## SUPPLEMENTARY FILE 6: Study designs and findings

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Study design features</th>
<th>Intervention</th>
<th>QA</th>
<th>Study findings</th>
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<tbody>
<tr>
<td>Author (year), country, Restrictions</td>
<td>Study designs (n)</td>
<td>Timescale, Intervention characteristics, comparator</td>
<td>QA score (out of 11)</td>
<td>Review results</td>
</tr>
<tr>
<td>Bekhet (2019), Egypt, SR, no restrictions</td>
<td>RCTs (n=12) Post-treatment (n=1120)</td>
<td>To investigate the efficacy of aerobic exercise interventions on physical activity, QoL (primary outcomes), weight, inflammatory markers and sleep among breast cancer survivors</td>
<td>7</td>
<td>Weight loss (4 studies, n=100)</td>
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<tr>
<td>Boing (2020), Brazil, SR and meta-analysis, English, Portuguese, Spanish</td>
<td>RCTs (n=5) NRCTs (n=3) Pilot NRCT (n=2) Pilot RCT (n=1) Active hormonal treatment (n=368)</td>
<td>To investigate the effects of exercise on physical outcomes in breast cancer women receiving any modality of hormone therapy</td>
<td>10</td>
<td>Body fat percentage (4 studies, n=206)</td>
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<tr>
<td>Chlebowski (2016), USA</td>
<td>RCTs (n=8) [n=6 breast cancer]</td>
<td>To assess the effectiveness of RCTs evaluating weight loss in</td>
<td>11</td>
<td>Weight loss (4 studies, n=1266)</td>
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<tr>
<td>SR, no restrictions</td>
<td>Active or post treatment (n=1325)</td>
<td>breast, endometrial and ovarian cancers</td>
<td>12 month intervention: Weight loss significantly greater in group receiving individually tailored diet and aerobic exercise (150 minute duration, -3.8kg, p&lt;0.05)</td>
<td>women closer to the cancer diagnosis and efficacy for achieving weight loss, in particular with telephone-based interventions. Challenges identified in achieving significant weight loss in African American cancer survivors and of maintaining weight loss in any group.</td>
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<tr>
<td><strong>Guinan (2013).</strong>&lt;sup&gt;22&lt;/sup&gt; Ireland</td>
<td>RCTs (n=7) NRCTs (n=2) Active hormonal treatment or post-treatment (n=435)</td>
<td>To conduct a systematic literature review investigating the effect of exercise interventions on anthropometric variables and related biomarkers of cancer risk in breast cancer survivors</td>
<td>BMI (1 study, n=29) Resistance and aerobic exercise over 15 weeks, significant reduction in BMI (p=0.022)</td>
<td>More robust RCTs are required to fully elucidate the effect of exercise training on biomarkers of breast cancer risk and determine the role of physical activity as an adjunct to breast cancer.</td>
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<tr>
<td></td>
<td>8 weeks to 6 months</td>
<td>Aerobic exercise alone or combined with resistance training</td>
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<td></td>
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<td>Resistance training alone</td>
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<td>Walking alone</td>
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<td></td>
<td></td>
<td>Control: usual care</td>
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- **Control:** usual care (n=1), healthy eating (n=1), another intervention (n=1), leaflet/education (n=2), weight management, counselling (n=1)

- **Aim of review**

- **Timescale, Intervention characteristics, comparator QA score (out of 11)**

- **Review results**

- **Authors’ conclusions**
<table>
<thead>
<tr>
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<tr>
<td><strong>Ingram (2006).</strong>&lt;sup&gt;23&lt;/sup&gt; Canada SR, no restrictions</td>
<td>RCTs (n=9) NRCTs (n=5) Active or post-treatment (n=725)</td>
<td>- 6 to 26 weeks - Aerobic exercise (n=7) - Aerobics and resistance exercise (n=5) - Walking and Tai Chi (n=1) - Lymphoedema exercises (n=1) - Supervised or Home based - Control: usual care (n=7), other intervention (n=2)</td>
<td>9</td>
<td>No difference in glucose (n=3), insulin (n=4), insulin resistance (n=3) Significant decrease in IGF-1 (n=2, p=0.03) Significant increase in IGF-3 (n=1, p=0.02) Significant decrease in IGF-3 (n=1, p=0.01) Significant decrease in IGF-2 (n=1, p=0.02)</td>
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</table>
| **Lahart (2018).**<sup>28</sup> England SR and meta-analysis, no restrictions | RCTs (n=60) Quasi-randomised trials (n=3) Active or post-treatment (n=5761) | - 4 to 24 months - Aerobic exercise only (n=28) - Aerobic and resistance exercise (n=21) - Resistance training (n=7) - Yoga (n=8) - Qigong/Pilates/Tai Chi (n=1) - Control: usual care (n=30), wait-list (n=24), education (n=2), telephone (n=1), physical therapy (n=1), psychosocial (n=1), stretching (n=1), attention control (n=1) | 11 | Weight loss (11 studies, n=1047) Body mass change from baseline to end of intervention, significant effect of physical activity compared with control (MD -0.05 kg, 95% CI -0.98 to -0.01, IS = 59%) BMI (19 studies) No significant effect of physical activity for either follow-up or change from baseline BMI when compared with control. Physical activity interventions may have small to moderate beneficial effects on HRQoL, emotional or perceived physical and social function, anxiety, cardiorespiratory fitness and self- }
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<tr>
<td>Lee (2020),29 Korea</td>
<td>RCTs (n=29)</td>
<td>To investigate the effects of exercise</td>
<td>4 weeks to 12 months</td>
<td>Body fat (3 studies, n=226)</td>
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Significant change from baseline to end of intervention (SMD -0.62, 95% CI -1.19 to -0.06, IS = 88%, 9 studies, 499 participants; low-quality evidence)

**QoL (22 studies, n=1996)**
Significantly improved HRQoL with physical activity (SMD 0.39, 95% CI 0.21 to 0.57), and immediately post-intervention, and from baseline to end of intervention (SMD 0.78, 95% CI: 0.39 to 0.17)

**Mental well being**
Significantly improved emotional function with physical activity post-intervention (SMD 0.21, 95% CI 0.10 to 0.32, 26 studies, 2102 women, moderate-quality evidence), and from baseline to end of intervention (SMD 0.31, 95% CI: 0.18 to 0.49, 15 studies, 1579 participants, low quality evidence)

Significant reduction in anxiety post-intervention (SMD -0.37, 95% CI -0.63 to -0.12, 4 studies, 235 participants, low quality evidence)

**Physical functioning**
Perceived physical function significantly improves post-intervention (SMD 0.33, 95% CI 0.18 to 0.49, 25 studies, 2129 women, moderate quality evidence), and from baseline to end of intervention (SMD 0.80, 95% CI 0.23 to 0.97, 13 studies, 1433 participants, moderate quality evidence)
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<tr>
<td>Author (year), country</td>
<td>Study designs (n)</td>
<td>Aim of review</td>
<td>QA score (out of 11)</td>
<td>Review results</td>
</tr>
<tr>
<td>SR, no restrictions</td>
<td>Active treatment (n=2989)</td>
<td>Interventions in breast cancer patients during adjuvant therapy when taking into consideration separate measurement and practical exercise recommendations during adjuvant therapy</td>
<td></td>
<td>Exercise significantly reduced body fat (d=-0.27, 95CI: -0.47 to -0.07, p&lt;0.01)</td>
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<tr>
<td>Lopez (2021), Australia</td>
<td>RCTs (n=8)</td>
<td>To examine the resistance training dose-response (volume and intensity) relationship on the health-related outcomes of muscle strength and body composition in breast cancer patients undergoing primary treatment (chemo and/or radiotherapy)</td>
<td>4 weeks to 6 months</td>
<td>Body composition and BMI (9 studies, n=933)</td>
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<tr>
<td>Review type, restrictions</td>
<td>Treatment status, (participants)</td>
<td>Timescale, Intervention characteristics, comparator</td>
<td></td>
<td>BMI (2 studies n=69)</td>
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<td>QoL (5 studies n=562)</td>
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<td>Depression and Anxiety (3 studies n=248)</td>
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BMI: Non-significant total mean change of -0.56 +/- 1.65% (95% CI: -2.0 to 0.9%)
Body fat: Non-significant total mean change of -2.0 +/- 2.8% (95% CI: -4.2 to 0.2%)
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<td><strong>Review results</strong></td>
</tr>
<tr>
<td>McNeely (2006), Canada</td>
<td>RCTs (n=14)</td>
<td>To summarise the available evidence concerning the effects of exercise on breast cancer patients and survivors</td>
<td>9</td>
<td>Weight loss (4 studies, n=277): Non-significant reduction (WMD -0.03kg, 95% CI: -0.44 to 0.38, p=0.88)</td>
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<td></td>
<td>Active treatment, post- or mixed (n=717)</td>
<td>7 weeks to 6 months</td>
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<td>BMI (4 studies, n=240): Non-significant reduction (WMD -0.02, 95% CI: -0.09 to 0.05, p=0.58)</td>
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<tr>
<td></td>
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<td>Mixed aerobic and resistance exercise</td>
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<td>QoL (3/14 studies, n=194) Significant improvements (WMD 4.58, 95% CI: 0.35 to 8.80) according to FACT-G, and FACT-B (WMD 6.62, 95% CI: 1.21 to 12.03)</td>
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<td></td>
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<td>Supervised or home based</td>
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<td>Physical functioning (4 studies, n=208) Significant increase in physical functioning and wellbeing (SMD 0.84, 95% CI: 0.36 to 1.32; p=0.0006), measured by FACT and SF-36</td>
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<td></td>
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<td>Control: usual care</td>
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<tr>
<td>Pan (2015), China</td>
<td>RCTs (n=9)</td>
<td>To evaluate measures of pathology, physical activity and overall wellbeing from the available randomized controlled trials in order to understand the potential benefits of Tai Chi Chuan (TCC) in</td>
<td>10</td>
<td>No difference in BMI for TCC group compared with control (SMD 0.31; 95% CI: -0.81 to 0.19, p=0.22)</td>
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<td></td>
<td>Active treatment (n=322)</td>
<td>10 weeks to 6 months</td>
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<td>Physical wellbeing (5 studies, n=216) No improvement in wellbeing in the TCC group compared with control (SMD 0.24; 95% CI: -0.021 to 0.51, p=0.07)</td>
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<tr>
<td></td>
<td></td>
<td>Tai chi Chuan</td>
<td></td>
<td>Social wellbeing (5 studies, n=213) No improvement in wellbeing in the TCC group vs. control group (SMD -0.11; 95% CI: -0.41 to 0.18, p=0.44)</td>
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<tr>
<td>Review type, restrictions</td>
<td>Treatment status, (participants)</td>
<td>reducing treatment-related side effects and improving personal wellbeing in patients with breast cancer</td>
<td>Emotional wellbeing (3 studies, n=137)</td>
<td>No improvement in emotional wellbeing compared with control group (SMD 0.12; 95% CI: -0.21 to 0.47, p=0.46)</td>
</tr>
<tr>
<td>Playdon (2013), 24 USA SR, no restrictions</td>
<td>RCTs (n=8)</td>
<td>To determine the effectiveness of weight loss intervention for breast cancer survivors</td>
<td>Weight loss (15 studies)</td>
<td>14/15 studies resulted in statistically significant weight loss of between 3 to 12.5% of baseline weight</td>
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<td></td>
<td>Cohort intervention studies (n=4)</td>
<td>▪ 8 weeks to 12 months ▪ Weight loss intervention (any combination of diet and exercise and/or behavioural components focusing on weight loss) ▪ Supervised ▪ Control: usual care (n=1), printed healthy eating materials (n=2), wait-list (n=3), citrus herbal tea (n=1)</td>
<td>General HRQoL (4 studies, n=178)</td>
<td>No improvement in general HRQoL in TCC group compared with control (SMD -0.12; 95% CI: -0.59 to 0.35, p=0.61)</td>
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<td>Randomised parallel interventions (n=2)</td>
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<td></td>
<td>NRCTs (n=1)</td>
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<td>Crossover trials (n=3)</td>
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<td>Active or post-treatment (n=1028)</td>
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| **Reeves (2014), Australia** | RCTs (n=10), Single-arm trials (n=4) | To systematically review the evidence from weight loss intervention trials in women with breast cancer. The review sought to identify the magnitude of weight loss achieved and the effect on breast cancer related and general health outcomes. | 6 | **Weight loss:** (14 studies, n=654) 13/14 studies showed statistically significant within-group weight loss. 8/13 showed a mean weight loss of 5% or greater.  
**Waist circumference** (14 studies, n=654) 5/10 RCTs and 3/4 single arm trials reported significant reductions 6/10 RCTs and 2/4 single arm trials reported changes in adiposity (% body fat reduced in all but one)  
**Biomarkers** (9 studies, n=309) 6 RCTs and 3 single arm trials. Changes in glucose and/or lipids were inconsistently associated with weight loss. The most consistent changes were reductions in lCL cholesterol and glucose. 6 trials measured insulin/insulin resistance and found that trials reporting weight loss of more than 5% had reductions in insulin and insulin resistance of 15 to 40%.  
**Psychosocial wellbeing** (n=4) 2/4 reported significant intervention effects on QoL; one reported significant associations with weight loss, and one reported no change in QoL | **Authors’ conclusions** The studies suggest that weight loss is feasible to achieve and is safe in women following treatment for breast cancer. Future studies should assess a range of biomarker and patient-reported outcomes. |
| **Shaikh (2020), Australia** | RCTs (n=17), Randomised crossover trials (n=3) | To assess the effects of different body weight loss approaches in breast cancer survivors who are overweight or obese | 11 | **Body weight** (21 studies, n=1751) Significant reductions in body weight (MD -2.25kg, 95% CI: -3.19 to -1.3) p<0.00001. Substantial heterogeneity, low quality.  
**BMI** (17 studies, n=1353) Significant reduction in BMI (MD: -1.08 KG/m2, 95% CI: -1.61 to -0.56) p<0.0001. Large heterogeneity, low quality. | Weight loss interventions, particularly multimodal interventions (incorporating diet, exercise and psychosocial support) |
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**Waist circumference (13 studies, n=1193)**
Significant reduction in waist circumference (MD: -1.73cm, 95% CI: -3.17 to -0.29) p=0.02. Considerable heterogeneity, low quality.

**Overall QoL (10 studies, n=867)**
Significant improvement (SMD: 0.74, 95% CI: 0.20 to 1.29) p=0.008. Large heterogeneity, low quality.

**Physical QoL subscales (10 studies, n=1024)**
Significant difference favouring intervention (SMD: 0.33, 95% CI: 0.10 to 0.56, p=0.005). Moderate heterogeneity.

**Social QoL subscales (6 studies, n=389)**
No significant difference (SMD: 0.19, 95% CI: -0.01 to 0.39, p=0.49). No significant heterogeneity.

**Emotional QoL subscales (8 studies, n=498)**
No significant difference (SMD: 0.11, 95% CI: -0.09 to 0.30, p=0.28). Minimal heterogeneity.

**Mental health QoL subscales (3 studies, n=355)**
Significant difference favouring intervention (SMD: 0.60, 95% CI: 0.17 to 1.02, p=0.006). Moderate heterogeneity.

**Anxiety and depression QoL subscales (3 studies, n=669)**
No significant difference between (SMD: 0.63, 95% CI: -0.07 to 1.33, p=0.08). Significant heterogeneity.

**Multimodal weight loss interventions** (diet, exercise and psychosocial support) resulted in greater reductions in body weight, BMI and waist circumference compared to dietary change alone.
Body weight: (MD -2.88kg, 95% CI: -3.98 to -1.77) support), in overweight or obese breast cancer survivors appear to result in decreases in body weight, BMI and waist circumference and improvement in overall quality of life. Further research is required to determine the optimal weight loss intervention and assess the impact of weight loss on survival outcomes. Long-term follow-up in weight loss intervention studies is required to determine if weight changes are sustained beyond the intervention period.
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<tr>
<td>Singh (2018), Australia</td>
<td>RCTs (n=61)</td>
<td>To systematically evaluate the safety, feasibility and effect of exercise among women with stage II+ breast cancer</td>
<td>10</td>
<td>BMI: (MD -1.44 kg/m², 95% CI: -2.16 to -0.72)</td>
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<tr>
<td>Review type, restrictions</td>
<td>Active or post treatment (n=5200)</td>
<td>6 weeks to 12 months</td>
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<td>Waist: (MD: -1.66, 95% CI: -3.49 to -0.16 cm)</td>
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<td>SR and meta-analysis, English only</td>
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<td>▪ 6 weeks to 12 months</td>
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<td>▪ Aerobic exercise only (n=20)</td>
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<td>▪ Combined aerobic and resistance (n=21)</td>
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<td>▪ Resistance exercise only (n=6)</td>
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<td>▪ Other exercise (n=11)</td>
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<td>▪ Separate aerobic and resistance exercise arms (n=3)</td>
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<td>▪ Control: usual care</td>
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<td>Effects of exercise for QoL, BMI and waist circumference were significant (SMD: 0.17 to 0.77, p&lt;0.05).</td>
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<td>Anxiety (14 studies)</td>
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<td>Significant reduction (SMD 0.77, 95% CI: 0.64 to 0.91, p&lt;0.01) High heterogeneity.</td>
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<td>Depression (14 studies)</td>
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<td>Significant reduction (SMD 0.66, 95% CI: 0.52 to 0.80, p&lt;0.01). High heterogeneity.</td>
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<td>QoL (40 studies)</td>
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<td>Significant improvements (SMD 0.40, 95% CI: 0.33 to 0.47, p&lt;0.01). High heterogeneity.</td>
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<td>Waist circumference (8 studies)</td>
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<td>Significant reductions (SMD 0.22, 95% CI: 0.02 to 0.43, p&lt;0.03). Low heterogeneity.</td>
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<td>BMI (13 studies)</td>
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<td>Significant reduction (SMD 0.17, 95% CI: 0.01 to 0.32, p&lt;0.03). Low heterogeneity.</td>
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<td>Body weight (15 studies)</td>
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<td>Non-significant effects in favour of intervention (SMD 0.08, 95% CI: -0.04 to 0.20, p=0.22). Low heterogeneity.</td>
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<td>Body fat (13 studies)</td>
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<td>Non-significant effects in favour of intervention (SMD 0.11, 95% CI: -0.02 to 0.24, p=0.11). Low heterogeneity.</td>
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<td>Sub-group by exercise type and supervision</td>
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The findings support the safety, feasibility and effects of exercise, suggesting that national and international exercise guidelines appear generalisable to women with local, regional and distant breast cancer. Specifically, exercise should include mixed exercise modes including aerobic and resistance based exercise, and should be performed at moderate or higher intensities, 3 to 5 times per week, for a total of at least 150 minutes.
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</thead>
<tbody>
<tr>
<td>Author (year), country</td>
<td>Study designs (n)</td>
<td>Aim of review</td>
<td>Timescale, Intervention characteristics, comparator</td>
<td>QA score (out of 11)</td>
</tr>
<tr>
<td>Review type, restrictions</td>
<td>Treatment status, (participants)</td>
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<tr>
<td>Soares Falcetta (2018), Brazil</td>
<td>RCTs (n=64)</td>
<td>To conduct a systematic review and meta-analysis to assess the effects of physical exercise on anthropometric measurements, QoL and survival in women who had been through curative treatment of early stage breast cancer.</td>
<td>4 weeks to 24 months</td>
<td>Significant weight loss (-1.36kg, 95% CI: -2.51 to -0.21, p=0.02)</td>
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<tr>
<td>Post-treatment (n=6303)</td>
<td></td>
<td></td>
<td>Physical activity interventions with or without diet, counselling or structured programmes</td>
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<td>Supervised and/or individualised sessions</td>
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<td>Control: usual care</td>
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<td>Weight (28 studies, n=1292)</td>
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<td>Significant weight loss (-1.36kg, 95% CI: -2.51 to -0.21, p=0.02)</td>
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<td>BMI (22 studies, n=995)</td>
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<td>Significant reduction (-0.89 kg/m2, 95% CI: -1.50 to -0.28, p&lt;0.01)</td>
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<td>Body fat (20 studies, n=655)</td>
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<td></td>
<td>Significant reduction in body fat % (-1.6%, 95% CI: -2.31 to -0.88, p&lt;0.01)</td>
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<td>Overall QoL (23 studies, n=953)</td>
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<td>Significant improvement (SMD 0.45, 95% CI: 0.20 to 0.69, p&lt;0.01)</td>
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<td>Physical QoL:</td>
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</tbody>
</table>

Significant effects on QoL in favour of aerobic (p<0.01), resistance (p<0.01), combined and ‘other’ exercise (p<0.01). Significant reductions in anxiety and depression, large effects for combined exercise (p<0.01) and ‘other’ exercise (p<0.01).

There were also significant effects for aerobic exercise (p<0.01); no effect for resistance exercise (anxiety p=0.68, depression p=0.79).

In terms of exercise supervision, there were significant improvements in QoL and anxiety/depression for both supervised and unsupervised interventions (p<0.01).

Both interventions lasting longer than 12 weeks or shorter than 12 weeks had significant improvements in depression (p<0.01).
<table>
<thead>
<tr>
<th>Identifier</th>
<th>Study design features</th>
<th>Intervention</th>
<th>QA (out of 11)</th>
<th>Study findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomson (2017), Australia SR, no restrictions</td>
<td>RCTs (n=5) Active treatment (n=381)</td>
<td>To evaluate the effectiveness of weight gain prevention interventions among women with breast cancer</td>
<td></td>
<td><strong>Significant increase (SMD 0.51, 95% CI: 0.23 to 0.79, p&lt;0.01)</strong>  <strong>Mental QoL:</strong> Significant increase (SMD 0.28, 95% CI: 0.06 to 0.50, p=0.013)</td>
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<td><strong>Weight loss (5 studies, n=381)</strong> Mean weight change among intervention arms ranged from -2.9 to +2.3kg change.  <strong>Within-group analysis</strong> Weight gain was prevented in two intervention arms  Weight loss was achieved in two intervention arms  Three intervention arms reported weight gain &gt;1kg  <strong>Between-group analysis (n=4 studies)</strong> Two reported significant differences in weight change between groups (of at least 2kg). Sub-group analysis in one study showed significantly greater weight loss in participants aged &gt;50 than those younger than 50 <strong>Body composition (5 studies, n=381)</strong> Within intervention arms, fat mass/body fat reduced in 3 interventions and increased in 3. A reduction in fat mass/body fat was reported in 3/4 intervention arms achieving overall mean weight loss or maintenance.</td>
</tr>
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<td>Timescale, Intervention characteristics, comparator</td>
<td></td>
<td>Authors’ conclusions</td>
</tr>
<tr>
<td>Wang (2021), 36 China SR and meta-analysis, no restrictions</td>
<td>RCTs (n=11) Post-treatment (n=666)</td>
<td>To structure the available evidence relating to physical exercise programmes and their impact on patients’ cardiovascular system during the convalescence for breast cancer</td>
<td></td>
<td>BMI (4 studies, n=264) Significant reductions (MD -3.59kg/m2, 95% CI: -6.29 to 0.89, p=0.009). Significant heterogeneity.</td>
</tr>
</tbody>
</table>

- 8 to 24 weeks
- Physical activity interventions (aerobics, flexible/endurance exercise, resistance training, yoga, stretching and dancing)
- Supervised
- Control: usual care

Exercise may be a promising means for cardiovascular nursing. Higher effects were achieved when patients started exercising immediately after treatment, with an intervention of at least 30 min at a time, at least three times a week, for 8–12 weeks.