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The effect of computers for weight loss: a systematic review and meta-analysis of randomized trials

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CRD summary
Addition of computer-based interventions to a standard weight reduction programme had a small but significant positive effect on weight. A computer modality was significantly less effective than a standard tool. The unclear quality of the evidence due to substantial gaps in the reporting of the studies and some weaknesses in the analysis of this otherwise well-conducted review mean that the reliability of the conclusions is unclear.

Authors' objectives
The stated objective of the review was to assess the independent effect of a computer modality as a means of delivering a weight reduction programme compared to standard modes of delivery and the impact of an additional computer-based component to a weight reduction programme.

Searching
MEDLINE, Cochrane Central Register of Controlled Trials (CENTRAL), CINAHL and PsycINFO were searched up to May-June 2010. There were no language restrictions. ClinicalTrials.gov, Google Scholar and reference lists of included studies were consulted. Search terms were reported.

Study selection
Randomised controlled trials (RCTs) that evaluated computer-based education or support aimed at reducing weight or body mass index (BMI) were eligible. Control groups had to receive a non-computer-based intervention. Participants were eligible if they were adults classed as overweight or obese according to the Centres for Disease Control and Prevention (CDC). Studies that required participants to have lost weight before the intervention were excluded as their focus was on weight maintenance rather than weight loss.

Most studies comprised a majority of women and white people. Mean weight ranged from 78kg to 99kg. Mean BMI ranged from 29kg/m² to 36kg/m². Interventions lasted between two and 12 months. Most interventions were clinic based. Half of the studies (addition studies) added a computer-based tool to an intervention that generally comprised in-person sessions. The other trials (substitution studies) delivered a similar programme in the intervention and control groups but used different modes of delivery (computer-based versus non-computer-based).

Abstracts were selected by one reviewer. Full texts by two reviewers independently. Disagreements were resolved via consensus.

Assessment of study quality
Study quality was assessed using the Cochrane Risk of Bias tool of random sequence generation, allocation concealment, blinding, incomplete outcome data, selective reporting and other possible sources of bias.

Two reviewers independently assessed study quality. Disagreements were resolved by discussion.

Data extraction
The primary outcome (weight and/or BMI change) was extracted from each study to calculate weighted mean differences (WMDs) with 95% confidence intervals. Missing data were sought through contact with study authors. Standard deviations were imputed or calculated when not reported in the studies.

Two reviewers independently extracted the data.

Methods of synthesis
Studies were pooled using a random-effects model. Heterogeneity was assessed using I^2 and was explored using sensitivity analyses. Publication bias was examined by visual inspection of a funnel plot. Post hoc subgroup analyses were conducted to explore the influences of two modes of delivery (substitution and addition studies) and within these the effect of programme duration, follow-up duration and year of delivery.

Results of the review
Eleven RCTs (1,866 participants,13 comparisons) met the inclusion criteria. Only five studies reported follow-up duration, which ranged from three months to five years. Nine trials provided insufficient data to assess three or more bias categories. Seven trials did not report sufficient information on randomisation methods. Only two trials reported appropriate information regarding allocation concealment. Eight trials reported balanced study arms at baseline.

Addition studies: The effect of adding a computer-based intervention to a standard weight loss programme was statistically significant (WMD -1.48kg, 95% CI -2.52 to -0.43; six comparisons, 550 participants; I^2=0%). BMI was statistically significantly lower for participants who received the intervention compared to control (WMD -0.43kg/m², 95% CI -0.83 to -0.03; three comparisons, 647 participants; I^2=0%). A subgroup analysis showed that the effect on weight loss was significant at less than six months (WMD -1.89, 95% CI -3.41 to -0.38; five comparisons, 198 participants; I^2=0%) but no longer significant at six months or more (MD -1.10, 95% CI -2.55 to 0.35; one comparison, 352 participants).

Substitution studies: There was no statistically significant effect of substituting a computer-based technology to deliver a similar intervention to that given to control (WMD 0.36kg 95% CI -1.80 to 2.53; six comparisons,1,086 participants; I^2=65%). Non-computer-based interventions became significantly more effective in a sensitivity analysis that excluded a small study (WMD 1.47kg, 95% CI 0.13 to 2.81;

five comparisons, 1,074 participants; I^2=0%). No significant difference in BMI was observed between computer and non-computer-based programmes (WMD 0.44, 95% CI -1.15 to 2.03; three comparisons, 101 participants; I^2=0%).

No evidence of publication bias was found.

Authors' conclusions
Addition of computer-based interventions to a standard weight loss programme had a significant positive effect on weight. However, this small effect was unlikely to be clinically significant and its sustainability was questionable. Use of computer-based technology instead of a standard mode of delivery led to significantly less weight loss.

CRD commentary
The stated review question was relatively clear. The review appropriately addressed two distinct issues: the impact of an additional computer-based component to a weight reduction programme and the effect of a computer as a tool to deliver an intervention compared to a standard programme. The inclusion criteria were clear. The search of relevant sources was thorough. Study selection, data extraction and quality assessment were performed with appropriate attempts to minimise error and bias.

The amount of data imputed was not reported and the extent to which it influenced the findings was unclear. Appropriate imputation methods were used. Potential for publication bias was assessed appropriately and no evidence of it was found. Validity was assessed and the results were appropriately reported. Significant gaps in the reporting of methodological aspects of the studies mean that the validity of the included evidence was unclear.

Overall effect estimates were reported only in subgroup analyses. The rationale for this was unclear which suggested the risk of reporting bias. Subgroup analyses included few studies and this may have limited the reliability of the results. Tests for statistical heterogeneity were appropriate and the analyses yielded homogenous results overall.

The unclear quality of the evidence due to substantial gaps in the reporting of the studies and some weaknesses in the analysis of this otherwise well-conducted review mean that the reliability of the conclusions is unclear.

Implications of the review for practice and research
Research: The authors stated that other outcomes such as patient and provider satisfaction, convenience and cost-effectiveness should be investigated in further meta-analyses. A review of studies that included portable electronic devices and new applications (such as networking websites) could be conducted once more primary studies that included such tools were available.

Practice: The authors did not state any implications for practice.

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