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Interventions to support return to work for people with coronary heart disease (Review)

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Interventions to support return to work for people with coronary heart disease.
Cochrane Database of Systematic Reviews 2019, Issue 3. Art. No.: CD010748.
DOI: 10.1002/14651858.CD010748.pub2.

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[Intervention Review]

Interventions to support return to work for people with coronary heart disease

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Editorial group: Cochrane Work Group.
Publication status and date: New, published in Issue 3, 2019.

Citation: Hegewald J, Wegewitz UE, Euler U, van Dijk JL, Adams J, Fishta A, Heinrich P, Seidler A. Interventions to support return to work for people with coronary heart disease. *Cochrane Database of Systematic Reviews* 2019, Issue 3. Art. No.: CD010748. DOI: 10.1002/14651858.CD010748.pub2.

ABSTRACT

Background

People with coronary heart disease (CHD) often require prolonged absences from work to convalesce after acute disease events like myocardial infarctions (MI) or revascularisation procedures such as coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI). Reduced functional capacity and anxiety due to CHD may further delay or prevent return to work.

Objectives

To assess the effects of person- and work-directed interventions aimed at enhancing return to work in patients with coronary heart disease compared to usual care or no intervention.

Search methods

We searched the databases CENTRAL, MEDLINE, Embase, PsycINFO, NIOSHTIC, NIOSHTIC-2, HSELINE, CISDOC, and LILACS through 11 October 2018. We also searched the US National Library of Medicine registry, clinicaltrials.gov, to identify ongoing studies.

Selection criteria

We included randomised controlled trials (RCTs) examining return to work among people with CHD who were provided either an intervention or usual care. Selected studies included only people treated for MI or who had undergone either a CABG or PCI. At least 80% of the study population should have been working prior to the CHD and not at the time of the trial, or study authors had to have considered a return-to-work subgroup. We included studies in all languages. Two review authors independently selected the studies and consulted a third review author to resolve disagreements.

Data collection and analysis

Two review authors extracted data and independently assessed the risk of bias. We conducted meta-analyses of rates of return to work and time until return to work. We considered the secondary outcomes, health-related quality of life and adverse events among studies where at least 80% of study participants were eligible to return to work.

Main results

We found 39 RCTs (including one cluster- and four three-armed RCTs). We included the return-to-work results of 34 studies in the meta-analyses.

Person-directed, psychological counselling versus usual care

We included 11 studies considering return to work following psychological interventions among a subgroup of 615 participants in the meta-analysis. Most interventions used some form of counselling to address participants' disease-related anxieties and provided information on the causes and course of CHD to dispel misconceptions. We do not know if these interventions increase return to work up to six months (risk ratio (RR) 1.08, 95% confidence interval (CI) 0.84 to 1.40; six studies; very low-certainty evidence) or at six to 12 months (RR 1.24, 95% CI 0.95 to 1.63; seven studies; very low-certainty evidence). We also do not know if psychological interventions shorten the time until return to work. Psychological interventions may have little or no effect on the proportion of participants working between one and five years (RR 1.09, 95% CI 0.88 to 1.34; three studies; low-certainty evidence).

Person-directed, work-directed counselling versus usual care

Four studies examined work-directed counselling. These counselling interventions included advising patients when to return to work based on treadmill testing or extended counselling to include co-workers' fears and misconceptions regarding CHD. Work-directed counselling may result in little to no difference in the mean difference (MD) in days until return to work (MD −7.52 days, 95% CI −20.07 to 5.03 days; four studies; low-certainty evidence). Work-directed counselling probably results in little to no difference in cardiac deaths (RR 1.00, 95% CI 0.19 to 5.39; two studies; moderate-certainty evidence).

Person-directed, physical conditioning interventions versus usual care

Nine studies examined the impact of exercise programmes. Compared to usual care, we do not know if physical interventions increase return to work up to six months (RR 1.17, 95% CI 0.97 to 1.41; four studies; very low-certainty evidence). Physical conditioning interventions may result in little to no difference in return-to-work rates at six to 12 months (RR 1.09, 95% CI 0.99 to 1.20; five studies; low-certainty evidence), and may also result in little to no difference on the rates of patients working after one year (RR 1.04, 95% CI 0.82 to 1.30; two studies; low-certainty evidence). Physical conditioning interventions may result in little to no difference in the time needed to return to work (MD −7.86 days, 95% CI −29.46 to 13.74 days; four studies; low-certainty evidence). Physical conditioning interventions probably do not increase cardiac death rates (RR 1.00, 95% CI 0.35 to 2.80; two studies; moderate-certainty evidence).

Person-directed, combined interventions versus usual care

We included 13 studies considering return to work following combined interventions in the meta-analysis. Combined cardiac rehabilitation programmes may have increased return to work up to six months (RR 1.56, 95% CI 1.23 to 1.98; number needed to treat for an additional beneficial outcome (NNTB) 5; four studies; low-certainty evidence), and may have little to no difference on return-to-work rates at six to 12 months' follow-up (RR 1.06, 95% CI 1.00 to 1.13; 10 studies; low-certainty evidence). We do not know if combined interventions increased the proportions of participants working between one and five years (RR 1.14, 95% CI 0.96 to 1.37; six studies; very low-certainty evidence) or at five years (RR 1.09, 95% CI 0.86 to 1.38; four studies; very low-certainty evidence). Combined interventions probably shortened the time needed until return to work (MD −40.77, 95% CI −67.19 to −14.35; two studies; moderate-certainty evidence). Combining interventions probably results in little to no difference in reinfarctions (RR 0.56, 95% CI 0.23 to 1.40; three studies; moderate-certainty evidence).

Work-directed, interventions

We found no studies exclusively examining strictly work-directed interventions at the workplace.

Authors' conclusions

Combined interventions may increase return to work up to six months and probably reduce the time away from work. Otherwise, we found no evidence of either a beneficial or harmful effect of person-directed interventions. The certainty of the evidence for the various interventions and outcomes ranged from very low to moderate. Return to work was typically a secondary outcome of the studies, and as such, the results pertaining to return to work were often poorly reported. Adhering to RCT reporting guidelines could greatly improve the evidence of future research. A research gap exists regarding controlled trials of work-directed interventions, health-related quality of life within the return-to-work process, and adverse effects.

PLAIN LANGUAGE SUMMARY

Interventions to help people return to work after a heart attack, bypass or stent.

What is the aim of this review?

We aimed to find and analyse the results of studies examining programmes to help people with heart disease return to work in order to determine if these programmes really help them return to work, and also if these programmes affect quality of life or have any unwanted effects.

Key messages

Cardiac rehabilitation programmes, including both exercise and counselling components, probably shorten the time needed to return to work (moderate-certainty evidence) and may increase the number of patients who return to work in the first six months after a heart attack, bypass or stent (low-certainty evidence), but these programmes may have little or no effect on return to work after six months. Programmes comprising only counselling or exercise may make little to no difference in the number of patients returning to work or in the time needed to return to work (low to very low-certainty evidence).

What was studied in the review?

People recovering from a heart attack or from a procedure to improve heart disease may have problems returning to work. These procedures could be a bypass (a surgical procedure to bypass narrowed coronary arteries, also called coronary artery bypass graft or CABG) or a nonsurgical intervention, including implanting stents (called percutaneous coronary interventions (PCI)), for example. Physical weakness and emotional problems resulting from heart disease may result in long absences from work or lead to disability retirement. Conditions at work may also make it difficult for patients to return to work. This can have a lasting impact on their quality of life. We looked at programmes that made it easier for people to return to work, for example by modifying their working conditions, or addressing the anxiety that often accompanies heart disease by educating patients on heart health, helping them to exercise or applying a combination of counselling and exercise to help them become healthy enough to return to work.

What are the main results of the review?

We found a total 39 studies that looked at return to work among people with heart disease in programmes designed to support the recovery process or encourage return to work compared to patients receiving usual care.

We found no studies that made changes to the workplace or workplace policies to ease the return to work, for example by reducing patients' working hours or tasks, and gradually increasing the working hours and tasks as health improves.

We found 11 studies evaluating programmes that addressed the fears and depression that often accompany heart disease, by teaching patients about heart disease. We do not know if these counselling and health education programmes increase the number of patients who returned to work or shorten the time patients are away from their jobs (low- to very low-certainty evidence).

We found four studies using programmes that recommended when people with heart disease should return to work or provided counselling to co-workers to address their concerns regarding the causes of the heart attacks and the patient's ability to resume working. Work-directed counselling interventions may make little to no difference to the time patients need to return to work (low-certainty evidence).

We found nine studies providing exercise programmes alone. Exercise programmes may make little to no difference in the number of patients returning to work between six months and a year (low-certainty evidence) and may make little to no difference in the number of patients working between one and five years or in the time needed to return to work (low-certainty evidence).

We found 17 studies that evaluated combined exercise and counselling programmes. These combined programmes may increase the number of patients returning to work up to six months after a heart attack, bypass or stent (low-certainty evidence): for every five patients enrolled in a combined cardiac rehabilitation programme, one additional patient may return to work. These programs probably shorten the time needed to return to work (moderate-certainty evidence) by about a month.

How up-to-date is this review?

We searched for studies that had been published up to 11 October 2018.

Summary of findings for the main comparison. Psychological interventions (including health education) compared to usual care for people with coronary heart disease

Psychological interventions (including health education) compared to usual care for people with coronary heart disease

Patient or population: people with coronary heart disease
Setting: hospital/home
Intervention: psychological interventions (including health education)
Comparison: usual care

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with usual care	Risk with psychological interventions (including health education)				
Proportion of participants returning to work in the short term (up to 6 months) Follow-up: range 3 months to 4 months	Study population 63 per 100	68 per 100 (53 to 88)	RR 1.08 (0.84 to 1.40)	375 (6 RCTs)	⊕⊖⊖⊖ **Very low**[1,2,3,4]	We do knot know if psychological interventions (including health education) increase the proportion returning to work in the short term (up to 6 months)
Proportion of participants returning to work in the medium term (6 months - 1 year) Follow-up: range 6 months to 1 year	Study population 63 per 100	78 per 100 (59 to 100)	RR 1.24 (0.95 to 1.63)	316 (7 RCTs)	⊕⊖⊖⊖ **Very low**[1,2,3,4]	We do not know if psychological interventions (including health education) increase the proportion returning to work in the medium term (6 months - 1 year).
Proportion of participants at work in the long term (> 1 to < 5 years) Follow-up: range 1.5 years to 4 years	Study population 74 per 100	81 per 100 (65 to 99)	RR 1.09 (0.88 to 1.34)	239 (3 RCTs)	⊕⊕⊖⊖ **Low**[2,3]	Psychological interventions (including health education) may make little or no difference in the proportion working in the long term (> 1 to < 5 years)
Days until return to work Follow-up: range 6 months to 1.5 years		The mean time to return to work was 9.7 days lower (35.09 lower to 15.69 higher)	-	125 (2 RCTs)	⊕⊖⊖⊖ **Very low**[1,2,3]	We do not know if psychological interventions (including health education) lower the days needed until returning to work

*The risk in the Intervention group (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **RCT:** randomised controlled trial; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

[1]Downgraded one level due to substantial heterogeneity that we could not completely explain.
[2]Downgraded one level due to risk of bias.
[3]Downgraded one level due to imprecision (pooled confidence interval is wide and includes either a possible appreciable harm or benefit).
[4]Downgraded one level, because results of a funnel plot indicated possible publication bias.

Summary of findings 2. Work-directed counselling compared to usual care for people with coronary heart disease

Work-directed counselling compared to usual care for people with coronary heart disease

Patient or population: people with coronary heart disease
Setting: hospital/home
Intervention: work-directed counselling
Comparison: usual care

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with usual care	Risk with work-directed counselling				
Days until return to work		The mean time to return to work was 7.52 days lower (20.07 lower to 5.03 higher)	-	618 (4 RCTs)	⊕⊕⊖⊖ **Low**[1,2]	Work-directed counselling may result in little to no difference in days until return to work
Adverse effects: cardiac deaths Follow-up mean: 6 months	2 per 100	2 per 100 (0 to 8)	RR 1.00 (0.19 to 5.39)	388 (2 RCTs)	⊕⊕⊕⊖ **Moderate**[3]	Work-directed counselling probably results little or no difference in cardiac death rates

*The risk in the Intervention group (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **RCT:** randomised controlled trial; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

[1]Downgraded one level due to substantial heterogeneity that we could not completely explain.
[2]Downgraded one level due to imprecision (two of the four studies did not report the standard deviation).
[3]Downgraded one level due to imprecision (pooled confidence interval is wide and includes either a possible harm or benefit).

Summary of findings 3. Physical conditioning interventions compared to usual care for people with coronary heart disease

Physical conditioning interventions compared to usual care for people with coronary heart disease

Patient or population: people with coronary heart disease
Setting: hospital/home
Intervention: physical conditioning interventions
Comparison: usual care

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with usual care	Risk with physical conditioning interventions				
Proportion of participants returning to work in the short term (up to 6 months) Follow-up: range 3 months to 5.5 months	Study population		RR 1.17 (0.97 to 1.41)	460 (4 RCTs)	⊕⊖⊖⊖ **Very low**[1,2,3]	We do not know if physical conditioning interventions increase the proportion returning to work in the short term (up to 6 months)
	68 per 100	80 per 100 (66 to 96)				
Proportion of participants returning to work in the medium term (6 months-1 year) Follow-up: range 0.5 years to 1 years	Study population		RR 1.09 (0.99 to 1.20)	510 (5 RCTs)	⊕⊕⊖⊖ **Low**[1 4]	Physical conditioning interventions may result in little to no difference in proportion returning to work in the medium term (6 months-1 year)
	75 per 100	82 per 100 (74 to 90)				

Proportion of participants at work in the long term (> 1 to < 5 years) Follow-up: range 3 years to 4 years	Study population		RR 1.04 (0.82 to 1.30)	156 (2 RCTs)	⊕⊕⊖⊖ **Low**[1]	Physical conditioning interventions may result in little to no difference in proportion at work in the long term (> 1 to < 5 years)
	64 per 100	67 per 100 (53 to 84)				
Proportion of participants at work in the extended long term (≥ 5 years) Follow-up: mean 5 years	Study population		RR 1.83 (1.26 to 2.66)	119 (1 RCT)	⊕⊕⊖⊖ **Low**[5]	Physical conditioning interventions may increase the proportion at work in the extended long term (≥ 5 years)
	37 per 100	68 per 100 (47 to 99)				
Days until return to work		The mean time to return to work was 7.86 days lower (29.46 lower to 13.74 higher)	-	430 (4 RCTs)	⊕⊕⊖⊖ **Low**[1 2]	Physical conditioning interventions appear to result in little to no difference in mean time to return to work (days)
Adverse effects: cardiac deaths Follow-up: mean 4.8 years	8 per 100	8 per 100 (3 to 24)	RR 1.00 (0.35 to 2.80)	285 (2 RCTs)	⊕⊕⊕⊖ **Moderate**[3]	Physical conditioning interventions probably do not increase adverse effects (cardiac deaths)

*__The risk in the__ Intervention group (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **RCT:** randomised controlled trials; **RR:** risk ratio

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

[1]Downgraded one level due to risk of bias.
[2]Downgraded one level due to substantial heterogeneity that we could not completely explain.
[3]Downgraded one level due to imprecision (pooled confidence interval is wide and includes either a possible appreciable harm or benefit).
[4]Downgraded one level, because results of funnel plot indicated possible publication bias.
[5]Downgraded one level because only one study reported the proportion of study participants working five years after the intervention.

Summary of findings 4. Combined interventions compared to usual care for people with coronary heart disease

Combined interventions compared to usual care for people with coronary heart disease

Patient or population: people with coronary heart disease
Setting: hospital/home
Intervention: combined interventions
Comparison: usual care

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with usual care	Risk with combined interventions				
Proportion of participants returning to work in the short term (up to 6 months) Follow-up: range 2.3 months to 4 months	Study population 39 per 100	61 per 100 (48 to 78)	RR 1.56 (1.23 to 1.98)	395 (4 RCTs)	⊕⊕⊖⊖ **Low**[1,2]	Combined rehabilitation interventions may increase the proportion returning to work in the short term (up to 6 months)
Proportion of participants returning to work in the medium term (6 months - 1 year) Follow-up: range 6 months to 1 year	Study population 72 per 100	76 per 100 (72 to 81)	RR 1.06 (1.00 to 1.13)	992 (10 RCTs)	⊕⊕⊖⊖ **Low**[3]	Combined interventions may result in little to no difference in the proportion returning to work in the medium term (6 months - 1 year)
Proportion of participants at work in the long term (> 1 to < 5 years) Follow-up: range 1.2 years to 3 years	Study population 53 per 100	60 per 100 (51 to 72)	RR 1.14 (0.96 to 1.37)	491 (6 RCTs)	⊕⊖⊖⊖ **Very low**[1,3]	We do not know if combined interventions increase the proportion working long term (> 1 to < 5 years)
Proportion of participants at work in the extended long term (≥ 5 years) Follow-up: 5 years	Study population 37 per 100	41 per 100 (32 to 51)	RR 1.09 (0.86 to 1.38)	350 (4 RCTs)	⊕⊖⊖⊖ **Very low**[1,3]	We do not know if combined interventions increase the proportion working after an extended term (≥ 5 years)
Days until return to work		The mean time to return to work in the intervention group was 40.77 days lower	-	181 (2 RCTs)	⊕⊕⊕⊖ **Moderate**[4]	Combined rehabilitation interventions probably reduce mean time to return to work (days)

		(67.19 lower to 14.35 lower)				
Health-related quality of life assessed with: Angina Pectoris Quality of Life Questionnaire	-	The MD for HrQoL was 0.40 (-0.03 lower to 0.83 higher)		87 (1 RCT)	⊕⊕⊖⊖ **Low**[2,5]	Combined interventions may result in little to no difference in HrQoL
Adverse effects: reinfarctions Follow-up: mean 3.8 years	10 per 100	6 per 100 (2 to 15)	RR 0.56 (0.23 to 1.43)	265 (3 RCTs)	⊕⊕⊕⊖ **Moderate**[1]	Combined interventions likely result in little to no difference in adverse effects

*__The risk in the__ Intervention group (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **HRQoL:** health-related quality of life; **RCT:** randomised controlled trial; **RR:** risk ratio; **MD:** mean difference

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

[1]Downgraded one level due to imprecision (pooled confidence interval is wide and includes either a possible appreciable harm or benefit).
[2]Downgraded one level due to risk of bias.
[3]Downgraded two levels due to risk of bias.
[4]We detected substantial heterogeneity that we could not completely explain.
[5]Downgraded one level because only one study reported the effects of the intervention on health-related quality of life.

BACKGROUND

Description of the condition

Coronary heart disease (CHD), also called coronary artery disease or ischaemic heart disease, is a narrowing or blockage of the blood vessels supplying the heart muscles (WHO 2012). The most common cause of CHD is atherosclerosis, which is a build-up of cholesterol and fatty deposits (called plaques) on the inner walls of these arteries. A myocardial infarction (MI) may be the first manifestation of coronary artery disease, but it may also occur in people with established disease. Cardiac ischaemia, that is restriction in blood supply, can often cause chest pain known as angina pectoris when the myocardium, or heart muscle tissue, is starved of oxygen.

CHD is the most important cause of mortality and morbidity in Western industrialised countries. In 2016, with 9.4 million deaths (16.2% of total deaths, all ages) it was the leading cause of deaths in the world (WHO 2018a). In European countries it accounts for 13.6% of total disability adjusted life years (DALYs) and 7.6% of total DALYs internationally (WHO 2018b).

CHD morbidity has economic as well as social implications. Leal 2006 estimated the total costs for the European Union to be EUR 45 billion in 2003, with 51% incurred in health care, 34% in productivity losses and 15% in informal care. Anxiety and depression are often experienced after MI and can have major effects on quality of life and on return to work (Dickens 2006; O'Neil 2010).

People who have experienced cardiac events face many challenges, such as pain and discomfort, fatigue, anxiety, problems with physical activity, cardiac medication, or concerns about diet (Blair 2014). Furthermore, data from qualitative interviews with young patients show that their disease has an impact on establishing a career, meaningful relationships, family, and financial security, thus negatively affecting mental health and health-related quality of life (Walsh 2018).

Cardiac rehabilitation plays an important role in the overall clinical management of cardiac patients. The National Institute for Health and Care Excellence (NICE) has defined cardiac rehabilitation as a "coordinated and structured programme designed to remove or reduce the underlying causes of cardiovascular disease, as well as to provide the best possible physical, mental and social conditions, so that people can, by their own efforts, continue to play a full part in their community. A healthier lifestyle and slowed or reversed progression of cardiovascular disease can also be achieved" (NICE 2015). Although physical activity is commonly recommended as a core element for people with MI or other acute coronary syndromes, combined (or comprehensive) cardiac rehabilitation consists of interventions with health education, lifestyle advice, stress management and physical exercise components (NICE 2013; Perk 2012; Piepoli 2014). According to the Agency for Healthcare Research and Quality (AHRQ), the programmes are "designed to limit the physiological and psychological effects of cardiac illness, reduce the risk for sudden death or re-infarction, control cardiac symptoms, stabilise or reverse the atherosclerotic process, and enhance the psychosocial and vocational status of selected patients" (Wenger 1995; Wenger 2008).

The benefits of cardiac rehabilitation have been examined in several systematic reviews. A recently updated Cochrane Review concluded that exercise-based cardiac rehabilitation for people with CHD is effective in reducing cardiovascular mortality in medium- to long-term studies, and hospital admissions in short-term studies, but not total MI or need for revascularisation by means of coronary artery bypass surgery (CABG) or percutaneous coronary intervention (PCI) including percutaneous transluminal coronary angioplasty and stents (Anderson 2016). Both PCI and CABG are used to treat blocked coronary arteries. CABG is a surgical procedure to bypass narrowed coronary arteries, whereas PCI is a nonsurgical procedure that opens blocked or narrowed coronary arteries. Another Cochrane Review that focused on psychological interventions for CHD found that psychological interventions may produce small to moderate reductions in depression and anxiety, and may also reduce cardiac mortality. The authors did not find evidence that psychological interventions reduced the rate of MI or the need for cardiac surgery, or total mortality (Richards 2017; Whalley 2011). A third Cochrane Review stated that there is not enough information available to fully understand the impact of educational interventions on mortality, morbidity and health-related quality of life of people with CHD (Anderson 2017b; Brown 2011).

Although all patients should be offered a cardiac rehabilitation programme with an exercise component (NICE 2013), the majority of CHD patients eligible for cardiac rehabilitation do not enter into these programmes; this is especially true for women, older people, and people with a lower socio-economic status (Sunamura 2017).

However, it is not sufficient to focus on mortality and morbidity alone. Returning to work is another important outcome of societal and economic significance, especially for younger patients. Although one goal of cardiac rehabilitation is to improve vocational status, it is not known how effective the various properties of cardiac rehabilitation programmes are at enhancing return to work among people with CHD, nor how effective interventions provided by the occupational physicians or other healthcare personnel are when there is no cardiac rehabilitation. According to Hämäläinen 2004 there are also large variations between countries in what proportion of patients (between 40% and 90%) return to work following a MI.

Returning to work is a complex and multi-factorial process. It has been shown that there are a variety of predictors of returning to work among patient groups, for example, the medical seriousness of the disorder, work-related factors, personal factors, national compensation policies, and the structure of the healthcare system (Cancelliere 2016; De Vries 2018; Den Bakker 2018). Recent studies examining generic factors that influence return to work found job control, work ability, perceived good health, higher self-efficacy, the individual's own prediction of their return to work, high socioeconomic status, return-to-work co-ordination, and multidisciplinary interventions facilitate return to work, while job strain, anxiety, depression, comorbidity, long-term sick leave, older age and low education were identified to be barriers to returning to work (Cancelliere 2016; Gragnano 2018; Vooijs 2015).

Concerning people with CHD, important predictors of returning to work appear to be cardiac factors on admission to the hospital (heart failure, arrhythmia), recurrent cardiac events, and depression scores during hospitalisation (Bhattacharyya 2007), as well as occupational factors, such as the physical intensity of work (Dreyer 2016). Results of a systematic review suggest that depression recorded between admission and up to two

months after discharge predicted poorer return to work six to 12 months after a cardiac event (O'Neil 2010). Furthermore peoples' beliefs and perceptions about their illness are considered key determinants of recovery after MI (Petrie 1996). More recently, a study suggested that when patients are satisfied with their job and perceive their work environment positively, they will be more likely to return to work early (Fiabane 2012). An interview survey of a random sample of 2000 people in the UK revealed that being able to work was judged to be the third most important aspect of quality of life for people suffering from an illness, whereas healthy people viewed it as only the sixth most important aspect (Bowling 1995).

While there is a high interest in increasing return to work, the adverse effects of returning to work too early, also called presenteeism, have to be considered (Järvholm 2012). A study by Kivimäki 2005 from the Whitehall II cohort examined the association between sickness absenteeism and the incidence of serious coronary events. The incidence of serious coronary events among unhealthy employees with no sickness absenteeism was twice as high as among unhealthy employees with moderate levels of sickness absenteeism.

Several authors in various countries have proposed additions or alterations to cardiac rehabilitation programmes that are important for work outcomes. In the Netherlands a new guideline on cardiac rehabilitation has been established which includes occupational checklists for determining the need for intervention (NVVC 2011). These checklists and interventions are based on the Dutch guideline for occupational physicians on how to deal with people with CHD (Verbeek 2006). The guidelines strongly advise to start supporting return to work during cardiac rehabilitation, and not after it has finished.

Usually, cardiac rehabilitation programmes focus on the use of aerobic exercise to restore functional capacity after an acute cardiac event. Also resistance training is nowadays standard practice. If the primary goal is return to work, the training programmes should be based on actual job-related activities (Mital 2004). For example, studies with measurements of functional capacity requirements of firefighters and of police officers have found that a greater functional capacity is required than that typically attained in traditional cardiac rehabilitation programmes (Adams 2009; Adams 2010).

An example of a work-directed intervention is the stepwise occupational reintegration (SOR) programme. It is an established instrument in Germany intended to support insured workers currently on sick leave to reintegrate back into work step-by-step after long-term illness of more than six weeks duration (Bethge 2016; Bürger 2011). Another programme has been developed for people who were not able to return to work after finishing their regular cardiac rehabilitation called "Interdisciplinary Support Programme (INA)". INA is a combined support programme consisting of exercise training, health education, psychological intervention and expert advice concerning job-related problems (Karoff 2000a).

Description of the intervention

Based on the International Classification of Functioning, Disability, and Health model (ICF) by the World Health Organization (WHO 1993) there are three opportunities for interventions to enhance return to work (Verbeek 2006):

1. better treatment of the disease;
2. work-directed interventions; and
3. person-directed interventions.

This Cochrane Review aims to assess the effects of interventions directed at people with CHD or their environment, specifically their working environment, or combinations of the two, to enhance return to work.

Work-directed interventions are defined in this review as: workplace adjustments such as modified work hours, modified work tasks, or workplace modifications and improved communication with or between managers, colleagues and health professionals.

Person-directed interventions consist of:

1. Physical conditioning interventions that include any type of physical training and physical exercises, and
2. Psychological interventions that include any type of intervention such as patient counselling and health education; screening and treatment of comorbid psychological disorders; stress management and relaxation training; social support; and gender-specific interventions.

How the intervention might work

Person-directed interventions like physical conditioning interventions and intense, occupation-specific training aim to equip patients with a level of functional capacity that is necessary to perform work tasks safely and successfully (Adams 2010; Adams 2009). Specific psychological interventions, on the other hand, can help by changing people's perception of their illness such that they see themselves again as capable workers and not just as recuperating patients (Petrie 2002).

Work-directed interventions aim to facilitate return to work by reducing perceived or actual barriers to returning to work by implementing workplace design changes, pauses, etc.

Why it is important to do this review

A range of programmes has been developed to increase the return to work of people with CHD. There are also large variations between countries in the proportion of people that return to work following an MI (ranging from 40% to 90%) (Hämäläinen 2004). While varying cultural and sociopolitical factors may influence people's decisions to return to work (Perk 2004), the variation between countries also seems to suggest that some programmes may be more effective than others.

A number of Cochrane Reviews (Anderson 2016; Anderson 2017a; Anderson 2017b; Brown 2011; Heran 2011; Richards 2017; Whalley 2011) have already assessed the effects of cardiac rehabilitation consisting of: patient education, exercise and psychological interventions in reducing morbidity and mortality of people with CHD. However, none of these reviews have specifically assessed the effects on return to work, which is the aim of our review.

OBJECTIVES

To assess the effects of person- and work-directed interventions aimed at enhancing return to work in patients with coronary heart disease compared to usual care or no intervention.

METHODS

Criteria for considering studies for this review

Types of studies

We included all randomised controlled trials (RCTs) including cluster-RCTs and quasi-RCTs irrespective of publication language or publication status. Quasi-RCTs are controlled trials that use inappropriate randomisation strategies, accompanied by inadequate allocation concealment, and are therefore at higher risk of bias (Higgins 2017).

Due to the difficulties of performing RCTs at workplaces, we originally intended to include controlled before-after studies (CBAs). CBAs are non-randomised studies with one group that receives the intervention and a control group that does not. For a CBA study to have been included, data must have been collected contemporaneously, both at baseline and post-intervention, so that the timing of the study periods for the control and intervention groups are comparable. Although we found a large number of CBAs examining the effects of person-directed interventions on return to work, none of the CBA studies that we identified used interventions conducted at workplaces. As CBA studies are more prone to bias than RCTs, and because the CBAs that we found did not contribute information on work-directed interventions, we deviated from the published protocol and excluded CBAs from the review (see Differences between protocol and review). The CBAs excluded from the review can be found in the Characteristics of excluded studies table.

Types of participants

We included studies involving adults (18 years or older) who had been diagnosed with CHD, who experienced a MI, or a coronary revascularisation procedure like CABG or PCI, as well as people with angina pectoris or angiographically-defined CHD. Within each study, at least 80% of participants had to fulfil these criteria.

Participants should also have been employed (either in paid employment or self-employed) at the time of diagnosis and on sick leave or otherwise not working at the time of the study because of the CHD. This could have been a subgroup of a trial, but at least 80% of the participants should not have been working at the start of the trial.

Types of interventions

We considered all interventions in the following categories that aim to support the return-to-work process with individual or group approaches.

1. Work-directed interventions: these can include changes in the work environment, work tasks or working methods such as in a stepwise occupational reintegration (SOR) programme
2. Person-directed interventions:
   a. psychological interventions: all psychological interventions, such as counselling and health education; screening and treatment of comorbid psychological disorders; stress management and relaxation training; social support; gender-specific interventions undertaken by any qualified professional (e.g. psychologist)
   b. physical conditioning interventions: any supervised or unsupervised inpatient, outpatient, or community- or home-based intervention including some form of physical training or physical exercises that is applied to a cardiac rehabilitation patient population
3. Any combination of the above

We included studies with a control group receiving no intervention, that is, usual care (as described in study reports). We considered studies involving any pharmacotherapeutic or dietary therapies only if both the intervention and control groups received the same treatment.

Types of outcome measures

Primary outcomes

The primary outcome was return to work, including return to either full- or part-time employment, to the previous job, and to the same role or with changes in work status (change of duties, working location, function).

Return to work could be measured either as event data (e.g. return-to-work rates, disability pension rates), or as time-to-event data (e.g. time span between reporting sick and resumption of work, number of days on sick leave during the follow-up period).

Secondary outcomes

1. Health-related quality of life within the return-to-work process, either measured with generic instruments (SF-36 and SF-12, EuroQol EQ-5D™), or with disease-specific instruments for participants with angina, MI or heart failure (SAQ, QLMI/MacNew, MLHF, MIDAS, CLASP; Thompson 2003)
2. Number of participants who returned to work and were still working after an extended period of at least one year
3. Adverse effects

As we encountered a number of studies reporting the number of participants who were still working after five years during the review process, we added working after five years to the list the secondary outcomes.

Search methods for identification of studies

Electronic searches

We searched the following electronic databases through October 2018 to identify potentially relevant studies:

1. Cochrane Central Register of Controlled Trials (CENTRAL; 2018, Issue 10) in the Cochrane Library;
2. MEDLINE (PubMed);
3. EMBASE (OVID);
4. PsycINFO (ProQuest);
5. NIOSHTIC (OSH-UPDATE);
6. NIOSHTIC-2 (OSH-UPDATE);
7. HSELINE (OSH-UPDATE);
8. CISDOC (OSH-UPDATE); and
9. LILACS (Virtual Library of Health).

We also searched ClinicalTrials.gov (ClinicalTrials.gov), and the World Health Organization trials portal (www.who.int/ictrp/en/), in May 2018 to identify ongoing trials. We searched all databases from their inception to the present, and we imposed no restriction on language of publication.

The search strategies used for each database and the day of the searches are available in Appendix 1, Appendix 2, Appendix 3, Appendix 4, Appendix 5, and Appendix 6.

Searching other resources

We checked the reference lists of all included studies and key review articles (Anderson 2016; Anderson 2017a; Anderson 2017b; Brown 2011; Heran 2011; O'Brien 2017; Whalley 2011), for additional references. We also contacted experts in the field to identify additional unpublished materials**.**

Data collection and analysis

Selection of studies

Two review authors (UE, UEW) independently screened titles and abstracts of all the studies we identified as a result of the initial search, and coded them as 'retrieve' (eligible or potentially eligible/ unclear) or 'do not retrieve'. Two review authors (PH, AF or PH, JH) also independently screened later search updates. We retrieved the full-text study reports or publication and two of the review authors (UE, UEW, or JH) independently screened the full-texts, identified studies for inclusion, and recorded reasons for exclusion of the ineligible studies. We resolved any disagreement through discussion or, if required, we consulted a third person (JA or AS). We identified and excluded duplicates and collated multiple publications of the same study so that each study, rather than each report or publication, was the unit of interest in the review. We recorded the selection process in sufficient detail to complete a PRISMA flow diagram (Moher 2009), and Characteristics of excluded studies table.

We determined the inclusion of articles published in languages other than English or German by having documents professionally translated or with the help of native speakers.

Data extraction and management

We used a data collection form for study characteristics and outcome data, which was piloted on one study in the review. Two of the review authors (UEW, JH, PH) extracted the following study characteristics from included studies.

1. Methods: study design, total duration of study, study location, study setting, withdrawals, and date of study
2. Participants: number, mean age or age range, gender, severity of condition, diagnostic criteria if applicable, inclusion criteria, and exclusion criteria
3. Interventions: description of intervention, comparison, duration, intensity, content of both intervention and control condition, and co-interventions
4. Outcomes: description of primary and secondary outcomes specified and collected, and at which time points reported
5. Notes: references to review for inclusion, funding for trial, and notable conflicts of interest of study authors

Two of the review authors (UEW, PH or PH, JH) independently extracted outcome data from included studies. We noted in Characteristics of included studies if outcome data were not reported in a usable way. We resolved disagreements by consensus or by involving a third person (AF). We extracted multiple publications or reports describing a single study into a single data collection form.

We transferred extracted information into Review Manager 5 (Review Manager 2014), file via Covidence. We originally planned to enter the data directly into Review Manager 5, but during the review we decided to use Covidence to enter and compare extracted data. Two review authors (PH, JH) entered data into Covidence twice and compared entries before importing data into Review Manager 5. A second review author (AF) compared the data presented in the systematic review and study characteristics with study reports for accuracy. Where relevant data were missing or in case of uncertainties, we attempted to contact the authors of the original articles. Articles published in languages other than English, German, or Dutch were translated into English or German for the extraction and 'Risk of bias' assessment.

Assessment of risk of bias in included studies

Two authors (PH, JH) independently assessed the risk of bias in RCTs using the ‘Risk of bias’ tool recommended by Cochrane (Higgins 2017). In case of differences we consulted a third review author (AF). We assessed the risk of bias according to the following domains.

1. Random sequence generation
2. Allocation concealment
3. Blinding of participants and personnel
4. Blinding of outcome assessment
5. Incomplete outcome data
6. Selective outcome reporting
7. Other bias

We graded each potential source of bias as high-risk, low-risk or unclear and provided quotes from the study reports together with a justification for our judgment in the 'Risk of bias' table. We summarised the 'Risk of bias' judgements across different studies for each of the domains listed. We considered blinding separately for different key outcomes where necessary (e.g. for unblinded outcome assessment, risk of bias for all-cause mortality may be very different than for a patient-reported health-related quality-of-life scale). If information on risk of bias related to unpublished data or correspondence with a study author, we noted this in the 'Risk of bias' table.

We assessed the risk of bias in cluster-RCTs with the six domains of the 'Risk of bias' tool as well as recruitment bias, baseline imbalance, loss of clusters, incorrect analysis and compatibility with RCTs randomised by individual.

We originally intended to have two authors (UE, UEW) independently assess the risk of bias in CBAs by using the checklist developed by Downs and Black (Downs 1998). We wanted to only use the items on internal validity and not those on reporting quality or external validity. The instrument has been shown to have good reliability, internal consistency and validity. The thirteen items of the checklist include the domains of the 'Risk of bias' tool recommended in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2017), listed above. We planned to modify the answers to the questions of the checklist so that they would fit the 'Risk of bias' tool as implemented in Review Manager 2014 by using 'high risk', 'low risk' or 'unclear' instead of 1 or 0 as proposed by the checklist authors. Due to their increased susceptibility to bias compared to RCTs, we deviated from our protocol and excluded CBA studies (Differences between protocol and review),

making the assessment of bias with the Downs and Black checklist unnecessary.

Measures of treatment effect

We entered the outcome data for each study into the data tables in Review Manager 5 to calculate the treatment effects (Review Manager 2014). We expressed dichotomous outcome data as risk ratios with their 95% confidence intervals (CIs). When overall results were statistically significant, we calculated the number needed to treat for an additional beneficial outcome (NNTB).

For continuous variables, such as the number of days until returning to work, we used the mean difference (MD) when outcome measurements in all trials were made on the same scale. We converted results reported in months or weeks into days. If future updates of this review include studies that measure the same concept with different scales, we will calculate the standardised mean difference (SMD) with its 95% CI.

Unit of analysis issues

We originally planned to analyse data from cluster-RCTs at the level of the individual by accounting for the clustering by using the intracluster correlation coefficient (ICC), as explained in the *Cochrane Handbook for Systematic Reviews of Interventions* (Deeks 2017). However, because the cluster-RCTs that we identified did not report the number or size of clusters, it was impossible to include their results. We were unable to contact the authors of the cluster-RCTs to obtain this information.

Dealing with missing data

We contacted investigators or study sponsors to verify key study characteristics and obtain missing numerical outcome data where possible (e.g. when a study was identified as abstract only). Where this was not possible, and the missing data were thought to introduce serious bias, we explored the impact of including such studies in the overall assessment of results with a sensitivity analysis (see Sensitivity analysis).

If numerical outcome data such as standard deviations (SDs) or correlation coefficients were missing, and we could not obtain them from the study authors within six weeks of request, we calculated them from other available statistics such as P values and t-scores, according to the methods described in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011). In one case, we calculated the SD from the reported range and sample size using a formula for small studies where n ≤ 15 (Hozo 2005). Where only means and sample sizes were available, we imputed SDs from the pooled SD of the other studies in the same comparison group (Furukawa 2006).

Assessment of heterogeneity

We attempted to assess the clinical homogeneity of the results of included studies based on similarity of intervention, outcome and study designs. We did this by considering study populations with similar distributions of gender, severity of CHD, physically demanding occupational groups or alternatively blue-collar and white-collar workers as homogeneous.

During the review process, we found that the heterogeneous reporting of occupational characteristics made it difficult to objectively establish which study populations could be considered as having participant populations with similar physically demanding occupational groups. Therefore, we created a definition for categorising studies into groups with similar physically demanding working conditions that was not a part of the original protocol. We defined physically demanding occupational groups as studies where a majority of study participants (more than 50%) worked in physically demanding employment, manual labour or were described as blue-collar workers. If 50% or fewer participants worked in physically demanding employment, manual labour or were considered blue-collar workers, we categorised these study populations as having predominantly non-physically demanding occupations. We considered all other studies not reporting the characteristics of occupations before the incident CHD to have unknown physical demands.

Likewise, the immense variation in how baseline cardiovascular health was reported made it necessary to create an objective framework for determining which studies could be considered to have study populations with similar CHD severity. We created this decision framework during the review process and it was not included in the original study protocol. We examined study exclusion criteria and the most commonly reported cardiovascular baseline characteristics, in order to create a framework for identifying studies with similar distributions of CHD severity. We categorised study populations as having less severe CHD if the study reported:

1. excluding participants with one or more of the following:
   a. heart failure or systolic dysfunction (i.e. left ventricular ejection fraction (LVEF) < 40%),
   b. unstable or stable angina (often only reported as angina),
   c. positive exercise stress test (i.e. ≥ 2 mm ST segment change, ischaemia) using treadmill or bicycle ergometer,
   d. intracardiac defibrillator (ICD) or atrial fibrillation; or
2. the study reports that either less than 25% of the participant population had heart failure or the mean LVEF in the study population was more than 40% at baseline.

We included stable angina in the criteria, because studies often used the term angina without explicitly differentiating between unstable and stable anginas. We considered study populations having more severe CHD when patients were not excluded based on cardiovascular criteria and when over 25% of the participant population had heart failure or the average LVEF in the study population was below 40% at baseline. We had a clinical occupational medical doctor specialised in occupational cardiology (JVD) assess and categorise studies that reported excluding participants based on some of the above criteria but including others. We categorised all other studies into a third category of unknown cardiovascular health or CHD severity where we could not determine the severity of CHD from the reported data.

We considered the following interventions as different from each other: work-directed interventions, physical conditioning interventions, psychological interventions, work-directed counselling, and combined interventions.

We considered both return-to-work outcomes and sick leave-duration outcomes as similar return-to-work outcomes. We planned to combine overall quality-of-life outcomes, even if measured with different instruments, with the intention to specifically consider quality of life within the return-to-work

process. Often studies reported results for subscales or aspects of quality of life (e.g. depression and anxiety) of all study participants, not just study participants in the return-to-work subgroups. Similarly, studies also reported adverse events for the entire study populations and not just for participants working prior to returning to work or who were in the return-to-work process. Therefore, we presented the results for health-related quality-of-life outcomes and adverse events only for studies where at least 80% of the study participants were eligible to return to work.

For the assessment of statistical heterogeneity, we used the Chi^2 test with a significance level of P = 0.1 (because of low power of the test in most meta-analyses), as well as the I^2 statistic (Higgins 2003). We adopted the values for interpretation proposed in the *Cochrane Handbook for Systematic Reviews of Interventions,* "0% to 40%: might not be important; 30% to 60%: may represent moderate heterogeneity; 50% to 90%: may represent substantial heterogeneity; 75% to 100%: considerable heterogeneity" (Deeks 2017).

Assessment of reporting biases

Where we were able to pool more than five studies in any single meta-analysis, we created and visually examined a funnel plot to explore possible small study biases. Asymmetry of the plot may be due to publication bias. Where a sufficient number of studies were available, we additionally tested for funnel plot asymmetry with the test developed by Egger 1997 (Sterne 2017).

Where we detected publication bias, we adjusted for reporting bias using the 'Metatrim' command in Stata. We planned to calculate the failsafe N, which means the estimated number of studies needed to negate the results of the meta-analysis. However, the results of the analyses where we detected publication bias were not statistically significant.

Data synthesis

Where more than one study provided usable data in any single comparison, we pooled data from studies judged to be clinically homogeneous using Review Manager 5 software (Review Manager 2014), and not version 5.2 as was stated originally in the review protocol. Where studies were statistically heterogenous, we used a random-effects model; otherwise we used a fixed-effect model. When using the random-effects model, we conducted sensitivity checks by using the fixed-effect model to reveal differences in results. We included a 95% CI for all estimates.

Where there was considerable unexplainable heterogeneity, we refrained from aggregating the studies and instead presented a narrative review.

Where multiple trial arms were reported in a single trial, we included only the relevant arms. Where two comparisons (e.g. intervention A versus usual care and intervention B versus usual care) were combined in the same meta-analysis, we divided the control group in half to avoid double-counting.

GRADE and 'Summary of findings' table

We planned to create a 'Summary of findings' table using the following outcomes: return to work, number of participants who were still at work after one year, number of participants still at work after five years, health-related quality of life, and any adverse effects of interventions, if reported. We expanded the return-to-work outcomes to reflect the follow-up times considered for each of the main comparisons (i.e. up to six months, between six months and one year, number of participants who were still at work after one year, number of participants still at work after five years) as well as the mean time until return to work, and any adverse effects of interventions (i.e. cardiac deaths, total mortality, reinfarctions).

We used the five GRADE considerations (i.e. study limitations, consistency of effect, imprecision, indirectness, and publication bias) to assess the quality of the body of evidence as it relates to the studies that contributed data to the meta-analyses for the prespecified outcomes. We used methods and recommendations described in Section 8.5 (Higgins 2017), and Chapter 12 (Schünemann 2017), of the *Cochrane Handbook for Systematic Reviews of Interventions* using GRADEpro GDT software (GRADEpro GDT 2015). We justified all decisions to down- or upgrade the quality of studies using footnotes and made comments to aid readers' understanding of the review where necessary.

Subgroup analysis and investigation of heterogeneity

We stratified analyses according to the length of follow-up and conducted subgroup analyses to examine how the gender of the study populations, physically demanding occupational groups or CHD severity in the study population influenced the impact of the interventions. Given sufficient trials in future updates of this review, we will also perform meta-regression analyses (using Stata® software) to relate the following study characteristics to their sizes of effect:

1. study population (age, gender, country);
2. length of follow-up;
3. study date; and
4. physically demanding occupational groups or alternatively blue-collar versus white-collar workers.

As we expect that the quality of the usual care applied in the comparison groups is continually improving over time to include forms of cardiovascular rehabilitation in accordance with available guidelines (Price 2016), we performed meta-regression analysis considering study date with the Stata package metareg (Stata) for outcomes where five or more studies were available. We also ordered the studies in the forest-plots according to their publication date to visually assess any change in effect over time.

Sensitivity analysis

We performed sensitivity analysis to see what effect study limitations, that is problems in sequence generation, allocation concealment, or blinding, or incomplete outcome data, or selective outcome reporting, might have had on the results by omitting studies we judged to have a high overall risk of bias from meta-analyses. We considered studies to have a high risk of bias overall if we judged any of the domains: sequence generation, incomplete outcome data, or selective outcome reporting to have a high risk of bias.

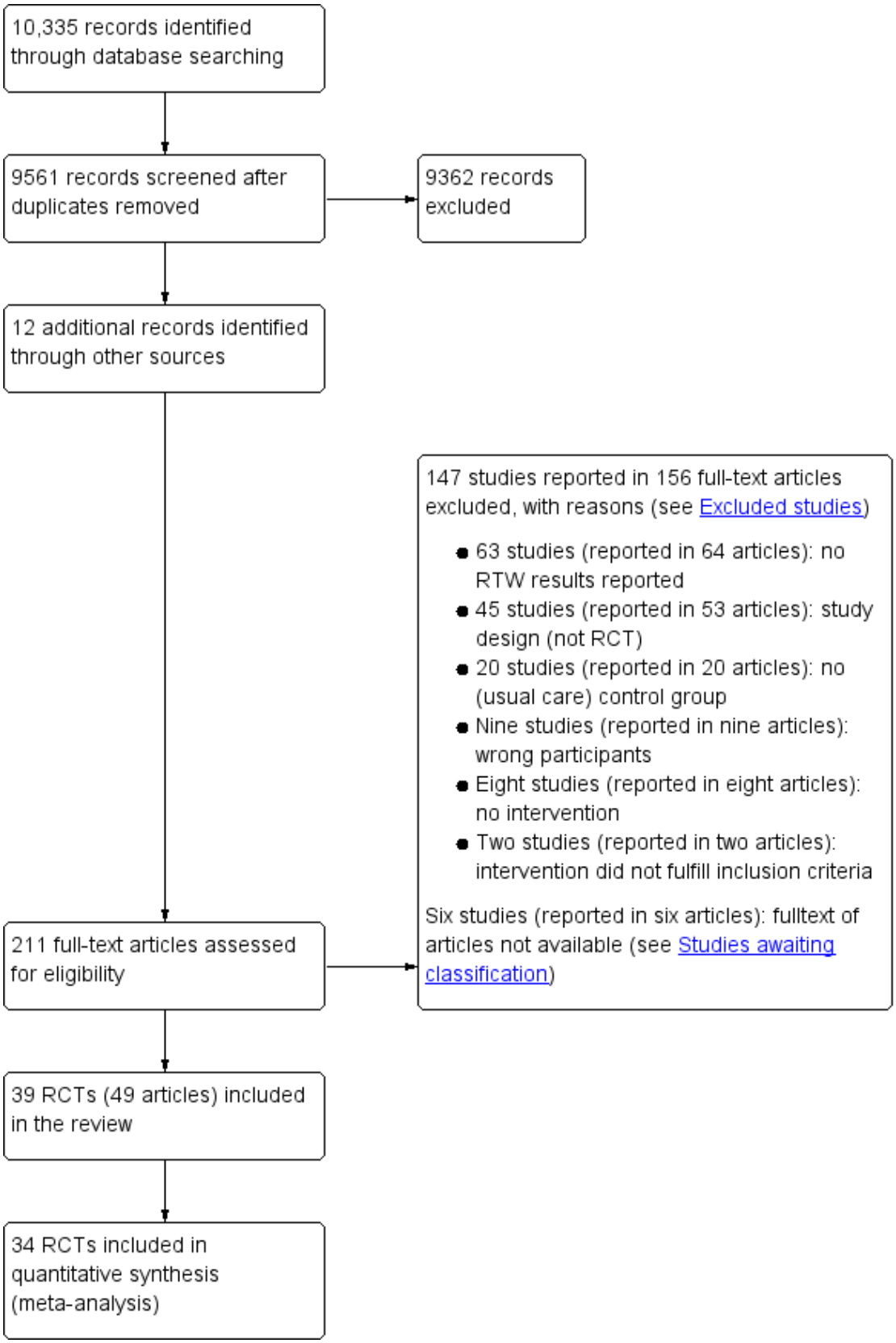
RESULTS

Description of studies

Results of the search

Running our systematic search strategies in the chosen electronic reference databases from inception to 11 October 2018 resulted in a total of 10,335 references. After removing duplicates, we screened 9561 titles and abstracts for eligibility. This title and abstract screening identified 199 records where the full text of the articles needed assessment, and we identified an additional 12 records through other sources. Of these 211 articles, we excluded 156 articles (147 studies) with reasons (see Excluded studies; Characteristics of excluded studies) and we were unable to obtain the full text of six arcticles (see Studies awaiting classification; Characteristics of studies awaiting classification). The qualitative synthesis included 39 RCTs described in 49 articles (see Included studies; Characteristics of included studies), and we included 34 of the 39 studies in the quantitative synthesis of data. Figure 1 depicts the study selection process as a PRISMA flow diagram (Moher 2009). We also identified six ongoing studies through searches of clinical trials registries (see Ongoing studies; Characteristics of ongoing studies).

Figure 1. PRISMA flow diagram of study selection process



Included studies

We included 39 RCTs in the review (see Characteristics of included studies).

Design

All of the included studies were RCTs. One study applied cluster randomisation (Geissler 1979), and four studies evaluated more than one form of intervention using a three-armed design (Froelicher 1994; PRECOR 1991; Rivas 1988; Stern 1983).

Sample sizes

Thirty-eight of the 39 studies (excluding the multicentre WHO 1983 study) randomised altogether 5944 people with CHD into intervention and control arms. The sample sizes of the studies ranged from 10 to 456 participants. Excluding two studies lacking any information on the number of study participants who had been working prior to CHD (Carson 1982; Hämäläinen 1991), the return-to-work subgroups of the studies comprised 3660 participants. The studies included in the quantitative analysis randomised altogether 4661 participants and the return-to-work subgroups followed up comprised 3290 participants.

Setting

Studies had been conducted mostly in North America and Europe (31 of 38 studies, excluding the international multicentre WHO 1983 study). The countries contributing the most studies were the USA (eight studies), Sweden (five studies), UK (five studies), and Australia (three studies). Finland, the Netherlands, New Zealand, and Norway each contributed two studies. We also found single studies originating from Canada, Cuba, Denmark, France, the former German Democratic Republic, Germany, Italy, Portugal, and Switzerland. Of the 39 included studies, 32 recruited patients admitted to hospitals or cardiac care units, where they were being treated for CHD. Of the remaining studies, three recruited PCI patients (Higgins 2001; Hofman-Bang 1999; Pfund 2001), one recruited patients before elective CABG (Engblom 1997), one recruited participants from what seemed to be a post-MI outpatient clinic (Holmbäck 1994), one recruited patients referred to the study by their attending cardiologist (Erdman 1986), and one study recruited study participants among patients surviving the first (possibly in-hospital) rehabilitation phase (Geissler 1979). Six studies conducted inpatient interventions before the participants were discharged from hospital (sometimes beginning shortly before a planned cardiac procedure). Twenty-four studies conducted interventions as outpatient programmes, and nine studies began their interventions in the hospital before discharge and continued the intervention with either outpatient rehabilitation sessions or some sort of post-discharge contact with the participants.

The oldest study was published in 1974 and the most recent study was published in 2017. Six of the 39 included studies first published results in the 1970s. We also observed a peak in study publication in the 1980s (13 studies) and 1990s (12 studies) that subsided in the decades beginning in 2000 (six studies) and 2010 (two studies).

Participants

Most trials (24 of the 39 included studies) included both men and women, where women typically made up a smaller proportion of the recruited participant population. Andersson 2010 was the only study to include only women, whereas 12 studies included only men (Andersen 1981; Bethell 1990; Carson 1982; Engblom 1997; Erdman 1986; Fielding 1980; Geissler 1979; Picard 1989; PRECOR 1991; Vermeulen 1988; WHO 1983; Worcester 1993), and two studies did not report the sex of participants (Bertie 1992; Marra 1985).

Only 15 of the 39 studies provided any information regarding the types of employment prior to the intervention or how many of the study participants worked in physically strenuous jobs. Based on the information provided, we classified six studies as having examined interventions among a study population of predominantly manual (blue-collar) workers (Dugmore 1999; Haerem 2000; Lidell 1996; Maeder 1977; Vermeulen 1988; Worcester 1993) and nine studies as having considered a more sedentary (white-collar) working population (Burgess 1987; Engblom 1997; Higgins 2001; Holmbäck 1994; Horlick 1984; Marra 1985; Picard 1989; Pilote 1992; Rivas 1988). The remaining studies did not provide enough information to judge the physical demands of work among the study population.

Most studies had been conducted among people who had suffered an acute MI (34 of 39 studies). Three studies included only PCI patients, one study included CABG patients, and one study included patients who had either suffered a MI or had undergone CABG or PCI (Andersson 2010). The severity of CHD in the participant populations was difficult to assess with the information reported, however we judged 14 studies to have included only participants with less severe CHD (Andersson 2010; Bertie 1992; Burgess 1987; Erdman 1986; Hall 2002; Holmbäck 1994; Maeder 1977; Marra 1985; Oldridge 1991; Pfund 2001; Pilote 1992; PRECOR 1991; Stern 1983; Vermeulen 1988), and 12 studies to have included participants with more severe CHD (Bengtsson 1983; Carson 1982; Dugmore 1999; Engblom 1997; Froelicher 1994; Hofman-Bang 1999; Petrie 2002; Picard 1989; Pozen 1977; Rahe 1979; WHO 1983; Worcester 1993). Although Pozen 1977 considered participants with less severe CHD separately, we categorised this study in the more severe category but examined the results of both categories separately in subgroup analyses of CHD severity. We could not determine the severity of CHD among participant populations of the remaining 13 studies.

Interventions

We compared interventions to usual care. Usual care for CHD may have sometimes also included some lesser forms of cardiovascular rehabilitation, and participants receiving usual care might have sought other sources of cardiac rehabilitation. Some studies described usual care as having included the provision of brochures on risk factors, individual risk factor counselling or recommendations for physical training, while other studies only described usual care as comprising the clinical care of patients or provided no further description of usual care. Descriptions of the care received by participants included in the control group are included in the Characteristics of included studies tables.

Comparisons

We compared studies according to the type of intervention(s) implemented compared to usual care. We defined categories of intervention comparisons as follows.

1. Work-directed interventions versus usual care
2. Psychological interventions (including health education) versus usual care

3. Work-directed counselling versus usual care
4. Physical conditioning interventions versus usual care
5. Combined interventions applying both psychological counselling and physical conditioning versus usual care

We included four three-armed RCTs. One study randomised participants into one of two combined intervention groups with varying intensities of exercise and a control group receiving usual care (Rivas 1988), and three randomised participants into an exercise intervention, a counselling intervention, and usual care groups (Froelicher 1994; PRECOR 1991; Stern 1983). We considered the study arms of the latter studies in the appropriate comparison groups and divided the control groups in half to avoid double counting.

The control group of one included study also received a light exercise programme instead of usual care (Worcester 1993), but the results of this study were comparable to the results of the other exercise intervention studies.

Work-directed interventions

None of the studies implemented work-directed interventions at the organisational level, meaning changes in the work environment, work tasks or working methods, or a stepwise occupational reintegration programme.

Person-directed psychological interventions

Eleven studies examined the impact of psychological counselling, risk factor educational interventions or a combination of both on return to work compared to usual care (Broadbent 2009; Fielding 1980; Figueiras 2017; Haerem 2000; Hanssen 2009; Horlick 1984; Petrie 2002; Pozen 1977; PRECOR 1991; Rahe 1979; Stern 1983). We included in our meta-analyses the return-to-work results for a total of 615 participants receiving psychological counselling interventions or usual care.

Person-directed work-directed counselling interventions

Four studies (641 participants) applied work-directed counselling, either by recommending a time frame for return to work based on the results of a symptom-limited treadmill test (Picard 1989; Pilote 1992), by recommending a specific workday for return to work (within a week of the counselling session) to participants and their family physicians (Pfund 2001), or by extending the counselling offered to address concerns regarding the causes of the CHD and return to work after CHD to include participants' co-workers (Burgess 1987).

Person-directed physical conditioning interventions

Ten studies evaluated the impact of some form of physical conditioning or physical exercises on return to work compared to usual care (Andersen 1981; Bethell 1990; Carson 1982; Dugmore 1999; Froelicher 1994; Holmbäck 1994; Maeder 1977; Marra 1985; Stern 1983; Worcester 1993). We included the return-to-work results of 920 participants altogether (nine studies) in our meta-analyses. We excluded one study from the meta-analysis because the authors did not report information regarding the number of participants returning to work in each arm of the study (Carson 1982).

Person-directed combined interventions

Seventeen studies reported return to work following combined cardiac rehabilitation programmes including both counselling and exercise interventions compared to usual care studies (Andersson 2010; Bengtsson 1983; Bertie 1992; Engblom 1997; Erdman 1986; Froelicher 1994; Geissler 1979; Hall 2002; Hämäläinen 1991; Higgins 2001; Hofman-Bang 1999; Lidell 1996; Oldridge 1991; PRECOR 1991; Rivas 1988; Vermeulen 1988; WHO 1983). We included the return-to-work results of 1230 study participants (13 studies) in our meta-analyses.

We excluded four studies of combined interventions from our meta-analysis (Geissler 1979; Hall 2002; Hämäläinen 1991; WHO 1983). We excluded Hall 2002 because they did not provide, and we could not obtain, the numbers of participants rejoining the workforce at various time points. We also excluded Hämäläinen 1991 from our meta-analysis because it was unclear how many study participants had been in employment prior to the MI. We could not include the cluster-randomised study by Geissler 1979 in our meta-analysis, because we could not determine the number of clusters and the size of the clusters. We also excluded the WHO 1983 multicentre study from our meta-analysis because the interventions and study methods varied greatly between centres, details about the study procedures, interventions, and characteristics of study participants of each individual centre were lacking, and results were - at least in part - published elsewhere by the individual studies.

Outcomes

Primary Outcomes

Most of the included studies reported the number or proportion of study participants working at follow-ups using a subgroup of study participants who were working before their CHD. We did not include studies that did not consider return to work at least as a secondary outcome. In 10 studies, all of the participants were working or on sick leave prior to their CHD (Dugmore 1999; Fielding 1980; Froelicher 1994; Hofman-Bang 1999; Marra 1985; Pfund 2001; Picard 1989; Pilote 1992; Rivas 1988; Vermeulen 1988). When authors reported the proportion of participants working only as percentages, we calculated the number of participants using the total number of participants in the return-to-work subgroups (working before CHD) where this was possible. We could not determine the number of participants working prior to CHD and at the follow-ups in two studies (Hall 2002; Hämäläinen 1991), and the follow-up time and number of participants who returned to work was unclear in one study that reported the mean time until return to work (Carson 1982). Although Hall 2002 applied a survival analysis to evaluate differences in return-to-work rates, the reported results included only the P values of Wilcoxon and log-rank tests. Thirteen studies also reported mean time on sick leave or until return to work (Bengtsson 1983; Bethell 1990; Burgess 1987; Carson 1982; Fielding 1980; Hanssen 2009; Higgins 2001; Holmbäck 1994; Maeder 1977; Marra 1985; Pfund 2001; Picard 1989; Pilote 1992).

Secondary Outcomes

The studies reporting adverse effects and aspects of health-related quality of life often reported results for the entire study population and not just among those eligible to return to work (health-related quality of life within the return-to-work process). Therefore, we considered the adverse effects and health-related quality of life results only among studies where the population eligible to return to work exceeded 80%.

Health-related quality of life

For psychological intervention studies where more than 80% of the population were eligible to return to work, one study measured anxiety with a Catell Self-Analysis Form and nine-point rating scale (reporting only results of the paired t-test; Fielding 1980), and a second study measured perceived health with a self-developed personal adjustment questionnaire (Horlick 1984). We did not find enough studies reporting total health-related quality of life to perform a meta-analysis of health-related quality of life for psychological interventions.

One study of work-directed counselling assessed aspects of health-related quality of life within the return-to-work process using the Impact of Events Scale, the Taylor Manifest Anxiety Survey, and the Zung Depression Scale at baseline and at the three- and 13-month follow-ups (Burgess 1987). A second study assessed health-related quality of life with the EuroQoL Questionnaire at baseline and the four-month follow-up, but reported only the baseline values (Pfund 2001). All work-directed counselling studies included only participants eligible for return to work. We did not find enough studies reporting total health-related quality of life to perform a meta-analysis of health-related quality of life of work-directed counselling interventions.

Two physical conditioning intervention studies assessed aspects of health-related quality of life where at least 80% of the study population was considered eligible to return to work; one used the Toronto attitude scale (TAS) and the profile of mood states (POMS) checklists to assess depression, anxiety and vigour or activity, as well as a 10-item quality-of-life questionnaire at the 12-month follow-up, stratifying the results according to prognosis (Dugmore 1999), and the other used a self-report questionnaire on perceived physical performance and psychological well-being but did not report the individual results (Holmbäck 1994). We were not able perform a meta-analysis of health-related quality of life of physical conditioning interventions.

Three studies of combined interventions where at least 80% of the study population was considered eligible to return to work assessed aspects of health-related quality of life (Bengtsson 1983; Erdman 1986; Hofman-Bang 1999). One study used the Minnesota Multiphasic Personality Inventory (MMPI) and questions on anxiety (Bengtsson 1983), a second study used a self-developed well-being questionnaire at the six-month and five-year follow-ups to measure mean well-being, feelings of disability, despondency, and social inhibition at the six-month and five-year follow-ups (Erdman 1986), and the third study used the Angina Pectoris Quality of Life Questionnaire (APQLQ), Beck Depression Inventory, and Trait anxiety questionnaires, and reported the mean health-related quality of life scores at the one- and two-year follow-ups (Hofman-Bang 1999). We did not find enough studies reporting total health-related quality of life scores to perform a meta-analysis of combined interventions.

Adverse effects

We considered severe adverse effects, such as deaths, reinfarctions, cardiac surgeries, and hospital readmissions reported by studies where at least 80% of the study population was considered eligible to return to work.

Two studies of psychological and educational interventions considered adverse outcomes in study populations where at least 80% of all study participants were eligible to return to work. One reported total mortality up to six months (Broadbent 2009), and the other reported reinfarctions (Fielding 1980). We did not find enough studies to perform a meta-analysis of adverse effects for psychological interventions.

Two studies assessed cardiac mortality or reinfarction rates up to six months following work-directed counselling versus usual care (Picard 1989; Pilote 1992).

Three physical conditioning studies reported adverse effects as total mortality (Holmbäck 1994), cardiac deaths or fatal reinfarctions (Dugmore 1999; Marra 1985), and reinfarctions (Holmbäck 1994; Marra 1985) in study populations where at least 80% of all study participants were eligible to return to work (Dugmore 1999; Holmbäck 1994; Marra 1985). We considered fatal MI together with cardiac deaths in one meta-analysis, and reinfarction rates in a second meta-analysis.

Studies of combined interventions reported adverse effects as all deaths (Bengtsson 1983; Erdman 1986; Hofman-Bang 1999; Rivas 1988), cardiac deaths (Vermeulen 1988), hospital readmissions (Hofman-Bang 1999), or reinfarctions (Bengtsson 1983; Erdman 1986; Vermeulen 1988) in study populations where at least 80% of all study participants were eligible to return to work. We evaluated results for all deaths (total mortality) in one meta-analysis and reinfarction rates in a second meta-analysis.

Working after an extended period of at least one year

We found a total of 15 studies reporting on the rates of participants still working after an extended period of at least one year that could be included in a meta-analysis (Andersen 1981; Andersson 2010; Bengtsson 1983; Bertie 1992; Burgess 1987; Dugmore 1999; Engblom 1997; Erdman 1986; Hanssen 2009; Hofman-Bang 1999; Lidell 1996; Maeder 1977; PRECOR 1991; Rahe 1979; WHO 1983). Three studies reported extended working rates after psychological counselling and education programmes (Hanssen 2009; PRECOR 1991; Rahe 1979), one study reported extended working rates after work-directed counselling (Burgess 1987), three studies reported working rates after physical conditioning interventions (Andersen 1981; Dugmore 1999; Maeder 1977), and eight studies reported extended working rates after combined interventions (Andersson 2010; Bengtsson 1983; Bertie 1992; Engblom 1997; Erdman 1986; Hofman-Bang 1999; Lidell 1996; PRECOR 1991).

Follow-up

The included studies reported return-to-work rates for various follow-up times, so we categorised results into similar periods of time to examine the short-term (up to six months), medium-term (six to 12 months), long-term (between one and five years), and extended long-term (five years or longer) effects of the interventions on return to work. Where studies reported results for more than one time point we considered the data for the longest follow-up in the range. For example, if a study reported the number of participants returning to work at both eight and 12 months, we only included the 12-month results in the analysis of medium-term results. Single studies sometimes provided data for more than one follow-up range.

Five studies considered only shorter follow-up times up to six months (Broadbent 2009; Froelicher 1994; Marra 1985; Petrie 2002; Pfund 2001), while nine studies reported both short-term results

and at least one additional follow-up time (Andersen 1981; Bertie 1992; Dugmore 1999; Figueiras 2017; Higgins 2001; Horlick 1984; Rahe 1979; Rivas 1988; Worcester 1993).

A total of 22 studies reported return-to-work results for follow-ups between six and 12 months: eight studies reported the six-month follow-up (Dugmore 1999; Erdman 1986; Fielding 1980; Horlick 1984; Picard 1989; Pilote 1992; Pozen 1977; Rivas 1988), eight reported the 12-month follow-up (Andersson 2010; Figueiras 2017; Higgins 2001; Hofman-Bang 1999; Holmbäck 1994; Oldridge 1991; Stern 1983; Worcester 1993), and five studies reported both (Engblom 1997; Geissler 1979; Haerem 2000; Lidell 1996; Rahe 1979).

We also differentiated the secondary outcome of working after an extended period of time of at least one year to consider follow-ups conducted between one and five years and at five years or later. Thirteen studies reported working rates between one and five years (Andersen 1981; Andersson 2010; Bengtsson 1983; Bertie 1992; Burgess 1987; Engblom 1997; Geissler 1979; Hanssen 2009; Hofman-Bang 1999; Maeder 1977; PRECOR 1991; Rahe 1979; WHO 1983), and five studies reported results for five-year follow-up (Andersen 1981; Dugmore 1999; Engblom 1997; Erdman 1986; Lidell 1996).

Excluded studies

We excluded 147 studies (published in 156 articles), and listed the most critical reasons for exclusion in the Characteristics of excluded studies table. We excluded studies for the following reasons:

1. 63 studies (64 articles) did not consider the outcome return to work or did not report the return to work results;
2. 45 studies (53 articles) were not RCTs;
3. 20 studies lacked a usual care control group;
4. eight studies lacked an intervention;
5. seven studies did not meet the requirement that at least 80% of study participants had to be employed at the time of diagnosis and on sick leave because of the CHD, or that study authors considered a subgroup of previously employed study participants (Bar 1992; Cay 1981; Gutschker 1977; Kittel 2008; Nelson 1994; Schiller 1976; Yonezawa 2009);
6. two studies applied interventions that did not satisfy our inclusion criteria (Heller 1993; Kagan-Ponomarev 1994);
7. two study populations did not meet our requirements regarding CHD indications (Christensen 2017; Huber 2014).

Six futher studies reported in six articles are awaiting classification because our library staff could not locate or obtain the full-text articles (see Characteristics of studies awaiting classification).

Risk of bias in included studies

Due to poor reporting, we often judged studies to have an unclear risk of bias for one or more domains. We considered studies to have an overall high risk of bias if we judged them to have a high risk of bias in any of the following domains: sequence generation (selection bias), incomplete outcome data (attrition bias), or selective outcome reporting (reporting bias). According to these criteria, 15 studies had an overall high risk of bias (Andersen 1981; Andersson 2010; Bertie 1992; Broadbent 2009; Carson 1982; Erdman 1986; Geissler 1979; Hanssen 2009; Hofman-Bang 1999; Holmbäck 1994; Horlick 1984; Lidell 1996; Pozen 1977; WHO 1983; Worcester 1993). Interventions requiring the active participation of the participants, such as cardiac rehabilitation interventions are difficult, if not impossible, to conduct completely without the knowledge of the study participants (i.e. blinding of participants). Therefore, we did not consider the domains for blinding (performance bias and detection bias) in our determination of the overall risk of bias.

Of the 24 studies we considered not to have an overall high risk of bias, we assigned six studies a low risk of bias for random sequence generation, and low or unclear risk of bias for allocation concealment, blinding of outcome assessors (detection bias), incomplete outcome data (attrition bias) and selective outcome reporting (reporting bias) (Figueiras 2017; Maeder 1977; Petrie 2002; Picard 1989; Pilote 1992; Rivas 1988). We assigned the remaining 18 studies an unclear risk of bias for random sequence generation and low or unclear risk of bias for incomplete outcome data (attrition bias), incomplete outcome data (attrition bias), or selective outcome reporting (reporting bias) (Figure 2).

Figure 2. 'Risk of bias' summary: review authors' judgements about each risk of bias item for each included study

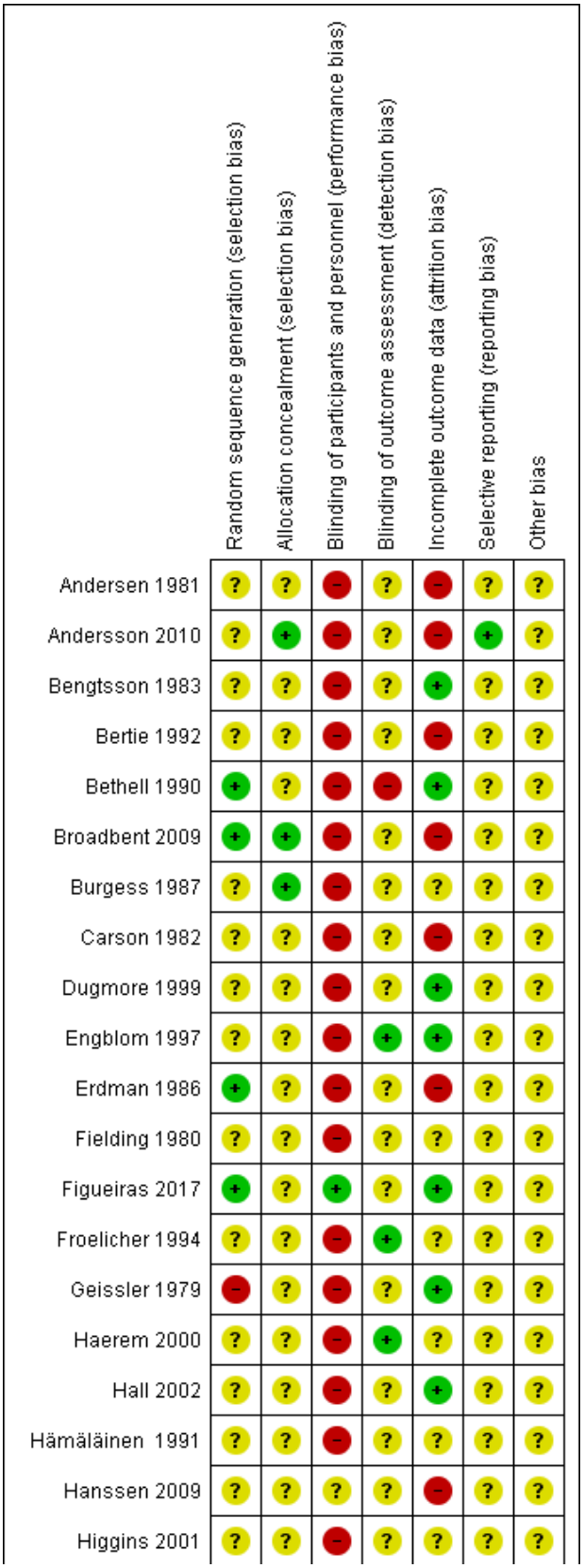
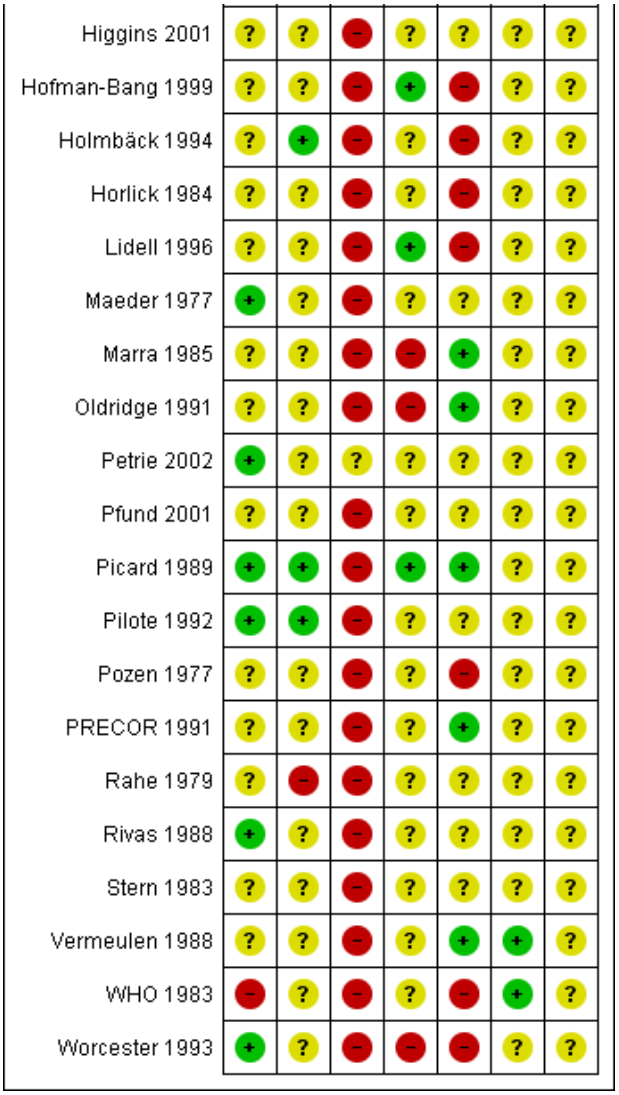


Figure 2. (Continued)



Allocation

We judged three studies to have a low risk of selection bias, that is, they used a suitable random sequence generation method and concealed allocation (Broadbent 2009; Picard 1989; Pilote 1992), and seven further studies used a suitable sequence generation method (Bethell 1990; Erdman 1986; Figueiras 2017; Maeder 1977; Petrie 2002; Rivas 1988; Worcester 1993). Usually studies did not describe the method of random sequence generation and did not mention allocation concealment, and we judged these studies to have an unclear risk of bias. One study was cluster-randomised, by region according to hospital districts (Geissler 1979). We considered this study to have a high risk of bias, as they did not report the number and size of the clusters or further details regarding the method of randomisation. Also we judged the multicentre WHO 1983 study to have a high risk of bias, because the authors reported that only half of the centres appeared to have achieved suitable randomisation.

Blinding

We gave all but three of the included studies a rating of high risk of performance bias, because the study participants and personnel were aware of the rehabilitation intervention. One exception is the study by Figueiras 2017, where the authors reported that the caregivers did not know the group allocation and we judged the risk of bias to be low. Where the form of the intervention made it less likely that participants in either group would have realised their allocated group, we judged the risk of performance bias to be unclear. This was the case for the studies where follow-up counselling was provided with telephone calls (Hanssen 2009), and the counselling intervention was integrated within the inpatient care (Petrie 2002).

We gave six studies a low risk of bias rating for blinding of outcome assessors (Engblom 1997; Froelicher 1994; Haerem 2000; Hofman-Bang 1999; Lidell 1996; Picard 1989). Although only Picard 1989 reported that the data co-ordinator assessing the outcome (employment status) was not involved with performing the intervention (and presumably blinded to group allocation), we also judged detection bias to be low if work status was obtained

from official documents, registries or validated questionnaires (Engblom 1997; Froelicher 1994; Haerem 2000; Hofman-Bang 1999; Lidell 1996). We judged studies to have a high risk of bias for blinding of outcome assessors if the study descriptions stated that the outcome assessors were aware of the group allocation. This applied to four studies (Bethell 1990; Marra 1985; Oldridge 1991; Worcester 1993).

Incomplete outcome data

We assigned studies a high risk of attrition bias rating if there were unbalanced losses to follow-up (i.e. over 5%-point difference between groups), overall attrition exceeded 10% (without information regarding group allocation), information pertaining to the number of participants in the return-to-work analyses or follow-up times for the return-to-work analyses were incomplete, study participants who suffered adverse outcomes were excluded from the return-to-work analyses, or participants' reported reasons for dropping out of the study could have biased the results, and no intention-to-treat analysis was conducted. Altogether this pertained to 11 studies (Andersen 1981; Andersson 2010; Bertie 1992; Broadbent 2009; Erdman 1986; Hanssen 2009; Holmbäck 1994; Horlick 1984; Lidell 1996; Pozen 1977; WHO 1983). We judged 12 studies with low losses to follow-up and balanced attrition or studies that conducted intention-to-treat analyses to have a low risk of attrition bias (Bengtsson 1983; Bethell 1990; Dugmore 1999; Engblom 1997; Figueiras 2017; Geissler 1979; Hall 2002; Marra 1985; Oldridge 1991; Picard 1989; PRECOR 1991; Vermeulen 1988). We judged the remaining 13 studies as having an unclear risk of attrition bias because not enough information was provided to determine if attrition was balanced or there where discrepancies in the reported number of persons followed.

Selective reporting

Reporting bias was difficult to assess, because none of the studies cited any prior study protocol or registration with a clinical trials database. Therefore, we considered studies reporting non-significant results and without indications of unplanned subgroup analyses as having a low risk of selective reporting bias (Andersson 2010; Vermeulen 1988). We judged the remaining studies to have an unclear risk of reporting bias.

Other potential sources of bias

We evaluated the following additional sources of bias for the Geissler 1979 cluster-RCT: recruitment bias, baseline imbalance, loss of clusters, incorrect analysis, comparability with individually randomised trials. We included our judgements and the reasons for these judgements in the risk of bias table under other bias. Otherwise, we did not find any other potential sources of bias among the studies.

Effects of interventions

See: **Summary of findings for the main comparison** Psychological interventions (including health education) compared to usual care for people with coronary heart disease; **Summary of findings 2** Work-directed counselling compared to usual care for people with coronary heart disease; **Summary of findings 3** Physical conditioning interventions compared to usual care for people with coronary heart disease; **Summary of findings 4** Combined interventions compared to usual care for people with coronary heart disease

1. Work-directed interventions

We could not consider the effect of work-directed interventions alone, as we found no studies examining only work-directed interventions conducted at the organisational level. Only one study integrated a work-directed intervention into their combined cardiac rehabilitation programme by providing employers with recommendations for work modifications when it was deemed necessary (Bengtsson 1983). We examined the results of this study in the combined interventions category.

2. Person-directed psychological interventions

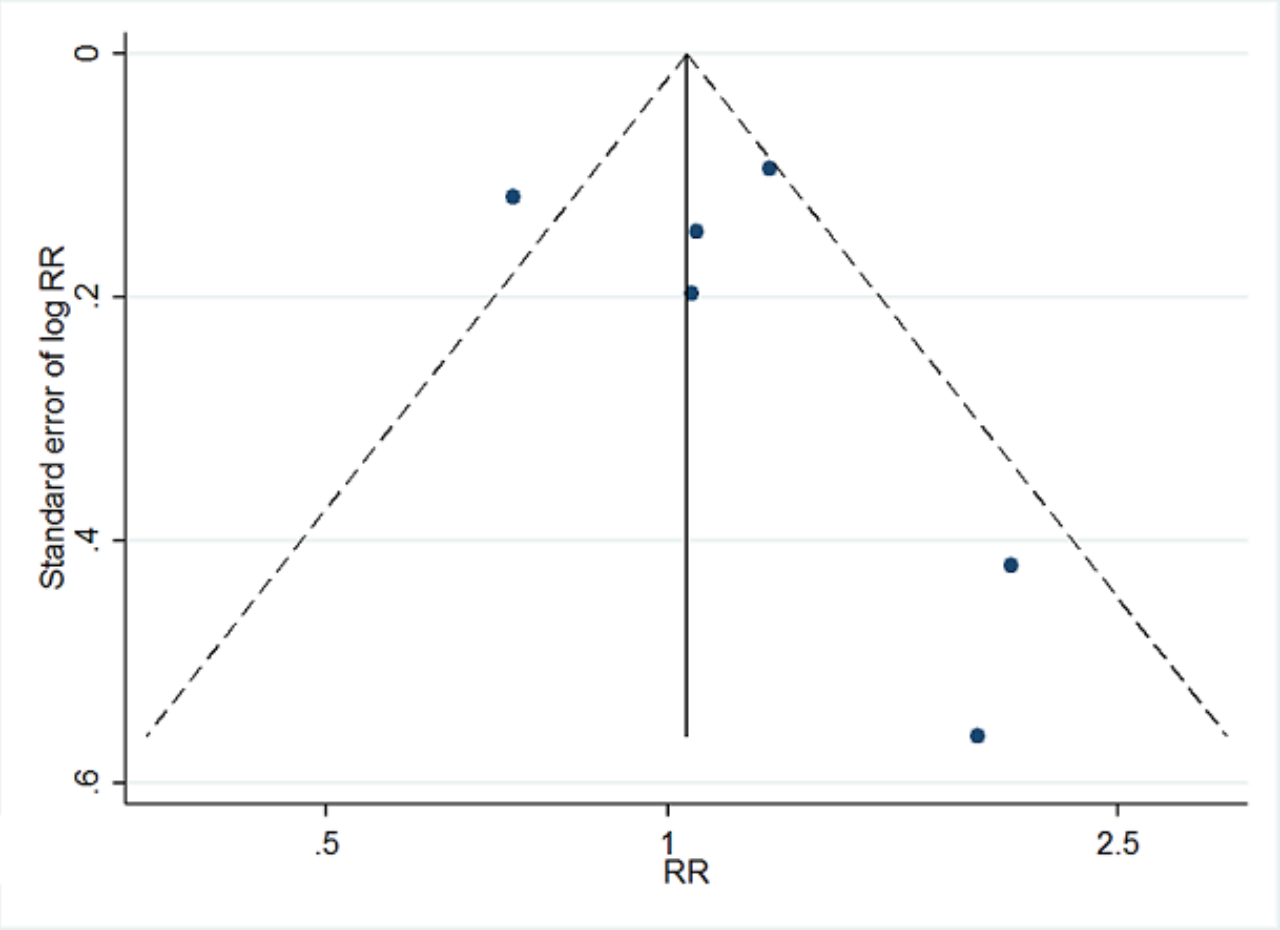
2.1 Psychological counselling and risk factor education versus usual care: primary outcomes

Eleven studies examined the impact of psychological counselling, risk factor educational interventions or a combination of both on return to work (Broadbent 2009; Fielding 1980; Figueiras 2017; Haerem 2000; Hanssen 2009; Horlick 1984; Petrie 2002; Pozen 1977; PRECOR 1991; Rahe 1979; Stern 1983).

2.1.1 Short term (less than six months)

Psychological interventions had little or no effect on the proportions of study participants returning to work up to six months (RR 1.08, 95% CI 0.84 to 1.40; I^2 = 69%; very low-certainty evidence), and both the I^2 values and the Chi^2-test (P = 0.007) indicated substantial heterogeneity (Analysis 1.1). The severity of CHD in the study populations seemed to explain some of this heterogeneity (Analysis 1.2). To determine the possible impact of small-study effects, we also conducted a fixed-effect meta-analysis, where smaller studies received less weight. The fixed-effect model resulted in a summarised RR of 1.04 (95% CI 0.92 to 1.17). When we excluded the two studies with an overall high risk of bias (Broadbent 2009; Horlick 1984), the pooled effect of counselling interventions on the proportion of participants returning to work up to six months was RR 1.13 (95% CI 0.91 to 1.41; I^2 = 1%). Exclusion of these two studies also seemed to explain much of the observed heterogeneity. Considering changes to study results over time, we found that newer studies appeared less likely to find an effect. However, a meta-regression considering the linear relationship between publication year and the log RR did not indicate any change in the impact of interventions over time (slope β = 0.006, P = 0.623). The asymmetry of the funnel plot for the short-term results (Figure 3), indicated a presence of publication bias. However, the results of the Egger's test did not indicate any small-study effects (P = 0.502), so we did not apply the 'trim and fill' method.

Figure 3. Funnel plot of comparison 2. Psychological interventions (including health education) vs usual care, outcome: 2.3 proportion returning to work (short term)



2.1.2 Medium term (six months to one year)

Seven studies reported the number of participants in work at follow-ups from six to 12 months following psychological counselling and risk factor education (Analysis 1.1). These interventions resulted in a pooled RR for medium-term return to work of 1.24 (95% CI 0.95 to 1.63; I^2 = 65%; very low-certainty evidence). The I^2 value indicated substantial heterogeneity and a P value < 0.1 for the Chi^2-test was detected for the results of the medium-term follow-up period. A sensitivity analysis with fixed-effect analysis to detect small-study effects lowered the observed RR to 1.03 (95% CI 0.91 to 1.16). As a sensitivity analysis we also excluded the two studies we judged to have an overall high risk of bias (Horlick 1984; Pozen 1977), which increased the RR to 1.40 (95% CI 1.11 to 1.77; I^2 = 0%). Excluding the studies with an overall high risk of bias also appeared to explain some of the heterogeneity. Since interventions focused primarily on risk factor education may produce smaller effects, we also excluded the one study applying a predominantly informative intervention as a further sensitivity analysis. However, excluding Haerem 2000 lowered the pooled effect (RR 1.20, 95% CI 0.89 to 1.63; I^2 = 61%).

Visually, the intervention effects on return to work between six and 12 months appear to be decreasing with time (Analysis 1.1). However, the results of the meta-regression considering the linear relationship between study year and the log RR did not indicate any time-dependency (slope β = −0.004, P = 0.668).

A funnel plot of the seven studies included also indicated the presence of reporting biases, which was supported by the Egger test (P = 0.034). We applied a 'trim and fill' method to correct for the asymmetry, and the corrected random-effects estimate was RR 0.97 (95% CI 0.74 to 1.27), after filling with four 'missing' studies. The pooled results of the seven studies were not statistically significant, so we did not calculate a failsafe N. We did not conduct a subgroup analysis for the sex of the study participants, because with the exception of two studies including only male participants (Fielding 1980; PRECOR 1991), all of the studies included both women and men. Similarly, we did not perform any subgroup analyses based on physically demanding occupations, because only two studies reported having study populations with either predominantly physically demanding occupations (Haerem 2000) or less physically active occupations (Horlick 1984). The remaining five studies did not describe the physical demands of the study populations' occupations (Fielding 1980; Figueiras 2017; Pozen 1977; Rahe 1979; Stern 1983).

Subgroup analysis

We also considered return to work at six to 12 months for subgroups of studies with similar severity of CHD, where we considered

the low- and high-risk subpopulations of Pozen 1977 separately (Analysis 1.3). Among the two study populations with higher severity of CHD (Pozen 1977; Rahe 1979), we found a summarised effect of RR 1.61 (95% CI 0.97 to 2.67; I^2 = 43%). The summarised effect was RR 1.17 (95% CI 0.67 to 2.03; I^2 = 0%) for the subgroup with less severe CHD (Pozen 1977; Stern 1983). Among the studies where we could not determine the severity of CHD among the study participants, we found a summarised effect was RR 1.12 (95% CI 0.82 to 1.53; I^2 = 67%; Fielding 1980; Figueiras 2017; Haerem 2000; Horlick 1984). The severity of CHD in the study populations also explained some of the heterogeneity, where both the Chi^2 tests and I^2 values indicated lower heterogeneity in the subgroups where we were able to classify the general severity of CHD.

2.1.3 Mean days until return to work

Two studies considering psychological interventions also reported the mean or median days until returning to work (Fielding 1980; Hanssen 2009). We pooled these two studies using SDs derived from the reported range (Fielding 1980), or imputed (Hanssen 2009). We observed a pooled MD for time until return to work of −9.70 days (95% CI −35.09 to 15.69, very low-certainty evidence; Analysis 1.4).

2.2 Psychological counselling interventions versus usual care: secondary outcomes

Working after an extended period of at least one year

We found three studies reporting the rates of people working more than one year and up to four years (long-term) after hospitalisation (Hanssen 2009; PRECOR 1991; Rahe 1979). Psychological interventions may have little or no effect on the proportion of participants working at follow-ups between one and four years (RR 1.09, 95% CI 0.88 to 1.34; I^2 = 44%; low-certainty evidence). Excluding the one study with overall high risk of bias (Hanssen 2009) from the analysis resulted in a RR of 1.28 (95% CI 0.61 to 2.67; I^2 = 67%). Pooling with the fixed-effect model did little to change the summarised effect estimate (RR 1.08, 95% CI 0.94 to 1.23). There were not enough studies to perform a meta-regression.

2.3 Work-directed counselling versus usual care: primary outcomes

Four studies applied work-directed counselling, either by recommending a time-frame for returning to work based on the results of a symptom-limited treadmill test (Picard 1989; Pilote 1992), recommending a specific workday for return to work to participants and their family physicians (Pfund 2001), or by extending the offered counselling to participants' social networks (including co-workers) to address their concerns regarding the causes of CHD and the ability of participants to return to work (Burgess 1987). Due to the variation in follow-up times, we could not summarise the effects of these interventions on the relative proportions of study participants returning to work (Analysis 2.1).

We pooled the MD in days of the four studies by using imputed SDs for two studies (Burgess 1987; Picard 1989). We observed a pooled MD of −7.52 days (95% CI −20.07 to 5.03; low-certainty evidence; Analysis 2.2) for mean time until return to work following work-directed counselling interventions compared to usual care. The results of the four studies showed considerable heterogeneity (Chi^2 = 20.36, df = 3 (P = 0.0001); I^2 = 85%). Excluding the one study population categorised as having a more severe CHD (and the only study population consisting of only men) from the analysis (Picard 1989), reduced the observed heterogeneity (Chi^2 = 2.48, df = 2 (P = 0.29); I^2 = 19%) and the observed effect estimate (MD −2.02 days, 95% CI −8.53 to 4.49). We considered none of the four work-directed counselling studies to have a high overall risk of bias, and we found no visual indication of any time-dependency (Analysis 2.2).

2.4 Work-directed counselling versus usual care: secondary outcomes

Adverse effects

Two studies reported the rates of cardiac deaths (i.e. sudden death, death following MI) and reinfarctions up to six months after work-directed counselling (Picard 1989; Pilote 1992). Work-directed counselling probably makes little or no difference to cardiac death rate (RR 1.00, 95% CI 0.19 to 5.39, I^2 = 0%; moderate-certainty evidence; Analysis 2.3). Work-directed counselling may make little or no difference to reinfarction rate (RR 0.67, 95% CI 0.21 to 2.11; I^2 = 3%; Analysis 2.4).

3. Person-directed physical conditioning interventions versus usual care

3.1 Person-directed physical conditioning interventions versus usual care: primary outcomes

We included nine studies comparing the impact of some form of physical training or exercises versus usual care on return to work in the meta-analysis shown in Analysis 3.1 (Andersen 1981; Bethell 1990; Dugmore 1999; Froelicher 1994; Holmbäck 1994; Maeder 1977; Marra 1985; Stern 1983; Worcester 1993).

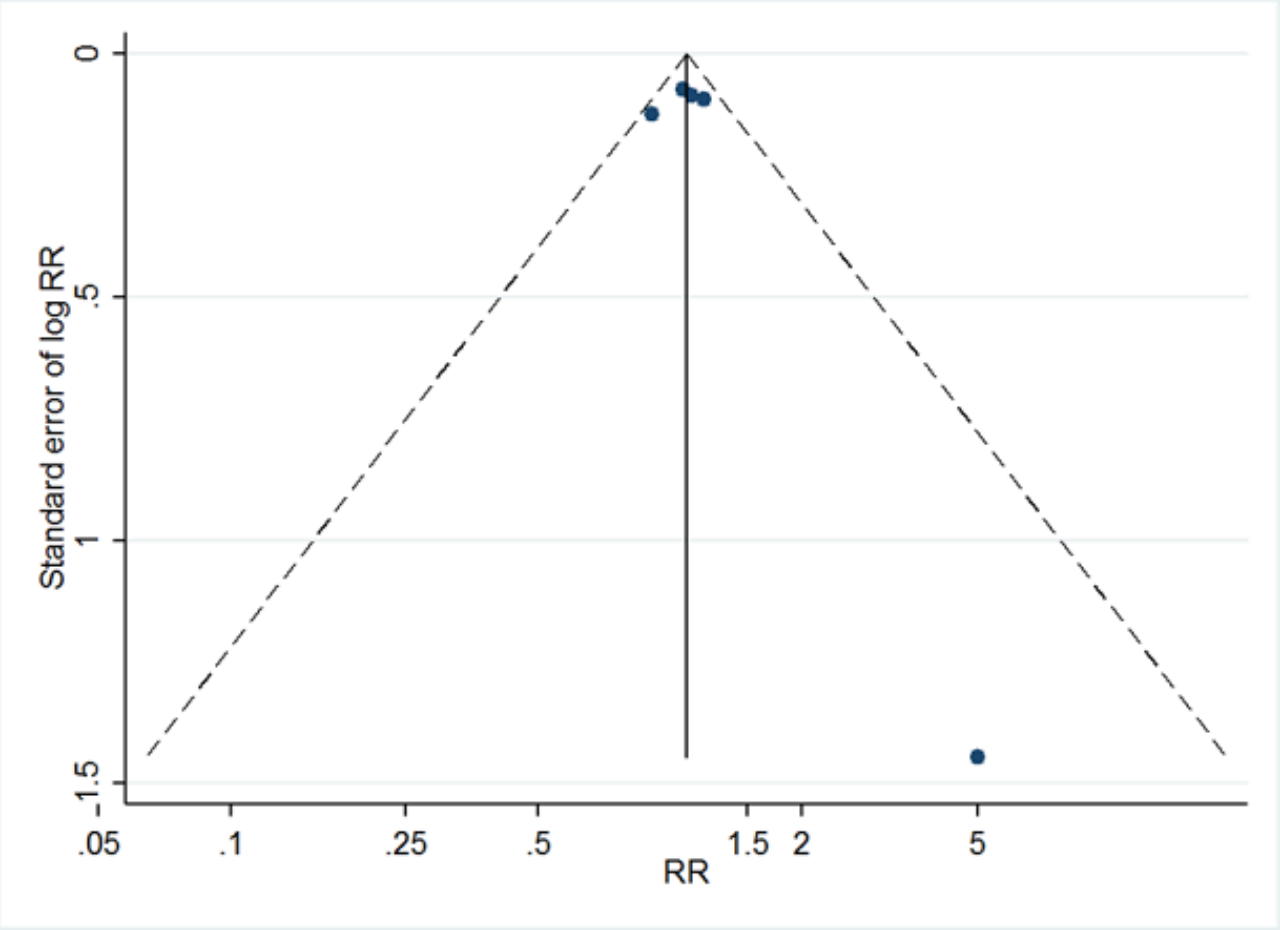
3.1.1 Short term (less than six months)

Physical conditioning interventions resulted in a pooled RR estimate for short-term return to work of 1.17 (95% CI 0.97 to 1.41; very low-certainty evidence), with indications of substantial statistical heterogeneity (Chi^2 = 11.54, df = 3 (P = 0.009); I^2 = 74%). Excluding the Dugmore 1999 results, which we extracted from a graph, eliminated much of the observed heterogeneity (Chi^2 = 0.73, df = 2 (P = 0.69); I^2 = 0%) and reduced the pooled effect (RR 1.06, 95% CI 0.98 to 1.14). A sensitivity analysis excluding studies with overall high risk of bias (Andersen 1981; Worcester 1993), resulted in a pooled RR of 1.62 (95% CI 0.65 to 4.06; I^2 = 91%), due to the increased influence of the Dugmore 1999 study results.

3.1.2 Medium term (six months to one year)

Physical conditioning interventions made little or no difference in the medium-term return-to-work rates (RR 1.09, 95% CI 0.99 to 1.20; I^2 = 5%; low-certainty evidence). When we excluded studies with an overall high risk of bias (Holmbäck 1994; Worcester 1993) in a sensitivity analysis, physical conditioning interventions increased return-to-work rates at six to 12 months (RR 1.16, 95% CI 1.02 to 1.31; I^2 = 0%). The funnel plot of the five study results suggested some potential publication bias (Figure 4). The results of the Egger's test (P = 0.60), gave no indication of potential publication bias for this outcome, so we did not apply the 'trim and fill' method. However tests of publication bias may be underpowered when few studies are available. The meta-regression considering changes of log RR over study time gave no indication of a time-dependency (slope β = 0.00, P = 0.951).

Figure 4. Funnel plot of comparison 4. Physical conditioning interventions vs usual care, outcome: 4.3 proportion returning to work (medium term)



Subgroup analysis

Pooling only study populations with similar CHD severity (Analysis 3.2) resulted in physical interventions having a bigger effect on the return-to-work rate in the two studies where the CHD was generally more severe (RR 1.12, 95% CI 1.00 to 1.25; I^2 = 0%; Dugmore 1999; Worcester 1993), and made little to no difference to return to work among the three study populations where the CHD was less severe (RR 1.04, 95% CI 0.84 to 1.29, I^2 = 36%; Holmbäck 1994; Marra 1985; Stern 1983).

3.1.5 Mean days until return to work

Four studies reported the mean time until return to work after MI either in weeks (Bethell 1990; Holmbäck 1994), or months (Maeder 1977; Marra 1985). We converted the reported results into mean days until return to work and pooled the mean differences. Using the SDs reported by Bethell 1990 and the interquartile ranges reported by Holmbäck 1994 we imputed the SD for the remaining two studies. Marra 1985 reported the results separately for study participants previously working in blue- or white-collar professions, and we combined these results for Analysis 3.3. This analysis found that physical interventions made little or no difference in the time needed until return to work compared to usual care (MD −7.86 days, 95% CI −29.46 to 13.74; low-certainty evidence). Due to the considerable statistical heterogeneity observed for this analysis (Chi^2 = 12.38, df = 3 (P = 0.006); I^2 = 76%), we also conducted a sensitivity analysis with the fixed-effect model. The fixed-effect model resulted in a smaller MD of −2.84 days (95% CI −10.43 to 4.75), giving some indication of the presence of a small-study effect.

Subgroup analysis

We conducted subgroup analyses of study populations with more physically demanding occupations (blue-collar workers) or less physically demanding occupations (white-collar workers), using the stratified results reported by Marra 1985 (Analysis 3.4). We observed no mean difference in return-to-work times and considerably heterogeneity (Chi^2 = 4.50, df = 1; P = 0.03; I^2 = 78%) for white-collar workers, while physical conditioning interventions reduced the mean time until return to work for blue-collar workers (MD 28.29 days, 95% CI −48.68 to −7.91; I^2 = 0%).

3.2 Person-directed physical conditioning interventions versus usual care: secondary outcomes

Working after an extended period of at least one year

Two studies reported the number or proportions of participants working between one and five years (Andersen 1981; Maeder 1977). Physical conditioning interventions had little to no effect on the proportion of participants at work in the long term (RR 1.04, 95% CI 0.82 to 2.66; I^2 = 0%; low-certainty evidence). Excluding Andersen

1981, which we judged to have an overall high risk of bias, left only Maeder 1977, where the authors detected no effect of the intervention. However, Maeder 1977 applied an early, in-hospital mobilisation intervention, and it is reasonable to expect more moderate effects on return to work by such a mild intervention. Only Dugmore 1999 reported the proportions of participants working five years after study completion. Dugmore 1999 alone reported the effects of a physical conditioning intervention on return to work compared to usual care at five years' follow-up (RR 1.83, 95% 1.26 to 2.66; low-certainty evidence).

Adverse effects

One study reported the rates of cardiac deaths (Marra 1985), and a second reported the rate of fatal MI (Dugmore 1999). We found that physical conditioning interventions may make little or no difference to the rate of cardiac deaths (RR 1.00, 95% CI 0.35 to 2.80; I^2 = 0%; moderate-certainty evidence; Analysis 3.5). Two studies reported reinfarction rate (RR 0.70, 95% CI 0.26 to 1.88; I^2 = 47%; Analysis 3.6).

4. Combined interventions versus usual care

4.1 Combined interventions versus usual care: primary outcomes

We included 13 studies evaluating combined (comprehensive) cardiac rehabilitation programmes combining both counselling and physical exercise components in the meta-analysis (Andersson 2010; Bengtsson 1983; Bertie 1992; Engblom 1997; Erdman 1986; Froelicher 1994; Higgins 2001; Hofman-Bang 1999; Lidell 1996; Oldridge 1991; PRECOR 1991; Rivas 1988; Vermeulen 1988).

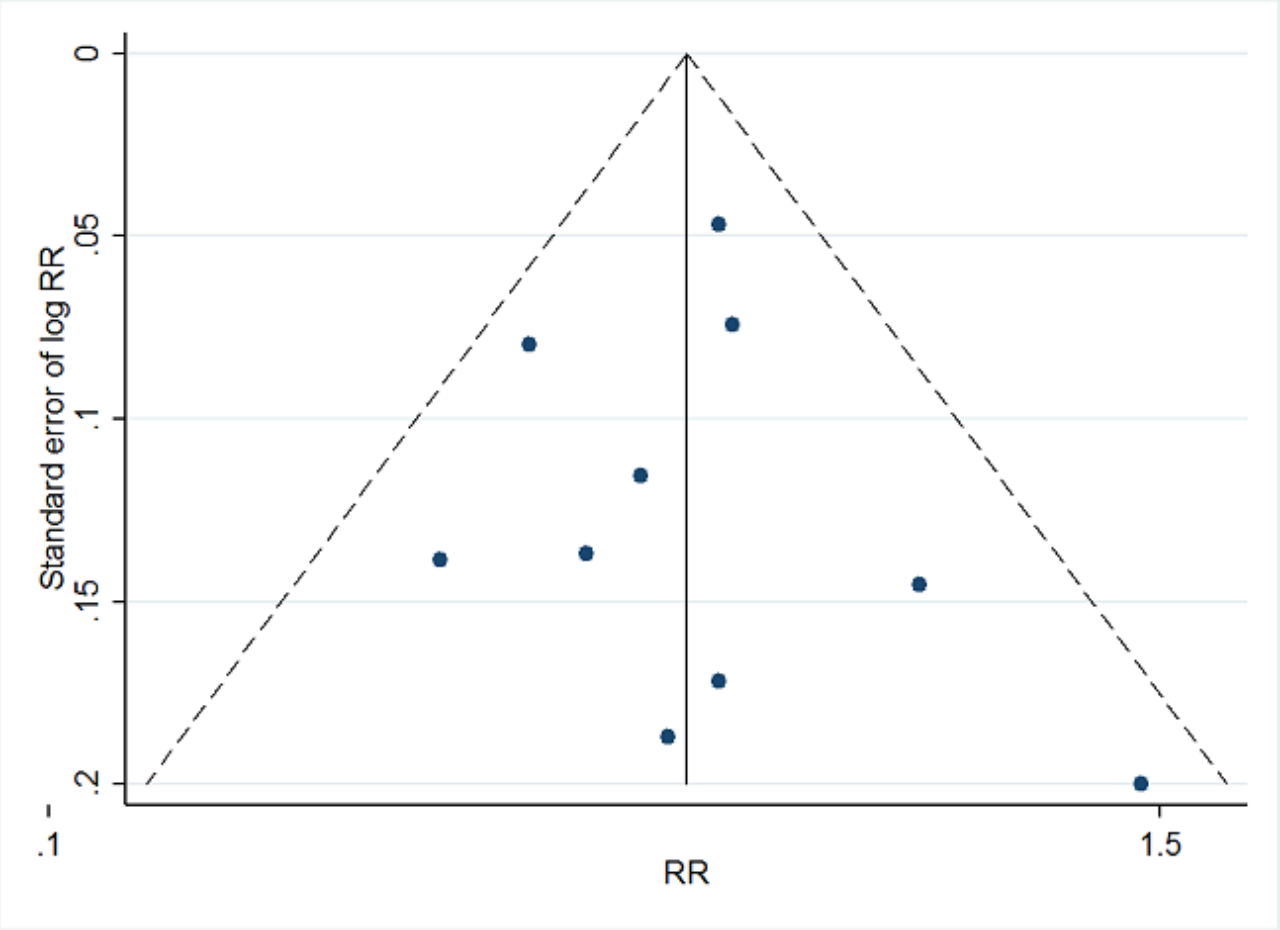
4.1.1 Short term (less than six months)

Four studies reported rate of return to work up to six months following a combined cardiac rehabilitation programme (Bertie 1992; Higgins 2001; PRECOR 1991; Rivas 1988). Combined cardiac rehabilitation programmes may increase the short-term return-to-work rate (RR 1.56, 95% CI 1.23 to 1.98; I^2 = 20%; low-certainty evidence; Analysis 4.1). This corresponds with a NNTB of 5, meaning one additional person will return to work up to six months after CHD hospitalisation for every five people receiving combined cardiac rehabilitation. Rivas 1988 considered two combined cardiac rehabilitation arms with varying intensities of the exercise component versus a single control group receiving usual care, and we combined the results of both intervention arms for the data synthesis. A sensitivity analysis excluding the one study with an overall high risk of bias (Bertie 1992) did not substantially alter the pooled estimate (RR 1.51, 95% CI 1.09 to 2.09, I^2 = 42%). The forest plot gave no visual indications of any time-dependency for short-term effects of combined interventions, and there were not enough studies considering short-term return to work to conduct a meta-regression.

4.1.2 Medium term (six months to one year)

Ten studies reported medium-term return to work following combined interventions (Andersson 2010; Engblom 1997; Erdman 1986; Froelicher 1994; Higgins 2001; Hofman-Bang 1999; Lidell 1996; Oldridge 1991; Rivas 1988; Vermeulen 1988). Combined interventions may make little to no difference in the medium-term return-to-work rate (RR 1.06, 95% CI 1.00 to 1.13; I^2 = 0%; low-certainty evidence; Analysis 4.1). As a sensitivity analysis, we omitted the four studies with an overall high risk of bias (Andersson 2010; Erdman 1986; Hofman-Bang 1999; Lidell 1996) from the analysis, and this caused little change to the pooled effect estimate (RR 1.05, 95% CI 0.97 to 1.14; I^2 = 23%). Both a funnel plot (Figure 5), and the results of the Egger's Test (P = 0.843), showed no indications of publication bias for this outcome. We discerned no clear pattern of changing effect over time from the forest plot, and the meta-regression of the log RR and study year also did not indicate any time-dependency (slope β = 0.005, P = 0.409).

Figure 5. Funnel plot of comparison 5. Combined conditioning interventions vs usual care, outcome: 5.3 proportion returning to work (medium term)



Subgroup analysis

The subgroup analysis of participant populations with similar severities of CHD (Analysis 4.2), resulted in a larger pooled effect estimate for participant populations with more severe CHD (RR 1.12, 95% CI 0.99 to 1.25; I^2 = 11%). We also considered study populations with similar physical work demands in a subgroup analysis (Analysis 4.3). The three study populations with more sedentary (white-collar) workers (Engblom 1997; Higgins 2001; Rivas 1988), resulted in a pooled RR of 1.11 (95% CI 0.97 to 1.28; I^2 = 20%), while the two studies with study populations predominantly comprised of physical labourers (Lidell 1996; Vermeulen 1988), resulted in a pooled RR of 1.06 (95% CI 0.76 to 1.48; I^2 = 66%). Results did not differ notably according to the sex of the participants included in the studies (Analysis 4.4).

4.1.3 Mean days until return to work

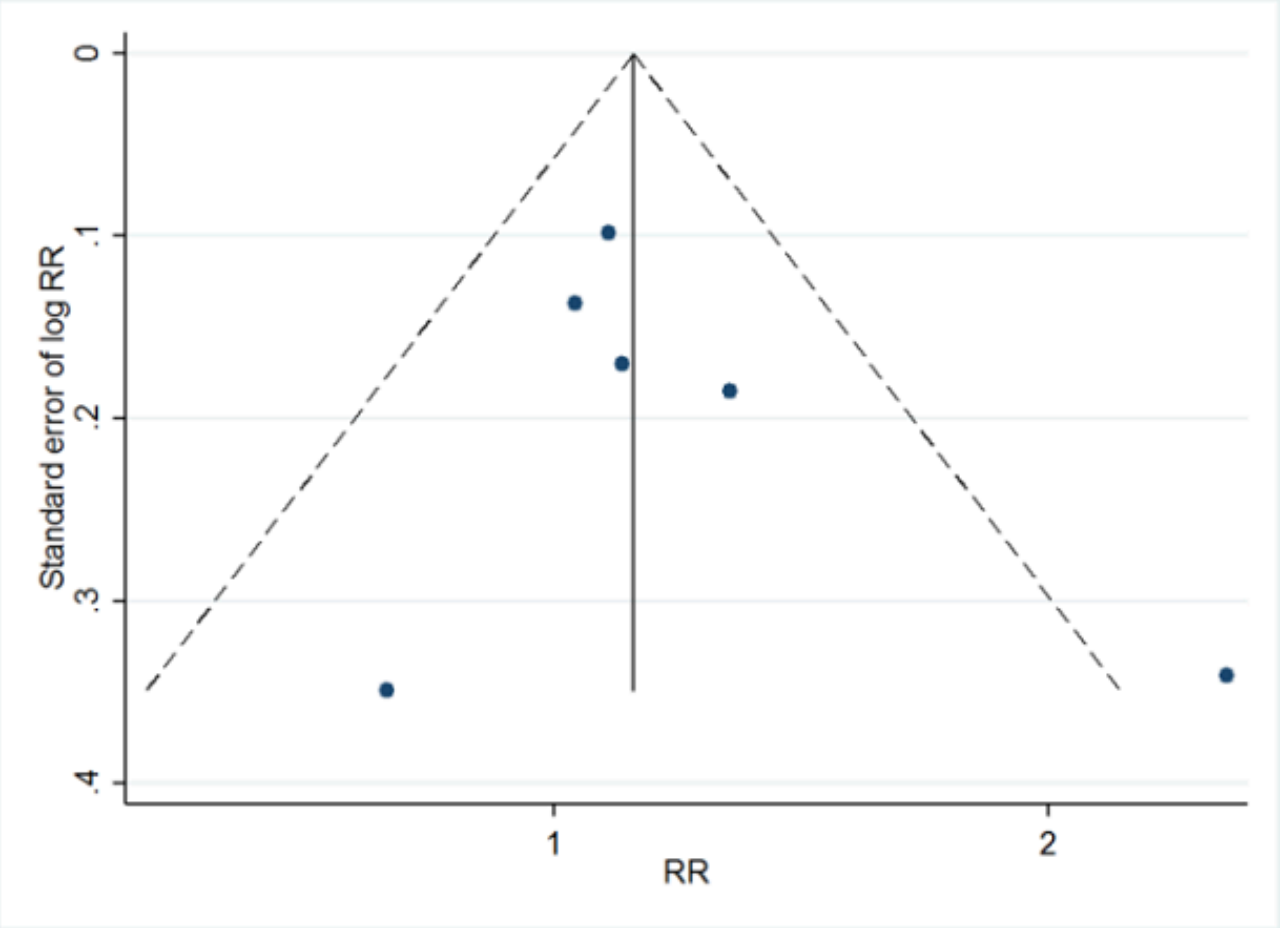
Two studies reported the time until return to work following a combined intervention (Bengtsson 1983; Higgins 2001). We obtained SDs from the t-test results of Higgins 2001 and applied this to both studies. Combined interventions shortened the mean length of time until return to work to a MD of −40.77 days (95% CI −67.19 to −14.35; I^2 = 66%; moderate-certainty evidence; Analysis 4.5). We considered neither of these studies to have an overall high risk of bias. A sensitivity analysis with the fixed-effect model resulted in a pooled MD of −39.32 days (95% CI −54.49 to −24.16).

4.2 Combined interventions versus usual care: secondary outcomes

Working after an extended period of at least one year

Aggregation of the six studies reporting results from long-term follow-ups of one to five years (Andersson 2010; Bengtsson 1983; Bertie 1992; Engblom 1997; Hofman-Bang 1999; PRECOR 1991), resulted in a RR of 1.14 (95% CI 0.96 to 1.37; I^2 = 37%; very low-certainty evidence; Analysis 4.1). Excluding the three studies with an overall high risk of bias (Andersson 2010; Bertie 1992; Hofman-Bang 1999) increased the RR and the heterogeneity (RR 1.23, 95% CI 0.88 to 1.70; I^2 = 69%). Both a funnel plot (Figure 6), and the Egger's test (P = 0.406), showed no indications of publication bias or small-study effects for long-term return-to-work rates following combined interventions. We observed low heterogeneity for return-to-work rates following combined interventions, and sensitivity analyses with fixed-effect models resulted in similar estimates. Regarding changes of effect over time, the meta-regression of the log RRs and study year indicated no time-dependency (slope β = 0.006, P = 0.614), and we discerned no clear pattern of changes over time from the forest plot.

Figure 6. Funnel plot of comparison: 5 combined conditioning interventions vs usual care, outcome: 5.6 proportion returning to work (long term)



Four studies reported the effects of combined interventions on the working status at five-year follow-up (Andersson 2010; Engblom 1997; Erdman 1986; Lidell 1996). Combined interventions resulted in a summarised RR for working after five years of 1.09 (95% CI 0.86 to 1.38, I^2 = 0%, very low-certainty evidence; Analysis 4.1). When we excluded the three studies with an overall high risk of bias from the meta-analysis, only Engblom 1997 remained. This study found the highest beneficial effect of the interventions on working status at five years (RR 1.66, 95% CI 0.76 to 3.61). There were also too few studies to be considered in a meta-regression, and we discerned no pattern of changes over time from the forest plot.

Health-related quality of life

One study reported a total score for health-related quality of life using the Angina Pectoris Quality of Life Questionnaire among study participants primarily eligible to return to work at a follow-up time of two years (Hofman-Bang 1999). The studied combined intervention appeared to have little to no effect on health-related quality of life score when compared to usual care group at two years (MD 0.40, 95% CI −0.03 to 0.83; low-certainty evidence; Analysis 4.6).

Adverse effects

Four studies reported total mortality rates after combined interventions for follow-up times of one to five years (Bengtsson 1983; Erdman 1986; Hofman-Bang 1999; Rivas 1988). Combined interventions resulted in a summarised RR for total mortality of 1.43 (95% CI 0.59 to 3.51; I^2 = 5%; Analysis 4.7). Three studies also reported reinfarction rates after combined interventions for follow-up times of one to five years (Bengtsson 1983; Erdman 1986; Hofman-Bang 1999; Vermeulen 1988). Combined interventions resulted in a summarised RR for reinfarctions of 0.56 (95% CI 0.23 to 1.40; I^2 = 0%; moderate-certainty evidence; Analysis 4.8).

DISCUSSION

Summary of main results

This review included 39 studies applying a randomised controlled study design to investigate the impact of various interventions on the rate and timing of return to work following a MI, CABG or PCI. We do not know if counselling interventions (including health education) that addressed fears or concerns related to CHD increase the proportion of people with CHD returning to work at follow-ups of up to one year (very low-certainty evidence), and these interventions may make little or no difference in the proportion working in the long term (low-certainty evidence). We also do not know if psychological counselling interventions reduce the time needed to return to work due to the very low certainty of the evidence. We did not find studies reporting total health-related quality of life during the return-to-work process or adverse effects

following person-directed psychological interventions, so we could not assess these secondary outcomes.

Counselling directed specifically at encouraging returning to work, for example by providing a physician-sanctioned goal for returning to work based on the results of symptom-limited treadmill testing or by attempting to assuage concerns of co-workers regarding their colleague's ability to return to work, may result in little to no difference in days until return to work. Work-directed counselling probably results in little or no difference in cardiac death rates. Why counselling to encourage return to work did not have more of an impact on return to work is unclear. Perhaps interventions providing a concrete time frame for when it should be physically safe to return to work do not adequately address other personal and work-related obstacles that may affect an individual's decision to return to work.

Cardiac rehabilitation comprising only some form of physical conditioning following CHD may result in little to no difference in the medium-term (six to 12 months) return-to-work rate (low-certainty evidence) and may result in little to no difference in the proportion at work after one year and up to five years (low-certainty evidence). We do not know if physical conditioning interventions alone increase short-term (up to six months) return to work (very low-certainty evidence). Considering the timing of return to work among participants returning to work, physical conditioning interventions may result in little to no difference in mean time needed to return to work (low-certainty evidence). Physical conditioning interventions appeared to reduce time away from work particularly among blue-collar workers. Physical conditioning interventions probably do not increase adverse effects (cardiac deaths).

Combined (comprehensive) cardiac rehabilitation programmes combining physical conditioning with counselling and risk factor education appeared to have some effect on return to work. Combined cardiac rehabilitation programmes may increase the proportion of participants resuming work up to six months following hospitalisation for CHD (low-certainty evidence). For about every five participants receiving combined rehabilitation, one additional participant returned to work within six months of hospitalisation (NNTB 5). Combined rehabilitation programmes may result in little to no difference in the proportion returning to work after six months and up to one year (low-certainty evidence). We do not know if combined cardiac rehabilitation programmes increase the long-term (one to five years) or the extended long-term (five or more years) proportion of participants working after hospitalisation (very low-certainty evidence). Combined interventions probably reduce the average time needed to return to work (moderate-certainty evidence) by about 40 days when compared to receiving usual care. Combined interventions may result in little to no difference in health-related quality of life and probably result in little to no difference in adverse effects (assessed as reinfarctions).

Overall completeness and applicability of evidence

We found 39 RCTs examining the effect of person-directed interventions on return to work among people with CHD conducted since the 1970s. However, none of the studies focused on the evaluation of work-directed programmes. Overall the evidence of the studies was directly applicable to the aim of this review and its study questions. Studies were conducted for the most part in North America, Western Europe, and Australia. Although women were more often included in the study populations (25 studies) than not, women generally comprised a very small portion of the included participants. Only one study explicitly examined the effect of an intervention on return to work among women (Andersson 2010). Studies predominantly considered people who had been hospitalised for a MI, and less frequently considered people undergoing CABG or PCI. This may mean that the results are less applicable to people undergoing revascularisation procedures.

The studies considering health-related quality of life reported results for the entire study populations and not just those eligible to return to work. Therefore, to assess our secondary outcome of health-related quality of life within the return-to-work process, we considered health-related quality of life results of studies where at least 80% of study participants were eligible to return to work. We did not find enough studies conducted predominantly among participants eligible to return to work that had assessed health-related quality of life to conduct a meta-analysis of this secondary outcome. Likewise, we also considered cardiac death rates, reinfarction rates and total mortality as severe adverse effects of interventions among studies where at least 80% of study participants were eligible to return to work in order to increase the applicability of the results to the return-to-work process.

Quality of the evidence

We included 39 studies, but once we aggregated studies according to intervention form and follow-up times, the highest number of studies that we could aggregate was 10. We judged the overall risk of bias to be high for 16 of the studies. However, excluding studies judged to have an overall high risk of bias did not seem to systematically alter the results. The way that studies described many aspects of the study characteristics of interest, including return-to-work results and details regarding the severity of CHD at baseline were heterogeneous and often lacking important details, such as the actual number of participants considered in the return-to-work analysis. Also studies rarely provided information regarding study participants' employment characteristics prior to CHD (i.e. how many participants worked in physically strenuous occupations). Studies considering return to work among a subgroup of previously employed participants for the return-to-work analyses, reported loss to follow-up for the entire study populations, which made it difficult for us to determine the outcome-specific losses to follow-up in these studies. Some studies also reported that the desire to return to work reduced compliance with the rehabilitation programmes, however withdrawals during the interventions should not have affected the results among studies conducting intention-to-treat analyses, and we considered intention-to-treat in our 'Risk of bias' assessments.

Our assessment of the quality of evidence was also hindered by poorly reported methods. Even studies published after the publication of the first proposal of standards for reporting of RCTs (Standards of Reporting Trials Group 1994) lacked adequate descriptions of allocation methods to permit clear 'Risk of bias' judgements, and none of the included studies cited a study protocol that would have permitted more objective assessments of selective reporting bias. Although we initially intended to contact all study authors to obtain additional information to aid in the 'Risk of bias' assessments, this often proved to be impossible, as many studies were conducted more than 20 years ago.

We downgraded nearly all outcomes by at least one level due to risk of bias. We also downgraded many outcomes because of imprecision due to wide confidence intervals that could include possible appreciable harm or benefit, and because of inconsistency due to substantial heterogeneity that could not completely be explained. We did not downgrade any outcomes for indirectness.

Return to work was often a secondary outcome of the studies, and as such, the results pertaining to return to work were not always clearly reported. There may have been additional cardiac rehabilitation studies that considered return to work, but did not report these results in any published document. It is possible that such omissions may be more likely to involve results for secondary outcomes when these were not statistically significant, and this selective reporting could result in a form of publication bias. We found some indications of publication bias among the studies of psychological interventions considering short-term (Figure 3), and medium-term return to work. We also observed visual indications of publication bias among physical conditioning intervention studies reporting medium-term return to work (Figure 4). We did not detect publication bias for the pooled analyses of combined interventions reporting medium-term (Figure 5) and long-term (Figure 6) return to work.

Potential biases in the review process

Although we conducted an extensive search, our review process may have some limitations. We excluded studies mentioning return to work somewhere in the abstract or introduction without reporting any return-to-work results. We included studies reporting return-to-work results as percentages without providing the absolute number of study participants working prior to their CHD. We tried to obtain unpublished data from study authors regarding numbers of people working prior to CHD, but we were not always able to contact them. While we still included these studies in the review, we could not include the results of these studies in the meta-analysis.

We also found registered clinical trials mentioning return to work as an outcome, that according to their registered start dates, should have produced results by now. However, we did not find any results that we could link to these studies. Publication bias may be leading to an underreporting of return-to-work results.

Agreements and disagreements with other studies or reviews

Like the Anderson 2017a review, we found no evidence that psychological interventions for CHD had any impact, positive or otherwise, on adverse reactions such as mortality or non-fatal MI in the studies examining return to work. The Anderson 2017a review also reported that four of 10 studies examining health-related quality of life observed improvements in at least one dimension of health-related quality of life in the intervention group receiving a psychological intervention that differed significantly from that observed in the comparison groups. We were unable to examine health-related quality of life following psychological interventions among studies examining return to work.

In contrast to the Anderson 2016 review, which found evidence that exercise-based rehabilitations reduced cardiac mortality, we did not observe any meaningful differences across study groups with regard to cardiac mortality in the studies examining return to work in populations predominantly eligible to return to work.

AUTHORS' CONCLUSIONS

Implications for practice

We found low-certainty evidence that cardiac rehabilitation, including both physical conditioning and psychological aspects, may promote return to work up to six months following coronary heart disease (CHD), but we also found low-certainty evidence that these programmes may have little or no effect on the proportion of participants returning to work between six months and one year. Due to the very low certainty of evidence found, we do not know if these programmes increase the proportion of participants at work after a year.

Regarding single-component, person-directed interventions, we do not know if programmes including only a counselling component make any difference in return to work up to six months or between six months and one year (very low-certainty evidence). We found low-certainty evidence that work-directed counselling alone may result in little to no difference in the time needed to return to work. We found very low-certainty evidence regarding the effect of physical conditioning programmes up to six months, so we do not know if physical conditioning alone has any effect on return to work. Physical conditioning programmes may result in little to no difference in return to work between six months and one year (low-certainty evidence).

Implications for research

Our review identified several aspects that future research could address.

Population

In our analysis, pooling the effect estimates of psychological interventions (including health education) and physical conditioning interventions resulted in risk ratios 1.24 and 1.17, respectively, for short-term return to work, but the pooled confidence intervals were imprecise. According to our power analysis, the pooled confidence intervals for these two results should not have included a null effect 83% to 84% of the time. To find precise estimates of smaller effects 80% of the time with 95% confidence, such as the RR 1.06 we observed for medium-term return to work following combined interventions, new studies need to recruit altogether 3774 study participants (compared to the 992 study participants included in our analysis). Since sick leave is costly for employers and paid sick leave may be limited or even unavailable for some workers, we consider even small increases in return to work to be relevant. However, detecting small effects requires conducting very large trials.

In addition, we still need high quality studies that directly address the return-to-work process and adequately report the vocational status and job characteristics of study participants prior to the onset of CHD. In a subgroup analysis of physical conditioning interventions, we found that physical conditioning lowered the time needed to return to work only among the two study populations where physically strenuous working conditions or blue-collar occupations were predominant (Analysis 3.4). More information is needed to corroborate this finding and to determine

if interventions may be more effective at promoting return to work for certain employee populations.

When working situations are beneficial and supportive of health, return to work can be considered an important component of regaining full health and improving health-related quality of life. Delayed return to work or early retirement following CHD can have long-lasting detrimental financial consequences on individuals and their families, especially where social systems are lacking to provide adequate financial support following a prolonged illness. For some people, such financial factors may be the main impulse to decide if and when they will return to work. Additional research is needed to determine if health outcomes are comparable between people who feel compelled to return to work and those who want to return to work of their own accord.

Interventions and comparisons

Additional evidence is also needed to determine if cardiac rehabilitation including both physical conditioning and psychological components truly promotes return to work up to six months following CHD. In addition to containing exercise, as well as anxiety and risk factor education, future combined interventions may also need to develop better ways to assist transitions back into the workforce without inadvertently promoting presenteeism. Returning to work is a complex and multi-factorial process, and combined interventions that better address work-related factors, possibly by providing return-to-work coordination, could eliminate further barriers to returning to work. Cardiac rehabilitation interventions also need to make accommodations for people who have to or want to return to work. There is a need to concurrently support the recovery process while alleviating any difficulties that can occur during the return-to-work process. This may require the development of strategies that improve access to cardiac rehabilitation centres.

None of the studies exclusively considered work-directed interventions such as stepwise occupational reintegration (SOR). We also found no controlled studies on the effectiveness of coaching by an occupational physician or on the effects of structured communication between occupational physicians, employers, and the cardiac rehabilitation team. Few combined rehabilitation programmes (three studies) mentioned providing individual work-directed recommendations to patients or employers as part of the rehabilitation programme. Similarly, only a few studies directly addressed the return-to-work process by offering a recommendation for when to return to work (three studies) or by counselling patients and their co-workers to assuage their concerns about working with heart disease (one study). Although studies sometimes reported changes in working status (full versus part time), reductions in working hours seemed to have been initiated by the patients themselves and were not part of the intervention.

In view of the variation of the single interventions implemented to address either physical or psychological condition following CHD, more research is also needed. Effective single interventions are advantageous, because they are cheaper and simpler to organise than the combined interventions and can also take place outside cardiac rehabilitation centres. Studies considering single components of combined interventions also help explain how much return to work is impacted by either focusing on psychological or physical recovery following CHD among study participants with specific risks.

Outcomes

Return to work was often a secondary outcome of the studies, and as such, the results pertaining to return to work were often poorly reported. Providing the complete results of secondary analyses, at least as on-line supplements (even when the results were not statistically significant), would help future assessments of return to work among people with CHD. Adhering to recommended reporting guidelines for RCTs could also greatly improve the evidence obtained from future research of return to work following cardiac rehabilitation programmes.

A priori registration of protocols in online RCT registries, which would assist in the objective assessment of selective reporting, may already be improving, as we found seven ongoing registered studies. We also encountered difficulties in identifying participant populations with comparable CHD severity due to the greatly varying selection of cardiac health measures and comorbidities reported. Using core outcome sets when assessing cardiac health of study populations will help alleviate this problem.

ACKNOWLEDGEMENTS

We thank Jani Ruotsalainen, Managing Editor, Cochrane Work for providing administrative and logistical support for the development of the review protocol, and Kaisa Neuvonen, Information Specialist, Cochrane Work for developing the search strategies. We also thank Jochen Schmitt for his contributions to the planning of the study and his contributions to the protocol.

We also thank Cochrane Work Co-ordinating Editor, Jos Verbeek; Managing Editor, Jani Ruotsalainen; Information Specialist, Kaisa Neuvonen; Editors, Anneli Ojajärvi and Wim van Veelen; and external peer referees Andrew Beswick, Eira Viikari-Juntura, Lars Hermann Tang, and Tomi-Pekka Tuomainen for their comments on the protocol and the review. Last but not least, we thank Megan Prictor and Denise Mitchell for copy-editing the text.

Thank you to the many wonderful people who helped us to screen and translate documents in various languages, including Giorgio Maria Agazzi, Julie Cwikel, Nikolaos Stilianakis, and Shangqing Wang. And a special thanks to Soja Nazarov for her help obtaining and translating Russian papers. And our most heartfelt thanks to Evgeniya Regner, Alejandra Rodriguez Sanchez, Hermann Burr, and Ronny Staudte for their tremendous support with the literature collection. We wish you all the best in all of your future endeavours!

And most of all, our thanks go to the courageous people that help science by agreeing to participate in research studies.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Andersen 1981

Methods	**Study design**: parallel RCT **Recruitment**: recruited at hospital discharge **Allocation**: not reported **Blinding**: none reported **Randomisation**: random numbers **Follow-up(s):** 3 years **Description:** supervised training programme
Participants	**Baseline characteristics** Intervention group • Mean age (SD): 52.2 (7.5) • Sex (male %): 100 • Number of participants randomised: 46 • Working before CHD (number self-calculated): 31 Control group • Mean age (SD): 55.6 (6.3) • Sex (male %): 100 • Number of participants randomised: 42 • Working before CHD (number self-calculated): 27 **Inclusion criteria** • Men with first AMI • < 66 years of age **Exclusion criteria** • Unmotivated (to exercise) • Musculoskeletal complaints preventing exercise The study authors report that participants had no signs of heart failure, severe ventricular ectopies or atrioventricular blockages at discharge. It is unclear if this was an inclusion criteria. **Baseline imbalances:** - **Physically demanding work (i.e. white- vs blue-collar)**: unknown **Severity of CHD**: unknown
Interventions	**Intervention characteristics** Training group

Andersen 1981 *(Continued)*

	• Participants were mobilised and shown breathing and muscle exercises 2-3 days after entering the hospital • Supervised physical exercises (including running, bicycle riding, rope skipping, ball games, weight exercises) for 1 h twice a week in the 1st 2 months and for 1 h once a week in the following 10 months • Participants were advised to continue the exercises at home • Duration of intervention: 2 months (twice a week) + 10 months (once a week) • Providers: training was supervised (information regarding the qualifications of the provider were not described) Control group • Participants were mobilised and shown breathing and muscle exercises 2-3 days after entering the hospital
Outcomes	Proportion at work at < 6 months (short term): 4 months Proportion at work at > 12 months to < 5 years (long term): 3 years Number returning to previous work Adverse events (mortality, non-fatal reinfarctions)
Identification	**Sponsorship source**: none reported **Country:** Denmark **Setting**: single-centre, ambulant **Possible conflicts of interest**: no information provided **Ethics committee approval**: no information provided regarding participant consent or ethics committee approval
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Participants were randomised using "random numbers". No further information about generation of random numbers
Allocation concealment (selection bias)	Unclear risk	No allocation method was reported
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	None reported. It is unclear how return to employment was assessed. If assessed with official records, it may not be subject to detection bias.
Incomplete outcome data (attrition bias) All outcomes	High risk	The number of participants with fatal or non-fatal reinfarctions was reported in the text, but these participants were excluded from the analysis. (no loss-to-follow-up analysis)
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available.

Andersen 1981 *(Continued)*

Other bias	Unclear risk	None identified

Andersson 2010

Methods	**Study design**: parallel RCT **Recruitment:** AMI, CABG, PCI patients recruited from April 1997-October 2000 **Allocation**: envelope **Blinding**: not blinded **Randomisation**: no Information provided **Follow-up(s):** yearly up to 5 years **Description:** combined inpatient rehabilitation programme for women
Participants	**Baseline characteristics** Intervention group • Mean age (SD): 52.5 (6.2) • Sex (male %): 0 • Number of participants randomised: 69 • Working before CHD: 54 Control group • Mean age (SD): 54.3 (6.1) • Sex (male %): 0 • Number of participants randomised: 61 • Working before CHD: 42 **Inclusion criteria** • Female • < 65 years of age, working age • Resident of Stockholm • CHD: hospitalised for AMI, CABG or PCI **Exclusion criteria** • Non-Swedish speaking • Heart failure • Unstable angina pectoris • Other disabling diseases including drug abuse **Baseline imbalances:** - **Physically demanding work (i.e. white- vs blue-collar)**: unknown **Severity of CHD**: less
Interventions	**Intervention characteristics** Group programme (6-10 women) aimed at promoting and maintain lifestyle changes • 2-week residential course

Andersson 2010 *(Continued)*

- 5 inpatient days after 2 months
- 2 follow-ups per year, each requiring 2 inpatient days
- Group activities included:
  - seminar/discussions (group and individual counselling with a cardiologist, psychologist, psychiatrist, dietician, physiotherapist)
  - practical activities: e.g. healthy cooking
  - physical activities: walking, aerobics, Yoga, Qi Gong, water-aerobics
  - daily relaxation techniques: breathing exercises, meditation
  - activities with friends and families on weekend
  - psychosocial intervention: an interactive, self-instructional programme "Stress as an Opportunity".
- Duration of intervention: 5 years
- Providers: trained personnel

Control group

- Conventional post-hospitalisation care varied by hospital, e.g. physiotherapy twice per week for 4 weeks
- information on healthy food and adverse effects of nicotine

Outcomes	Proportion at work at 6–12 months (medium term): 12 months Proportion at work at > 12 months to < 5 years (long term): 3 years Proportion at work at 5 years (extended long term): 5 years Number of participants at work calculated from proportions provided and number of participants working at baseline Becks Depression Inventory, Gothenburg QoL Inventory (only baseline results reported) Adverse events (mortality, emergency room visits)
Identification	**Sponsorship source**: supported by Swedish Research Council, Swedish Heart & Lung Foundation, regional agreement on medical training & clinical research (ALF), Stockholm County Council, Saltsjöbaden Hospital and the Dept. of Cardiology at the Karolinska Univ. Hospital **Country:** Sweden **Setting**: single-centre: Saltsjöbaden Hospital near Stockholm; inpatient **Possible conflicts of interest**: none reported **Ethics committee approval**: approved by the Karolinska Hospital Ethics Committee and all participants gave informed written consent.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "The randomisation was not stratified as the number of eligible patients was presumed to be too small for a stratified randomisation." No further information provided.
Allocation concealment (selection bias)	Low risk	Quote: "All baseline examinations were performed before randomisation… Patients were logged into the study and then called to baseline examination. After that, a biomedical scientist, not involved in the study, opened the envelope that revealed the group allocation."

Andersson 2010 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding mentioned
Incomplete outcome data (attrition bias) All outcomes	High risk	Results only given as the proportion (%) employed, on sick leave or with disability pension (not mutually exclusive) for year 1, 3 and 5 after study onset. No information regarding the actual number of study participants employed at the 1-, 3- or 5-year follow-ups were reported or how many study participants were followed at each of the follow-up time points (loss-to-follow-up). Study authors contacted, no further information provided. No information about how the drop-outs (n = 19) were distributed across the groups # imbalanced group sizes (I: n = 69; C: n = 61)
Selective reporting (reporting bias)	Low risk	No study protocol available, however no difference in proportion of employed study participants was detected and still was reported, suggesting there was no reporting bias (towards only reporting statistically significant results).
Other bias	Unclear risk	None identified

Bengtsson 1983

Methods	**Study design**: parallel RCT **Recruitment:** October 1973-January 1975 **Allocation**: no information provided **Blinding**: not reported **Randomisation:** "…allocated at random"; no further information provided **Follow-up(s):** 8-19 months (average 14 months) **Description**: combined rehabilitation programme with recommendations for work modifications
Participants	**Baseline characteristics** Intervention group • Mean age (SD): 55.3 (6.6) • Sex (male %): 86 • Number of participants randomised: 44 • Working before CHD (number self-calculated): 36 Control group • Mean age (SD): 57.1 (6.6) • Sex (male %): 84 • Number of participants randomised: 43 • Working before CHD (number self-calculated): 40 **Inclusion criteria**

Bengtsson 1983 *(Continued)*

- < 65 years of age
- MI patients

Exclusion criteria

- Severe heart failure, post-MI syndrome, aortic regurgitation, cerebral infarct, hemiparesis
- Diseases of the hip, post-poliomyelitis, amputation of a lower extremity
- Diabetes mellitus with retinopathy, hyperthyroidism, hypothyroidism, hyperparathyroidism
- Mental illness: anxiety neurosis, low intelligence, alcoholism, schizophrenia
- Living > 50 km from the hospital

Baseline imbalances: -

Physically demanding work (i.e. white- vs blue-collar): unknown

Severity of CHD: severe (severe cardiac failure excluded, angina not excluded)

Interventions	**Intervention characteristics**
	
	Rehabilitation programme
	
	• Outpatient examination:
	  ◦ detailed health, work and family history
	  ◦ attitudes toward illness
	  ◦ exercise tolerance test on ergometer
	• Physical training supervised by physiotherapist for 30 min 2 x/week over 3 months:
	  ◦ interval training of large muscle groups on mechanically braked ergometer bicycle (Monark Ergometercykel)
	  ◦ callisthenics
	  ◦ 30 min jogging (2 x/week over 3 months)
	  ◦ intensity was graded on basis of exercise tolerance test findings; maximum heart rate = 90% of maximum heart rate at exercise
	• Counselling, individually and in groups (topics included avoiding weight gain, smoking cessation, continued physical exercise, resuming leisure activities, social benefits, and return-to-work)
	• Classes regarding causes of MI (anatomy of the heart, psychological reactions, mode of life), course, treatment (drug treatment)
	• Counselling of family members
	• Social measures:
	  ◦ medical reports sent to insurance, employer, local employment authority, disablement resettlement officer
	  ◦ recommendations for work modifications issued to employer (in 4 cases)
	  ◦ report (course of illness, performance on exercise tolerance test, drug therapy, plans for maintenance treatment) was sent to participants' doctors
	• Duration of intervention: about 3.5 months (from 1.5–5 months post-MI)
	• Providers: physiotherapists, cardiologist (qualifications for counselling provider not described)
	
	Control group
	
	• Usual care (not explicitly stated)

Outcomes	Proportion at work at > 12 months to < 5 years (long term): about 13.5 months Working status ascertained at follow-up examination between 8 and 19 months Mean sick leave (days) Minnesotal Multiphasic Personality Inventory Adverse events (mortality, reinfarction)

Bengtsson 1983 *(Continued)*

Identification	**Sponsorship source**: none reported **Country:** Sweden **Setting**: single-centre; outpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: no information provided regarding patient consent or ethics committee approval
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"…allocated at random to either the rehabilitation (81) or the control (90) group…" No further information provided
Allocation concealment (selection bias)	Unclear risk	No information regarding allocation concealment was reported.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Neither blinding of outcome assessors, nor how work status was assessed was reported.
Incomplete outcome data (attrition bias) All outcomes	Low risk	The study authors attempted an intention-to-treat analysis. Quote: "Seven who were invited to take part [in the treatment programme] declined; 6 of these were seen at follow-up examination, and were included in the rehabilitation group because the control group probably also comprised a comparable number of patients who would no doubt also have declined further treatment." However the impact of adverse effects was not assessed. Quote: "Those patients who developed a new infarction during the investigation period were excluded, because the follow-up interview was focused on experiences of MI at time of entry to the study."
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol available
Other bias	Unclear risk	None identified

Bertie 1992

Methods	**Study design**: parallel RCT **Recruitment:** patients who were admitted to a single centre after AMI **Allocation**: not reported

Bertie 1992 *(Continued)*

Blinding: not reported

Randomisation: no information provided

Follow-up(s): after rehabilitation, 4 months, 1-2 years

Description: combined rehabilitation programme

Participants	**Baseline characteristics** Intervention group • Mean age (SD): 52.1 (1.3) • Sex (male %): not reported • Number of participants: 43 • Working before CHD: 31 Control group • Mean age (SD): 52.7 (1.3) • Sex (male %): not reported • Number of participants: 38 • Working before CHD: 26 **Inclusion criteria:** - **Exclusion criteria** • Residing too far from the hospital • Uncontrolled heart failure • Persistent serious rhythm disturbances requiring treatment at the time of discharge, pacemaker or needed treatment with anti-arrhythmic drugs for atrial fibrillation • Other disabling illness, e.g. severe diabetes, peripheral vascular disease, renal failure **Baseline imbalances:** - **Physically demanding work (i.e. white- vs blue-collar)**: unknown **Severity of CHD**: less severe (patients with uncontrolled heart failure excluded)

Interventions	**Intervention characteristics**
	
	• Formal outpatient rehabilitation programme at the hospital twice a week
	  ◦ Standard pulse-monitored group exercise commonly used in the physiotherapy of cardiac patients, supervised by a physiotherapist.
	  ▪ Pulse was monitored before and after each circuit of 12 exercises, and after a 5-min interval
	  ▪ circuit repeated up to a maximum of 4 circuits
	  ◦ Information about improving health such as not smoking and diet
	  ◦ Relaxation technique
	  ◦ Relatives were not actively encouraged to attend with the participant, nor were they discouraged from attending if they wished to do so
	• Exercises at the gymnasium started in the 3rd week after discharge from the CCU
	• Participants received a video recording of the exercise programme and were encouraged to undertake daily exercises at home by following the instructions on the recording
	• Duration of intervention: 4 weeks
	• Providers: exercises were supervised by a physiotherapist
	
	Control group
	
	• Standard hospital care

Bertie 1992 *(Continued)*

Outcomes	Proportion at work at < 6 months (short term): 4 months Proportion at work at > 12 months to < 5 years (long term): 1-2 years Well-being and anxiety about health Adverse events (mortality, MI)
Identification	**Sponsorship source:** The British Heart Foundation and the Chest, Heart and Stroke Association **Country:** UK **Setting**: single centre: the Plymouth cardiac care unit **Possible conflicts of interest**: no information provided **Ethics committee approval**: no information provided
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "On their final hospital day, 110 patients who had suffered acute myocardial infarction and had been admitted to the Plymouth coronary care unit were randomised into two groups…". No further information provided
Allocation concealment (selection bias)	Unclear risk	No information provided
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	None reported. Employment status was assessed with a questionnaire filled out by the study participants (with help from a physiotherapist if necessary). Study participants were aware of their group allocation, which could have affected reporting.
Incomplete outcome data (attrition bias) All outcomes	High risk	Quote: "Patients were withdrawn from the study because of death, increasing angina, coronary artery surgery, reinfarction at their own request, and failure to complete assessments 2 or 4." No ITT analysis was conducted; however, attrition: 28% of controls and 25% of exercise group was similar.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Bethell 1990

Methods	**Study design**: parallel RCT **Recruitment**: patients admitted to CCU were recruited from December 1979-March 1984

Bethell 1990 *(Continued)*

Allocation: not reported

Blinding: not reported

Randomisation: random letter sequence

Follow-up(s): 3 months post-interview (about 4 months after admission)

Description: supervised exercise programme (3 months) at a community sports centre

Participants	**Baseline characteristics** Invervention group • Mean age (SD): 54.2 (7.2) • Sex (male %): 100 • Number of participants randomised: 113 • Working before CHD: unclear/not reported Control group • Mean age (SD): 53.2 (7.7) • Sex (male %): 100 • Number of participants randomised: 116 • Working before CHD: unclear/not reported **Inclusion criteria** • < 66 years of age • Male • AMI patients (history of chest pain typical of MI, progressive ECG changes, a rise and fall in aspartate transaminase concentrations with ≥ 1 reading > 40 units/mL) **Exclusion criteria** • Living > 25 miles from Alton • Medical/orthopaedic problems preventing exercise • Insulin-dependent diabetes mellitus • In atrial fibrillation • Previous course graduates • Patients on study authors' general practice list • Died before randomisation **Baseline imbalances:** - **Physically demanding work (i.e. white- vs blue-collar)**: unknown **Severity of CHD**: unknown
Interventions	**Intervention characteristics** Circuit training at Alton Sports Centre 3 x/week • exercises are performed as 8 stages on a circuit: a. Bicycling on an ergometer b. Stepping up and down 2 steps c. An overhead pull of 20 kg d. A squat lift against 40 kg e. Trunk curls f. A quadriceps exercise against 20 kg

Bethell 1990 *(Continued)*

	g. A bench press against 10-20 kg h. Sitting leg press against 50 kg • Performed on a Nissen polygym and involve frequent rapid dynamic repetitions with small loads • Duration of intervention: 3 months • Providers: GP, sports centre sports officer secretary, physiotherapist Control group • Short talk on safe unsupervised exercise
Outcomes	Mean time to RTW (weeks): 4 months Adverse events (mortality)
Identification	**Sponsorship source:** Grand from British Heart Foundation, Wessex Regional Health Authority **Country:** UK **Setting**: single-centre; outpatient **Possible conflicts of interest**: not reported **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "The qualifying patients were randomised by order of admission into treatment and control groups by means of a random letter sequence."
Allocation concealment (selection bias)	Unclear risk	Not reported
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	High risk	Quote: "Three months from the initial interview the patient was seen again by the research assistant who repeated the initial interview and examination."
Incomplete outcome data (attrition bias) All outcomes	Low risk	In the end only 73 of the 99 participants in the treatment group completed the exercise course (8 participants left the exercise group to return to work), but all participants attending the 3-month assessment appear to have been included in the analyses.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol available
Other bias	Unclear risk	None identified

Broadbent 2009

Methods	**Study design**: parallel RCT **Recruitment:** June 2002-June 2003 **Allocation**: sealed, consecutively numbered envelopes **Blinding**: not reported **Randomisation**: randomisation sequence was generated using a computerised random number generator **Follow-up(s):** 3 and 6 months **Description**: inpatient illness perception intervention
Participants	**Baseline characteristics** Intervention group • Number of participants randomised: 52 • Working before CHD: 43 • Mean age (SD): 54.6 (8.3) • Sex (male %): 87 Control group • Number of participants randomised: 51 • Working before CHD: 41 • Mean age (SD): 54.9 (7.8) • Sex (male %): 90 **Inclusion criteria** • Admitted to Auckland City Hospital for AMI • < 70 years of age • English speaking **Exclusion criteria:** a serious comorbid psychiatric or medical condition **Baseline imbalances:** - **Physically demanding work (i.e. white- vs blue-collar)**: unknown **Severity of CHD**: unknown

Interventions	**Intervention characteristics**
	
	"Standard care plus/intervention group"
	
	• An illness perception intervention was delivered in hospital. The baseline illness perception questionnaire guided the four 30-min intervention sessions:
	  ◦ explanation of the intervention, MI and associated symptoms explained, exploration of the participant's ideas about the cause of their own MI
	  ◦ personal action recovery plan worksheet prepared
	  ◦ participant and the spouse counselled (only for participants with spouse/partner)
	  ◦ going home was discussed: medications, leaving the hospital, worry about a further MI, the importance of visiting the GP, normal symptoms of recovery, following the recovery action plan
	• All of the sessions were recorded, and the recordings were given to the participants so that they could listen to the sessions again at home. Participants were also given a folder of information based on their sessions and their own recovery plan.
	• Duration of intervention: not reported

Broadbent 2009 *(Continued)*

	• Providers: 1 health psychologist Control group Standard hospital care • Visit by a cardiac rehabilitation nurse who gave participants a booklet on cardiac rehabilitation • Talked to the participants about community cardiac rehabilitation classes • Invited to attend an 8-week outpatient community rehabilitation programme • Duration of intervention: - • Providers: cardiac rehabilitation nurse
Outcomes	Proportion at work at < 6 months (short term): 3 months Days to RTW: Cox proportional hazards model was used to determine if RTW rate differed between groups. Intervention group returned to work faster (log rank statistic $Chi^2(1)=19.31$, P=.001)). Adverse events (mortality)
Identification	**Sponsorship source**: a grant from the Heart Foundation of New Zealand **Country:** New Zealand **Setting**: single-centre at Auckland City Hospital; inpatient and self-administered (tape listening) **Possible conflicts of interest**: no information provided **Ethics committee approval**: approval was gained from the Auckland Ethics Committees (AKY/02/00/092)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "The randomisation sequence was generated using a computerized random number generator…"
Allocation concealment (selection bias)	Low risk	Quote: "…allocation was kept in sealed consecutively numbered envelopes."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "There was no blinding of group assignment."
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Assessed with questionnaires
Incomplete outcome data (attrition bias) All outcomes	High risk	Although the loss to follow-up at 6 months was 19% in the intervention group and 27% in the control group, at 3 months it was 3% in the intervention group and 10% in the control group. RTW results were only reported for the 3-month follow-up.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol available
Other bias	Unclear risk	None identified

Burgess 1987

Methods	**Study design**: parallel RCT **Recruitment:** patients recruited from CCU admissions log **Allocation:** sealed envelope **Blinding**: not reported **Randomisation:** stratified by sex for each hospital site **Follow-up(s):** 3-4 months, 13 months **Description**: multi-centred RCT for people < 62 years compared to conventional care
Participants	**Baseline characteristics** Intervention group • Mean age (SD): 51.6 (7.1) • Sex (male %): 85.4 • Number of participants randomised: 89 • Working before CHD: 89 Control group • Mean age (SD): 50.2 (7.7) • Sex (male %): 85.7 • Number of participants randomised: 91 • Working before CHD: 91 **Inclusion criteria** • Aged 18-62 • Employed ≥ 20 h/week outside the home prior to MI • Typical symptoms of MI (e.g. prolonged chest discomfort, dyspnoea, arm pain. And diaphoresis) • ECG evidence of MI • Diagnostic elevations of serum enzymes consistent with myocardial necrosis (CPK, CPK-MB, SGOT, and LDH) **Exclusion criteria** • Primarily cardiac complications and other co-morbid conditions preventing reemployment (e.g. cardiogenic shock, recurrent pulmonary edema, uncontrolled and life-threatening ventricular arrhythmias, unstable post-infarction angina, and serious habituation to alcohol or drugs) • Individuals who decided to file for disability or retirement pensions at the time of hospitalisations or who anticipated mandatory retirement due to the AMI **Baseline imbalances:** - **Physically demanding work (i.e. white- vs blue-collar):** white-collar (54% white-collar vs 46% blue-collar) **Severity of CHD**: less severe (participants with unstable postinfarction angina excluded)
Interventions	**Intervention** Conventional care plus the experimental cardiac RTW intervention beginning during the last week of the hospitalisation with the following goals. Quote:

Burgess 1987 *(Continued)*

- Quote: "(1) to limit patient psychological distress, using a cognitive-behavioural intervention model, (2) to minimize social network strain by providing guidance and moral support to patients and to a key member of each patient's primary social network, and (3) to facilitate job re-entry by clinicians meeting with participants and their co-workers or supervisors to address mutual concerns about the patient's planned return to work".
- Attending physicians' RTW-recommendations used as guidance
- Duration of intervention: approximately 3 months
- Providers: physician advisor (usually a cardiologist) and masters-prepared nurse clinicians from the CCU

Control group

- Usual care with conventional hospital rehabilitation

Outcomes	Proportion at work at > 12 months to < 5 years (long term): 13 months Impact of Events, Taylor Manifest anxiety, Zung Depression
Identification	**Sponsorship source**: a grant from The Robert Wood Johnson Foundation, Princeton, New Jersey, USA **Country:** USA **Setting**: multi-centred; 11 hospitals in eastern Massachusetts as well as outpatient (visits at home) and workplace **Possible conflicts of interest**: not reported **Ethics committee approval**: informed consent was obtained prior to the patient interview
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	The exact randomisation method is not clearly stated, however, the use of stratification and a central allocation centre do suggest that much consideration went into the planning of the randomisation. Quote: "Randomization was conducted by telephone from the study's central office, ... The randomisation stratified by sex for each hospital site to assure a proportionate mix of males and females in the usual care and rehab groups."
Allocation concealment (selection bias)	Low risk	Quote: "Randomization was conducted by telephone from the study's central office, where a research assistant opened a sealed envelope containing the subject's group assignment."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote: "A full patient medical and work history was obtained from hospital medical records and from patient interviews at baseline. Measures taken at baseline and at each of the two follow-up interviews provided information on variables looking at each patient's demographic, medical, psychological, social, and occupational status." - data gained from medical records and via interviews; no information about blinding
Incomplete outcome data (attrition bias)	Unclear risk	The attrition of study participants was similar in both treatment groups, and the number of study participants with complete data were the same for the

Burgess 1987 *(Continued)*

All outcomes		groups at the final follow-up. However, there appeared to be discrepancies in the reported numbers of study subject followed.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available.
Other bias	Unclear risk	None identified

Carson 1982

Methods	**Study design**: parallel RCT **Recruitment**: men with MI who were admitted to CCU **Allocation**: not reported **Blinding**: not reported **Randomisation**: not reported **Follow-up(s):** 3.5 years **Description**: supervised exercise programme (12 weeks, 2 x/week)
Participants	**Baseline characteristics** Intervention group • Mean age (SD): 50.3 (0.65) • Sex (male %): 100 • Number of participants randomised: 151 • Working before CHD: not reported Control group • Mean age (SD): 52.8 (0.67) • Sex (male %): 100 • Number of participants randomised: 152 • Working before CHD: not reported **Inclusion criteria** MI diagnosis based on ECG changes and/or elevation of SGOT or LD) taken on 3 consecutive days, and admitted to the CCU **Exclusion criteria** • > 70 years of age • Heart failure at follow-up clinic • Cardiothoracic ratio exceeding 59% • Severe chronic obstructive lung disease • Hypertension requiring treatment • Diabetes requiring insulin • Disabling angina during convalescence • Orthopaedic or medical disorders likely to impede progress in the gym • Personality disorders likely to render participant unsuitable for the course **Baseline imbalances:** -

Carson 1982 *(Continued)*

	Physically demanding work (i.e. white- vs blue-collar): unknown **Severity of CHD**: severe (prevalence of angina reported)
Interventions	**Intervention characteristics** Exercise • Circuit based training twice a week • Isometric exercise was avoided • Participants were advised to maintain their fitness by continuing with similar exercises or with other methods of their choice after course completion • Duration of intervention: 12 weeks • Providers: physician, physical educationalist Control group • no training provided
Outcomes	Not enough information provided to be included in the meta-analysis (number of study participants working before MI): Quote: "Eighty-one per cent of both exercise and control groups who were working before MI returned to work after MI. There was no significant difference between the two groups in the mean time of return to work following MI (exercise 13 weeks, control 12 weeks)." Adverse events (mortality)
Identification	**Sponsorship source:** DHHS (Department of Health and Social Security) **Country:** UK **Setting**: single-centre, outpatient (hospital gym) **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: “The 303 patients who accepted were then randomly allocated to an exercise group (151) and a control group (152).” No further information provided.
Allocation concealment (selection bias)	Unclear risk	No information provided
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	It is not clear how work status was assessed

Carson 1982 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	High risk	The study authors write, "eighty-one per cent of both exercise and control groups who were working before MI returned to work after MI", but do not state at what within what time-frame or at which rate they returned to work. Study follow-ups were done at 5 months, 1, 2 and 3 years after the MI, but the loss-to follow-up is unclear. It is also unclear how many study participants were working prior to the MI.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol available
Other bias	Unclear risk	None identified

Dugmore 1999

Methods	**Study design**: parallel RCT **Recruitment:** patients of consultant physicians with clinically documented MI; 1984-1988 **Allocation**: not reported **Blinding**: not reported **Randomisation**: not reported **Follow-up(s):** 3 weeks, 4 months, 8 months, 12 months, 5 years **Description:** aerobic and local muscular endurance training
Participants	**Baseline characteristics** Intervention group Treatment (good/poor prognosis) • Mean age (good/poor): 51.6/59.3 • Sex (male %): 98 • Number of participants randomised: 62 • Working before CHD: 62 Control (good / poor prognosis • Mean age (good/poor): 52.9/59.5 • Sex (male %): 98 • Number of participants randomised: 62 • Working before CHD: 62 **Inclusion criteria** clinically documented MI **Exclusion criteria** - **Baseline imbalances:** - **Physically demanding work (i.e. white vs. blue collar):** blue-collar **Severity of CHD**: severe (> 2 mm ST segment depression included and classified into poor prognosis group; RTW results combined the groups)
Interventions	**Intervention characteristics** Good prognosis group:

Dugmore 1999 *(Continued)*

	• the participants began aerobic and local muscular endurance training immediately
	
	Poor prognosis group:
	
	• the participants began aerobic and local muscular endurance training 8 weeks after their MI
	• Training: 3 x/week for 12 months:
	  ◦ warm-up and cool-down exercises, sit ups, wall bar/bench step ups, cycle ergometry,
	  ◦ major component centred on the training of aerobic capacity with walking and jogging
	  ◦ training was monitored, individually designed, and based on the results of the regular exercise tests and trial exercise prescriptions
	• Duration of intervention: 12 months
	• Providers: not reported
	
	Control group
	
	• The control population received no formal exercise training throughout the same 12-month period

Outcomes	Proportion at work at < 6 months (short term): 3 months Proportion at work at 6 months–12 months (medium term): 6 months Proportion at work at 5 years (extended long term): 5 years Results included in the meta-analyses were derived from percentages provided in the figures and text. Toronto attitude scale (TAS); Profile of Mood States (POMS); Quality of life (10-item) Adverse events (mortality, non-fatal reinfarctions)
Identification	**Sponsorship source:** grant from British Heart Foundation, Wessex Regional Health Authority **Country:** UK **Setting**: single-centre; outpatient **Possible conflicts of interest**: not reported **Ethics committee approval**: not reported
Notes	Groups were matched based on prognosis, severity of their infarcts (cardiac enzymes/ECG changes), age, sex, Peel index score

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Insufficient information provided. Quote: "Following an uncomplicated response to early exercise testing and subsequent random allocation to a treatment group, the 36 patients who formed the good prognosis group immediately begin anaerobic training three times a week for 12 months."
Allocation concealment (selection bias)	Unclear risk	No information provided
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.

Dugmore 1999 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Self-assessment of RTW at 5-year follow-up could have also introduced recall bias to the outcome assessment. Quote: "Vocational status/lifestyle change (five year follow-up)— Selected aspects reflecting changes in vocational status and lifestyle were measured five years after completing the initial 12 month study. The instrument used for this assessment was a self-administered questionnaire designed in accordance with the principles listed in the symposium on methodology for this investigative procedure."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Quote: "In all, 119 completed questionnaires were received from this research population (n = 124), representing a 95.6% compliance rate for this investigative procedure." The only attrition reported at the five-year follow-up was due to deaths in the study population and these were similar in both study arms (2 treatment, 3 controls).
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Engblom 1997

Methods	**Study design**: parallel RCT **Recruitment:** men scheduled for elective CABS February 1986-December 1987 were recruited consecutively **Allocation**: not reported **Blinding**: none reported **Randomisation**: none reported **Follow-up(s):** 6 months, 1 year **Description**: combined rehabilitation programme for CABS patients
Participants	**Baseline characteristics** Intervention group • Mean age (SD): 52 (6) • Sex (male %): 100 • Number of participants: 66 • Working before CHD: 17 Control group • Mean age (SD): 51 (6) • Sex (male %): 100 • Number of participants: 58 • Working before CHD: 12 **Inclusion criteria** • Male (RTW is only examined in the subgroup of working men) • Elective CABS patients

Engblom 1997 *(Continued)*

	Exclusion criteria • > 64 years of age • Non-cardiac diseases prohibitive of participation in the rehabilitation programme • Permanently retired patients **Baseline imbalances:** - **Physically demanding work (i.e. white vs. blue collar):** white-collar (42% manual workers) **Severity of CHD**: severe (LVEF: intervention group: 70%; control group: 71%)
Interventions	**Intervention characteristics** • 4-phase programme: a. 2-day course (2-3 weeks prior to surgery): information about CABS, recovery, and the rehabilitation programme; group session with a psychologist b. 3-week course (6-8 weeks post-CABS): standard cardiac rehabilitation programme modified for CABS participants, including lectures and demonstrations on diet and treatment of CAD, exercise and relaxation training, group discussions with a physician and a psychologist c. 2-day refresher course (8 months post post-CABS) d. 1-day refresher course (30 months post-CABS) • Duration of intervention: approximately 2.5 years • Providers: a group session with a psychologist Control group • Usual care
Outcomes	Proportion at work at 6 months–12 months (medium term): 12 months Proportion at work at > 12 months to < 5 years (long term): 3 years Proportion at work at 5 years (extended long term): 5 years Nottingham Health Profile (NHP) Adverse events (death due to cardiac arrest, reinfarction)
Identification	**Sponsorship source**: none reported. **Country:** Finland **Setting**: single centre; outpatient **Possible conflicts of interest**: none reported **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Insufficient information provided to determine risk of bias. The method for generating the random sequence was not described.
Allocation concealment (selection bias)	Unclear risk	No allocation concealment procedure was described. Risk of bias cannot be determined

Engblom 1997 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	None described, but the outcome time until returning to work is not likely to be falsely assessed and cross-checked with the social registries. Quote: “The employment status of each patient was asked by the physician and later checked from the registries of the Social Insurance Institution of Finland.” (Engblom 1997)
Incomplete outcome data (attrition bias) All outcomes	Low risk	One person in the control "usual care" (H) group died 7 months post-CABS. In the 5-year follow-up, deaths and loss to follow-up were reported for the entire study population (not just men working at baseline). There appeared to be no notable differences between treatment groups. Quote: “Twelve patients in group R and 13 patients in group H (no significant difference between groups [NS]) died either peri- or postoperatively. Two patients in group R and three patients in group H were lost during the follow-up.”
Selective reporting (reporting bias)	Unclear risk	A study protocol was not available to permit assessment of reporting bias. However, a number of non-statistically significant results were reported, indicating a reporting bias might not have been a serious problem.
Other bias	Unclear risk	None identified

Erdman 1986

Methods	**Study design**: parallel RCT **Recruitment**: cardiac patients in greater Rotterdam were referred by their treating cardiologist; September 1976-March 1978 **Allocation**: not reported **Blinding**: not reported **Randomisation**: random number tables **Follow-up(s):** 6 months, 5 years **Description**: a combined and interactive rehabilitation programme with sport games for men < 65 years of age
Participants	**Baseline characteristics** Intervention group • Mean age (range): - • Sex (male %): 100 • Number of participants randomised: 40 • Working before CHD: 40 Control group • Mean age (SD): - • Sex (male %): 100 • Number of participants randomised: 40

Erdman 1986 *(Continued)*

	• Working before CHD: 40 Total • Mean age (range): 51 (35-60) **Inclusion criteria** • Male • Married • Recent MI (had occurred < 6 months before the 1st psychologic follow-up) • First MI • 3 psychologic criteria: ≥ 1 symptoms of anxiety reaction, e.g. sudden phobic reaction, depression, fear of death, etc.; diminished self-esteem; positive motivation to participate **Exclusion criteria** • > 65 years of age • Not mentally and physically fit to take part in the rehabilitation programme • Health conditions: severe cardiomyopathy, severe valvular disorders, inadequate performance on exercise, and unstable angina pectoris **Baseline imbalances:** - **Physically demanding work (i.e. white vs. blue collar)**: unknown (73% skilled labourers and low-level employees) **Severity of CHD**: less severe (patients with unstable angina excluded)
Interventions	**Intervention characteristics** Outpatient interactional rehabilitation programme • ○ 2 training sessions for 2 h/week ○ Consisted of warm-up (15 min), jogging (15 min), gymnastics (15 min), volleyball, soccer or hockey (30 min), and relaxation (15 min) ○ Parallel to the exercise programme, participants regularly received counselling on risk factors in both small and large groups • Duration of intervention: 6 months • Providers: a multidisciplinary team: cardiologist, psychologist, two physical therapists, social worker, nurse **Control group** Standard cardiologic care, and referring physician suggested a home rehabilitation programme, i.e. brochure with guidelines and advice for physical fitness training and jogging
Outcomes	Proportion at work at 6 months–12 months (medium term): 6 months Proportion at work at 5 years (extended long term): 5 years Well-being questionnaire Adverse events (reinfarction deaths, non-fatal reinfarctions)
Identification	**Sponsorship source:** The Dutch Heart Foundation grant #75.066 and the Rotterdam Foundation for Cardiac Rehabilitation **Country:** Netherlands **Setting**: single centre: a conventional gymnasium; outpatient **Possible conflicts of interest**: no information provided

Erdman 1986 *(Continued)*

	Ethics committee approval: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Immediately after fulfilment of the selection criteria for this study, the 80 patients were randomly allocated (by means of a table for random numbers) either to participation in the Rehab programme or to the home rehabilitation (Home) with the encouragement of their referring physicians."
Allocation concealment (selection bias)	Unclear risk	No information reported
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding was conducted and work resumption was self-reported. The study authors do not report any verification of working status using employment registry data.
Incomplete outcome data (attrition bias) All outcomes	High risk	Although the study authors report similar attrition in both study arms (about 20%), the reasons for the loss to follow-up seem to differ. Reasons given for loss to follow-up in the treatment group were primarily cardiovascular in nature, while the reasons in the control group were not (lack of motivation to participate in the follow-up evaluations).
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Fielding 1980

Methods	**Study design**: parallel RCT **Recruitment**: participants were recruited at discharge from the CCU **Allocation**: not reported **Blinding**: not blinded **Randomisation**: not reported **Follow-up(s):** 6 months **Description**: weekly group meetings with a psychologist with relaxation training
Participants	**Baseline characteristics** Intervention group "Heart Club" • Number of participants randomised: 5 • Working before CHD: 5

Fielding 1980 *(Continued)*

- Age: < 60 years
- Sex (male %): 100

Control group

- Number of participants randomised: 5
- Working before CHD: 5
- Age: < 60 years
- Sex (male %): 100

Inclusion criteria

- MI patients (according to ECG and enzyme criteria (not further specified))
- Male
- < 60 years of age

Exclusion criteria

- Previous history of heart disease or any other major physical illness
- Psychiatric complaint in the 2 years prior to present hospitalisation

Baseline imbalances: -

Physically demanding work (i.e. white vs. blue collar): unknown

Severity of CHD: unknown

Interventions	**Intervention**
	"Heart Club"
	• Person-directed psychological intervention comprising:
	  ○ weekly meetings for 10 weeks
	  ■ 1st h: anxieties or problems related to MI discussed
	  ■ 30 min of relaxation training (home practice was encouraged)
	• Duration of intervention: 10 weeks
	• Providers: psychologist, a physician attended the group on one session to answer questions of a medical nature and to discuss the mechanisms of MI
	Control group
	• These participants were placed on a waiting list and received no meetings

Outcomes	Proportion at work at 6 months–12 months (medium term): 6 months Mean length of illness (sick leave) in days Anxiety with the Catell Self-Analysis Form; 9-point rating scale Adverse events (reinfarctions)
Identification	**Sponsorship source**: no information **Country:** UK **Setting**: single setting, outpatient **Possible conflicts of interest**: none reported **Ethics committee approval:**

Fielding 1980 *(Continued)*

Notes	Personal communication: information regarding occupational status of the study participants provided by the study author

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	A randomisation method was not described. Quote: "Ten patients were assessed and randomly allocated to experimental or control groups."
Allocation concealment (selection bias)	Unclear risk	None described
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible. Control participants were placed on a 'waiting list', which might have influenced their decisions of when to return to work
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There is no mention of blinding and information regarding the assessment of working status and illness duration is insufficient to determine if these were prone to detection bias.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No dropouts reported; no percentage of 'number working' reported, unclear how many participants remained in each group
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Figueiras 2017

Methods	**Study design**: parallel RCT **Recruitment**: recruitment at three CCUs **Allocation**: not reported **Blinding**: care-givers were blinded **Randomisation:** computer block randomisation **Follow-up(s):** 4, 8, and 12 months **Description**: an inpatient individual psychological counselling with telephone follow-ups
Participants	**Baseline characteristics** Intervention group • Number of participants randomised: 60 • Working before CHD: 37 • Age (SD): 56.6 (8.2) years • Sex (male %): 92

Figueiras 2017 *(Continued)*

	Control group • Number of participants randomised: 67 • Working before CHD: 37 • Age(SD): 56.8 (8.0) years • Sex (male %): 79 **Inclusion criteria** • Admitted for AMI • First uncomplicated MI • Able to read and write Portuguese **Exclusion criteria** • Severe comorbid psychiatric or medical condition **Baseline imbalances:** - **Physically demanding work (i.e. white vs. blue collar)**: unknown **Severity of CHD**: unknown
Interventions	**Intervention** In-hospital individual participant session (about 45 min) with health psychologist including: • explanation of intervention • discussion/dispelling of participant's cardiac misconceptions • identification of participant's main cardiac risk factors, and • discussion of adequate risk reduction strategies Participants were mailed a manual with illness and recovery information Weekly phone calls were made in the first 4 weeks after discharge to discuss strategies to change behavior and recovery goals • Duration of intervention: 4 weeks post-discharge • Providers: health psychologist Control group • Standard hospital care: no structured cardiac rehabilitation was made available and counselling given individually by medical and nursing staff.
Outcomes	Proportion at work at < 6 months (short term): 4 months* Proportion at work at 6-12 months (medium term): 8 months* *Provided by personal communication Hospital Anxiety & Depression Scale
Identification	**Sponsorship source:** FEDER through COMPETE and FCT – Fundação para a Ciência e a Tecnologia – reference PTDC/PSI-PCL/112503/2009 **Country:** Portugal **Setting**: single setting, inpatient/outpatient (phone calls) **Possible conflicts of interest**: none reported

Figueiras 2017 *(Continued)*

	Ethics committee approval: "The study was approved by the Ethics Commissions of all hospitals involved and by the Portuguese Data Protection Authority (CNPD) and registered with the number n °17,523/2011 – 'Programa Coração Saudável'"
Notes	RTW results were obtained through personal communication. It is unclear how many people actually responded to the follow-ups.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "The randomisation sequence was generated using a computer block randomisation to allocate the patients either to the control or the Intervention group after the baseline assessment."
Allocation concealment (selection bias)	Unclear risk	Allocation and randomisation were conducted after the baseline assessment. No information regarding allocation concealment was provided.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "Caregivers were blinded to the group assignment."
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	None reported
Incomplete outcome data (attrition bias) All outcomes	Low risk	Participants not replying at all time-points (loss-to-follow-up) were similar in both groups. However, it is unclear how many actually responded regarding the RTW results.
Selective reporting (reporting bias)	Unclear risk	No mention of an a priori published study protocol. Non-significant results for RTW not provided in the published articles
Other bias	Unclear risk	None identified

Froelicher 1994

Methods	**Study design:** 3-armed RCT **Recruitment**: patients admitted to CCUs of 7 hospitals, September 1977-December1979 **Allocation**: not reported **Blinding**: not reported **Randomisation**: not reported **Follow-up(s):** 6 months **Description**: a 3-arm RCT with exercise or exercise with education counselling, relaxation therapy, and family support provided
Participants	**Baseline characteristics** Intervention group 1 – exercise • Mean age (SD): 55.6 (9.3)

Froelicher 1994 *(Continued)*

- Sex (male %): 88
- Number of participants randomised: 88
- Working before CHD: 69

Intervention group 2 – exercise and teaching counselling

- Mean age (SD): 56.3 (8.3)
- Sex (male %): 84
- Number of participants randomised: 86
- Working before CHD: 58

Control group

- Mean age (SD): 57.1 (7.3)
- Sex (male %): 88
- Number of participants randomised: 84
- Working before CHD: 59

Inclusion criteria

- A primary diagnosis of confirmed AMI
- Free of complications for ≥ 24 h within 7 d of hospital admission
- Able to walk without aid
- Able to speak and read English
- Free from serious non-cardiac complications before the admission
- Resided within a 50 mile radius from the University of Washington

Exclusion criteria

- > 71 years of age
- Prolonged complications
- Physical limitations
- Non-cardiac diseases
- Other cardiac diseases

Baseline imbalances: -

Description and recruitment methods: all consecutively admitted patients ≤ 70 years of age diagnosed AMI admitted to CCUs of 7 participating Seattle hospitals during 1977 through 1979 were screened for inclusion in the study.

Physically demanding work (i.e. white vs. blue collar): unknown

Severity of CHD: severe (patients with angina included)

Interventions

Intervention characteristics

Intervention 1 – exercise

- Participants participated in an inpatient exercise programme
- Exercise prescribed based on treadmill-tests given before discharge
- After discharge, participants had weekly 30 min outpatient appointments with a research nurse to review the prior week's activities and responses to daily activities carried out at home
- Duration of intervention: 3 months
- Providers: intervention 1 – B 1 The research staff (research nurse/ occupational therapist) were instructed to offer advice, but not formal teaching.

Intervention 2 – exercise and counselling

- In addition to exercise (described above):

Froelicher 1994 *(Continued)*

	○ A series of 12 times 1-h group education-counselling sessions ○ Relaxation therapy for 20-40 min of content with liberal time for Q&A, discussion, and problem solving ○ Spouses and friends were encouraged to attend the sessions to assist with the problem solving and provide family support • Duration of intervention: 3 months • Providers: intervention 2 – B research staff (research nurse/occupational therapist), educational classes by two research staff cardiovascular clinical nurse specialists and a physical therapist specially trained in methods of relaxation therapy Control group • Usual care
Outcomes	Proportion at work at < 6 months (short term): 5.5 months (24 weeks) Sickness impact profile Adverse events (mortality, cardiac surgery)
Identification	**Sponsorship source:** study was supported by Research Grant 5 ROI NU 00589-04 from the Bureau of Health Professions, Division of Nursing, Department of Health and Human sciences **Country:** USA **Setting**: multicentre: seven North-Western hospitals; in- and outpatient **Possible conflicts of interest**: not reported **Ethics committee approval**: the participants gave an informed consent to participate in the study. "Human subjects review committee requirements for human informed consent were observed."
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	The randomisation method is not clearly stated. Quote: "Randomization was designed to provide patients in each hospital with an equal chance to be assigned to one of three groups..."
Allocation concealment (selection bias)	Unclear risk	No allocation method is reported.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants and personnel was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Although no blinding of outcome assessors is reported, a validated standardised questionnaire (Activity Summary Questionnaire) was used at regular intervals to determine if participants had returned to work.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Attrition due to withdrawal and the medical reasons for withdrawal reported (i.e. surgery, death) were similar across all three groups. However, "of the remaining 207 patients eligible for follow -up, 177 (86%) had completed questions pertaining to return to work, defined as return to the same job as before AMI."

Froelicher 1994 *(Continued)*

		14% of the participants eligible for follow-up had not completed questions pertaining to RTW
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available.
Other bias	Unclear risk	None identified

Geissler 1979

Methods	**Study design**: parallel RCT **Recruitment:** MI patients surviving the first phase of rehabilitation (in-hospital treatment) in one East German district; June 1973-June 1975 **Allocation**: not reported **Blinding**: not reported **Randomisation**: cluster-randomisation according to hospital region **Follow-up(s):** 6 months, 12 months, 2 years **Description:** combined rehabilitation with an inpatient and outpatient phase
Participants	**Baseline characteristics** Intervention group • Mean age (SD): - • Sex (male %): 100 • Number of participants: 161 • Working before CHD: 146 Control group • Mean age (SD): not reported • Sex (male %): 100 • Number of participants: 166 • Working before CHD: 148 **Inclusion criteria** < 70 years of age at the time of the MI **Exclusion criteria** - **Baseline imbalances:** - **Physically demanding work (i.e. white vs. blue collar)**: unknown **Severity of CHD**: unknown

Interventions	**Intervention characteristics**
	
	Inpatient (Phase II) and outpatient (Phase III) rehabilitation:
	
	• Phase II: inpatient rehabilitation centre
	  ◦ Daily endurance training: 30 min on bicycle ergometer, terrain training, gymnastic exercises
	  ◦ Up to 80%-90% the maximal symptom-limited workload limit (monitored with pulse frequency)
	  ◦ RTW possibilities discussed upon completion
	• Phase III: outpatient rehabilitation:

Geissler 1979 *(Continued)*

	○ 50 min of supervised training 2 x/week in gym or indoor swimming pool ○ 30 min daily unsupervised training with home programme • Duration of intervention: ○ Phase II 3 months ○ Phase III 6 months (not clearly described) • Providers: phase III training supervised by physical education specialist Control group • Usual care through general practitioner upon hospital discharge (i.e. after phase I)
Outcomes	Proportion at work at 6 months–12 months (medium term): 12 months Proportion at work at > 12 months to < 5 years (long term): 2 years Adverse events (cardiac deaths, reinfarctions)
Identification	**Sponsorship source**: no information provided **Country:** Former East Germany (GDR) **Setting**: inpatient and outpatient **Possible conflicts of interest**: not reported **Ethics committee approval**: not reported
Notes	The number of people working before MI is not explicitly reported, but RTW is reported for all men aged < 65 years. Due to the sociopolitical policies in place at the time of this study, presumed that all of the participants presented in the RTW table were working prior to their heart attack.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	The study authors write that "regional cluster randomisation" was used. No further description of the randomisation method was reported.
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment was reported.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No outcome assessor blinding was reported, nor is it reported how RTW was assessed.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Only 2 participants from the control group refused the 2-year follow-up and the participants' 2-year survival was similar in both groups.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol available
Other bias	Unclear risk	Additional sources of bias from cluster-RCT:

Geissler 1979 *(Continued)*

- Recruitment bias: low risk - no recruiting after “regional” randomisation reported
- Baseline imbalance: high risk - no baseline population characteristic within clusters reported
- Loss of clusters: low risk - no cluster loss reported; individual losses equal (13%:15%) and reasons described
- Incorrect analysis: unclear risk - no standard errors, P values or meta-analysis calculated; unable to combine with other studies due to lack of cluster information
- Comparability with individually randomised trials: unclear risk - results similar to those of individually randomised studies; however, 'herd effect' is possible if people in a region are all invited to take part in rehabilitation and RTW.

Haerem 2000

Methods	**Study design**: parallel RCT **Recruitment:** - **Allocation**: not reported **Blinding**: not reported **Randomisation**: not reported ("carried out in blocks of 4 patients") **Follow-up(s):** 1, 8, and 52 weeks **Description**: tape-recorded discharge counselling provided for 4 weeks of listening
Participants	**Baseline characteristics** Intervention group "tape" • Number of participants randomised: 26 • Working before CHD (number self-calculated): 14 • Median age (male, female): 53 , 59 • Sex (male %): 69 Control group • Number of participants randomised: 24 • Working before CHD (number self-calculated): 16 • Median age (male, female): 53, 53 • Sex (male %): 83 **Inclusion criteria** • < 76 years of age • First-time MI • Mentally fit • Self-supporting • Without any other life-threatening disease and with a supposed life expectancy of > 1 year • Be able to use a tape player **Exclusion criteria** - **Baseline imbalances:** -

Haerem 2000 *(Continued)*

	Physically demanding work (i.e. white vs. blue collar): blue-collar (13 light work vs 17 physical work) **Severity of CHD**: unknown
Interventions	**Intervention** "Audiotape" Intervention participants received a structured recorded conversation regarding MI, risk factors, medication, treatment options, etc. with a doctor on audiotape and a tape player (returned at the 1-week follow-up) • Duration of intervention: 1 week • Providers: physician, self-administered (tape-listening) Control group • No audiotape nor tape recorders were given to the control group
Outcomes	Proportion at work at 6–12 months (medium term): 6 and 12 months Adverse events (hospital readmissions)
Identification	**Sponsorship source**: a grant from the Norwegian Medical Association **Country:** Norway **Setting**: single centre: Hedmark Central Hospital; inpatient and self-administered (tape-listening). **Possible conflicts of interest**: not reported **Ethics committee approval**: an informed consent was obtained from each participant
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Other than that the randomisation was done in blocks of 4 participants, no method of randomisation is described.
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment is described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	No blinding of outcome assessors is mentioned. However, information regarding lifestyle was collected using a questionnaire comprising 8 questions. Additionally, information regarding sick leave was obtained from, "the patients, their private doctors, the local health insurance offices, and hospital records". This suggests that information on employment was validated with data from unbiased sources.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	The group allocation of people not assessed at the follow-up is not described.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available

Haerem 2000 *(Continued)*

Other bias	Unclear risk	None identified

Hall 2002

Methods	**Study design**: parallel RCT **Recruitment**: low-risk AMI patients admitted to Westmead and Blacktown Hospitals; April 1994-December 1996 **Allocation**: not reported **Blinding**: not reported **Randomisation**: not reported **Follow-up**(s): 1 year **Description**: combined outpatient rehabilitation programme

Participants	**Baseline characteristics**
	
	Intervention group
	
	• Mean age: 56
	• Sex (male %): 59
	• Number of participants : 65
	• Working before CHD: 36
	
	Control group
	
	• Mean age: 56
	• Sex (male %): 56
	• Number of participants: 62
	• Working before CHD: 40
	
	Inclusion criteria
	
	• < 76 years of age at the time of the MI
	• Low-risk patients:
	  ◦ Negative exercise stress test (< 2 mm ST segment change) with ≥ 7 metabolic equivalents achieved at the initial exercise test or, in manual workers, a workload commensurate with levels achieved at work prior to AMI
	  ◦ LVEF ≥ 40%
	  ◦ No inducible ventricular tachycardia in patients with LVEF < 40%
	  ◦ No unstable angina post infarction
	  ◦ No severe cardiac failure
	
	Exclusion criteria: high-risk patients
	
	Baseline imbalances: -
	
	Physically demanding work (i.e. white vs. blue collar): unknown
	
	Severity of CHD: less severe (excl. unstable angina post infarction, cardiac failure, LVEF > 40%, negative exercise stress test (> 2mm ST depression))

Interventions	**Intervention characteristics** Rehabilitation group (REHAB)

Hall 2002 *(Continued)*

	• 4 days a week for 6 weeks outpatient rehabilitation programme including:
	  ○ low-level training programme
	  ○ counselling on group behavioural and risk factor management (given education about risk factors for heart disease, counselling and a home walking programme)
	• Duration of intervention: 6 weeks
	• Providers: -
	
	Control group
	
	• ERNA: return to normal activities 2 weeks after infarction without rehabilitation
	• Given education about risk factors for heart disease, counselling and a home walking programme

Outcomes	Graphics of cumulative proportions of people returning to any paid work presented. Participants in the control group returned to work sooner (survival analysis: Wilcoxon test P = 0.007; log-rank test P = 0.038), but the cumulative percentages were approximately the same by 12 months. Cardiovascular extension of the Health Measurement Questionnaire
Identification	**Sponsorship source:** Australian National Health and Medical Research Council **Country:** Australia **Setting:** outpatient **Possible conflicts of interest**: none reported **Ethics committee approval**: approved by the Western Sydney Area Ethics Committee. Consent obtained from participants and physicians
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No method of randomisation was reported
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment was reported
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No outcome assessor blinding was reported, RTW was assessed with questionnaires asking how many hours of paid work the participants worked in the previous week.
Incomplete outcome data (attrition bias) All outcomes	Low risk	By the 12-month follow-up, loss to follow-up was similar in both groups.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available.
Other bias	Unclear risk	None identified

Hanssen 2009

Methods	**Study design**: parallel RCT **Recruitment:** starting 2001, patients hospitalised (≥ 2 days) for AMI **Allocation**: not reported **Blinding**: not reported **Randomisation:** "Simple randomisation procedure" **Follow-up(s):** 12 and 18 months **Description:** telephone follow-up
Participants	**Baseline characteristics** Intervention group • Number of participants randomised: 156 • Working before CHD: 76 • Mean age (SD): 59.5 (12.9) • Sex (male %): 85 Control group • Number of participants randomised: 132 • Working before CHD: 70 • Mean age (SD): 60.9 (10.8) • Sex (male %): 77 **Inclusion criteria** • A diagnosis of AMI confirmed through medical records • Patients > 80 years were additionally included after the first year of the study **Exclusion criteria** • Coexisting severe chronic disabling diseases • Residence in a nursing home • Unable to receive telephone calls or fill in questionnaires • Living in an area where the local hospital provided any nurse-initiated post-discharge follow-up services • Had or was expected to have CABG surgery during their hospital stay **Baseline imbalances:** - **Physically demanding work (i.e. white vs. blue collar)**: unknown **Severity of CHD**: unknown

Interventions	**Intervention**
	
	• A structured telephone follow-up after discharge:
	  ◦ weekly nurse-initiated telephone calls - the first 4 weeks
	  ◦ subsequent calls scheduled - 6, 8, 12 and 24 weeks after discharge
	  ◦ follow-up addressed individual needs and supported participants' own coping efforts with respect to lifestyle changes and risk factor reduction
	• Duration of intervention: 24 weeks
	• Providers: nurses

Hanssen 2009 *(Continued)*

	Control group
	• Current clinical practice:
	  ○ 1 visit to a physician at the outpatient clinic 6-8 weeks after discharge
	  ○ subsequent visits to the participant's GP
	  ○ rehabilitation programmes or supervised exercise were only offered to a very small proportion of AMI participants in this region

Outcomes	Proportion at work at > 12 months to < 5 years (long term): 18 months SF-36 Adverse events (mortality)
Identification	**Sponsorship source**: the study was supported by grants from the Haukeland University Hospital, the Norwegian Nurse Association, the Meltzer Foundation for grants and the Norwegian Lung and Heart Foundation **Country:** Norway **Setting**: single-centre: Haukeland University Hospital; outpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: this study was approved by The Regional Committee for Medical Research Ethics and the Privacy Issues Unit at Norwegian Social Science Data Services
Notes	RTW results for the subgroup study participants working prior to the intervention were provided through personal communications.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "simple randomisation procedure." The sequence generation method used was described only as a "simple randomisation procedure". This unfortunately, does not provide an insight regarding the susceptibility of the method to bias.
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment is described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Quote: "Once group allocation was disclosed each subject was informed orally and in writing what his or her participation in the study involved." Blinding not possible due to study design. No blinding of participants and personnel is described, however the fact that the participants were first made aware of the what their "participation in the study involved" for their allocated group, and since the intervention comprised mainly of a weekly telephone calls from a nurse, participants might not have been aware of being in a treatment or control group.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote: "Endpoints were assessed by self-report using mailed questionnaires and from the medical records 12 and 18 months after discharge." Assessment via questionnaires
Incomplete outcome data (attrition bias) All outcomes	High risk	Quote: "From randomisation to the fifth measurement point after 18 months, the loss to follow-up was 26% in the control group and 35% in the Intervention group."

Hanssen 2009 *(Continued)*

		The proportion of study participants not followed until 18 months is moderately high and unevenly distributed between the intervention and control groups. The researchers also report that the participants lost to follow-up had "significantly longer hospital stays, poorer HRQoL scores at baseline, a larger proportion of non-smokers and smokers and a smaller proportion of ex-smokers".
Selective reporting (reporting bias)	Unclear risk	No study protocol was available. However, none of the results/analyses described a statistically significant difference, suggesting a lack of selective outcome reporting.
Other bias	Unclear risk	None identified

Higgins 2001

Methods	**Study design**: parallel RCT **Recruitment**: consecutive PCI patients; June 1995-January 1997 **Allocation**: not reported **Blinding**: not reported **Randomisation**: no method described **Follow-up(s):** 10 weeks (range: 8-26 weeks); 51 weeks (range: 36-56 weeks) **Description**: combined rehabilitation programme
Participants	**Baseline characteristics** Intervention group • Mean age (range): 48 (31-63) • Sex (male %): 83 • Number of participants randomised: 54 • Working before CHD: 34 Control group • Mean age (range): 47 (26-63) • Sex (male %): 96 • Number of participants randomised: 51 • Working before CHD: 23 **Inclusion criteria** • Employed within the previous year • No MI within 1 month before the PCI procedure **Exclusion criteria** • Malignancy • History of cerebrovascular accident • "Severe, chronic debilitating disease" • Previous CABG • Peri-PCI complications: MI, emergency CABG, persistent unstable angina during admission • "Participants who required surgical management at some time during the one-year duration of study"

Higgins 2001 *(Continued)*

Baseline imbalances:

- Sedentary lifestyle: intervention group: 35 (65%); control group: 27 (53%)
- BMI > 35: intervention group: 43 (80%); control group: 32 (63%)
- Sex - male: intervention group: 45 (83%); control group: 49 (96%)

Physically demanding work: white-collar

Severity of CHD: unknown

Interventions	**Intervention characteristics**
	• Combined cardiac rehabilitation based on social cognitive theory
	  ○ 2 personal bedside education sessions with cardiac nurse
	  i. pre-PCI (45 min): information regarding the procedure and
	  ii. post-PCI (60 min): pathology and risk factors for CHD, wound and medication management
	  ○ Individualised goals and plans based on personal risk-factor profile and educational material based on preferred learning style (assessed with Hill's Cognitive Style Inventory)
	  ○ Individualised exercise plan ("moderate-intensity walking programme with a graded increase in the frequency and duration of exercise")
	  ○ 3 clinician home visits within 2 months post-PCI:
	  ■ knowledge about CHD reinforced
	  ■ participants' spouses included
	  ■ encouraged exercise and diet monitoring
	  ■ consultation regarding risk-factor modification strategies; how to monitor rate of perceived exertion (RPE); walked with participants during each home visit; clinician made monthly telephone calls (discussed problems such as lacking the confidence to return to work)
	• Duration of intervention: not reported
	• Providers: cardiac nurse, clinician, occupational therapist, doctoral student
	Control group
	• Usual care:
	  • 2 personal bedside education sessions with cardiac nurse: 45 min pre-PCI (information regarding the procedure) and 60 min post-PCI (pathology and risk factors for CHD, wound and medication management)
	  • 3-monthly post-discharge CHD clinician telephone call

Outcomes	Proportion at work at < 6 months (short term): 2 months Proportion at work at 6 months–12 months (medium term): 12 months Psychological adjustment to illness scale: self-report (PAIS-SR)
Identification	**Sponsorship source:** Prince Charles Hospital Private Practice Fund **Country:** Australia **Setting:** home-based intervention **Possible conflicts of interest**: no information provided **Ethics committee approval**: informed written consent was obtained
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Higgins 2001 *(Continued)*

Random sequence generation (selection bias)	Unclear risk	Participants “were randomly assigned to either control (standard care and telephone follow-up) or intervention (individualized, comprehensive, home-based, cardiac rehabilitation) groups.” No further information was provided.
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment was reported
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding reported in data collection Quote: "Occupational information was obtained from the hospital medical records and from interviews with participants at T1, T2 , and T3. Information obtained at T2 and T3 was collected using telephone interviews and mailed questionnaires."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Although 15 participants were excluded after recruitment due to complications or due to the need for additional surgical procedures, it is unclear how these cases were distributed among the treatment groups. Presumably, the randomisation resulted in evenly distributed groups of 60 participants each, so the attrition of participants would have been comparable in both treatment arms (9 control and 6 intervention participants).
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol available
Other bias	Unclear risk	None identified

Hofman-Bang 1999

Methods	**Study design**: parallel RCT **Recruitment**: participants recruited among those referred to the outpatient clinic of the Department of Cardiology, Karolinska Hospital for PCI **Allocation**: not reported **Blinding**: not reported **Randomisation**: no method described **Follow-up(s):** 12 months, 2 years **Description**: combined inpatient rehabilitation with 11-month maintenance programme
Participants	**Baseline characteristics** Intervention group • Mean age (SD): 53 (7) • Sex (male %): 80 • Number of participants randomised: 46 • Working before CHD: 46

Hofman-Bang 1999 *(Continued)*

Control group

- Mean age (SD): 53 (7)
- Sex (male %): 88
- Number of participants randomised: 41
- Working before CHD: 41

Inclusion criteria

- ≥ 1 significant coronary stenosis suitable for PTCA and ≥1 additional clinically insignificant coronary atherosclerotic lesion that could be evaluated by quantitative computerised angiography
- < 65 years of age
- Employed
- Able to perform a bicycle ergometer test with a minimum capacity of 70 W following the PTCA

Exclusion criteria

- Other diseases of importance for completion of the programme
- Unsuccessful PTCA

Baseline imbalances: beta-blockers (P < 0.05): intervention group: 70; control group: 90

Recruitment Methods:

Physically demanding work: unknown

Severity of CHD: severe (included patients with angina, congestive heart failure)

Interventions	**Intervention characteristics**
	• Inpatient phase:
	  ○ Health education and activities to promote behavioural changes
	  ○ Teaching sessions (main emphasis: training of practical skills and habit rehearsal; lifestyle areas of particular emphasis were stress management, diet, exercise and smoking habits)
	  ○ Groups of 5-8 people; education, discussions and skills training were mainly performed within these groups
	  ○ Physical exercise
	  ○ Food preparation (participants were served and trained to prepare a standard, low fat diet according to Swedish official guidelines)
	  ○ Training in applied relaxation
	  ○ Daily individual task including self-observation
	• Outpatient phase:
	  ○ 11-month maintenance programme
	  ○ Regular follow-up contacts between the patient and a nurse based on the agreed individual goal
	  ○ Continued self-observation and recording of important aspects on everyday life in a diary, monitoring of behavioural changes, and, when needed, problem-solving and pre-planning discussions
	  ○ At discharge from the rehabilitation centre a referral note was sent to the family physician with information on achieved lifestyle changes
	• Duration of intervention: 12 months
	• Providers: a specially trained nurse
	
	Control group
	
	Usual care after a PTCA procedure (one outpatient visit at the clinic), followed by family physician care for further secondary preventive efforts

Outcomes	Proportion at work at 6 months–12 months (medium term): 12 months Proportion at work at > 12 months to < 5 years (long term): 2 years

Hofman-Bang 1999 *(Continued)*

	APQLQ; Beck Depression Inventory; Trait anxiety Adverse events (mortality, hospital readmissions)
Identification	**Sponsorship source**: supported by AMF insurance company, SPP insurance company and the Swedish Heart and Lung Foundation **Country:** Sweden **Setting:** single-centre: rehabilitation centre HälsoInvest Föllinge; in- and outpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: the study protocol was approved by the ethical review board of the Karolinska Hospital, Stockholm
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	The method of sequence generation is not described.
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment is described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of this study (intervention was a 4-week residential rehabilitation), blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Blinding of outcome assessors is not mentioned, but RTW and sick leave information from the self-administered questionnaires was confirmed with official registry data.
Incomplete outcome data (attrition bias) All outcomes	High risk	The number of study participants followed was relatively evenly distributed between groups. However, roughly half of the participants were not included in the reported proportions of participants returning to work by 12 and 18 months (all of the included study participants were employed at baseline).
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Holmbäck 1994

Methods	**Study design**: parallel RCT **Recruitment:** MI patients attending a post-MI clinic during 2-year period **Allocation**: sealed envelopes **Blinding**: not reported **Randomisation**: no method described

Holmbäck 1994 *(Continued)*

Follow-up(s): 4 within 12 months

Description: supervised exercise programme

Participants	**Baseline characteristics** Exercise/training group • Median age (range): 55 (38-65) • Sex (male %): 97 • Number of participants randomised: 34 • Working before CHD: 34 Non-exercise/control group • Median age (range): 55 (43-63) • Sex (male %): 97 • Number of participants randomised: 35 • Working before CHD: 32 **Inclusion criteria** • MI patients • < 65 years of age **Exclusion criteria** • Unwilling to participate • Had great language difficulties • Moved out of the area • Incapable of performing strenuous training due to poor left ventricular function or arrhythmias, orthopaedic disorders, other incapacitating somatic diseases or mental disorders **Baseline imbalances:** • AMI situation anterior infarction: intervention group: 10; control group: 16 • Heart size > 600 mL/qm: intervention group: 6; control group: 9 • Median peak values of S-ASAT: intervention group: 2.3 µkat/L; control group: 4.1 µkat/L • Exercise testing: intervention group: 162W (SD 33); control group: 145W (SD 28) **Physically demanding work**: white collar **Severity of CHD**: less severe
Interventions	**Intervention characteristics** Exercise/training group • began 8 weeks post-MI • At least 45 min (effective time) 2 x/week with interval training involving large muscle groups: bicycling (10 min), callisthenics (10 min), and jogging (15 min), ending with relaxation (10 min) • On completion of the course, participants were encouraged to maintain their fitness by continuing on their own with similar types of exercises • Duration of intervention: 12 weeks • Providers: physiotherapist **Control group** • Usual care with no special emphasis on exercise
Outcomes	Proportion at work at 6–12 months (medium term): 12 months

Holmbäck 1994 *(Continued)*

	Median (and IQR) RTW time (weeks)
	Adverse events (mortality, reinfarction)
Identification	**Sponsorship source:** Malmöhus County Council
	Country: Sweden
	Setting: single-centre: Hospital Post-MI Clinic/Lund University Hospital; outpatient
	Possible conflicts of interest: none reported
	Ethics committee approval: approved by the Ethical Research Committee of the Medical Faculty
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Randomization was performed according to random numbers" no information about randomisation method
Allocation concealment (selection bias)	Low risk	Quote: "Randomization was performed according to random numbers in sealed envelopes."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the intervention (supervised training) blinding of participants would not have been possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Blinding of outcome assessors was not mentioned, and it is unclear how employment status was determined.
Incomplete outcome data (attrition bias) All outcomes	High risk	6 dropouts in Intervention group, 4 dropouts in control group until 1-year follow-up. Total study attrition was 14.5%. Half of the participants lost to follow-up in the intervention group did not finish the exercise training programme due to lack of motivation, time or severe lumbago. Also, 2 participants in the intervention group suffered a reinfarction, compared to no reinfarctions in the control group.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Horlick 1984

Methods	**Study design**: parallel RCT
	Recruitment: consecutive post-MI patients
	Allocation: not reported
	Blinding: not reported
	Randomisation: no method described

Horlick 1984 *(Continued)*

Follow-up(s): 6 months

Description: educational-group discussion programme

Participants	**Baseline characteristics** Intervention group • Number of participants randomised: 83 • Working before CHD: 83 • Mean age (SD): 53.8 (8.1) years • Sex (male %): 91.6 Control group • Number of participants randomised: 33 • Working before CHD: 33 • Mean age (SD): 52.7 (7.8) years • Sex (male %): 90.9 **Inclusion criteria** • < 66 years of age • Lived within 30 miles and physically able to attend classes • Employed for 6 months prior to MI and not intending to retire within 12 months **Exclusion criteria:** none **Baseline imbalances:** - **Physically demanding work**: white-collar **Severity of CHD**: unknown

Interventions	**Intervention**
	
	• Educational-group discussion programme beginning within 3 weeks of discharge from the hospital.
	  ◦ Initial interview (accompanied by a spouse or another family member) conducted by the nurse co-ordinator:
	  ▪ to assess the participant's and spouse's knowledge of heart disease (by questionnaire)
	  ▪ to provide information using a standard (in-hospital) education programme
	  ▪ to explain the elements of the treatment programme
	• The education-group discussion programme consisted of 6 weekly classes
	  ◦ Educational component (30-45 min) involving a presentation upon a certain topic (expanded on information presented in the audio-visual programme provided at discharge from hospital); spouses were encouraged to attend; topics were:
	  ▪ how the heart works in health and disease
	  ▪ physical recovery
	  ▪ emotional recovery
	  ▪ risk factors and intervention
	  ▪ nutrition, and
	  ▪ living with heart disease
	• Group discussion (45 min) for 4-8 participants only:
	  ◦ Free discussion of ideas, thoughts and feelings about the heart attack and its effects (no lecturing or direction provided by the leader) to help participants to "normalize" their experience.
	• Duration of intervention: 6 weeks
	• Providers: nurse co-ordinator, nurse, clinical psychologist, cardiovascular nurse, nutritionist, nurse educator, recovered patient
	
	Control group

Horlick 1984 *(Continued)*

	• Usual care
Outcomes	Proportion at work at < 6 months (short term): 3 months Proportion at work at 6 months–12 months (medium term): 6 months Self-developed personal adjustment questionnaires
Identification	**Sponsorship source:** grant from the Saskatchewan Heart Foundation **Country:** Canada **Setting**: multi-centred: three Saskatoon hospitals; in- and outpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	Number of participants returning to work calculated from percents given in text and number of study participants followed at 3 and 6 months.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Only the ratios of distribution to treatment versus control group over time are described, i.e. 3:1 and later 2.5:1. The method of sequence generation is not described.
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment is described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the intervention (outpatient educational group discussions), blinding of participants would not have been possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No concealment of outcome assessors is described, and assessment of "intention to return to work or retire" was described as self-reported. Information regarding RTW was also obtained from a physician's report, but it is unclear if the physicians were aware of their participant's group allocation.
Incomplete outcome data (attrition bias) All outcomes	High risk	The proportion of study participants lost to follow-up was 12% in the control group and 22% in the Intervention group.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Hämäläinen 1991

Methods	**Study design**: parallel RCT **Recruitment**: patients < 65 years of age, treated for their first AMI at 1 of 5 hospitals; April 1978-March 1980

Hämäläinen 1991 *(Continued)*

Allocation: randomly

Blinding: not reported

Randomisation: not reported

Follow-up(s): 1, 2, 3 months, 1 and 6 years

Description: 2-week inpatient combined rehabilitation programme

Participants	**Baseline characteristics** Intervention group (residential rehabilitation) • Mean age (SD): - • Sex (male %): 77 • Number of participants: 228 • Working before CHD: no information provided Intrvention group (hospital outpatient) • Mean age (SD): - • Sex (male %): 77 • Number of participants: 228 • Working before CHD: no information provided **Inclusion criteria** • < 65 years of age • Diagnosed MI following the WHO criteria • Treated for their first definite AMI • Survived the hospital phase **Exclusion criteria** - **Baseline imbalances:** - **Physically demanding work (i.e. white vs. blue collar)**: unknown **Severity of CHD**: unknown
Interventions	**Intervention characteristics** • Residential rehabilitation group: • ○ Medical examination with blood tests, chest X-ray, ECG, 24-h ECG and cycle ergometer exercise test ○ A physiotherapist advised on how to continue physical exercise at home ○ Dietary counselling consisted of nutrition classes ○ A doctor guided 2 sessions about risk factors, MI, medication, and rehabilitation ○ A psychologist discussed psychic and social consequences of heart attack • Duration of intervention: 2 weeks • Providers: psychologists, diet specialists, physiotherapists, physician **Control group** • Hospital outpatient care with visits to the coronary outpatient clinic 1, 2, and 3 months after AMI, and also later if medical problems arose. The coronary clubs of local Heart Associations provided patient education and arranged exercise groups. The main emphasis was however on outpatient clinic visits.
Outcomes	Proportion at work at 6 months–12 months: 12 months Adverse events (mortality, reinfarctions)

Hämäläinen 1991 *(Continued)*

Identification	**Sponsorship source:** not reported **Country:** Finland **Setting**: inpatient rehabilitation **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	Study authors write that only people who were working (also part-time while receiving half-pension), on sick leave, or unemployed at the time of their MI were included in the RTW analysis. The number of participants included in the analysis was provided, and the study authors could not be reached.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No method of sequence generation is described.
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment is described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of this programme the blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding of outcome assessors is described and it is unclear how employment status/RTW was determined.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Quote: "The participation rates at the check-ups were 97%, 92%, and 89% at 1, 3, and 6 years"; no overall allocation of dropouts between intervention and control group indicated.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Lidell 1996

Methods	**Study design**: parallel RCT **Recruitment**: consecutive MI patients from 700-bed hospital in south west Sweden **Allocation**: not reported **Blinding:** cardiologist performing the exercise test was not aware of which group the participants belonged to; further blinding not reported **Randomisation**: no method described **Follow-up(s):** 1 year, 5 years **Description**: combined rehabilitation programme

Lidell 1996 *(Continued)*

Participants	**Baseline characteristics** Intervention group • Mean age (SD): 55 • Sex (male %): 86.8 • Number of participants randomised: 53 • Working before CHD: 45 Control group • Mean age (SD): 57.6 • Sex (male %): 87.3 • Number of participants randomised: 63 • Working before CHD: 39 **Inclusion criteria** • < 66 years of age at the time of the MI • Ability to speak Swedish **Exclusion criteria** • Communication inhibited by MI or other serious illness • Loss of independent living after the MI • Living in another district after hospital discharge **Baseline imbalances:** • Hypertension: intervention group: 28.9%; control group: 34.9% • Previous MI: intervention group: 22.6%; control group: 15.9% **Physically demanding work:** blue-collar **Severity of CHD**: unknown

Interventions	**Intervention characteristics**
	
	• Combined rehabilitation programme
	  ○ participants and spouses invited to take part in 6-month interdisciplinary combined rehabilitation programme post-MI: support and education introduced in-hospital-Home visits with district nurses
	  ○ Team-Nurse visit (1 h, 3 weeks post-discharge) to discuss family problems related to MI-symptom
	  ○ Limited exercise test on a bicycle ergometer 5 weeks post-MI
	  ○ Weekly 2-h sessions for participants and spouses:
	  ■ 1st h physical exercise
	  ■ 3 strenuous sessions: 1 x bicycle ergometer, 2 x floor/bicycle
	  ■ 2 less strenuous sessions: 1 x callisthenics, 1 x fitness training
	  ■ 2nd h meeting to discuss events of the previous week and one of 12 preselected themes for education and support (led by team-nurse, dietician, physician, psychologist or social worker). The topics included 2 main areas (lifestyle and health risks after MI, and psychosocial consequences of MI)
	  ■ A home training programme was presented to be conducted parallel to combined programme
	  ■ Telephone contact with team-nurse during the 6 months combined programme
	• Duration of intervention: 6 months
	• Providers: team-nurse, dietician, physician, psychologist, social worker
	
	Control group
	
	• Usual care

Lidell 1996 *(Continued)*

Outcomes	Proportion at work at 6 months–12 months (medium term): 12 months Proportion at work at 5 years (extended long term): 5 years WHO QoL questionnaire scale A: life situation, scale B: life habits, and scale C: physical and psychological complaints Adverse events (mortality)
Identification	**Sponsorship source:** Swedish National association for Heart and Lung Patients and the County Council Halland, Sweden **Country:** Sweden **Setting**: single-centre, outpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No method of randomisation was reported.
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment was reported.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	No outcome assessor blinding was reported, however the outcome RTW was assessed with a standardised assessment tool (WHO Questionnaire).
Incomplete outcome data (attrition bias) All outcomes	High risk	11 participants in the control group and 2 participants in the intervention group declined to take part in the 5-year follow-up. This imbalance could have caused attrition bias.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol available
Other bias	Unclear risk	None identified

Maeder 1977

Methods	**Study design**: parallel RCT **Recruitment:** participants hospitalised for AMI October 1971- December 1972 **Allocation**: not reported

Maeder 1977 *(Continued)*

Blinding: not reported

Randomisation: random numbers table

Follow-up(s): 12 months, 4 years

Description: participants in the intervention group encouraged to move and walk more in the weeks post-MI

Participants	**Baseline characteristics** Intervention group • Mean age (SD): 58 years • Sex (male %): 83.1 • Number of participants randomised: 77 • Working before CHD: 77 Control group • Mean age (SD): 58 years • Sex (male %): 84.4 • Number of participants randomised: 77 • Working before CHD: 77 **Inclusion criteria** • < 70 years • Hospitalised for AMI **Exclusion criteria** • Deaths during the first 24 h • Severe heart failure • Cardiogenic shock • Severe arrhythmias • Severe and persistent chest pain • Severe psychological disorders • Other contraindications **Baseline imbalances:** higher frequency of anamnestic angina in the early mobilisation group **Recruitment methods**: all participants < 70 years hospitalised for AMI were included in the study. **Physically demanding work:** blue-collar **Severity of CHD**: less severe
Interventions	**Intervention characteristics** Early mobilisation group • Gradual mobilisation under medical supervision started 24-48 h after admission • Walking initiated in the beginning of the 2nd week (on average) • Duration of intervention: not reported • Providers: physiotherapist and supervised by a doctor **Control group** • Usual care: including at least 3 weeks of strict bed rest, followed by progressive mobilisation

Maeder 1977 *(Continued)*

Outcomes	Proportion at work (part-/full-time) at 6 months–12 months (medium term): 12 months Proportion at work at > 12 months to < 5 years (long term): 4 years Mean sick leave duration in months Depression- transient and prolonged (clinical information from attending physician) Adverse events (mortality, non-fatal reinfarctions)
Identification	**Sponsorship source**: not reported **Country:** Switzerland **Setting**: single centre: the Cantonal Hospital of Geneva; inpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Participants were randomised using "random number tables in serial subgroups of six"
Allocation concealment (selection bias)	Unclear risk	No allocation method was reported.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	None reported, and it is unclear how RTW was assessed.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	An ITT analysis was not conducted, and the study authors do not report if the attrition of study participants was evenly distributed across groups. Quantities of dropout cases (also in combination of the 2 studies) did not match with the combined numbers provided in the text.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Marra 1985

Methods	**Study design**: parallel RCT **Recruitment:** patients referred to the hospital rehabilitation centre; July 1977-1980 **Allocation**: not reported

Marra 1985 *(Continued)*

Blinding: no blinding of assessors

Randomisation: no method described

Follow-up**(s):** 2 months, 4.5 years

Description: supervised training programme

Participants	**Baseline characteristics** Intervention group • Mean age (SD): 49.08 (7.8) • Sex (male %): not reported • Number of participants randomised: 84 • Working before CHD: 80 Control group • Mean age (SD): 50.83 (7.6) • Sex (male %): not reported • Number of participants randomised: 83 • Working before CHD: 81 **Inclusion criteria** • AMI documented by ≥ 2 of 3 usual criteria • Age: 25-65 years **Exclusion criteria** • Patients in NYHA class 4 or with angina at rest • Low grade 4 ventricular arrhythmias • Heart failure • Severe hypertension **Baseline imbalances:** hypercholesterolaemia (P < 0.02): intervention group: 42; control group: 29 **Physically demanding work**: white-collar **Severity of CHD**: less severe

Interventions	**Intervention characteristics**
	
	• Exercise rehabilitation
	  ◦ A supervised training programme consisted of callisthenics and cycling
	  ◦ 1 precordial ECG lead of each participant was monitored continuously throughout all the sessions of the programme
	  ◦ Every session consisted of 3 parts:
	  ■ 10 min cycling at warm-up level followed by 10 min of rest
	  ■ 45 min 10 calisthenic exercises (very simple exercises performed either upright or lying down) progressively increased up to 28 in 10 sessions
	  ■ After 20 min of rest: 5 min cycling at warm-up level and then 10-25 min at training level, followed by 5 min of cool-down. (25 min of cycling at training level was obtained by the 5th session
	• Duration of intervention: 8-9 weeks on average
	• Providers: physicians
	
	Control group

Marra 1985 *(Continued)*

	• participants were advised to undertake physical activities and instructed to exercise by cycling, walking, or doing callisthenics at home, increasing the intensity and frequency progressively up to 4 times per week. • Radial pulse rate to be checked periodically and an appropriate upper limit was defined
Outcomes	Proportion at work (blue/white collar) at 6-12 months (medium term):about 6 months Mean months till RTW Adverse events (cardiac deaths, MIs)
Identification	**Sponsorship source**: not reported **Country:** Italy **Setting**: single-centred: rehabilitation centre, the San Giovanni Battista main Hospital; inpatient/outpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	Timepoint of RTW assessment unclear, average time until RTW between 4 and 6 months for each group reported

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No method of sequence generation was described.
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment was described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "All the patients were evaluated, followed up and cared for by four physicians (the authors) who could not keep the study blinded because of practical and ethical reasons."; participants couldn't be blinded due to study design
Blinding of outcome assessment (detection bias) All outcomes	High risk	Quote: "All the patients were evaluated, followed up and cared for by four physicians (the authors) who could not keep the study blinded because of practical and ethical reasons."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Quote: "Three patients in both groups (see Table 1) dropped out during the rehabilitation programme or the equivalent self managed physical activity. No drop out was observed during long term follow-up."
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Oldridge 1991

Methods	**Study design**: parallel RCT **Recruitment**: all patients admitted with a diagnosis of AMI to any 1 of 6 local hospitals

Oldridge 1991 *(Continued)*

Allocation: not reported

Blinding: investigators were not blinded to allocation; blinding of participants it is not described

Randomisation: not described

Follow-up(s): 2, 4, 8 and 12 months

Description: combined outpatient rehabilitation programme

Participants	**Baseline characteristics** Intervention group • Mean age (SD): 52.9 (9.5) • Sex (male %): 78.9 • Number of participants randomised: 99 • Working before CHD: 65 Control group • Mean age (SD): 52.7 (9.5) • Sex (male %): 88.2 • Number of participants randomised: 102 • Working before CHD: 74 **Inclusion criteria** AMI patient **Exclusion criteria** • Residence > 30 miles from the Health Sciences Centre • Inability to exercise due to uncontrolled dysrhythmias, heart failure or unstable angina • Neurologic, orthopaedic, peripheral vascular or respiratory disease • Inability to complete the QoL questionnaires due to cognitive or language problems • Depression levels: patients scoring < 5 on the short form of the Beck Depression Inventory or < 43 on the Spielberger State Anxiety Inventory or < 42 on the Spielberger Trait Anxiety Inventory 17 while still in hospital were not considered eligible for the study **Baseline imbalances:** - **Physically demanding work**: unknown **Severity of CHD**: less severe

Interventions	**Intervention characteristics**
	
	• Cognitive behavioural group intervention
	  ◦ Once weekly counselling session (to enhance a participant's confidence in resuming customary activities)
	  ◦ For spouse as well (learning to manage own anxiety in response to the participant's heart attack and to support the participant)
	  ◦ Counselling objective was to, "provide patients an opportunity to identify, evaluate and manage their own feelings, attitudes, thoughts and behavioural responses to the physical changes, treatment regimens and health behaviour expectations associated with recovering".
	• Course in cardiopulmonary resuscitation for the spouse
	• Exercise conditioning:
	  ◦ 8 x 90 min (10-min group warm-up, stationary cycle ergometry, treadmill walking and arm ergometry for 20-30 min, cool-down involving low-intensity activities; initially on 65% of the maximal heart rate)
	  ◦ Complemented by progressive relaxation training ("to reinforce the perception of self-control and self-competence, and to help manage episodes of apprehension if they occurred")

Oldridge 1991 *(Continued)*

	• Duration of intervention: 8 weeks • Providers: group leaders without formal training in counselling, cardiologist, qualified exercise specialist **Control group** • Conventional community care
Outcomes	Proportion at work at 6–12 months (medium term): 12 months QoL after AMI questionnaire (self-developed), quality of well-being questionnaire Adverse events (mortality)
Identification	**Sponsorship source:** Grant 6606-2724-44 from the National Health Research and Development Programme, Health and Welfare, Canada **Country:** USA **Setting**: single-centre: the Health Sciences Centre; the intervention sessions were held in a hospital gymnasium; outpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: ethics committees of the University and each hospital
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	It is not clear how the allocation sequence was generated.
Allocation concealment (selection bias)	Unclear risk	The study authors report that participants received the next available study number with the associated group allocation. It is unclear if this method is sufficient to prevent bias.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the intervention (supervised exercise, cognitive behavioral intervention), blinding of participants would not have been possible.
Blinding of outcome assessment (detection bias) All outcomes	High risk	Quote: "Another possible limitation to the present study is that the investigators were not blinded to allocation, although such bias would be expected to favour the rehabilitation group." Quote: "Mortality and work status were monitored throughout the study." - unclear how this was done
Incomplete outcome data (attrition bias) All outcomes	Low risk	A low number of study participants were lost to follow-up. The number of study participants who died during the follow-up period was also similar in both study arms (intervention n = 3, control group n = 4).
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Petrie 2002

Methods	**Study design**: parallel RCT **Recruitment**: consecutive first-time MI patients admitted to Auckland Hospital over 12-month period (time period not given) **Allocation**: not reported **Blinding**: not reported **Randomisation**: computer-generated **Follow-up(s):** 3 months **Description:** individualised education to change illness perception
Participants	**Baseline characteristics** Intervention • Number of participants randomised: 31 • Working before CHD: 25 • Mean age (SD): 55.3 (8.8) • Sex (male %): 74.2 Usual care • Number of participants randomised: 34 • Working before CHD: 20 • Mean age (SD): 55.9 (10.0) • Sex (male %): 70.6 **Inclusion criteria** ≤ 65 years of age at the time of the MI **Exclusion criteria:** none **Baseline imbalances**: time in hospital (days): intervention group: 7.7 (4.0); control group: 9.3 (6.2); number working at baseline: intervention group: 80.7%; control group; 58.9% **Physically demanding work**: unknown **Severity of CHD**: severe

Interventions	**Intervention**
	
	In-hospital individualised illness perception counselling
	
	• Directed counselling
	• Standard MI-educational material
	• 3x 30- to 40-min sessions conducted by psychologist
	  ◦ Session 1:
	  ▪ pathophysiology of MI and cardiac vs non-cardiac symptoms described with illustrations
	  ▪ participant's beliefs and misconceptions about MI were discussed, education regarding other possible causes of MI, i.e. risk factors such as smoking, diet, lack of exercise
	  ◦ Session 2:
	  ▪ an individualised risk reduction plan and time-line based on results from Illness Perception Questionnaire assessed at baseline (pre-randomisation) developed. Plan included exercise, diet and RTW.
	  ◦ Session 3:
	  ▪ symptoms of recovery discussed

Petrie 2002 *(Continued)*

	▪ warning signs of a further MI, medication use, and participant concerns addressed
	• Duration of intervention: during usual hospital stay
	• Providers: psychologist
	
	Control group
	
	• Usual care
	  ○ In-hospital visits with cardiac rehabilitation nurse
	  ○ standard MI-educational material

Outcomes	Proportion at work at < 6 months (short term): 3 months Illness perception questionnaire
Identification	**Sponsorship source:** Heart Foundation of New Zealand **Country:** New Zealand **Setting**: inpatient **Possible conflicts of interest**: no information provided **Ethics committee approval:** study authors report obtaining consent and ethics committee approval
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "...patients were randomly assigned into either an intervention or control group using a computer-generated allocation code."
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment was reported.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Due to the nature of the study, blinding of participants was not possible. However, it is unclear if the participants in the intervention group would have realised they were in the intervention group, since the intervention was integrated into the inpatient hospital care.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No outcome assessor blinding was reported, time until returning to work was assessed with a questionnaire at 3 months. It is unclear if a validated questionnaire item was used to determine the time point of the participants' RTW
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Quote: "[The 12-week follow-up] questionnaire was returned by 56 patients (86%), and non-respondents did not differ significantly from respondents on any baseline variables." It is unclear if group assignment (intervention vs control) is considered to be one of the baseline variables.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol available
Other bias	Unclear risk	None identified

Pfund 2001

Methods	**Study design**: parallel RCT **Recruitment:** continuously employed patients (≤ 60 years) after successful coronary catheter revascularisation; March1998-December 1999 **Allocation**: not reported **Blinding**: not reported **Randomisation**: no method described **Follow-up(s):** 4 months **Description**: intervention group received a RTW consultation regarding RTW including a proposed date for RTW in the 1st week after the intervention

Participants	**Baseline characteristics**
	
	Intervention group
	
	• Mean age (SD): 53 ± 5
	• Sex (male %): -
	• Number of participants randomised: 48
	• Working before CHD: 48
	
	Control group
	
	• Mean age (SD): 52 ± 7
	• Sex (male %): -
	• Number of participants randomised: 52
	• Working before CHD: 52
	
	Inclusion criteria
	
	• Successful coronary catheter revascularisation
	• Working patients
	
	Exclusion criteria
	
	• MI in the last 4 weeks
	• Medical contraindications:
	  ◦ unstable angina pectoris
	  ◦ cardiac insufficiency (ejection fraction < 50%)
	  ◦ haemodynamically relevant valvular defect
	  ◦ severe co-morbidities (chronic obstructive pulmonary disease, tumours, apoplexy etc.)
	• Planned retirement
	• Housewives (difficulties to specify when their working day begins)
	
	Baseline imbalances: -
	
	Recruitment Methods:
	
	Physically demanding work: unknown
	
	Severity of CHD: less severe

Interventions	**Intervention characteristics** • RTW consultation ◦ Participants and their family doctors were provided with information about RTW

Pfund 2001 *(Continued)*

	○ Participants were verbally briefed by the investigator and the clinic to acquire general information about RTW ○ Family doctor received information via medical reports ○ Information session for all participants and their family doctors during the 1st week ○ Control-and-workload ECG test (if there was an ischaemia or a clinically suspected restenosis found, there was another ECG appointment) • Duration of intervention: not reported • Providers: study investigator, physician, family doctor **Control group** • No specific information about RTW
Outcomes	Proportion at work at < 6 months (short term): 4 months Duration of sick leave EuroQOL (only baseline reported)
Identification	**Sponsorship source:** Ernst und Berta-Grimmke-Stiftung, Düsseldorf **Country:** Germany **Setting**: multi-centred: medical clinic III of the University of Cologne and the joint practice Haubrichhof, Cologne; inpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	The method of sequence generation is not described.
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment is described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Blinding of the study participants was not mentioned. The hospital personnel and study researchers would have been aware of the group allocation.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding of outcome assessors is mentioned, and RTW was assessed with an interview. No additional checks of work status with external sources is mentioned.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Quote: "Overall there were 104 patients included in the study (intention-to-treat) of which 100 (96%) were interviewed after 4 months." Unclear what happened to the 4 dropouts and how they were allocated
Selective reporting (reporting bias)	Unclear risk	No study protocol was available. Although the intervention did not result in a statistically significant difference in short-term (4-month) RTW rates, the results were reported. However, the statistically significant differences between

Pfund 2001 *(Continued)*

		RTW among private vs pubically insured participants (which did not directly address the study aims) are overemphasised
Other bias	Unclear risk	None identified

Picard 1989

Methods	**Study design**: parallel RCT **Recruitment**: recruited at Kaiser Foundation Hospitals in Redwood City, Santa Clara, San Jose, Hayward and South San Francisco, USA. July 1983- September 1985 **Allocation**: sealed envelopes **Blinding**: not reported **Randomisation**: sealed envelopes with an equal number of group assignments were shuffled into random order and each new patient was assigned with the top envelope on the stack **Follow-up(s):** 6 months **Description**: intervention provided AMI patients eligible for treadmill testing with a RTW consultation including a recommendation for RTW based on results of treadmill testing
Participants	**Baseline characteristics** Intervention group • Mean age (SD): 50 (7) • Sex (male %): 100 • Number of participants randomised: 99 • Working before CHD: 99 Usual Care Group • Mean age (SD): 49 (7) • Sex (male %): 100 • Number of participants randomised: 102 • Working before CHD: 102 **Inclusion criteria** • Men • < 60 years of age • AMI • In full-time employment (≥ 36 hours/week) for at least 3 months prior to AMI • Low-risk participants eligible for treadmill testing based on the DeBusk 1983 risk stratification model (e.g. absence of cardiac failure and [unstable] angina at rest on the 5th hospital day) **Exclusion criteria** • Cardiac failure (on 5th hospital day) • Angina at rest (on 5th hospital day) **Baseline imbalances:** - **Physically demanding work**: white-collar

Picard 1989 *(Continued)*

	Severity of CHD: severe (patients with ventricular fibrillation included; intervention group n = 8; control group n = 3)

Interventions	**Intervention characteristics**
	• Occupational work evaluation treadmill testing approximately 21 days post-AMI:
	  ○ cardiac medications tapered off at least 3 half-lives prior to treadmill testing
	  ○ cardiovascular history and physical examination
	  ○ symptom-limited treadmill-testing (Naughton protocol): started at 3 Metabolic Equivalents (METs) (est. multiples of resting oxygen consumption) and increased by 1 MET/3 min until symptoms of fatigue, dyspnoea, moderate angina, dizziness, leg cramps, signs of exertional hypotension (decrease in systolic BP > 10 mmHg vs previous stage), ventricular tachycardia, staggering gait, blank facies
	  ○ cuff BP and 12-lead ECG at rest and at the end of each stage of exercise and every min during 10-min recovery
	  ○ ischaemic treadmill response defined as development of angina or ≥ 0.1mV of ST depression at 0.8 second after the J point in any lead during exercise or recovery
	• RTW recommendations based on treadmill results, and an algorithm estimating the 1-year risk of recurrent infarction/cardiac death:
	  ○ 5% risk advised to RTW at 35 days
	  ○ 10% risk advised to return to work at 42 days after beginning antianginal medication
	  ○ 25% risk advised to undergo coronary arteriography before returning to work (performed within 3 weeks and referred to primary physician)
	• Duration of intervention: 1 outpatient visit at ca. 21 days post AMI
	• Providers: cardiologist nurse clinician
	Control group
	• Usual care at the Kaiser Foundation Hospitals

Outcomes	Proportion at work (part-/full-time) at 6 months–12 months (medium term): 6 months Median and range of days until RTW: 6 months Working hours per week: 6 months Adverse events (mortality, cardiac events, non-fatal reinfarctions)
Identification	**Sponsorship source:** National Heart, Lung and Blood Institute, Bethesda, Maryland; Robert Wood Johnson Foundation, Princeton, New Jersey; Dr. Picard- National Research Service Award Fellowship **Country:** USA **Setting**: single-centre, outpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: institutional review boards at Stanford University and Kaiser Foundation Hospitals approved the study
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Participants were randomised using randomly sorted envelopes.

Picard 1989 *(Continued)*

Allocation concealment (selection bias)	Low risk	Sealed envelopes were used to allocate participants.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	RTW was assessed with questionnaires at 6 months or with an exit interview conducted by a data co-ordinator. The researchers report that the data co-ordinator had not been involved with performing the intervention, and this suggests an attempt to blind the outcome assessor.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Quote: “All analyses were done by intention to treat.”
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Pilote 1992

Methods	**Study design**: parallel RCT **Recruitment**: patients hospitalised for AMI in the CCUs of 4 San Francisco Bay Area Kaiser-Foundation Medical Centres from August 1987-December 1989 **Allocation**: sealed envelopes **Blinding**: all cardiac events were confirmed by a cardiologist blinded to the randomisation. **Randomisation**: computer programme **Follow-up(s):** 6 months **Description:** "Occupational Work Evaluation" including a recommendation of when to return to work based on treadmill testing
Participants	**Baseline characteristics** Intervention • Mean age (SD): 51 (7) • Sex (male %): 94 • Number of participants randomised: 95 • Working before CHD: 95 Usual care • Mean age (SD): 50 (6) • Sex (male %): 89 • Number of participants randomised: 92 • Working before CHD: 92 **Inclusion criteria**

Pilote 1992 *(Continued)*

- Diagnosis of AMI
- Medical eligibility for exercise testing
- Working before AMI (≥ 36 h/week for 3 months)

Exclusion criteria

- ≥ 61 years (common age of retirement)
- Not working before the MI
- Planning an early retirement
- Medically ineligible to perform a symptom-limited exercise test 10-21 days after an MI
- Presence of:
  - congestive heart failure
  - unstable angina pectoris
  - atrial fibrillation
  - left bundle branch block
  - chronic obstructive pulmonary disease
  - stroke
  - orthopaedic and peripheral vascular disease
  - severe obesity)

Baseline imbalances: white race (P < 0.05): intervention group: 82%; control group: 65%

Physically demanding work: white-collar

Severity of CHD: less severe

Interventions

Intervention characteristics

- Occupational work evaluation
  - Symptom-limited treadmill test followed by a counselling session with the participant 10-21 days after AMI
  - Counselling sessions to allay participants' concerns about RTW, emphasised the prognostic and psychologic implications of the treadmill test results and the potential for early RTW
  - Immediately after the treadmill test, the nurse clinician also telephoned the results to the participant's primary care physician. The cardiologists in each participating hospital signed a computer-generated consultation letter that contained formal guidelines about the timing of RTW. Within 2-3 days of the treadmill test, nurse clinicians delivered the consultation letters to the primary care physicians, who subsequently provided the participants with a specific RTW data. The RTW recommendations were based on the ability of exercise testing to identify a very low-risk subgroup among a clinically low-risk group of participants.
- The following practice guidelines were set:
  - Participant with a non-ischaemic exercise test (the combined risk of subsequent infarction < 5%) was advised to return to work within the next week
  - Participant with a "mildly ischaemic" exercise test (exhibiting flat or down-sloping ST-segment depression of > 0.1 mV or angina pectoris, the combined risk of infarction or death in the next 6 months < 10%) was advised to return to work in the next 2 weeks after treatment with anti-anginal drugs
  - Participant with a "severely ischaemic" exercise test (exhibiting flat or down-sloping ST-segment depression of > 0.2 mV or angina pectoris, the combined risk of infarction or death in the next 6 months < 10% at heart rate of < 135/min, the combined risk of infarction or death in the next 6 months 25%) was advised to have coronary angiography and consider revascularisation before RTW.
- Duration of intervention: not reported
- Providers: not reported

Usual care

- The usual care was not controlled by the investigators. It usually included treadmill exercise testing done within a few weeks after AMI.

Pilote 1992 *(Continued)*

Outcomes	Proportion at work (part-/full-time) at 6–12 months (medium term): 6 months Days until RTW: 6 months Adverse events (mortality, non-fatal reinfarctions)
Identification	**Sponsorship source:** Grant HL36734 from the National Heart, Lung and Blood Institute of Health, Bethesda, Maryland **Country:** USA **Setting**: multicentre: 4 Kaiser-Foundation Medical Centres, San Francisco Bay Area; evaluation (the Occupational Work Evaluation) at a university research clinic **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	A computer programme was used to randomly assign participants.
Allocation concealment (selection bias)	Low risk	Quote: "The assignments were placed in sealed envelopes and drawn in sequence as patients were randomised."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study intervention (treadmill tests with counselling session), blinding was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote: "Information regarding return to work for both groups was obtained by a Stanford-based data coordinator... The occupational status of all patients was ascertained by telephone by the data coordinator at 6 months after the myocardial infarction." Quote: "All cardiac events were confirmed by a cardiologist blinded to the randomisation."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	The number of participants lost to follow-up was altogether low. However, 3 (2 deaths) participants were lost to follow-up in the intervention group vs 1 participant in the control group by 6 months, and 15 people in the intervention group developed contraindications and withdrew from the study vs 10 (1 death due to cancer) in the control group.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Pozen 1977

Methods	**Study design**: parallel RCT

Pozen 1977 *(Continued)*

Recruitment: consecutive patients over 16 months (dates of recruitment not reported)

Allocation: not reported

Blinding: not reported

Randomisation: no method described

Follow-up(s): 6 months

Description: counselling with a nurse rehabilitator

Participants	**Baseline characteristics**
	
	Intervention group (high-risk)
	
	• Number of participants randomised: 36
	• Working before CHD: 29
	• Mean age (range): 53 (39-68) years
	• Sex (male %): 77.8
	
	Intervention group (low-risk)
	
	• Number of participants randomised: 19
	• Working before CHD: 15
	• Mean age (range): 56 (40-68) years
	• Sex (male %): 84.2
	
	Control group (high-risk)
	
	• Number of participants randomised: 34
	• Working before CHD: 26
	• *Mean age (range)*: 58 (42-70) years
	• Sex (male %): 79.4
	
	Control group (low-risk)
	
	• Number of participants randomised: 13
	• Working before CHD: 10
	• Mean age (range): 57 (45-69) years
	• Sex (male %): 61.5
	
	Inclusion criteria
	
	• Documented MI (with serial enzymes and typical ECG changes)
	• High-risk:
	  ◦ Patients with congestive heart failure (Killip Class III or IV)
	  ◦ Patients meeting one of Hutter and Sidel's additional 5 high-risk criteria:
	  ■ clinically significant ventricular arrhythmias
	  ■ heart block
	  ■ hypotension
	  ■ persistence of coronary pain
	  ■ prior MI within preceding 6 months)
	• Low risk:
	  ◦ Patients with Killip Class I or II failure without evidence of any Hutter and Sidel's 5 criteria
	• Willing to participate in the study and follow-up
	
	Exclusion criteria
	
	• Lack of unequivocal evidence of an MI

Pozen 1977 *(Continued)*

- In-hospital deaths
- Lost to follow-up
- > 70 years
- Language barriers

Baseline imbalances: -

Physically demanding work: unknown

Severity of CHD: severe (we considered high- and low-risk groups together and allocated all participants to the high-risk group, except in subgroup analysis considering CHD severity.)

Interventions	**Intervention** (low- and high-risk groups)
	• Hospitalisation (3-5 days)
	  ○ Nurse rehabilitator met with high- and low-risk participants individually, daily for 20-30 min
	  ○ Initial sessions were devoted to reducing anxiety and explaining procedures and events concerning their care and treatment
	• Convalescent area
	  ○ Transferred to an adjacent convalescent area, where nurse rehabilitator continued to meet with study participants individually and in groups on alternating days for 45 min-1 h
	  ○ Focus on disseminating knowledge of heart attack and treatment plans for returning to normal function and minimising anxiety
	  ○ Content of sessions was based on the physician's plans for the discharge and included diet, medication, prescribed activity, risk factors, and early warning signs and symptoms of heart attack. The participants received literature that summarised and reinforced information received
	• After discharge
	  ○ Nurse rehabilitator remained in contact with the study participants by telephone and/or in person at least once a week
	  ○ Material presented in earlier sessions reinforced, nurse responded to new problems, and served as a liaison between the participant and the physician
	  ○ Families of participants were included in 2 informal sessions with the nurse rehabilitator and in the pre-discharge conference with the participant, nurse rehabilitator, and physicians
	• Duration of intervention: not reported
	• Providers: CCU physicians/nurses and a nurse rehabilitator
	Control group (low- and high-risk)
	• Usual care: no contact with the nurse rehabilitator except for the administration of necessary questionnaires.

Outcomes	Proportion at work at 6–12 months (medium term): 6 months IPAT anxiety score; Hopkins Symptom Checklist-90
Identification	**Sponsorship source:** by funds from the Health Services Research and Development Grant #HS 000429 of the Johns Hopkins Health Services Research and Development Center, the Robert Wood Johnson Clinical Scholars Program, a Baltimore City Hospitals administered grant from the Department of Health, Education and Welfare, Grant # 5 501 RRO 5556 **Country:** USA **Setting:** CCU of the Baltimore City Hospitals; in- and outpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	

Pozen 1977 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "One hundred and seventy-nine patients categorized as high risk were randomly assigned in equal proportions to the study and control groups. One hundred and thirty-four patients categorized as low risk were randomly assigned in a 2: 1 ratio to the study and control groups, respectively." No further information
Allocation concealment (selection bias)	Unclear risk	None described
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of this study, blinding of participants and personnel would not have been possible. The study authors do write that study and control participants were assigned to different rooms when possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Blinding of outcome assessors is not described, and it is not entirely clear how work status was assessed - presumably with a questionnaire.
Incomplete outcome data (attrition bias) All outcomes	High risk	Quote: "follow-up consisted of phone calls, letters, and personal visits before these 26 patients were considered 'lost to follow-up' (representing 15 per cent of the 174 patients with true MIs)." Quote: "The 15 per cent loss to follow-up may slightly bias the results in the positive direction by selecting a somewhat more compliant patient population."
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

PRECOR 1991

Methods	**Study design:** 3-armed RCT **Recruitment:** patients admitted to the CCUs from February 1981- May 1984 **Allocation:** not reported **Blinding**: no blinding (participants were informed about the principle of the study) **Randomisation:** no method described **Follow-up(s):** 2 months, 2 years **Description**: combined rehabilitation programme with exercise and education, or counselling (only) programme (CP)
Participants	**Baseline characteristics** Intervention group (rehabilitation) • Number of participants randomised: 60 • Working before CHD: 48

PRECOR 1991 *(Continued)*

- Mean age: 51 years
- Sex (male %): 100

Intervention group (counselling)

- Number of participants randomised: 61
- Working before CHD: 46
- Mean age: 51 years
- Sex (male %): 100

Control group (usual care)

- Number of participants randomised: 61
- Working before CHD: 43
- Mean age: 49 years
- Sex (male %): 100

Inclusion criteria

- < 65 years of age
- Early complications of MI
- Refusal or impossibility to participate
- Inability to perform the exercise test
- Major ECG abnormalities

Exclusion criteria

- Contraindication to exercise testing i.e.
  - recent stroke
  - disability of lower limbs
  - uncontrolled heart failure
  - severe rhythm disturbances
  - high BP > 180 mmHg
  - severe angina pectoris, or
  - abnormalities triggered by the baseline exercise test (systolic BP > 250 mmHg, severe hypotension, atrio-ventricular block > 2nd degree, complex ventricular premature beat left bundle branch block, chest pain or a low heart rate on exercise)
- Female

Baseline imbalances: -

Physically demanding work: unknown

Severity of CHD: less severe

Interventions	**Intervention characteristics**
	
	Rehabilitation programme
	
	• 3 training sessions/week on a cyclo-ergometer:
	  ◦ 25-min exercise test on a cyclo-ergometer
	  ◦ workload set to reach 80% of the max heart rate, and then decreased progressively over 2 min; stopping criteria were the same as those for an exercise test. Max workload was increased as the sessions progressed
	• Walking
	• Gymnastic and respiratory physiotherapy
	• Relaxation
	• Recommendations on control of cardiovascular risk factors (smoking habits, diet)
	• Recommendations to continue programme after sessions ended

PRECOR 1991 *(Continued)*

- Duration of intervention: 6 weeks
- *Providers*: not reported

Counselling programme

- A group session with a cardiologist, a psychiatrist, a nutritionist and a physiotherapist whenever possible
  - spouse/partner was encouraged to attend
  - same recommendations were given about control of cardiovascular risk factors and physical standardised exercise as for the rehabilitation group
  - participants were also seen privately by the cardiologist in charge of the programme for a full medical examination and personal adjustment of the recommendations
- Duration of intervention: not reported
- Providers: cardiologist, a psychiatrist, a nutritionist and a physiotherapist

Control group

- Usual care
  - participants were just referred to their usual GP and/or cardiologist

Outcomes	Proportion at work at < 6 months (short term): 2 months Proportion at work at > 12 months to < 5 years (long term): 2 years Adverse events (reinfarction, cardiac surgery)
Identification	**Sponsorship source:** by a grant from the Institut National de la Santé et de la Recherche Médicale, by the Hospices Civils de Lyon and by the Association pour la Promotion et la Réalisation d'Essais Thérapeutiques **Country:** France **Setting**: multi-centred (4 clinical CCUs): Hospital Cardiovasculaire Louis Pradel; Centre Hospialier de Vienne; Hospital Lyon Sud; Clinique Mutualiste Eugene Andre **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Patients who could perform an exercise test adequately were randomised between a rehabilitation (RP) and a counselling programme (CP) or usual care (UC)." - no further information
Allocation concealment (selection bias)	Unclear risk	None described
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the intervention (group sessions), the blinding of participants and personnel would not have been feasible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding of outcome assessors is described, and no details are given regarding how RTW was assessed.

PRECOR 1991 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Low risk	All participants appear to have been followed. Quote: "No patient was lost to follow-up"
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Rahe 1979

Methods	**Study design**: parallel RCT **Recruitment:** October 1971-June 1972 (January-July1973 17 additional post-MI patients were referred for treatment) **Allocation**: not reported **Blinding**: not reported **Randomisation**: no method described **Follow-up(s):** 18 months, 3-4 years **Description**: a randomised treatment group and a non-randomised group of volunteers (not included in the meta-analysis) received group therapy
Participants	**Baseline characteristics** Intervention group 1 (randomised) • Mean age (SD): 50.9 • Sex (male %): 85 • Number of participants randomised: 22 • Working before CHD: 17 Intervention group 2 (non-randomised volunteers, not included in the analysis) • Mean age (SD): 51.5 • Sex (male %): 100 • Number of participants: 17 • Working before CHD: 13 Control group (CG) • Mean age (SD): 55.2 • Sex (male %): 94 • Number of participants randomised: 22 • Working before CHD: 12 **Inclusion criteria** • MI survivors • First MI (unequivocally documented) • < 60 years • Patients eligible to return to work • Resided in the San Diego area and planned to remain there for at least 3 years

Rahe 1979 *(Continued)*

	Exclusion criteria: not reported **Baseline imbalances:** average age: intervention group 1 50.9 years; control group 55.2 years **Physically demanding work**: unknown **Severity of CHD**: severe

Interventions	**Intervention characteristics**
	
	• 6 group therapy sessions once every 2 weeks, beginning 1 month following hospital discharge
	• Spouses were invited to attend the 2nd session (topic: the contribution of physical and psychological risk factors to CHD)
	• The progression of material:
	  ○ life stress and the onset of MI
	  ○ the contribution of physical and psychological risk factors to CHD
	  ○ coronary-prone behaviour
	  ○ home problems
	  ○ RTW
	  ○ the beginning of each session often included a didactic presentation of educational material; followed by an active discussion where participants were encouraged to report their experiences with the topic
	• Duration of intervention: 6 sessions; period not clear
	• Providers: the senior study author, with training in both psychiatry and internal medicine, first-year residents in internal medicine, two hospital corpsmen, one medical student, chief cardiologist
	
	Control group
	
	• The control participants received a regular outpatient medical treatment for post-MI participants.

Outcomes	Proportion at work at < 6 months (short term): 3 months Proportion at work at 6–12 months (medium term): 6, 12 months Participants working full-time after > 12 months to < 5 years: 4 years Clinical anxiety (general and cardiac-specific) Adverse events (mortality, reinfarction, bypass)
Identification	**Sponsorship source:** by the Naval Medical Research and Development Command, Department of the Navy, under Research Work Unit ZF 51.524.002.-5020 **Country:** USA **Setting:** Naval Regional Medical Centre/US Naval Hospital **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Twenty-two patients were randomly assigned to the treatment group and 22 to the control group." No further information provided

Rahe 1979 *(Continued)*

Allocation concealment (selection bias)	High risk	No allocation concealment was described, and the study authors report that, "17 additional post-MI patients who met the research criteria were referred for treatment." Although these participants should have been randomly allocated to the study arms, the study authors explain that these participants joined the study expecting the intervention (and examined as a separate treatment group). The results of these non-randomised people are nevertheless excluded from the quantitative synthesis of results.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the intervention (group therapy), blinding of participants and personnel would not have been possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding of outcome assessors is described, and it is unclear how exactly RTW was assessed. The study authors state that standardised interviews and research questionnaires were used at the follow-ups. However, no validated questionnaire or validation with independent (unbiased) occupational records is described.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was low across all groups. Three people died before the 3-4-year follow-up, but the study authors do not describe to which of the three study groups these participants were allocated.
Selective reporting (reporting bias)	Unclear risk	Although the study authors do mention a study protocol, it does not appear to have been published.
Other bias	Unclear risk	None identified

Rivas 1988

Methods	**Study design:** 3-arm RCT **Recruitment:** first AMI patients admitted to CCU **Allocation**: not reported **Blinding**: not reported **Randomisation**: no method described **Follow-up(s):** 3 months, 6 months, 9 months, 12 months **Description:** combined outpatient rehabilitation including supervised training with psychological and vocational counselling with more (group A) and less (group B) intense physical training
Participants	**Baseline characteristics** Intervention group (rehabilitation group A) • Mean age (SD): 46.7 (9) • Sex (male %): 85.5 • Number of participants randomised: 55 • Working before CHD: 50 Interventions group (rehabilitation group B) • Mean age (SD): 46.7 (8)

Rivas 1988 *(Continued)*

- Sex (male %): 90.7
- Number of participants randomised: 52
- Working before CHD: 52

Control group

- Mean age (SD): 50.3 (9)
- Sex (male %): 88.7
- Number of participants randomised: 48
- Working before CHD: 48

Inclusion criteria

- MI confirmed according to the WHO criteria
- No present further complications (moderate or severe cardiac insufficiency, dangerous ventricular arrhythmias uncontrolled with drugs, and physical or physical disability that do not allow for correct rehabilitation)

Exclusion criteria: none

Baseline imbalances: -

Physically demanding work: white-collar

Severity of CHD: unclear

Interventions

Intervention characteristics

- Rehabilitation group A (more intense physical training)
  - Ambulatory integral cardiac rehabilitation with supervised daily physical training (monday-friday)
    - Measures to control the coronary risk factors
    - Physical training, psychological support, occupational orientation, vocational and social orientation
    - Clinical follow-up through frequent medical consultations with a cardiologist, who was in charge of indicating whether a medical or surgical treatment was required according to patient's needs
    - Physical training sessions for 15 minutes: callisthenic exercises, pedaling a stationary bike and jogging for 30 min with the required intensity to reach individual training pulse (previously determined through ergometric testing)
    - Monthly health education talks; topics: prevention and the treatment of Ischaemic heart disease, sexual activity, resumption of work and social activities, etc., with the goal of increasing patient's knowledge about the disease
  - Starting from the 3rd week after the MI and until the 10th week
  - Then 3 times per week until at least the first year
  - Duration of intervention: at least 1 year
  - Providers: -
- Rehabilitation group B (less intense physical training)
  - Ambulatory integral cardiac rehabilitation with supervised physical training
  - 3 times per week from the 8th week after the MI episode and for ≥ 1 year
  - Between hospital discharge and the 8th week unsupervised programme of physical exercises at home (callisthenics, steps, walks)
- Duration of intervention: at least 1 year
- Providers: -

Control group

- After discharge the participants were seen by a cardiologist in a conventional external medical consultation without being assigned to a specific rehabilitation programme

Rivas 1988 *(Continued)*

Outcomes	Proportion at work at < 6 months (short term): 3 months Proportion at work at 6–12 months (medium term): 12 months Adverse events (mortality)
Identification	**Sponsorship source:** Institute of Cardiology and Cardiovascular Surgery, Rehabilitation Center **Country:** Cuba **Setting**: single centre (Institute of Cardiology and Cardiovascular Surgery, Rehabilitation Center), ambulant **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "...patients were randomly distributed according to a table of random numbers in three groups"
Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment is described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the intervention (outpatient exercise programmes), blinding of participants and personnel would not have been possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding of outcome assessors, nor is the method of assessing RTW is mentioned
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	For intervention group A and the control group, the number of study participants reported to be lost to follow-up due to death was the same (n = 1). Together in groups A and B a total of 3 study participants were lost due to retirement compared to 5 study participants in the control group.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Stern 1983

Methods	**Study design:** 3-armed RCT **Recruitment:** 3-year recruitment period. Recruited from the CCU, internists, and the larger community. MI documented within 6 weeks-1 year prior to study admission **Allocation**: not reported **Blinding**: not reported

Stern 1983 *(Continued)*

Randomisation: block randomisation; no method described

Follow-up(s): 3, 6, and 12 months

Description: intervention included either supervised exercise or group counselling

Participants	**Baseline characteristics** Study participants were predominantly white, married, middle to upper-middle class men admitted to the study 7 months (mean) after MI Intervention group (counselling) • Mean age (SD): - • Sex (male %): 88.5 • Number of participants randomised: 35 • Working before CHD: 26 intervention group (exercise therapy) • Mean age (SD): - • Sex (male %): 90.5 • Number of participants randomised: 42 • Working before CHD: 31 Control group (CG) • Mean age (SD): - • Sex (male %): 75.9 • Number of participants randomised: 29 • Working before CHD: 24 **Inclusion criteria** • Work capacity level of < 7 Metabolic Equivalents (MET) (men) or < 6 MET (women) when exercised on a treadmill to 85% of the predicted age • Adjusted maximum or to the appearance of symptoms or other abnormal responses that could terminate the exercise prior to the heart rate end point • And/or a Taylor Manifest Anxiety Scale1 raw score of 19+- and/or Zung Self-rating Depression Scale 2 raw score of 40+ **Exclusion criteria** • Unstable cardiovascular condition present (i.e. congestive heart failure, or required treatment for any physical/psychologic reason) **Baseline imbalances:** • Not married: counselling: 14% (n = 5); exercise: 12% (n = 5); control group: 45% (n = 13) • 49-58 years: counselling: 34% (n = 12) ; exercise: 67% (n = 28); control group: 34% (n = 10) • Admitted < 4 months after MI: counselling: 43% (n = 15); exercise: 21% (n = 9); control group: 21% (n = 6) Physically demanding work: unknown **Severity of CHD**: less severe
Interventions	**Intervention characteristics** • Exercise therapy ○ 3 × 1-h sessions/week over a 12-week period for a total of 36 sessions

Stern 1983 *(Continued)*

- All exercises were dynamic, involving rhythmic movements against resistance; half were upper limb (rowing machine, arm wheel, and arm ergometer) and half were lower limb (treadmill, cycle, and step ergometer)
- Participants exercised upper and lower limbs alternately for 4 min with 2 min of rest in between
- Exercise intensity was determined by heart-rate response, with the target level being 85% of the peak exercise heart rate achieved in the first evaluation. If the heart rate was consistently above or below target, the work load was increased or decreased
- Close supervision and continuous ECG monitoring of exercise allowed for rapid detection of any abnormalities in rhythm or ST segments

- Duration of intervention: 12 weeks
- Providers: sessions were supervised by a physical educator and a physician's assistant trained in emergency cardiac care, with a cardiologist either present or immediately available
- Group counselling
  - participants attended 12 × 60-75-min weekly group counselling sessions.
    - 1st session: acquaint participants with general problems encountered during convalescence
    - 2nd and 3rd sessions: educational (the anatomy, common MI complications, cardiac procedures; risk factors - ranging from family history to hypertension, obesity, smoking, and stress)
    - 4th session: stress, especially self-induced by type A behaviour, members providing examples and leaders provided guidelines for reducing time urgency and hostility. Participants were also taught the Jacobsen relaxation exercises and encouraged to do these at least twice daily.
    - 5th-11th sessions: general areas of stress (at work, at home, socially, sexually, physically, or in relation to the need to diet, give up smoking, and increase levels of physical activity)
    - 12th final session: summary discussion and general critique of the group.
- Duration of intervention: 12 weeks
- Providers: psychiatrist/social worker and nurse clinician

Control group

- Participants in the control group received no specific assignment. Instead, they were followed up by their physicians and given routine post-MI medical care. They were requested to not join a supervised exercise or a formal counselling programme.

Outcomes	Proportion at work at 6–12 months (medium term): 12 months Taylor Manifest anxiety, Zung Depression Adverse events (mortality, MI, bypass)
Identification	**Sponsorship source:** grant G008003044 from the National Institute of Handicapped Research, Department of Education, Washington DC **Country:** USA **Setting:** George Washington University Hospital; single-centre; outpatient **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Participants were randomised into 3 study groups in blocks of 6, but the method of sequence generation is not described.

Stern 1983 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	No method of allocation concealment is described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the interventions examined (supervised exercise training or group counselling), the blinding of study participants and personnel would not have been possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding of outcome assessors is mentioned and it is unclear if a validated questionnaire was used to assess RTW at the follow-up.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	It seems as if no participants were lost to follow-up for the evaluation of RTW. However, it is unclear if non-compliant study participants in the intervention groups were excluded from some or all of the outcome assessments.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

Vermeulen 1988

Methods	**Study design**: parallel RCT **Recruitment:** hospitalised for AMI during the period January 1971-May 1975 **Allocation**: not reported **Blinding**: not reported **Randomisation**: no method described **Follow-up(s):** 12 months **Description**: combined outpatient rehabilitation programme
Participants	**Baseline characteristics** Intervention group • Mean age (SD): - • Sex (male %): 100 • Number of participants randomised: 51 • Working before CHD: 40 Control group • Mean age (SD): - • Sex (male %): 100 • Number of participants randomised: 47 • Working before CHD: 45 **Inclusion criteria** • First MI • Male • Aged 44-55

Vermeulen 1988 *(Continued)*

	• Willing to participate in the programme **Exclusion criteria** • Lived too far away to visit the outpatient department • Contraindications or unsuitability for undertaking a treadmill exercise test • Preferred to visit their own specialist **Baseline imbalances:** - Physically demanding work**:** blue-collar **Severity of CHD**: less severe
Interventions	**Intervention characteristics** Rehabilitation interventions consisted of physical training, social counselling, group meetings and, when necessary, individual psychological advice • The participants visited the rehabilitation centre 5 days/week for 6 weeks • Physical training entailed a warm-up in which specific muscle groups were loosened, followed by an interval exercises on a bicycle ergometer. • After physical training (2 weeks), occupational therapy was added to the programme. The participants' behaviour was observed during these activities, the outcome of which could be used for immediate intervention or for discussion at a group meeting. • Group meetings: 1 x/week, under the guidance of the social worker and one of the other members of the team. Any special questions were answered by the specialist in a particular field at the next session. • Continued physical activity was offered in the form of group training programmes, consisting of recreational activities such as volleyball, badminton and other indoor games. • Duration of intervention: 6 weeks • Providers: cardiologist, rehabilitation medicine specialist, psychologist, social worker, physiotherapist, occupational therapist, job counsellor **Control group** • No rehabilitation programme
Outcomes	Proportion at work at 6– 12 months (medium term): 12 months Adverse events (mortality, reinfarction)
Identification	**Sponsorship source**: no information provided **Country:** The Netherlands **Setting**: single-centred, outpatient: Revalidatie Instituut Muiderpoort **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	The proportion of blue-collar workers returning to work was lower but the difference was not statistically significant.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "...the patients were randomly assigned to either a control group (N = 47) or a rehabilitation group (N = 51)." No further information given

Vermeulen 1988 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	None described
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not reported, and unclear how RTW was assessed (questionnaire or register)
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss-to-follow-up reported. RTW results at 1-year follow-up describe 85 participants. Examination of exercise tolerance at 5-year follow-up according to working status describes 89 participants
Selective reporting (reporting bias)	Low risk	No study protocol was available. However, the results were not statistically significant, and little differences were observed regarding RTW between the intervention and control group
Other bias	Unclear risk	None identified

WHO 1983

Methods	**Study design:** multi-centre, RCT **Recruitment:** 24 centres; hospitalised AMI patients from June 1973-October 1975 **Allocation**: not reported **Blinding**: not reported **Randomisation:** random numbers table (some centres applied cluster-randomisation or a non-randomised control group) **Follow-up(s):** 3, 6, 12 months, 2 and 3 years **Description**: combined rehabilitation programme
Participants	**Baseline characteristics** Intervention group (rehabilitation) • Age (%): 38% < 50 years; 41% 50-59 years; 21% 60-65 years • Sex (male %): 100 • Number of participants randomised: 1655 • Working before CHD: - Control group • Mean age (SD): 34% < 50 years; 39% 50-59 years; 28% 60-65 years • Sex (male %): 100 • Number of participants randomised: 1529 • Working before CHD: - **Inclusion criteria** • Diagnosed with AMI and treated in hospital

WHO 1983 *(Continued)*

	• Male • Aged < 66 at AMI **Exclusion criteria** - **Baseline imbalances:** - Physically demanding work: unknown **Severity of CHD**: severe

Interventions	**Intervention characteristics**
	
	• Each centre developed their own combined rehabilitation programme. The programmes' goals were to improve health by addressing the following.
	  ○ Treatment of underlying conditions and relevant co-morbidities (e.g. heart failure, diabetes, etc.)
	  ○ Risk factors (e.g. weight and serum lipid level reduction, smoking cessation, reduction of alcohol consumption, etc)
	  ○ Increase physical working capacity
	  ○ "Psychological, social and vocational sequelae of AMI had to be identified and corrected as far as possible"
	  ○ Physical training (optional)
	• Duration of intervention: -
	• Providers: -
	
	Control group
	
	• Usual care according to the region of the centre

Outcomes	Proportion at work at < 6 months (short term): 3 months Proportion at work at 6–12 months (medium term): 12 months Proportion at work at > 12 months to < 5 years (long term): 3 years Adverse events (mortality, reinfarctions, non-fatal reinfarctions)
Identification	**Sponsorship source:** WHO **Country:** international **Setting:** - **Possible conflicts of interest**: no information provided **Ethics committee approval**: not reported
Notes	The results of the individual centres were often published separately and the number of people included in the RTW results were not reported, therefore this study is not included in the meta-analyses.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Although the study protocol called for the randomisation of participants according to random number tables, some study centres applied cluster-randomisation or a selected a non-randomised control group (i.e. control hospital). Also the study authors write, "Only 12 centres out of the 24 seemed to have achieved proper randomisation in their groups of R and C patients".

WHO 1983 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	None described
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants was not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	None described
Incomplete outcome data (attrition bias) All outcomes	High risk	Quote: "By 1 April 1970 data on follow-up over a three-year period were available for about 78% of all patients initially enrolled in the study." Overall 22% loss to follow-up
Selective reporting (reporting bias)	Low risk	All of the results' proposed analyses seem to have been reported.
Other bias	Unclear risk	None identified

Worcester 1993

Methods	**Study design**: parallel RCT **Recruitment:** patients admitted to CCU with AMI over 3 years **Allocation**: not reported **Blinding**: not reported/open-management trial **Randomisation**: not reported **Follow-up(s):** 4 and 12 months **Description**: intense versus light exercise in men < 70 years of age
Participants	**Baseline characteristics** Intervention group (exercise training) • Mean age (SD): 54.8(0.8) • Sex (male %): 100 • Number of participants randomised: 108 • Working before CHD: 81 Intervention group (light exercise) • Mean age (SD): 53.9(0.8) • Sex (male %): 100 • Number of participants randomised: 116 • Working before CHD: 84 **Included criteria** • Men • < 70 years

Worcester 1993 *(Continued)*

- Admitted consecutively to a single CCU with transmural (Q-wave) AMI

Excluded criteria

- Distance from programme venues
- Inadequate command of the language
- Anticipated non-compliance with the programme
- Psychological disability
- Contamination, based on expressed preference for one or the other programme
- Early transfer to another hospital
- Excluded due to an administrative error

Baseline imbalances: -

Description and recruitment methods: during the 3 years of enrolment 339 men satisfied the criteria for entry to the study. Men < 70 years who had been admitted consecutively to a single CCU with AMI were eligible for the study.

Physically demanding work (i.e. white- vs blue-collar): blue-collar

Severity of CHD: severe (included clinical heart failure)

Interventions	**Intervention characteristics**
	• Exercise training
	  ○ 3 x 1 h classes/week in a gymnasium owned by the YMCA
	  ○ Training programme complied with American Heart Association recommendations
	  ○ Duration of intervention: 8 weeks
	  ○ Providers: teacher of physical education; physician attending
	Control group
	• Light exercise 2 x 1 h classes/week in the outpatient physiotherapy room (8)
	• Duration of intervention: 8 weeks
	• Providers: physiotherapist

Outcomes	Proportion at work at < 6 months (short term): 4 months Proportion at work at 6 –12 months (medium term): 12 months Spielberger state anxiety trait inventory; IPAT depression scale; Hackett-Cassern denial scale; Eysenck personality inventory Adverse events (mortality)
Identification	**Sponsorship source:** National Heart Foundation of Australia **Country:** Australia **Setting:** Australian teaching hospital: single centre, at the Austin Hospital, Melbourne; outpatient **Possible conflicts of interest**: not reported **Ethics committee approval**: all participants gave their informed consent.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Worcester 1993 *(Continued)*

Random sequence generation (selection bias)	Low risk	The randomisation method is not explicitly described. However, the study authors cite a paper by Peto et al (1976) that describes randomisation techniques and includes a random numbers table
Allocation concealment (selection bias)	Unclear risk	No allocation concealment is described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Due to the nature of the study, blinding of participants (and personnel) is not possible.
Blinding of outcome assessment (detection bias) All outcomes	High risk	No blinding of outcome assessors is described, and the assessment of occupational status seems to have been accomplished with semi-structured interviews and not with a validated questionnaire or an independent external source, such as employment records. However, several validated instruments measuring depression and anxiety were used to assess quality of life.
Incomplete outcome data (attrition bias) All outcomes	High risk	The loss to follow-up was greater in the Intervention group at both the 4- and 12-month reviews. No ITT analysis was conducted.
Selective reporting (reporting bias)	Unclear risk	Unable to determine, no study protocol was available
Other bias	Unclear risk	None identified

AMI: acute myocardial infarction; **APQLQ:** Angina Pectoris Quality of Life Questionnaire; **BMI:** body mass index; **BP:** blood pressure; **CABG:** coronary artery bypass grafting **CABS:** coronary artery bypass surgery; **CAD:** coronary artery disease; **CCU:** coronary care unit; **CHD:** coronary heart disease; **CPK:** creatine phosphokinase; **CPK-MB:** creatine kinase-muscle/brain; **ECG:** electrocardiogram; **ERNA:** Early Return to Normal Activities; **GP:** general practitioner; **HRQoL:** health-related quality of life; **IPAT:** Institute for Personality and Ability Testing; **ITT:** intention-to-treat; **IQR:** interquartile range; **LDH:** lactate dehydrogenase; **LVEF:** left ventricular ejection fraction; **MI:** myocardial infarction; **NYHA:** New York Heart Association; **PCI:** percutaneous coronary intervention; **PTCA:** percutaneous transluminal coronary angioplasty; **QoL:** quality of life; **RCT:** randomised controlled trial; **RTW:** return to work; **SF-36:** 36-item short form survey; **S-ASAT**: serum aspartate aminotransferase; **SGOT:** serum glutamic oxaloacetic transaminase; **W**: Watts; **WHO:** World Health Organization; **YMCA:** Young Men's Christian Association

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Ahlmark 1979	No intervention
Al'khimovich 1990	No RTW
Ali 2018	Not a RCT (cohort)
Aronov 1991	No RTW
Aronov 2006	No RTW
Bar 1992	Participants (not stated how many working prior to MI). By 20 May 2016 no answer to mail. Only 1 centre randomised patients
Ben-Ari 1986	Not a RCT

Study	Reason for exclusion
Bjarnason-Wehrens 1999	No control group
Boszormenyi 1984	Control group did not receive standard care
Boulay 1983	Not a RCT
Bounhoure 2014	Not a RCT
Buchwalsky 2002	Not a RCT
Burns 2007	No control group
Carlsson 1998	No RTW
Cay 1981	Participants - only approximately 50% were working prior to MI, no subgroup analysis
Christensen 2017	Participants included received implantable cardioverter defibrillator and unclear if > 80% had the indications of MI, CABG or PCI
Danchin 1988	Not a RCT
David 2011	No RTW
Davies 1991	Not a RCT
Dimopoulos 1999	Not a RCT
Dominiak 2011	No RTW
Dorn 1999	No RTW
Dorn 2001	No RTW
Dumont 1999	Not a RCT
Espinosa 2004	Not a RCT
Fattirolli 1998	Not RCT (protocol only)
Ferrario 2010	Not a RCT
Follick 1988	No intervention
Foster 1984	No RTW
Fujita 1983	No control group
Gallagher 2003	No RTW
Garrity 1973	Not a RCT
Giannuzzi 1992	No RTW
Giannuzzi 1993	No RTW

Study	Reason for exclusion
Giannuzzi 1997	No RTW
Goeminne 1989	Not a RCT
Grief 1995	No RTW
Griffo 1983	Not a RCT
Groden 1967	No control group
Gutschker 1977	Only an abstract available; not enough information to include: participants only % RTW reported no number of workers; possibly same study as Geissler 1979
Gysan 1999	No control group
Gysan 2004	No RTW
Hakkila 1965	Not a RCT
Hare 1983	Only abstract available; not enough information provided to include - no RTW results
Haussler 1997	Not a RCT
Havelkova 2010	No RTW
Hedback 1993	Not a RCT; same study as Hedback 1987 (excluded; see Hedback 1993, secondary reference)
Heller 1990	No RTW
Heller 1993	Main intervention focused on providing information on healthy nutrition (dietary intervention), and primary physicians were provided information on the benefits of prescribing beta-blockers (pharmaceutical co-intervention)
Henritze 1989	Not a RCT
Hertzeanu 1993	No RTW
Huber 2014	Participants: < 70% of patients included were diagnosed with an ischaemic heart disease (ICD-10 I20-I25)
Hui 2006	No RTW
Iacovino 1997	No usual care control group
Isaaz 2010	No intervention
Jette 1991	No RTW
Johnson 2014	Not a RCT
Kadda 2015	No RTW, self-efficacy scores for total population (including participants not employed at baseline)
Kagan-Ponomarev 1994	Intervention does not fulfil inclusion criteria: early discharge vs normal rehabilitation

Study	Reason for exclusion
Kallio 1979	No RTW
Kamath 2012	No RTW
Karoff 2000b	Not a RCT, same study as Karoff 1997 Karoff 1999, Karoff 2000 (see Karoff 2000b, secondary references)
Kelbaek 1981	No RTW
Kellermann 1968	No control group
Kellermann 1975	Not a RCT
Kittel 2008	Study participants were on sick-leave for > 3 months prior to rehabilitation and were selected because the patient or attending physician anticipated work reintegration would be difficult; 21.5% control group unemployed
Kokutsov 1990	Not a RCT
Korzeniowska-Kubacka 2004	Not a RCT
Korzeniowska-Kubacka 2015	Not a RCT
Kovoor 2006	No RTW
Krasemann 1979	Not a RCT
Kushnir 1976	Not a RCT
Laaksovirta 1985	No intervention
Lamberti 2016	Not a RCT
Lamm 1982	Not a RCT
Langosch 1982	No control group (in the follow-up)
Lautamaki 2017	CABG group compared with PCI, not a control group receiving usual care
Lear 2002	No RTW
Li 2004	No RTW
Liang 1988	No control group
Lie 2009	No RTW
Lisspers 1999	No intervention
Liu 1997	No RTW
Maeland 1987	No RTW
Maeland 1989	No control group

Study	Reason for exclusion
Marchionni 1994	No RTW
Maroto 1996	No RTW
Mayou 1981	Not a RCT
Miller 1988	No RTW comparison
Mirmohammadi 2014	Not a RCT
Mital 1999	No RTW (see Mital 1999 secondary reference)
Mital 2000	Not a RCT
Mulcahy 1971	No control group
Nelson 1994	Participants (< 80% working prior to MI and no RTW subgroup analysis)
Ng 2000	No RTW
Nikolaeva 1986	Not a RCT
Nikrahan 2016	No RTW
Ohm 1987	Not RCT (CBA)
Palatsi 1976	Not a RCT
Pegus 2002	No RTW
Petrie 1996	No control group; all participants were offered rehabilitation programme
Pierson 2001	No RTW
Pitscheider 1995	No control group
Price 2005	Not a RCT
Rakowska 2015	No RTW
Rauscha 1988	No intervention
Redfern 2007	No RTW
Reid 2012	No RTW
Roviaro 1984	No RTW
Rudnicki 1977	No RTW
Rugulies 2003	No RTW
Salonen 1980	No control group
Salvetti 2008	No RTW

Study	Reason for exclusion
Saner 1999	No control group
Sanne 1973	Difference in RTW between treatment groups not reported (only total RTW in the entire population)
Schaller 1977	No RTW comparison
Schiller 1976	Unclear how many participants were working; intervention unclear; not RCT
Schlierf 1995	No RTW
Schuster 1995	Not a RCT
Schwartze 1991	Not an RCT, no control group
Shapiro 1972	No control group
Shrey 2000	Review
Sieber 1986	Not a RCT
Siggeirsdottir 2016	Not a RCT
Simchen 2001	Not a RCT
Sledzevskaia 1994	No RTW
Smirnov 1989	No RTW
Speiser 1982	No intervention
Steinacker 2011	No RTW
Stepanova 1975	No RTW
Sturchio 2012	No RTW
Sundin 1994	No RTW
Szalewska 2015a	Not a RCT
Szalewska 2015b	Not a RCT
Tarasov 1998	No RTW
Toms 2003	Self-selection into intervention group
Tooth 1998	No RTW
Van der Peijl 2004	No RTW
Van Dixhoorn 1989	No RTW, no control group
Varvaro 2000	No RTW

Study	Reason for exclusion
Velasco 1982	No true control group without intervention
Vibulchai 2016	No RTW
Wallach 1969	No intervention
Wieslander 2005	No control group
Yonezawa 2009	Participants already returned to work at start of trial
Yoshida 1999	No RTW
Yu 2003	No RTW

CABG: coronary artery bypass grafting; **CBA:** controlled before-after study; **MI:** myocardial infarction; **PCI:** percutaneous coronary intervention; **RTC**: randomised controlled trial; **RTW:** return to work

Characteristics of studies awaiting assessment *[ordered by study ID]*

Franklin 2012

Methods	RCT
Participants	1813 patients (mean age 64 years, 74% men) hospitalized with a primary acute MI
Interventions	multifactorial rehabilitation programs
Outcomes	"Mortality at 2 years. Secondary outcomes included mortality at 1 and 9 years, and cardiac outcomes, MI, hospitalization for heart disease, stroke, percutaneous transluminal coronary angioplasty, coronary artery bypass graft, health-related quality of life (Short Form-36) and psychological general well-being (Psychological General Well-Being [PGWB] scale) at 12 months."
Notes	We were unable to obtain the full text. We only found an extended abstract.

Gao 2007

Methods	RCT
Participants	368 post operative CABG patients
Interventions	health managment group
Outcomes	quality of life
Notes	Unclear if RCT was examined. We were unable to obtain the full text.

Kellermann 1988

Methods	

Kellermann 1988 *(Continued)*

Participants	
Interventions	
Outcomes	
Notes	We found no abstract and were unable to obtain the full text.

Korzeniowska-Kubacka 2003

Methods	controlled trial (unclear if randomised)
Participants	70 men with ischemic heart disease after MI and CABG
Interventions	systematical ambulatory rehabilitation over five years versus six months of physical training
Outcomes	RTW; QOL
Notes	We were unable to obtain the full text.

Landrum 2000

Methods	unclear
Participants	patients with coronary artery disease
Interventions	traditional rehabilitation program veresus rehabiltation with additional stress management
Outcomes	cardiac events and days rehospitalized
Notes	We were unable to obtain this dissertation.

Rangel de Donaldo 1994

Methods	
Participants	
Interventions	
Outcomes	
Notes	We were unable to obtain this dissertation.

CABG: coronary artery bypass grafting; **MI:** myocardial infarction; **RTC**: randomised controlled trial; **RTW:** return to work; **QOL:** quality of life

Characteristics of ongoing studies *[ordered by study ID]*

EXPERTIS

Trial name or title	Prevention of reduced employability with an expert system with telephone, motivational interviews supporting self-management (EXPERTIS)
Methods	Cohort study; participants will be asked to fill out questionnaire when arriving at the rehabilitation clinic as well as to take part in 2 subsequent telephone interviews after 6 and 12 months
Participants	Insurants of the German Retirement Insurance (Deutsche Rentenversicherung) Oldenburg-Bremen; age: 18-85 years
Interventions	Medical rehabilitation
Outcomes	Primary: e.g. motivation for returning to work (time frame: when arriving at the rehabilitation clinic); change in motivation for returning to work at 6 and 12 months (time frame: after the rehabilitation treatment at 6 and 12 months); actual RTW (time frames: after the rehabilitation treatment at 6 and 12 months)
Starting date	October 2014
Contact information	Responsible party: Prof. Dr. Sonia Lippke, Professor of Health Psychology, Jacobs University Bremen gGmbH
Notes	

LC-REHAB

Trial name or title	Effect of learning and coping strategies in cardiac rehabilitation - group study (LC-REHAB)
Methods	RCT; 750 participants with data collection at baseline, just after rehabilitation and 3 months/years after rehabilitation
Participants	Patients 18-60 years newly hospitalised with either ischaemic heart disease or heart failure
Interventions	Behavioral: learning and coping arm; other: control arm
Outcomes	Secondary: e.g. RTW (time frame: at baseline and after 1 year)
Starting date	November 30, 2010
Contact information	Vibeke Lynggaard, Herning Hospital
Notes	

MILESTONE

Trial name or title	Revascularization in patients with non-ST-segment elevation acute coronary syndrome (NSTE-ACS) with multivessel and/or unprotected left main coronary disease (MILESTONE)
Methods	RCT
Participants	Age: > 21 years
Interventions	Procedure 1: PCI; procedure 2: CABG

MILESTONE *(Continued)*

Outcomes	Secondary: e.g. RTW (time frame: peri-hospital period, 1 month and 1 year after revascularisation procedure)
Starting date	June 2011
Contact information	Professor Pawel E. Buszman, MD, PhD, FESC, FACC, FSCAI,, American Heart of Poland
Notes	

SATISFY-SOS

Trial name or title	Systematic assessment and targeted improvement of services following yearlong surgical outcomes surveys (SATISFY-SOS)
Methods	Cohort study; surveys by either email, mail or via a telephone interview at 30-90 days and at 1 year post-procedure
Participants	Surgical and procedural patients who require anaesthesia services; age: >18 years
Interventions	Several surgical procedures with anaesthesia services
Outcomes	Other: RTW (time frame: 1 year)
Starting date	July 2012
Contact information	Sherry L McKinnon, AA (mckinnos@anest.wustl.edu); Michael S. Avidan, MBBCh, FCASA (avidanm@anest.wustl.edu)
Notes	

SUSTAINCSX

Trial name or title	SodiUm SeleniTe Administration IN Cardiac Surgery (SUSTAIN CSX®-Trial)
Methods	Randomised, placebo-controlled, double-blind, multicentre trial; 1400 participants across 20 sites in Germany and Canada
Participants	Age: > 18
Interventions	Perioperative supplementation in high-risk cardiac surgical patients undergoing complicated open heart surgery; drug 1: sodium selenite; drug 2: placebo
Outcomes	Secondary: e.g. RTW (time frame: 6-months)
Starting date	January 2015
Contact information	Daren K Heyland, MD (dkh2@queensu.ca)
Notes	

WARRIOR	
Trial name or title	Women's ischaemia trial to reduce events in non-obstructive CAD (WARRIOR)
Methods	Multicenter, prospective, randomised, blinded outcome evaluation; 4422 participants
Participants	Symptomatic women patients with symptoms and/or signs of ischaemia but no obstructive CAD
Interventions	Experimental: intensive medical treatment (4 kinds of drugs, 2 behavioral interventions); active comparator: usual care (the same 2 behavioral interventions as in experimental group)
Outcomes	Secondary: time to RTW
Starting date	9 February 2018
Contact information	Trinity J Cromwell, RN (tcromwell@ufl.edu); Debra Landers (debra.landers@medicine.ufl.edu)
Notes	

CABG: coronary artery bypass graft; **CAD:** coronary artery disease; **PCI:** percutaneous coronary intervention; **RCT:** randomised controlled trial; **RTW:** return to work

DATA AND ANALYSES

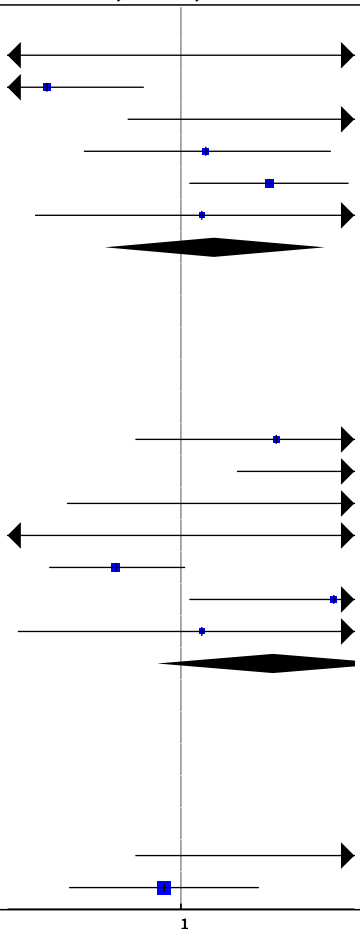
Comparison 1. Psychological interventions (including health education) vs usual care

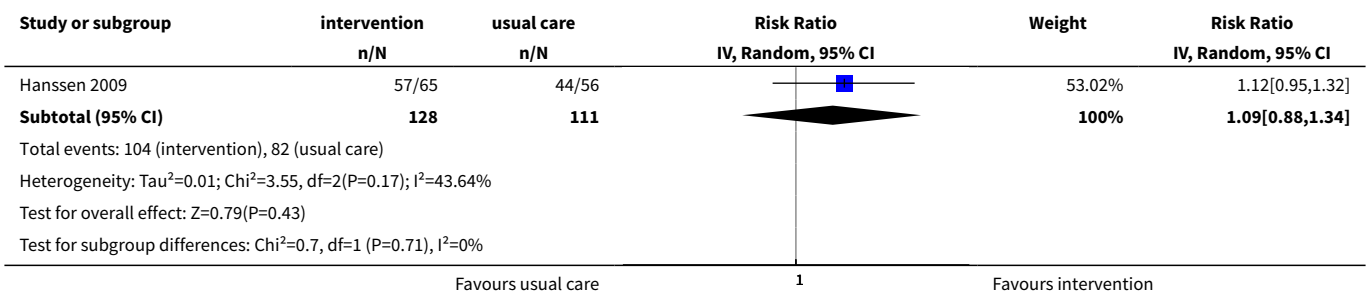
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Proportion returning to work (all studies)	11		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.1 Short term (< 6 months)	6	375	Risk Ratio (IV, Random, 95% CI)	1.08 [0.84, 1.40]
1.2 Medium term (6 months-1 year)	7	316	Risk Ratio (IV, Random, 95% CI)	1.24 [0.95, 1.63]
1.3 Long term (> 1 to < 5 years)	3	239	Risk Ratio (IV, Random, 95% CI)	1.09 [0.88, 1.34]
2 Proportion returning to work short term (< 6 months) by CHD severity	6	397	Risk Ratio (IV, Random, 95% CI)	1.10 [0.85, 1.43]
2.1 CHD severity unknown	3	241	Risk Ratio (IV, Random, 95% CI)	0.98 [0.68, 1.40]
2.2 CHD more severe	2	67	Risk Ratio (IV, Random, 95% CI)	1.10 [0.83, 1.46]
2.3 CHD less severe	1	89	Risk Ratio (IV, Random, 95% CI)	1.87 [1.03, 3.38]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3 Proportion returning to work medium term (6 months-1 year) by CHD severity	7	316	Risk Ratio (IV, Random, 95% CI)	1.23 [0.96, 1.59]
3.1 CHD severity unknown	4	208	Risk Ratio (IV, Random, 95% CI)	1.12 [0.82, 1.53]
3.2 CHD more severe	2	73	Risk Ratio (IV, Random, 95% CI)	1.61 [0.97, 2.67]
3.3 CHD less severe	2	35	Risk Ratio (IV, Random, 95% CI)	1.17 [0.67, 2.03]
4 Mean time until return to work (days)	2	125	Mean Difference (IV, Random, 95% CI)	-9.70 [-35.09, 15.69]

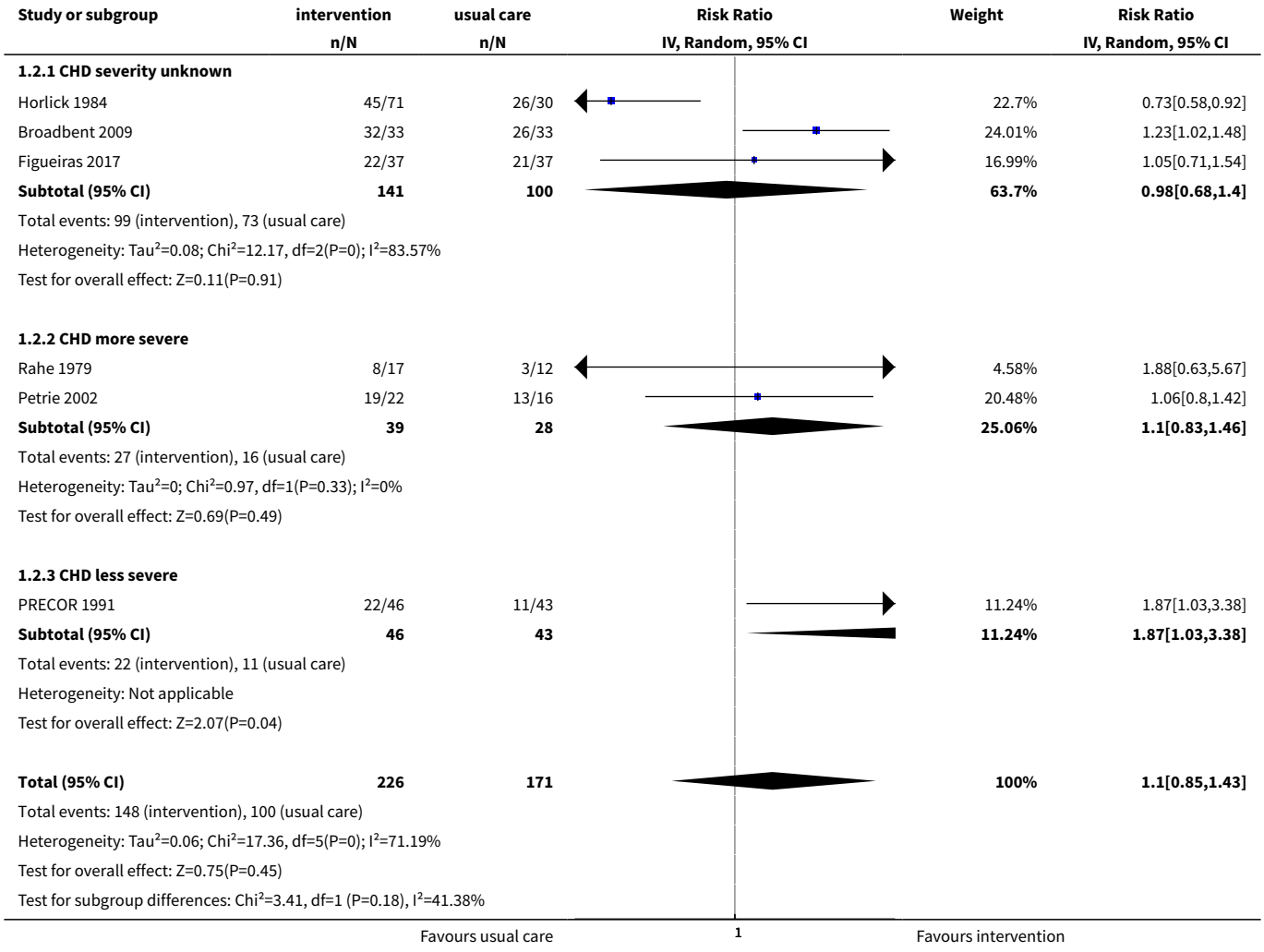
Analysis 1.1. Comparison 1 Psychological interventions (including health education) vs usual care, Outcome 1 Proportion returning to work (all studies).

Study or subgroup	intervention n/N	usual care n/N	Risk Ratio IV, Random, 95% CI	Weight	Risk Ratio IV, Random, 95% CI
1.1.1 Short term (< 6 months)					
Rahe 1979	8/17	3/12		4.58%	1.88[0.63,5.67]
Horlick 1984	45/71	26/30		23.86%	0.73[0.58,0.92]
PRECOR 1991	22/46	5/21		7.31%	2.01[0.88,4.57]
Petrie 2002	19/22	13/16		21.38%	1.06[0.8,1.42]
Broadbent 2009	32/33	26/33		25.32%	1.23[1.02,1.48]
Figueiras 2017	22/37	21/37		17.56%	1.05[0.71,1.54]
Subtotal (95% CI)	**226**	**149**		**100%**	**1.08[0.84,1.4]**
Total events: 148 (intervention), 94 (usual care)					
Heterogeneity: Tau^2=0.06; Chi^2=16.05, df=5(P=0.01); I^2=68.86%					
Test for overall effect: Z=0.6(P=0.55)					
1.1.2 Medium term (6 months-1 year)					
Pozen 1977	30/38	17/27		19.38%	1.25[0.9,1.75]
Rahe 1979	16/17	5/12		10.08%	2.26[1.14,4.46]
Fielding 1980	5/5	3/5		9.4%	1.57[0.77,3.22]
Stern 1983	2/9	0/5		0.87%	3[0.17,52.53]
Horlick 1984	52/65	27/29		25.03%	0.86[0.73,1.01]
Haerem 2000	14/14	11/16		19.07%	1.43[1.02,2.01]
Figueiras 2017	20/37	19/37		16.16%	1.05[0.68,1.62]
Subtotal (95% CI)	**185**	**131**		**100%**	**1.24[0.95,1.63]**
Total events: 139 (intervention), 82 (usual care)					
Heterogeneity: Tau^2=0.07; Chi^2=17, df=6(P=0.01); I^2=64.7%					
Test for overall effect: Z=1.56(P=0.12)					
1.1.3 Long term (> 1 to < 5 years)					
Rahe 1979	12/17	4/12		5.52%	2.12[0.9,4.99]
PRECOR 1991	35/46	34/43		41.47%	0.96[0.77,1.2]



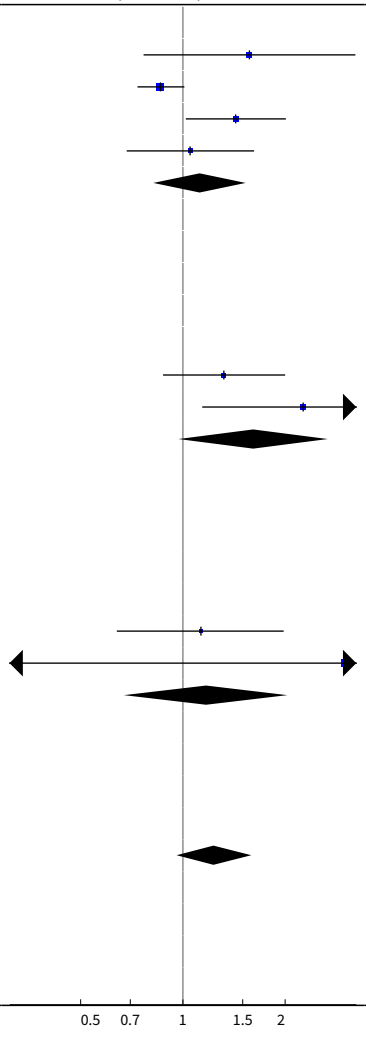


Analysis 1.2. Comparison 1 Psychological interventions (including health education) vs usual care, Outcome 2 Proportion returning to work short term (< 6 months) by CHD severity.



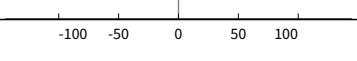
Analysis 1.3. Comparison 1 Psychological interventions (including health education) vs usual care, Outcome 3 Proportion returning to work medium term (6 months-1 year) by CHD severity.

Study or subgroup	intervention n/N	usual care n/N	Risk Ratio IV, Random, 95% CI	Weight	Risk Ratio IV, Random, 95% CI
1.3.1 CHD severity unknown					
Fielding 1980	5/5	3/5		8.33%	1.57[0.77,3.22]
Horlick 1984	52/65	27/29		23.41%	0.86[0.73,1.01]
Haerem 2000	14/14	11/16		17.47%	1.43[1.02,2.01]
Figueiras 2017	20/37	19/37		14.66%	1.05[0.68,1.62]
Subtotal (95% CI)	**121**	**87**		**63.87%**	**1.12[0.82,1.53]**
Total events: 91 (intervention), 60 (usual care)					
Heterogeneity: Tau²=0.06; Chi²=9.1, df=3(P=0.03); I²=67.02%					
Test for overall effect: Z=0.7(P=0.48)					
1.3.2 CHD more severe					
Pozen 1977	21/26	11/18		15.21%	1.32[0.87,2]
Rahe 1979	16/17	5/12		8.96%	2.26[1.14,4.46]
Subtotal (95% CI)	**43**	**30**		**24.17%**	**1.61[0.97,2.67]**
Total events: 37 (intervention), 16 (usual care)					
Heterogeneity: Tau²=0.06; Chi²=1.74, df=1(P=0.19); I²=42.61%					
Test for overall effect: Z=1.84(P=0.07)					
1.3.3 CHD less severe					
Pozen 1977	9/12	6/9		11.21%	1.13[0.64,1.98]
Stern 1983	2/9	0/5		0.75%	3[0.17,52.53]
Subtotal (95% CI)	**21**	**14**		**11.96%**	**1.17[0.67,2.03]**
Total events: 11 (intervention), 6 (usual care)					
Heterogeneity: Tau²=0; Chi²=0.43, df=1(P=0.51); I²=0%					
Test for overall effect: Z=0.55(P=0.58)					
Total (95% CI)	**185**	**131**		**100%**	**1.23[0.96,1.59]**
Total events: 139 (intervention), 82 (usual care)					
Heterogeneity: Tau²=0.06; Chi²=17.14, df=7(P=0.02); I²=59.17%					
Test for overall effect: Z=1.62(P=0.1)					
Test for subgroup differences: Chi²=1.47, df=1 (P=0.48), I²=0%					



Analysis 1.4. Comparison 1 Psychological interventions (including health education) vs usual care, Outcome 4 Mean time until return to work (days).

Study or subgroup	intervention N	intervention Mean(SD)	usual care N	usual care Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Fielding 1980	5	103 (17)	3	130 (22)		35.93%	-27[-56.01,2.01]
Hanssen 2009	68	91 (20)	49	91 (20)		64.07%	0[-7.35,7.35]
Total ***	**73**		**52**			**100%**	**-9.7[-35.09,15.69]**
Heterogeneity: Tau²=247.91; Chi²=3.13, df=1(P=0.08); I²=68.01%							
Test for overall effect: Z=0.75(P=0.45)							



Comparison 2. Work-directed counselling vs usual care

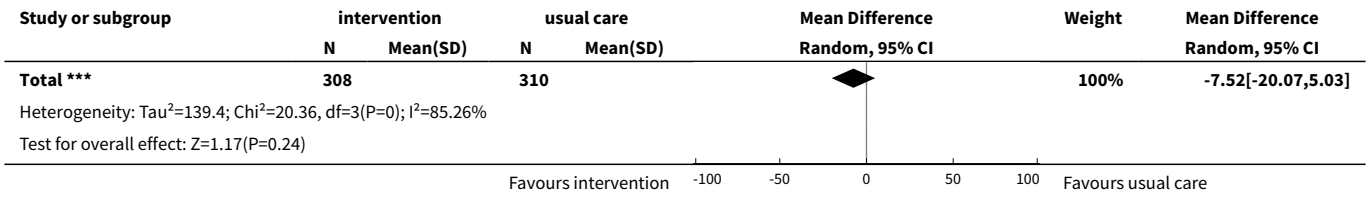
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Proportion returning to work (all studies)	4		Risk Ratio (IV, Random, 95% CI)	Totals not selected
1.1 Short term (< 6 months)	1		Risk Ratio (IV, Random, 95% CI)	0.0 [0.0, 0.0]
1.2 Medium term (6 months-1 year)	2		Risk Ratio (IV, Random, 95% CI)	0.0 [0.0, 0.0]
1.3 Long term (> 1 to < 5 years)	1		Risk Ratio (IV, Random, 95% CI)	0.0 [0.0, 0.0]
2 Mean time until return to work (days)	4	618	Mean Difference (IV, Random, 95% CI)	-7.52 [-20.07, 5.03]
3 Adverse effects: cardiac deaths	2	388	Risk Ratio (IV, Fixed, 95% CI)	1.00 [0.19, 5.39]
4 Adverse effects: reinfarctions	2	388	Risk Ratio (IV, Fixed, 95% CI)	0.67 [0.21, 2.11]

Analysis 2.1. Comparison 2 Work-directed counselling vs usual care, Outcome 1 Proportion returning to work (all studies).

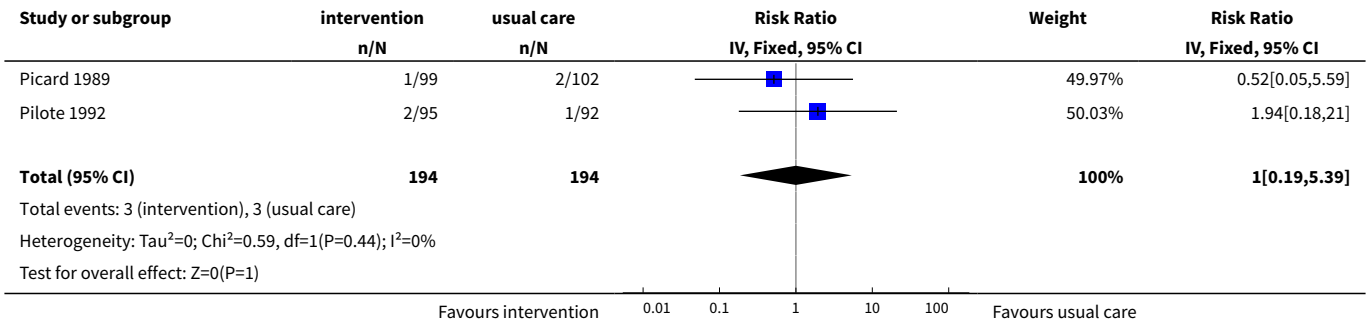
Study or subgroup	intervention n/N	usual care n/N	Risk Ratio IV, Random, 95% CI	Risk Ratio IV, Random, 95% CI
2.1.1 Short term (< 6 months)				
Pfund 2001	40/48	41/52		1.06[0.87,1.28]
2.1.2 Medium term (6 months-1 year)				
Picard 1989	91/99	88/102		1.07[0.97,1.17]
Pilote 1992	82/95	87/92		0.91[0.83,1]
2.1.3 Long term (> 1 to < 5 years)				
Burgess 1987	68/77	67/76		1[0.89,1.12]
		Favours usual care	1	Favours intervention

Analysis 2.2. Comparison 2 Work-directed counselling vs usual care, Outcome 2 Mean time until return to work (days).

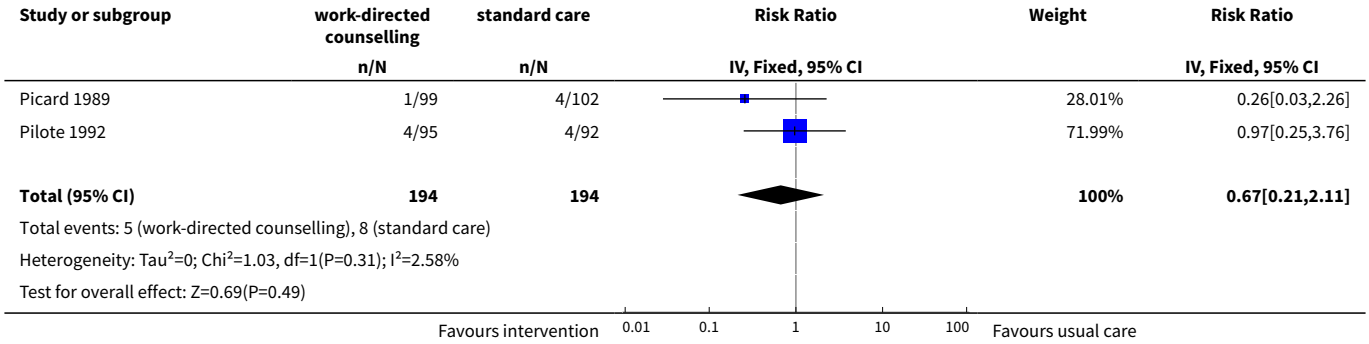
Study or subgroup	intervention N	intervention Mean(SD)	usual care N	usual care Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Burgess 1987	77	75 (30)	76	81 (30)		25.16%	-6[-15.51,3.51]
Picard 1989	99	51 (30)	102	75 (30)		26.06%	-24[-32.3,-15.7]
Pilote 1992	92	60 (35)	91	64 (35)		24.67%	-4[-14.14,6.14]
Pfund 2001	40	21.5 (27.4)	41	16.4 (22)		24.12%	5.1[-5.74,15.94]
					Favours intervention -100 -50 0 50 100		Favours usual care



Analysis 2.3. Comparison 2 Work-directed counselling vs usual care, Outcome 3 Adverse effects: cardiac deaths.



Analysis 2.4. Comparison 2 Work-directed counselling vs usual care, Outcome 4 Adverse effects: reinfarctions.



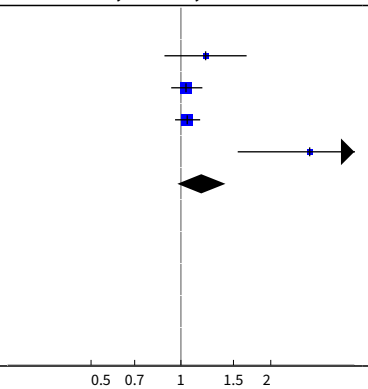
Comparison 3. Physical conditioning interventions vs usual care

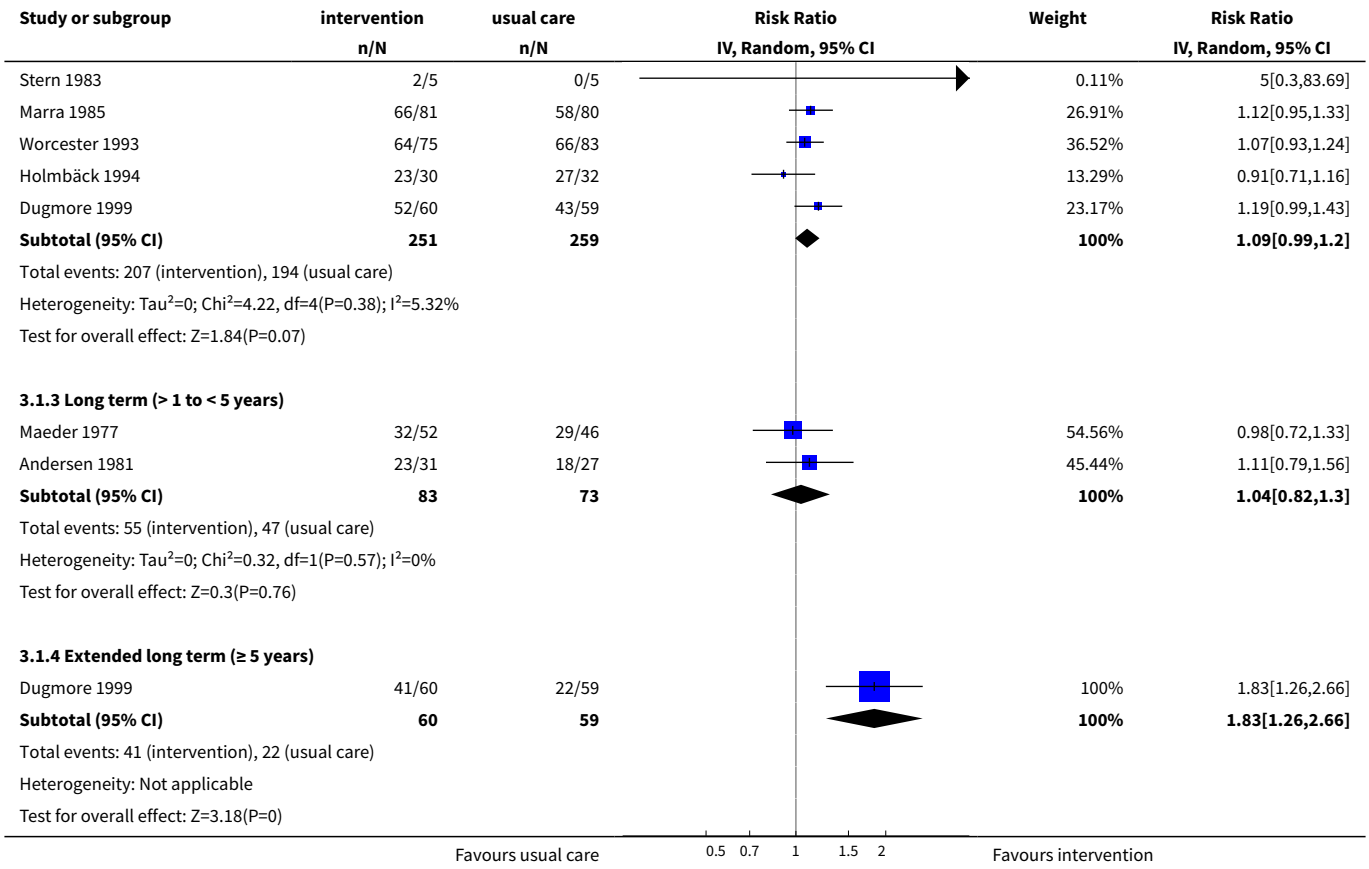
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Proportion returning to work (all studies)	8		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.1 Short term (< 6 months)	4	460	Risk Ratio (IV, Random, 95% CI)	1.17 [0.97, 1.41]
1.2 Medium term (6 months-1 year)	5	510	Risk Ratio (IV, Random, 95% CI)	1.09 [0.99, 1.20]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.3 Long term (> 1 to < 5 years)	2	156	Risk Ratio (IV, Random, 95% CI)	1.04 [0.82, 1.30]
1.4 Extended long term (≥ 5 years)	1	119	Risk Ratio (IV, Random, 95% CI)	1.83 [1.26, 2.66]
2 Proportion returning to work medium term (0.5-1 year) by CHD severity	5	510	Risk Ratio (IV, Fixed, 95% CI)	1.09 [1.00, 1.19]
2.1 CHD more severe	2	277	Risk Ratio (IV, Fixed, 95% CI)	1.12 [1.00, 1.25]
2.2 CHD less severe	3	233	Risk Ratio (IV, Fixed, 95% CI)	1.05 [0.92, 1.21]
3 Mean time until return to work (days)	4	430	Mean Difference (IV, Random, 95% CI)	-7.86 [-29.46, 13.74]
4 Mean time until return to work (days) by physically strenuous workgroup	4		Mean Difference (IV, Random, 95% CI)	Subtotals only
4.1 White-collar/less strenuous	2	153	Mean Difference (IV, Random, 95% CI)	-1.10 [-52.79, 50.59]
4.2 Blue-collar/more strenuous	2	148	Mean Difference (IV, Random, 95% CI)	-28.29 [-48.68, -7.91]
4.3 Type of work not reported	1	129	Mean Difference (IV, Random, 95% CI)	3.0 [-5.81, 11.81]
5 Adverse effects: cardiac deaths	2	285	Risk Ratio (IV, Fixed, 95% CI)	1.00 [0.35, 2.80]
6 Adverse effects: reinfarctions	2	230	Risk Ratio (IV, Fixed, 95% CI)	0.70 [0.26, 1.88]

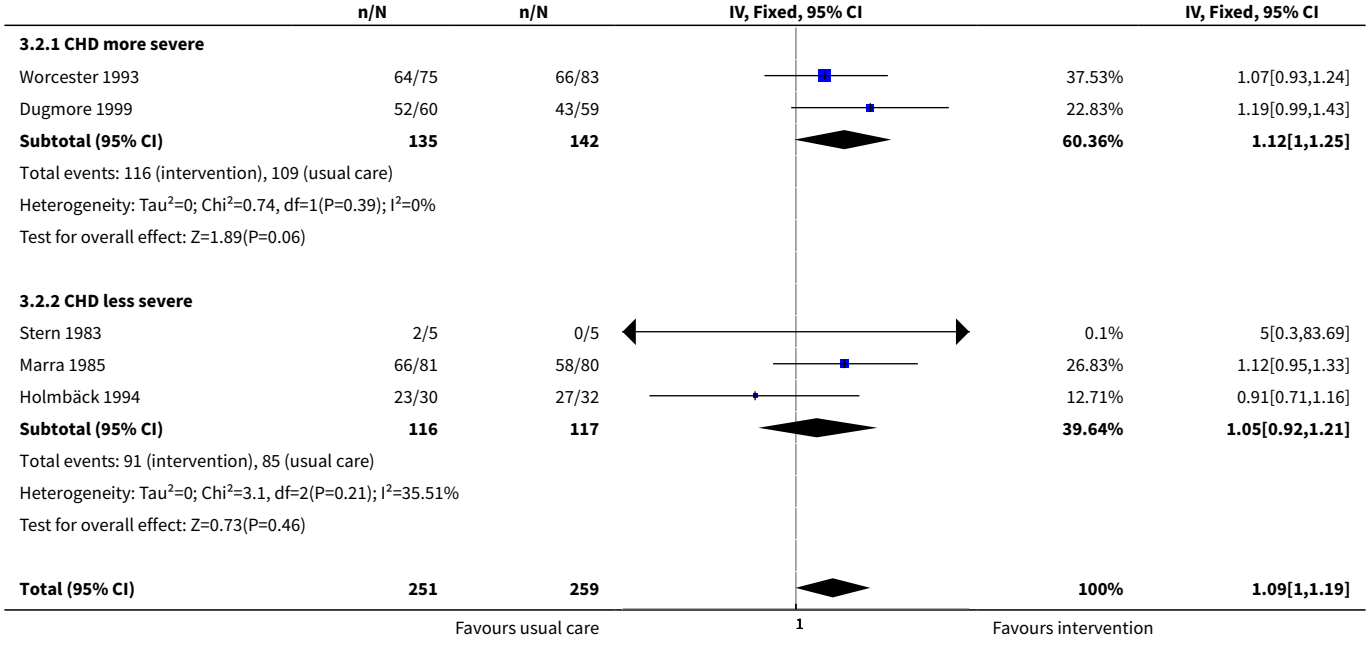
Analysis 3.1. Comparison 3 Physical conditioning interventions vs usual care, Outcome 1 Proportion returning to work (all studies).

Study or subgroup	intervention n/N	usual care n/N	Risk Ratio IV, Random, 95% CI	Weight	Risk Ratio IV, Random, 95% CI
3.1.1 Short term (< 6 months)					
Andersen 1981	25/31	18/27		18.65%	1.21[0.88,1.66]
Worcester 1993	67/75	71/83		35.47%	1.04[0.93,1.18]
Froelicher 1994	60/63	56/62		37.1%	1.05[0.96,1.16]
Dugmore 1999	33/60	12/59		8.77%	2.7[1.55,4.71]
Subtotal (95% CI)	**229**	**231**		**100%**	**1.17[0.97,1.41]**
Total events: 185 (intervention), 157 (usual care)					
Heterogeneity: Tau^2=0.02; Chi^2=11.54, df=3(P=0.01); I^2=74.01%					
Test for overall effect: Z=1.67(P=0.09)					
3.1.2 Medium term (6 months-1 year)					





Analysis 3.2. Comparison 3 Physical conditioning interventions vs usual care, Outcome 2 Proportion returning to work medium term (0.5-1 year) by CHD severity.



Study or subgroup	intervention n/N	usual care n/N	Risk Ratio IV, Fixed, 95% CI	Weight	Risk Ratio IV, Fixed, 95% CI
Total events: 207 (intervention), 194 (usual care)					
Heterogeneity: Tau²=0; Chi²=4.22, df=4(P=0.38); I²=5.32%					
Test for overall effect: Z=1.93(P=0.05)					
Test for subgroup differences: Chi²=0.39, df=1 (P=0.53), I²=0%					

Favours usual care 1 Favours intervention

Analysis 3.3. Comparison 3 Physical conditioning interventions vs usual care, Outcome 3 Mean time until return to work (days).

Study or subgroup	intervention N	Mean(SD)	standard care N	Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Maeder 1977	44	96 (63)	34	120 (63)		22.4%	-24[-52.19,4.19]
Marra 1985	81	146 (63)	80	174 (63)		27.99%	-28[-47.46,-8.54]
Bethell 1990	63	96 (26)	66	93 (25)		34.16%	3[-5.81,11.81]
Holmbäck 1994	30	112 (93)	32	84 (72)		15.46%	28[-13.59,69.59]
Total ***	**218**		**212**			**100%**	**-7.86[-29.46,13.74]**
Heterogeneity: Tau²=335.25; Chi²=12.38, df=3(P=0.01); I²=75.77%							
Test for overall effect: Z=0.71(P=0.48)							

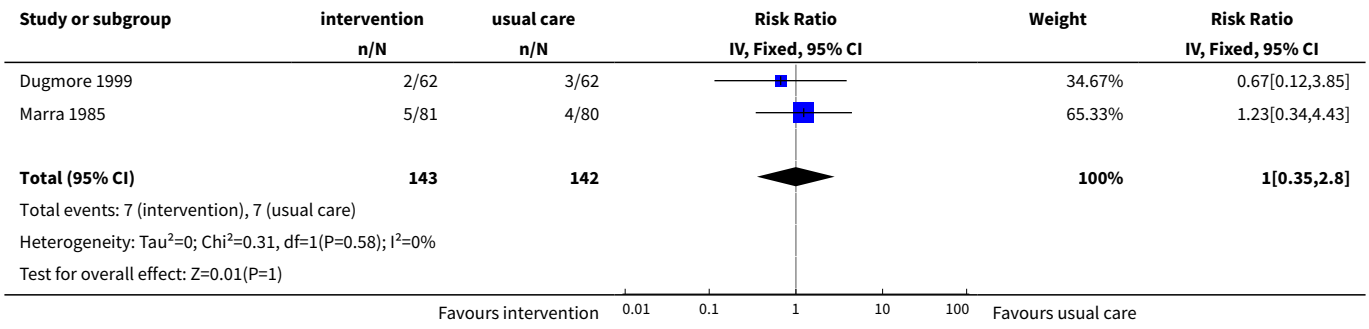
Favours intervention -50 -25 0 25 50 Favours usual care

Analysis 3.4. Comparison 3 Physical conditioning interventions vs usual care, Outcome 4 Mean time until return to work (days) by physically strenuous workgroup.

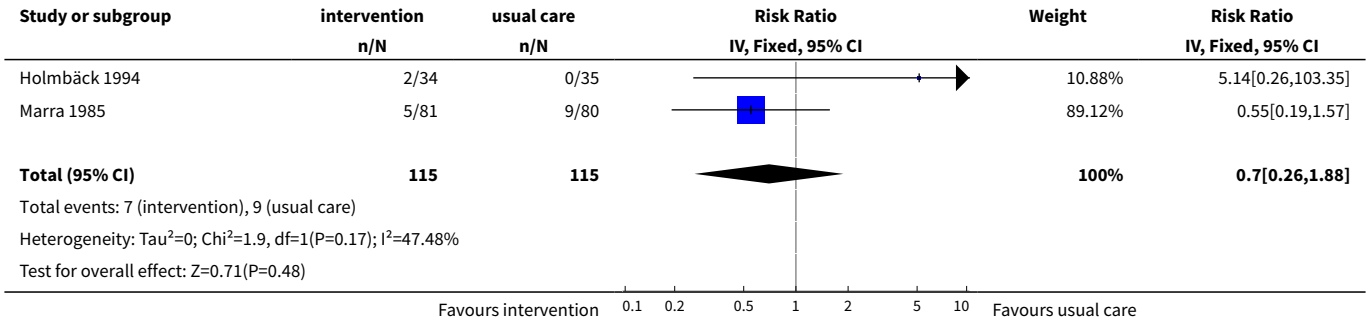
Study or subgroup	intervention N	Mean(SD)	standard care N	Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
3.4.1 White-collar/less strenuous							
Marra 1985	46	144 (63)	45	169 (63)		54.91%	-25[-50.89,0.89]
Holmbäck 1994	30	112 (93)	32	84 (72)		45.09%	28[-13.59,69.59]
Subtotal ***	**76**		**77**			**100%**	**-1.1[-52.79,50.59]**
Heterogeneity: Tau²=1092.11; Chi²=4.5, df=1(P=0.03); I²=77.76%							
Test for overall effect: Z=0.04(P=0.97)							
3.4.2 Blue-collar/more strenuous							
Maeder 1977	44	96 (63)	34	120 (63)		52.29%	-24[-52.19,4.19]
Marra 1985	35	148 (63)	35	181 (63)		47.71%	-33[-62.52,-3.48]
Subtotal ***	**79**		**69**			**100%**	**-28.29[-48.68,-7.91]**
Heterogeneity: Tau²=0; Chi²=0.19, df=1(P=0.67); I²=0%							
Test for overall effect: Z=2.72(P=0.01)							
3.4.3 Type of work not reported							
Bethell 1990	63	96 (26)	66	93 (25)		100%	3[-5.81,11.81]
Subtotal ***	**63**		**66**			**100%**	**3[-5.81,11.81]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.67(P=0.5)							

Favours intervention -50 -25 0 25 50 Favours usual care

Analysis 3.5. Comparison 3 Physical conditioning interventions vs usual care, Outcome 5 Adverse effects: cardiac deaths.



Analysis 3.6. Comparison 3 Physical conditioning interventions vs usual care, Outcome 6 Adverse effects: reinfarctions.



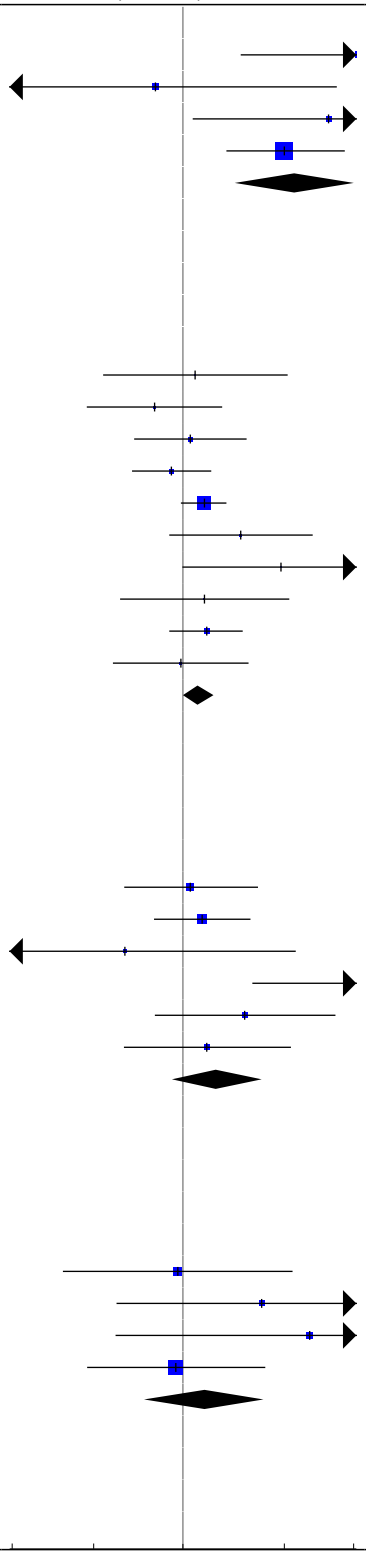
Comparison 4. Combined interventions vs usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Proportion returning to work (all studies)	13		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.1 Short term (< 6 months)	4	395	Risk Ratio (IV, Random, 95% CI)	1.56 [1.23, 1.98]
1.2 Medium term (6 months-1 year)	10	992	Risk Ratio (IV, Random, 95% CI)	1.06 [1.00, 1.13]
1.3 Long term (> 1 to < 5 years)	6	491	Risk Ratio (IV, Random, 95% CI)	1.14 [0.96, 1.37]
1.4 Extended long term (≥ 5 years)	4	350	Risk Ratio (IV, Random, 95% CI)	1.09 [0.86, 1.38]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2 Proportion returning to work medium term (6 months-1 year) by CHD severity	10	992	Risk Ratio (IV, Random, 95% CI)	1.06 [1.00, 1.13]
2.1 CHD more severe	3	293	Risk Ratio (IV, Random, 95% CI)	1.12 [0.99, 1.25]
2.2 CHD less severe	4	384	Risk Ratio (IV, Random, 95% CI)	0.96 [0.85, 1.08]
2.3 CHD severity unknown	3	315	Risk Ratio (IV, Random, 95% CI)	1.10 [0.99, 1.24]
3 Proportion returning to work medium term (6 months-1 year) by physically strenuous work	10		Risk Ratio (IV, Random, 95% CI)	Subtotals only
3.1 White-collar/less strenuous	3	357	Risk Ratio (IV, Random, 95% CI)	1.11 [0.97, 1.28]
3.2 Blue-collar/more strenuous	2	167	Risk Ratio (IV, Random, 95% CI)	1.06 [0.76, 1.48]
3.3 Type of work not reported	5	468	Risk Ratio (IV, Random, 95% CI)	1.05 [0.98, 1.13]
4 Proportion returning to work medium term (6 months-1 year) by sex	10		Risk Ratio (IV, Random, 95% CI)	Subtotals only
4.1 Men only	3	273	Risk Ratio (IV, Random, 95% CI)	1.09 [0.81, 1.45]
4.2 Women and men	6	623	Risk Ratio (IV, Random, 95% CI)	1.07 [1.00, 1.14]
4.3 Women only	1	96	Risk Ratio (IV, Random, 95% CI)	0.99 [0.76, 1.30]
5 Mean time until return to work (days)	2	181	Mean Difference (IV, Random, 95% CI)	-40.77 [-67.19, -14.35]
6 Health-related quality of life	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
7 Adverse effects: total mortality	4	438	Odds Ratio (M-H, Fixed, 95% CI)	1.43 [0.59, 3.51]
8 Adverse effects: reinfarctions	3	265	Odds Ratio (M-H, Fixed, 95% CI)	0.56 [0.23, 1.40]

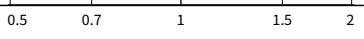
Analysis 4.1. Comparison 4 Combined interventions vs usual care, Outcome 1 Proportion returning to work (all studies).

Study or subgroup	intervention n/N	usual care n/N	Risk Ratio IV, Random, 95% CI	Weight	Risk Ratio IV, Random, 95% CI
4.1.1 Short term (< 6 months)					
Rivas 1988	60/102	14/48		20.8%	2.02[1.26,3.23]
PRECOR 1991	11/48	11/43		9.71%	0.9[0.43,1.85]
Bertie 1992	20/29	10/26		16.26%	1.79[1.04,3.09]
Higgins 2001	46/50	30/49		53.23%	1.5[1.19,1.91]
Subtotal (95% CI)	**229**	**166**		**100%**	**1.56[1.23,1.98]**
Total events: 137 (intervention), 65 (usual care)					
Heterogeneity: Tau^2=0.01; Chi^2=3.73, df=3(P=0.29); I^2=19.54%					
Test for overall effect: Z=3.7(P=0)					
4.1.2 Medium term (6 months-1 year)					
Erdman 1986	21/32	20/32		2.54%	1.05[0.73,1.52]
Vermeulen 1988	27/40	34/45		4.64%	0.89[0.68,1.17]
Rivas 1988	75/102	30/42		6.83%	1.03[0.82,1.29]
Oldridge 1991	52/65	62/74		13.8%	0.95[0.82,1.12]
Froelicher 1994	51/52	56/62		42.35%	1.09[0.99,1.19]
Lidell 1996	35/44	24/38		4.21%	1.26[0.95,1.68]
Engblom 1997	37/66	22/58		2.22%	1.48[1,2.19]
Hofman-Bang 1999	20/27	19/28		2.98%	1.09[0.78,1.53]
Higgins 2001	40/43	39/46		15.79%	1.1[0.95,1.27]
Andersson 2010	37/54	29/42		4.65%	0.99[0.76,1.3]
Subtotal (95% CI)	**525**	**467**		**100%**	**1.06[1,1.13]**
Total events: 395 (intervention), 335 (usual care)					
Heterogeneity: Tau^2=0; Chi^2=8.17, df=9(P=0.52); I^2=0%					
Test for overall effect: Z=2.07(P=0.04)					
4.1.3 Long term (> 1 to < 5 years)					
Bengtsson 1983	27/36	29/40		22.99%	1.03[0.79,1.35]
PRECOR 1991	41/48	34/43		30.73%	1.08[0.89,1.31]
Bertie 1992	10/29	10/23		5.92%	0.79[0.4,1.57]
Engblom 1997	26/64	9/57		6.17%	2.57[1.32,5.02]
Hofman-Bang 1999	21/27	17/28		16.22%	1.28[0.89,1.84]
Andersson 2010	34/54	24/42		17.97%	1.1[0.79,1.54]
Subtotal (95% CI)	**258**	**233**		**100%**	**1.14[0.96,1.37]**
Total events: 159 (intervention), 123 (usual care)					
Heterogeneity: Tau^2=0.02; Chi^2=7.93, df=5(P=0.16); I^2=36.98%					
Test for overall effect: Z=1.47(P=0.14)					
4.1.4 Extended long term (≥ 5 years)					
Erdman 1986	15/27	17/30		27.23%	0.98[0.62,1.55]
Lidell 1996	19/44	12/38		17.27%	1.37[0.77,2.44]
Engblom 1997	15/61	8/54		9.57%	1.66[0.76,3.61]
Andersson 2010	30/54	24/42		45.93%	0.97[0.68,1.39]
Subtotal (95% CI)	**186**	**164**		**100%**	**1.09[0.86,1.38]**
Total events: 79 (intervention), 61 (usual care)					
Heterogeneity: Tau^2=0; Chi^2=2.32, df=3(P=0.51); I^2=0%					
Test for overall effect: Z=0.69(P=0.49)					
Test for subgroup differences: Chi^2=9.84, df=1 (P=0.02), I^2=69.52%					



Analysis 4.2. Comparison 4 Combined interventions vs usual care, Outcome 2 Proportion returning to work medium term (6 months-1 year) by CHD severity.

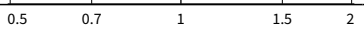
Study or subgroup	comprehensive intervention n/N	standard care n/N	Risk Ratio IV, Random, 95% CI	Weight	Risk Ratio IV, Random, 95% CI
4.2.1 CHD more severe					
Froelicher 1994	51/52	56/62		42.35%	1.09[0.99,1.19]
Engblom 1997	37/66	22/58		2.22%	1.48[1,2.19]
Hofman-Bang 1999	20/27	19/28		2.98%	1.09[0.78,1.53]
Subtotal (95% CI)	**145**	**148**		**47.55%**	**1.12[0.99,1.25]**
Total events: 108 (comprehensive intervention), 97 (standard care)					
Heterogeneity: Tau^2=0; Chi^2=2.26, df=2(P=0.32); I^2=11.34%					
Test for overall effect: Z=1.82(P=0.07)					
4.2.2 CHD less severe					
Erdman 1986	21/32	20/32		2.54%	1.05[0.73,1.52]
Vermeulen 1988	27/40	34/45		4.64%	0.89[0.68,1.17]
Oldridge 1991	52/65	62/74		13.8%	0.95[0.82,1.12]
Andersson 2010	37/54	29/42		4.65%	0.99[0.76,1.3]
Subtotal (95% CI)	**191**	**193**		**25.62%**	**0.96[0.85,1.08]**
Total events: 137 (comprehensive intervention), 145 (standard care)					
Heterogeneity: Tau^2=0; Chi^2=0.56, df=3(P=0.91); I^2=0%					
Test for overall effect: Z=0.71(P=0.48)					
4.2.3 CHD severity unknown					
Rivas 1988	75/102	30/42		6.83%	1.03[0.82,1.29]
Lidell 1996	35/44	24/38		4.21%	1.26[0.95,1.68]
Higgins 2001	40/43	39/46		15.79%	1.1[0.95,1.27]
Subtotal (95% CI)	**189**	**126**		**26.83%**	**1.1[0.99,1.24]**
Total events: 150 (comprehensive intervention), 93 (standard care)					
Heterogeneity: Tau^2=0; Chi^2=1.2, df=2(P=0.55); I^2=0%					
Test for overall effect: Z=1.7(P=0.09)					
Total (95% CI)	**525**	**467**		**100%**	**1.06[1,1.13]**
Total events: 395 (comprehensive intervention), 335 (standard care)					
Heterogeneity: Tau^2=0; Chi^2=8.17, df=9(P=0.52); I^2=0%					
Test for overall effect: Z=2.07(P=0.04)					
Test for subgroup differences: Chi^2=4.07, df=1 (P=0.13), I^2=50.84%					



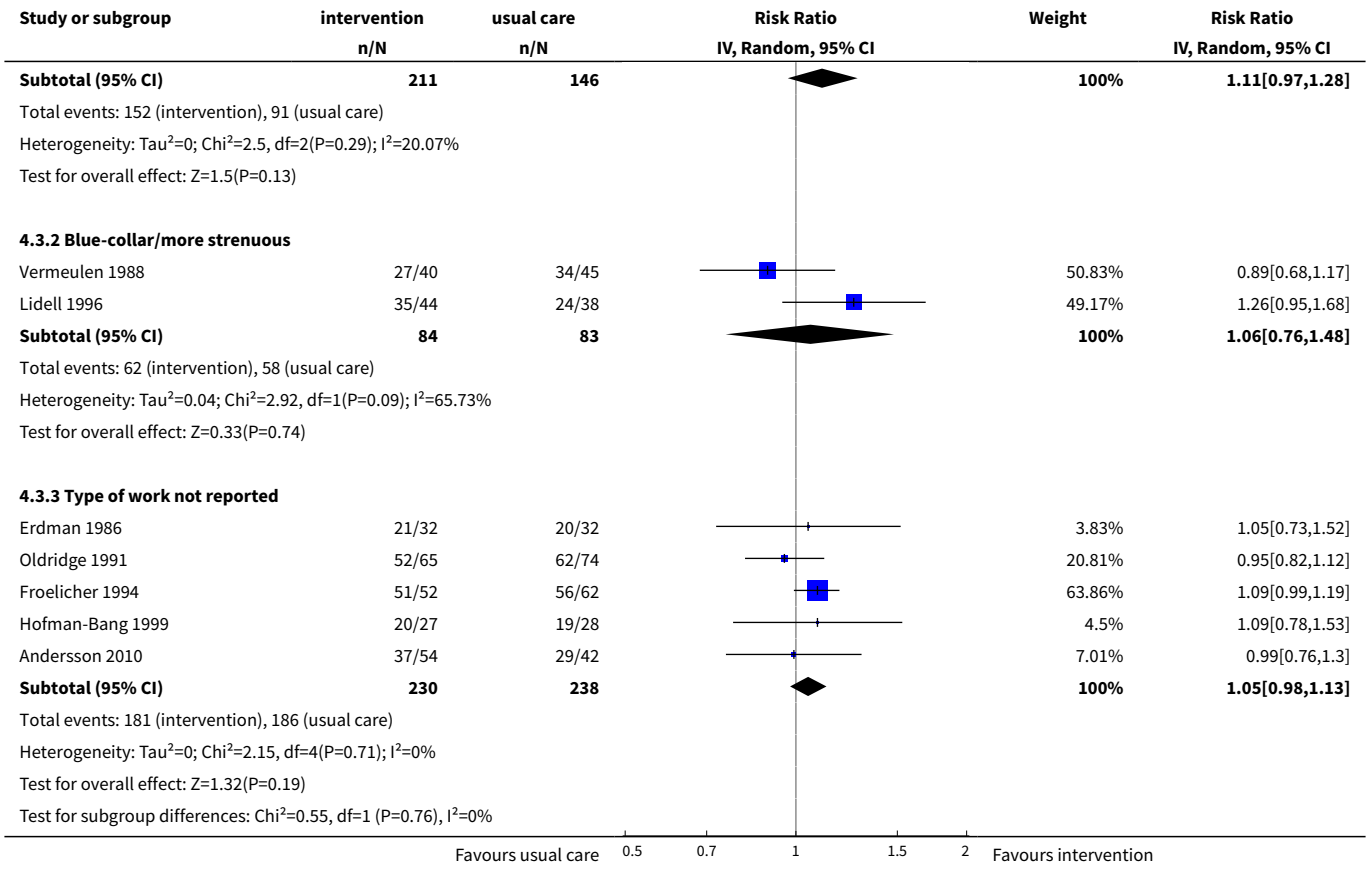
Favours usual care — Favours intervention

Analysis 4.3. Comparison 4 Combined interventions vs usual care, Outcome 3 Proportion returning to work medium term (6 months-1 year) by physically strenuous work.

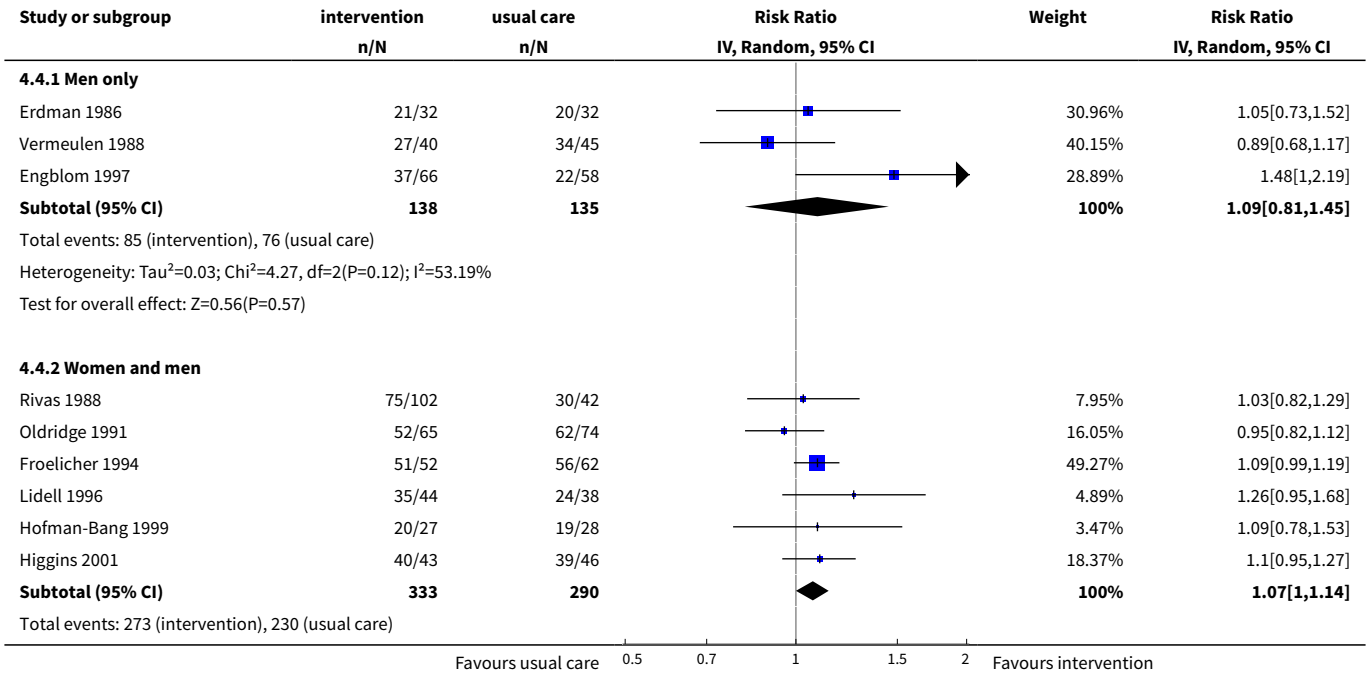
Study or subgroup	intervention n/N	usual care n/N	Risk Ratio IV, Random, 95% CI	Weight	Risk Ratio IV, Random, 95% CI
4.3.1 White-collar/less strenuous					
Rivas 1988	75/102	30/42		31.36%	1.03[0.82,1.29]
Engblom 1997	37/66	22/58		11.92%	1.48[1,2.19]
Higgins 2001	40/43	39/46		56.72%	1.1[0.95,1.27]

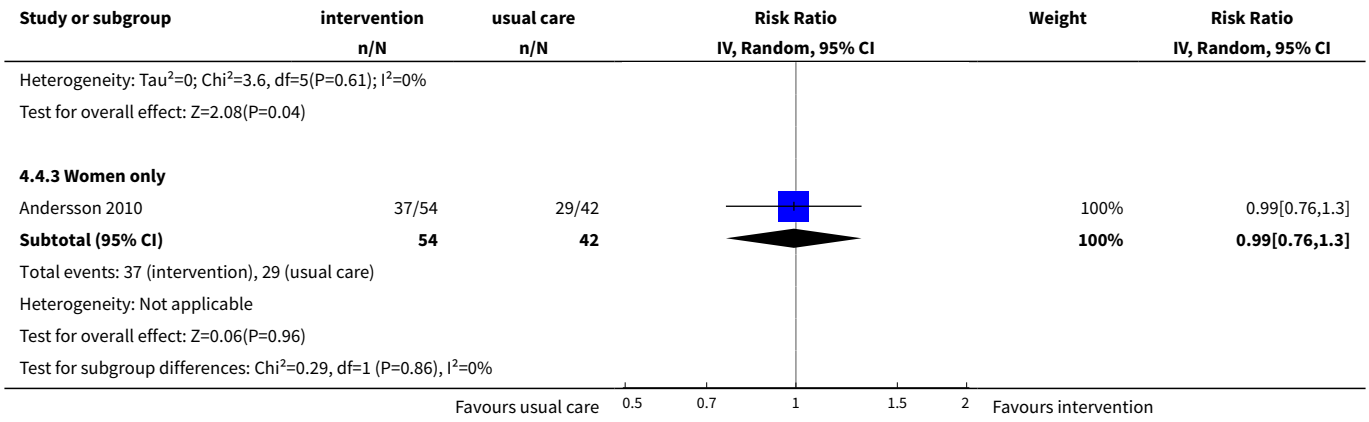


Favours usual care — Favours intervention

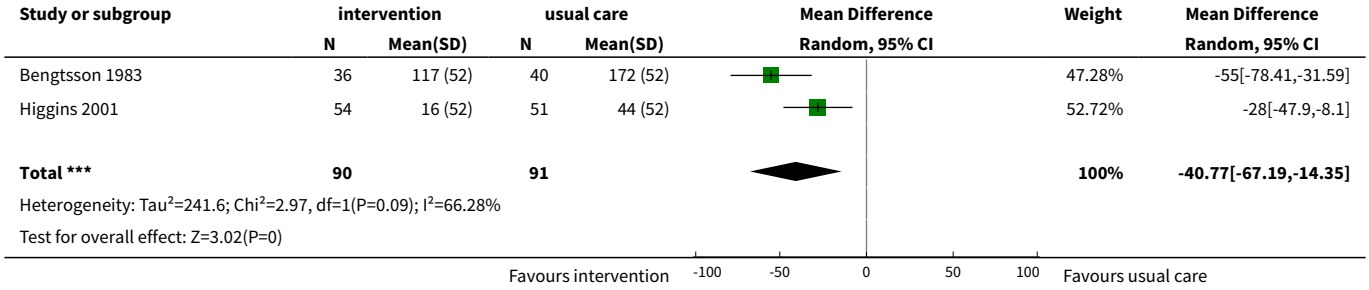


Analysis 4.4. Comparison 4 Combined interventions vs usual care, Outcome 4 Proportion returning to work medium term (6 months-1 year) by sex.

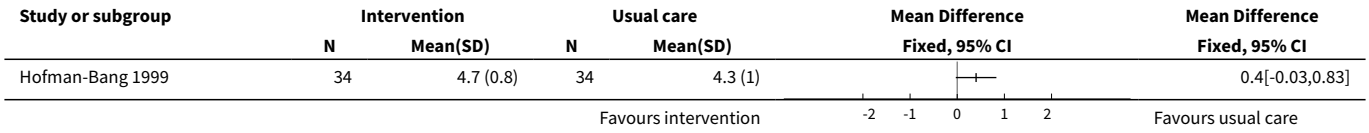




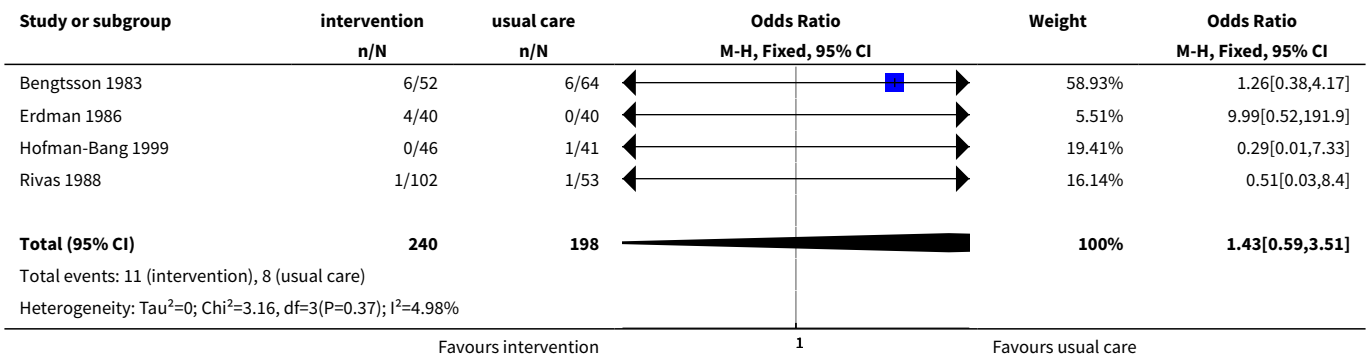
Analysis 4.5. Comparison 4 Combined interventions vs usual care, Outcome 5 Mean time until return to work (days).



Analysis 4.6. Comparison 4 Combined interventions vs usual care, Outcome 6 Health-related quality of life.



Analysis 4.7. Comparison 4 Combined interventions vs usual care, Outcome 7 Adverse effects: total mortality.



Study or subgroup	intervention n/N	usual care n/N	Odds Ratio M-H, Fixed, 95% CI	Weight	Odds Ratio M-H, Fixed, 95% CI
Test for overall effect: Z=0.79(P=0.43)					

Favours intervention 1 Favours usual care

Analysis 4.8. Comparison 4 Combined interventions vs usual care, Outcome 8 Adverse effects: reinfarctions.

Study or subgroup	intervention n/N	usual care n/N	Odds Ratio M-H, Fixed, 95% CI	Weight	Odds Ratio M-H, Fixed, 95% CI
Bengtsson 1983	2/44	4/43		30.39%	0.46[0.08,2.68]
Erdman 1986	2/40	1/40		7.47%	2.05[0.18,23.59]
Vermeulen 1988	4/47	9/51		62.14%	0.43[0.12,1.52]
Total (95% CI)	**131**	**134**		**100%**	**0.56[0.23,1.4]**
Total events: 8 (intervention), 14 (usual care)					
Heterogeneity: Tau^2=0; Chi^2=1.29, df=2(P=0.52); I^2=0%					
Test for overall effect: Z=1.23(P=0.22)					

Favours intervention 1 Favours usual care

APPENDICES

Appendix 1. CENTRAL search strategy

#1 MeSH descriptor: [Heart Diseases] explode all trees

#2 MeSH descriptor: [Heart Failure] explode all trees

#3 MeSH descriptor: [Coronary Disease] explode all trees

#4 MeSH descriptor: [Myocardial Infarction] explode all trees

#5 MeSH descriptor: [Myocardial Ischemia] explode all trees

#6 MeSH descriptor: [Angina Pectoris] explode all trees

#7 MeSH descriptor: [Angina, Unstable] explode all trees

#8 MeSH descriptor: [Acute Coronary Syndrome] explode all trees

#9 MeSH descriptor: [Coronary Artery Bypass] explode all trees 4

#10 "percutaneous intervention"

#11 "pci"

#12 "percutaneous coronary angioplasty"

#13 "ptca"

#14 thrombolysis

#15 "cabg"

#16 {or #1-#15}

#17 "return to work"

#18 MeSH descriptor: [Employment] explode all trees

#19 MeSH descriptor: [Unemployment] explode all trees

#20 MeSH descriptor: [Sick Leave] explode all trees

#21 MeSH descriptor: [Absenteeism] explode all trees

#22 retirement

#23 MeSH descriptor: [Work] explode all trees

#24 MeSH descriptor: [Occupations] explode all trees

#25 MeSH descriptor: [Occupational Medicine] explode all trees

#26 MeSH descriptor: [Occupational Health] explode all trees

#27 MeSH descriptor: [Occupational Health Services] explode all trees

#28 "disability management"

#29 "disability prevention"

#30 occupation*

#31 vocational*

#32 "work ability"

#33 "work capacity"

#34 "work activity"

#35 "work disability"

#36 "work rehabilitation"

#37 "work status"

#38 "work retention"

#39 workability

#40 employability

#41 employable

#42 employee*

#43 {or #17-#42}

#44 "modified duty" or "modified duties"

#45 "modified duties"

#46 MeSH descriptor: [Work Capacity Evaluation] explode all trees

#47 MeSH descriptor: [Vocational Guidance] explode all trees

#48 "vocational training" or "vocational placement" or "vocational counseling" (Word variations have been searched)

#49 "solution focused intervention" or "work adjustment" (Word variations have been searched)

#50 "work visit" or "work site visit" (Word variations have been searched)

#51 "light duty" or "work reintegration plan" or "supported employment" or "modified work" or "workplace accommodation" or "job accommodation"
or "on the job programs" (Word variations have been searched)

#52 "ergonomic counseling" or "ergonomic education" or "ergonomic training" or "ergonomic approach" (Word variations have been searched)

#53 MeSH descriptor: [Human Engineering] explode all trees

#54 "case manager" or "case management" or "vocational guidance" or "workplace intervention" or "occupational intervention" (Word variations
have been searched)

#55 {or #44-#54}

#56 MeSH descriptor: [Rehabilitation] explode all trees

#57 MeSH descriptor: [Exercise] explode all trees

#58 exercise or "exercise therapy" (Word variations have been searched)

#59 MeSH descriptor: [Sports] explode all trees

#60 MeSH descriptor: [Physical Education and Training] explode all trees

#61 exertion* (Word variations have been searched)

#62 rehabilitation and physical* (Word variations have been searched)

#63 rehabilitation and train* (Word variations have been searched)

#64 rehabilitation and exercise* (Word variations have been searched)

#65 rehabilitation and aerobic* (Word variations have been searched)

#66 MeSH descriptor: [Physical Therapy Modalities] explode all trees

#67 {or #56-#66}

#68 MeSH descriptor: [Gender Identity] explode all trees

#69 MeSH descriptor: [Social Support] explode all trees

#70 "autogenic training" (Word variations have been searched)

#71 "stress management" (Word variations have been searched)

#72 "relaxation techniques" (Word variations have been searched)

#73 "patient counseling" (Word variations have been searched)

#74 MeSH descriptor: [Psychotherapy] explode all trees

#75 MeSH descriptor: [Psychology, Applied] explode all trees

#76 MeSH descriptor: [Health Education] explode all trees

#77 {or #68-#76}

#78 {or #55, #67, #77}

#79 {and #16, #43, #78}

#80 #79 limit to trials

Searched on 11 October 2018

Appendix 2. MEDLINE search strategy

#1)

(heart diseases[MeSH Terms]) OR (heart diseases) OR (heart failure[MeSH Terms]) OR (heart failure) OR (coronary disease[MeSH Terms]) OR (coronary disease) OR (myocardial infarction[MeSH Terms]) OR (myocardial infarction) OR (myocardial ischaemia[MeSH Terms]) OR

(myocardial ischaemia) OR (angina pectoris[MeSH Terms]) OR (angina pectoris) OR (angina pectoris, unstable[MeSH Terms]) OR (acute coronary syndrome[MeSH Terms]) OR (acute coronary syndrome) OR (percutaneous intervention) OR ("pci") OR (percutaneous coronary angioplasty) OR ("ptca") OR (thrombolysis) OR (coronary artery bypass grafting[MeSH Terms]) OR (coronary artery bypass grafting) OR ("cabg")

#2)

(return-to-work) OR (employment[MeSH Terms]) OR (employment) OR (unemployment[MeSH Terms]) OR (unemployment) OR (unemployed) OR (retirement) OR (sick leave[MeSH Terms]) OR (sick leave) OR (sickness absence) OR (absenteeism[MeSH Terms]) OR (absenteeism) OR (work[MeSH Terms]) OR (occupations[MeSH Terms]) OR (occupational medicine[MeSH Terms]) OR (occupational health[MeSH Terms]) OR (occupational health services[MeSH Terms]) OR ("disability management") OR (“disability prevention”) OR (occupation*) OR (vocational*) OR (work ability) OR ("work ability") OR ("work capacity") OR ("work activity") OR ("work disability") OR ("work rehabilitation") OR ("work status") OR ("work retention") OR (workability) OR (employability) OR (employable) OR (employee*)

#3)

(modified duty) OR (modified duties) OR (work capacity evaluations[MeSH Terms]) OR (vocational guidance[MeSH Terms]) OR (vocational training) OR (vocational placement) OR (vocational counseling) OR (solution focused intervention) OR (work adjustment) OR (work visit) OR (work site visit) OR (light duty) OR (work reintegration plan) OR (supported employment) OR (modified work) OR (workplace accommodation) OR ("on the job programs") OR (job accommodation) OR (ergonomic counseling) OR (ergonomic education) OR (ergonomic training) OR (ergonomic approach) OR (ergonomics[MeSH Terms]) OR (case manager) OR (case management) OR (vocational guidance) OR (workplace intervention) OR (occupational intervention)

#4)

(rehabilitation[MeSH Terms]) OR (exercise[MeSH Terms]) OR (exercise) OR (exercise therapy) OR (sports[MeSH Terms]) OR ((physical education and training[MeSH Terms])) OR (exertion*) OR ((rehabilitation) AND physical*)) OR ((rehabilitation) AND train*)) OR ((rehabilitation) AND exercise*)) OR ((rehabilitation) AND aerobic*)) OR (physical therapy modalities[MeSH Terms])

#5)

(gender[MeSH Terms]) OR (social support[MeSH Terms]) OR (autogenic training) OR (stress management) OR (relaxation techniques) OR (patient counseling) OR (psychotherapies[MeSH Terms]) OR (applied psychology[MeSH Terms]) OR (health education[MeSH Terms])

#6) #3 OR #4 OR #5

#7)

(randomized controlled trial OR controlled clinical trial OR clinical trial OR comparative study OR evaluation studies[Publication Type])) OR (randomized controlled trial[MeSH Terms]) OR (random allocation[MeSH Terms]) OR (double blind method[MeSH Terms]) OR (single blind method[MeSH Terms]) OR (clinical trial[MeSH Terms]) OR (((singl* OR doubl* OR trebl* OR tripl*)) AND (mask* OR blind*))) OR (placebos[MeSH Terms]) OR (placebo) OR random*) OR (research design[MeSH Terms]) OR (studies, follow up[MeSH Terms]) OR (prospective studies[MeSH Terms]) OR (cross over studies[MeSH Terms]) OR (prospectiv*) OR (volunteer*) OR (evaluate*) OR (compare*) OR (programs) OR (effects) OR ((control OR controls* OR controla* OR controle* OR controli* OR controll*))

#8) #1 AND #2 AND #6 AND #7

#9) #8 NOT (animals NOT humans)

Searched on 11 October 2018

Appendix 3. Embase search strategy

#1) 'return to work'/exp OR 'employment'/de OR 'unemployment'/de OR unemployed OR 'retirement'/exp OR 'medical leave'/de OR 'sick leave'/exp OR 'sickness absence'/exp OR 'absenteeism'/de OR 'work'/de OR 'occupation'/de OR 'occupational medicine'/de OR 'occupational health'/de OR 'occupational health service'/de OR 'disability management' OR 'disability prevention' OR occupation* OR vocational* OR 'work ability'/exp OR 'work capacity'/exp OR 'work activity' OR 'work disability'/exp OR 'work rehabilitation' OR 'work status' OR 'work retention' OR 'workability' OR 'employability'/exp OR employable OR employee*

#2) 'modified duty' OR 'modified duties' OR ('work capacity'/exp AND 'evaluation'/exp) OR 'vocational guidance'/de OR 'vocational training'/exp OR 'vocational placement' OR 'vocational counseling'/exp OR 'solution focused intervention' OR 'work adjustment'/exp OR 'work visit' OR 'work site visit' OR 'light duty' OR 'work reintegration plan' OR 'supported employment' OR 'modified work' OR 'workplace accommodation' OR 'on the job programs' OR 'job accommodation'/exp OR 'ergonomic counseling' OR 'ergonomic education' OR 'ergonomic training' OR 'ergonomic approach' OR 'ergonomics'/de OR 'case manager'/exp OR 'case management'/exp OR 'vocational guidance'/exp OR 'workplace intervention' OR 'occupational intervention'

#3) 'rehabilitation'/de OR 'exercise'/de OR 'exercise therapy'/exp OR 'sport'/de OR 'physical education'/de OR exertion* OR (rehabilitation NEAR/5 physical*) OR (rehabilitation NEAR/5 train*) OR (rehabilitation NEAR/5 exercise*) OR ('rehabilitation'/exp AND aerobic*) OR 'physiotherapy'/de OR 'physical therapy modalities'/exp

#4) 'gender'/de OR 'social support'/de OR 'autogenic training'/exp OR 'stress management'/exp OR 'relaxation techniques'/exp OR 'patient counseling'/exp OR 'psychotherapy'/de OR 'psychology'/de OR 'health education'/de

#5) #2 OR #3 OR #4

#6) 'randomized controlled trial'/de OR 'randomization'/de OR 'double blind procedure'/de OR 'single blind procedure'/de OR 'clinical trial'/de OR (singl* OR doubl* OR trebl* OR tripl* AND (mask* OR blind*)) OR 'placebo'/exp OR random* OR 'methodology'/de OR 'follow up'/de OR 'prospective study'/de OR 'crossover procedure'/de OR (prospectiv* OR volunteer* OR evaluate* OR compare* OR programs OR effects OR 'control'/exp OR controls* OR controla* OR controle* OR controli* OR controll*)

#7) ('heart'/exp AND 'diseases'/exp) OR ('heart'/exp AND failure) OR 'coronary artery disease'/exp OR 'heart infarction'/exp OR (myocardial AND 'infarction'/exp) OR 'heart muscle ischaemia'/exp OR (myocardial AND 'ischaemia'/exp) OR 'angina pectoris'/exp OR ('angina'/exp AND pectoris) OR 'unstable angina pectoris'/exp OR 'acute coronary syndrome'/exp OR (acute AND coronary AND 'syndrome'/exp) OR 'percutaneous intervention' OR 'pci' OR 'percutaneous coronary angioplasty' OR 'ptca'/exp OR 'thrombolysis'/exp OR 'coronary artery bypass graft'/exp OR 'cabg'

#8) #1 AND #5 AND #6 AND #7

#9) #8 AND [humans]/lim AND [embase]/lim

Searched on 11 October 2018

Appendix 4. PsycINFO search strategy

#1) "Cardiovascular Disorders" OR (heart disease) OR (heart failure) OR (coronary artery disease) OR (heart infarction) OR (myocardial AND infarction) OR (heart muscle ischaemia) OR (myocardial AND ischaemia) OR (angina AND pectoris) OR "unstable angina pectoris" OR "acute coronary syndrome" OR (acute AND coronary AND syndrome) OR ("Heart Disorders") OR ("Myocardial Infarctions") OR ("Angina Pectoris") OR (percutaneous intervention) OR "percutaneous intervention" OR "pci" OR "percutaneous coronary angioplasty" OR "ptca" OR thrombolysis OR "coronary artery bypass graft" OR "cabg"

#2) ("return to work") OR ("Employment Status") OR ("Unemployment") OR unemployed OR ("Retirement") OR "medical leave" OR "sick leave" OR "sickness absence" OR absenteeism OR work OR occupation* OR (occupational medicine) OR (occupational health) OR (occupational health service) OR (disability management) OR (disability prevention) OR vocational* OR (work ability) OR (work capacity) OR (work activity) OR (work disability) OR (work rehabilitation) OR (work status) OR (work retention) OR workability OR employability OR employable OR employee*

#3) (modified duty) OR (modified duties) OR ((work capacity) AND (evaluation)) OR (vocational guidance) OR (vocational training) OR (vocational placement) OR (vocational counsel*) OR (solution focused intervention) OR (work adjustment) OR (work visit) OR (work site visit) OR (light duty) OR (work reintegration plan) OR (supported employment) OR (modified work) OR (workplace accommodation) OR (on the job programs) OR "on the job program" OR (job accommodation) OR (ergonomic counsel*) OR (ergonomic education) OR (ergonomic training) OR (ergonomic approach) OR ergonomics OR (case manager) OR (case management) OR ("Occupational Guidance") OR (workplace intervention) OR (occupational intervention)

#4) "Exercise" OR (exercise therapy) OR (AB sport) OR (TI sport) OR "Physical Education" OR exertion* OR ("rehabilitation" N5 physical*) OR ("rehabilitation" N5 train*) OR ("rehabilitation" N5 exercise*) OR ("Rehabilitation" N5 aerobic*) OR "Physical Therapy" OR physiotherapy OR "Rehabilitation"

#5) gender OR (social support) OR "Autogenic Training" OR "Stress Management" OR ("Relaxation" AND techniques) OR "Client Education" OR "psychotherapy" OR "psychology" OR (health education)

#6) (randomized controlled trial) OR randomization OR (double blind procedure) OR (single blind procedure) OR (clinical trial) OR ((singl* OR doubl* OR trebl* OR tripl*) AND (mask* OR blind*)) OR ("Placebo") OR random* OR methodology OR (follow up) OR (prospective study) OR (crossover procedure) OR prospectiv* OR volunteer* OR evaluat* OR compare* OR programs OR effects OR ("Experiment Controls") OR control*

#7) 3 OR 4 OR 5

#8) 1 AND 2 AND 6 AND 7

Searched on 11 October 2018

Appendix 5. OSH Update + Fire search strategy

#1) GW{(heart disease*) OR (heart failure) OR (coronary disease) OR (myocardial infarction) OR (myocardial ischaemia) OR (angina pectoris) OR (acute coronary syndrome) OR (percutaneous intervention) OR ("pci") OR (percutaneous coronary angioplasty) OR ("ptca") OR (thrombolysis) OR (coronary artery bypass grafting) OR ("cabg")}

#2) GW{(return-to-work) OR (employment) OR (unemployment) OR (unemployed) OR (retirement) OR (sick leave) OR (sickness absence) OR (absenteeism) OR ("disability management") OR ("disability prevention") OR (occupation*) OR (vocational*) OR (work ability) OR ("work ability") OR ("work capacity") OR ("work activity") OR ("work disability") OR ("work rehabilitation") OR ("work status") OR ("work retention") OR (workability) OR (employability) OR (employable) OR (employee*)}

#3) GW{((modified duty) OR (modified duties) OR (work capacity evaluation*) OR (vocational guidance) OR (vocational training) OR (vocational placement) OR (vocational counseling) OR (solution focused intervention) OR (work adjustment) OR (work visit) OR (work site visit) OR (light duty) OR (work reintegration plan) OR (supported employment) OR (modified work) OR (workplace accommodation) OR ("on the job programs") OR (job accommodation) OR (ergonomic counseling) OR (ergonomic education) OR (ergonomic training) OR (ergonomic approach) OR (ergonomics) OR (case manager) OR (case management) OR (workplace intervention) OR (occupational intervention)) OR ((exercise) OR (exercise therapy) OR (sports) OR (physical education and training) OR (exertion*) OR (rehabilitation)) OR ((social support) OR (autogenic training) OR (stress management) OR (relaxation techniques) OR (patient counseling) OR (psychotherap*) OR (health education))}

#4) GW{(randomized controlled trial) OR (controlled clinical trial) OR (clinical trial) OR (comparative study) OR (evaluation studies) OR (random allocation) OR (double blind method) OR (single blind method) OR (clinical trial) OR ((singl* OR doubl* OR trebl* OR tripl*) AND (mask* OR blind*)) OR (placebo) OR (random*) OR (prospectiv*) OR (volunteer*) OR (evaluate*) OR (compare*) OR (programs) OR (effects) OR (control OR controls* OR controla* OR controle* OR controli* OR controll*)}

#5) GW{#1 AND #2 AND #3 AND #4}

Searched on 17 October 2018

Appendix 6. LILACS search strategy

tw:((return TO work OR employment OR occupation) (coronary heart disease OR coronary disease OR myocardial infarction OR myocardial ischaemia OR heart disease*)) AND (instance:"regional") AND (db:("LILACS"))

Searched on 11 October 2018

CONTRIBUTIONS OF AUTHORS

Conceiving the protocol: UE, UEW

Designing the protocol: UE, UEW, JA, JVD, AS

Co-ordinating the protocol: UE

Designing search strategies: UE, UEW

Writing the protocol: UE, UEW

Providing general advice on the protocol: JA, JVD, AS

Performing previous work that was the foundation of the current study: UE, UEW, JA, JVD, AS

Screening of Titles and Abstracts: UE, UEW, PH, AF, JH

Screening of Full-Texts: UE, UEW, JA, PH, JH

Data Extraction: UEW, PH, JH

Quality Assessment (Risk of Bias): PH, JH

Planning the Sub-Group Analyses: JVD, JH

Meta-Analyses: JH

DECLARATIONS OF INTEREST

Janice Hegewald: None known.

Uta Wegewitz: I was employed at the Federal Institute for Risk Assessment (Germany) from 2007 to 2010. Currently I am employed by the Federal Institute for Occupational Safety and Health (BAuA) in Germany.

Ulrike Euler: I received payment for lectures in occupational epidemiology at the Berlin School of Public Health.

Jaap van Dijk: None known.

Jenny Adams: None known.

Alba Fishta: None known.

Philipp Heinrich: None known.

Andreas Seidler: I received payment for lectures in occupational epidemiology at the Berlin School of Public Health.

SOURCES OF SUPPORT

Internal sources

- Institute and Policlinic for Occupational and Social Medicine, Medical Faculty Carl Gustav Carus, Technical University Dresden, Germany.

  Support in form of salaries.
- Federal Institute for Occupational Safety and Health (BAuA), Berlin, Germany.

  Support in form of a salary and professional translation of documents.

External sources

- No sources of support supplied

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

Title

We changed the wording of the title from "Interventions to support return-to-work for patients with coronary heart disease" to "Interventions to support return to work for people with coronary heart disease" in agreement with Cochrane Work Coordinating Editor Jos Verbeek, following copy editor Denise Mitchell's suggestion. The new formulation is more inclusive and, as such, it is better in line with general Cochrane principles.

Types of studies

Due to the difficulties of performing randomised controlled trials at workplaces, we originally intended to include controlled before-after studies (CBAs). CBAs are non-randomised studies with one group receiving the intervention and a control group, which does not. For a CBA study to have been included in this Cochrane review, data had to have been collected contemporaneously both at baseline and post-intervention so that the timing of the study periods for the control and intervention groups are comparable. Although we found a large number of CBAs examining the effects of person-directed interventions on return to work, none of the CBA studies that we identified used interventions conducted at workplaces. As CBA studies are more prone to bias than RCTs, and because the CBAs that we found did not contribute information on work-directed interventions, we deviated from the published protocol and excluded CBAs from the review.

Selection of studies

Originally, two review authors (UE, UEW) were to independently screen titles and abstracts of all the studies identified as a result of the searching. Due to the length of time needed to complete the review, we had to update our searches. The titles and abstracts identified as a result of search updates were screened by other review authors (PH, AF, or JH).

Data synthesis

We pooled data from studies with similar interventions using Review Manager 5 software (Review Manager 2014), and not version 5.2 as was stated originally in the study protocol. We conducted the meta-analysis of subgroups with Review Manager 5, not Stata® software, although we used Stata® software to conduct some sensitivity analyses and meta-regression (Stata).

During the review process, we found that the heterogeneous reporting of occupational characteristics made it difficult to objectively establish which study populations could be considered as having participant populations with similar physically demanding occupational groups. Therefore, we created a definition for categorising studies into groups with similar physically demanding working conditions that was not a part of the original protocol. We defined physically demanding occupational groups as studies where a majority of study participants (more than 50%) worked in physically demanding employment, manual labour or were described as blue-collar workers. If 50% or less of the study population worked in physically demanding employment, manual labour or were blue-collar workers, we

categorised these studies into the non-physically demanding occupational group. We considered all other studies not reporting the characteristics of occupations before the incident CHD to have unknown physical demands.

Likewise, the immense variation in how studies reported baseline cardiovascular health made it necessary to create an objective framework for determining which studies could be considered to have study populations with similar CHD severity. We created this decision framework during the review process and it was not included in the original review protocol. We examined study exclusion criteria and the most commonly reported cardiovascular baseline characteristics in order to create a framework for identifying studies with similar distributions of CHD severity. We categorised study populations as having less severe CHD if the study reported:

1. excluding participants with one or more of the following:
   a. heart failure or systolic dysfunction (left ventricular ejection fraction (LVEF) < 40%),
   b. unstable or stable angina,
   c. positive exercise stress test (i.e. ≥ 2 mm ST segment change, ischaemia) using treadmill or bicycle ergometer,
   d. intracardiac defibrillator (ICD) or atrial fibrillation; or
2. the study reported that either less than 25% of the participant population had heart failure or the mean LVEF in the study population was more than 40% at baseline.

We considered that study populations had more severe CHD when: participants who had any or some of the above conditions were included or less than 25% of the participant population had heart failure or the mean LVEF in the study population was more than 40% at baseline. Where studies reported excluding participants based on some of the above conditions, a clinical occupational medical doctor specialised in occupational cardiology (JVD) examined the study to determine the categorisation. We categorised all other studies into a third category of unknown cardiovascular health or CHD severity where we could not determine the severity of CHD from the reported data.

Regarding the planned subgroup analysis and meta-regression analysis, we did not perform meta-regression analyses to relate the following study characteristics to their sizes of effect:

1. study population (age, gender, country),
2. length of follow-up,
3. study date, and
4. physically demanding occupational groups or alternatively blue-collar versus white-collar workers.

Instead, when there were sufficient trials, we stratified all analyses according to length of follow-up and conducted subgroup analyses to examine how the gender of the study populations, physically demanding occupational groups or CHD severity in the study population influenced the impact of the interventions. We performed meta-regression analysis considering study date with the Stata package metareg (Stata), for outcomes where five or more trials were available, and ordered the studies in the forest-plots according to their publication date to visually assess any change in effect over time.

'Summary of findings' tables

We planned to create a 'Summary of findings' table using the following outcomes: return to work, number of participants who were still at work after one year, number of participants still at work after five years, health-related quality of life, and any adverse effects of interventions, if reported. We expanded the return-to-work outcomes to reflect the follow-up times considered for each of the main comparisons (i.e. up to six months, between six months and one year, number of participants who were still at work after one year, number of participants still at work after five years) as well as the mean time until return to work.

Secondary outcomes

During the review process we encountered a number of studies that reported the number of participants who were still working after five years, so we added working after five years to the list of secondary outcomes.

Missing data

If numerical outcome data such as standard deviations (SDs) or correlation coefficients were missing, and could not be obtained from the study authors within six weeks of request, we calculated them from other available statistics such as P values and t-scores according to the methods described in the *Cochrane Handbook of Systematic Reviews of Interventions* (Higgins 2011). In one case, we calculated the SD from the reported range and sample size using a formula for small studies where n ≤ 15 (Hozo 2005). Where only means and sample sizes were available, we imputed SDs from the pooled SD of the other studies in the same comparison group (Furukawa 2006).

INDEX TERMS

Medical Subject Headings (MeSH)

*Psychotherapy; Coronary Disease [mortality] [*psychology]; Counseling; Physical Conditioning, Human; Randomized Controlled Trials as Topic; Return to Work [*psychology] [statistics & numerical data]; Time Factors

MeSH check words

Female; Humans; Male