thought and behaviour patterns and promote positive skill development. In the context of low perceived social support, therapists may mitigate an immediate lack of emotional support by establishing a strong therapeutic relationship with a client and may then tailor the intervention to address the individual's causes of the low perceived social support, whether they be maladaptive cognitions, poor communication skills, or actual social isolation. The successful albeit modest improvements in social support seen in the large multi-centre RCT conducted by Berkman et al. suggest a role for

psychotherapy in enhancing perceived social support. However, the authors noted no mortality benefit in the intervention group, suggesting a more complicated, multifactorial relationship between social support and cardiac endpoints. Indeed, several authors have called attention to the lack of insight into the mechanisms by which social support enhances health, noting the relative dearth of theory-informed studies aimed to conduct informative mediation analyses [64, 65]. Further research on social supports' "mechanisms of action" is needed to facilitate the development of more effective support interventions.

Our search revealed a variety of challenges in understanding how social support may be enhanced in the context of recovery after cardiac events. We found, with few exceptions, that studies provided little theory behind how an intervention enhanced particular aspects of social support (i.e. emotional, instrumental, informational). Furthermore, there were limitations regarding the measurement of social support. Reviewed studies used social support measures focused on perceived social support offered by friends, family, and significant others [24]; few assessed changes in social integration or changes in the quality of social interactions which may be relevant to enhanced health outcomes. It seems possible that participants of CRPs, for example, are experiencing meaningful expansions in structural or function social support that are insufficiently captured by the instruments used. Lastly, as only seven studies assessed social support as a primary outcome, it is possible that other studies lacked statistical power to demonstrate significant differences on measures of social support.

## Conclusion

The presence of social support plays a major role in health outcomes among those living with CVD. While a variety of interventions have been undertaken to enhance social support among this population, relatively few have been successful. The most compelling evidence to date suggests that caregiver-oriented strategies may offer an effective avenue to improving perceived social support; however, this evidence is not of high quality. Thus, more rigorous, theory-informed studies are required to determine the most effective methods to enhance social support in this population.

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## Compliance with Ethical Standards

**Conflict of Interest** C.T. Clayton, C. Motley, and B.M. Sakakibara declare that they have no conflict of interest.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

## Appendix

**Table 2** Medline search strategy

Database	Search strategy	Results (#)
Medline (OVID)	((Cardiovascular disease.mp. or Cardiovascular Diseases/) OR (coronary artery disease.mp. or Coronary Artery Disease/) OR (heart disease.mp. or Heart Diseases/) OR (myocardial ischemia.mp. or Myocardial Ischemia/) OR (heart failure.mp. or Heart Failure/) OR (ischemic heart disease.mp.) OR (heart attack.mp.) OR (myocardial infarction.mp. or Myocardial Infarction/)) AND ((cardiac rehabilitation.mp. or Cardiac Rehabilitation/) OR (healthy heart program.mp.) OR (cardiovascular rehabilitation.mp.) OR (chronic care.mp.) OR (Intervention.mp.) OR (clinical trial.mp. or Clinical Trial/) OR (randomized control trial.mp.) OR (randomized trial.mp.) OR (experimental.mp.) OR (quasi-experimental.mp.) OR (program.mp. or Programs/) OR (prospective controlled trial.mp.) OR (feasibility study.mp. or Feasibility Studies/) OR (proof of concept.mp.)) AND ((social support.mp. or Social Support/) OR (emotional support.mp.) OR (peer support.mp.) OR (self help groups.mp. or Self-Help Groups/))	841

Adapted to CINAHL, PsycINFO, EMBASE, and PubMed

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- Of importance
- Of major importance

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