A systematic review of randomized trials on the effectiveness of computer-tailored education on physical activity and dietary behaviours

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CRD summary
This review assessed the use of computer-tailored interventions aimed at changing the physical activity levels or dietary behaviours of individuals. The authors found that there was some evidence for a beneficial effect on dietary behaviour, but that more research was needed. There were limitations to this review but, overall, the authors' cautious conclusions appear appropriate.

Authors' objectives
To review the evidence on the effects of expert-driven computer-tailored education on changes in physical activity and nutrition behaviours.

Searching
PubMed, PsycINFO and Web of Science were searched for papers published between 1965 and 2004; the search terms were reported. The reference lists of relevant identified publications were checked, and experts were contacted. Only papers published in the English language were eligible for inclusion.

Study selection
Study designs of evaluations included in the review
Only randomised controlled trials (RCTs) were eligible for inclusion.

Specific interventions included in the review
Studies that assessed computer-tailored interventions, aimed at changing physical activity or nutrition behaviours, were eligible for inclusion. Tailored interventions were defined as those intended for individuals, based on their unique characteristics and derived from an assessment. The information had to be delivered in a non-personal way (such as printed format, interaction with computer or other media device). Studies assessing generic materials (aimed at a particular population), or those that used computer-tailored interventions as part of a wider package, were excluded.

In the included studies most interventions were informed by explicit theoretical behavioural models. They included feedback on current behaviour, awareness of performance or intentions/self efficacy, as well as information on knowledge, benefits, barriers to change, etc. Most computer-tailored interventions were delivered via letters, pamphlets, or brochures or computer; others were delivered using text and video. None used the Internet. Most of the comparator groups received no information or generic information, but some received self-help workbooks, video modelling/lecture or intake feedback. Most interventions involved a single contact.

Participants included in the review
Studies on apparently healthy adults were eligible for inclusion (i.e. those aimed at primary prevention of disease). In the included studies some people were recruited through work sites, colleges, medical practices, supermarkets and churches; others included recipients of welfare benefits or the general population. Some included studies recruited only sedentary people, while in others people were overweight or had risk factors for cardiovascular diseases.

Outcomes assessed in the review
Studies that assessed changes in physical activity or nutrition behaviours were eligible for inclusion. The included studies assessed physical activity, effects on fat intake and fruit and vegetable consumption, and other dietary behaviours (fibre and calcium intake or weight loss). Changes were assessed using questionnaires, food frequency questionnaires, food diaries, or shopping receipts. Most studies use validated questionnaires.

How were decisions on the relevance of primary studies made?
Two reviewers independently assessed papers for inclusion in the review. Any disagreements were resolved by consensus, with the help of a third reviewer.
Assessment of study quality
The authors did not state that they assessed validity. However, they did discuss the validity of methods used to measure the outcomes.

Data extraction
Two reviewers independently extracted the data. Any disagreements were resolved by consensus, with the help of a third reviewer. Where possible, effect sizes were calculated for individual studies. These were classified as small (0.2 to 0.5), moderate (0.5 to 0.8) and large (>0.8). The outcomes were classified as short term (less than 3 months), medium term (3 to 6 months) or long term (more than 6 months). Where a study reported outcomes for more than one time interval within these categories, the longest period only was extracted.

Methods of synthesis
How were the studies combined?
The studies were combined in a narrative discussion, grouped by outcome (changes in physical activity, fat intake, fruit and vegetable intake, and other types of nutritional behaviours).

How were differences between studies investigated?
The studies were also grouped by the timing of the outcome assessment. Differences between the studies were discussed in the narrative. Results for single-component interventions were compared with multi-component interventions.

Results of the review
Twenty-eight RCTs (13,063 participants) were included; ten (4,382 participants) studied physical activity and twenty-five (10,121 participants) studied nutritional behaviour. Some studies were aimed at more than one behaviour change. The sample sizes ranged from 84 to 1,317.

Physical activity

Of the three studies that reported on short-term effects, one found a significant effect from the intervention. Five studies assessed medium-term effects and of these two found a significant beneficial effect with the intervention and two a beneficial effect with the control. One of the 6 studies assessing long-term effects found a small but significant effect with the intervention.

Fat consumption

Fourteen studies assessed short-term benefits, and of these eleven showed a significant favourable effect from the intervention. In those where an effect size could be calculated, this was small (6 studies). Five of the 7 studies assessing medium-term benefits found a significant effect in favour of the intervention. The only 2 studies that assessed long-term benefits found no significant effect on fat intake.

Fruit and vegetable consumption

Ten studies assessed short-term effects and of these six found a significant effect on fruit and vegetable (combined or separately) intake with the intervention. The effect sizes were small. Four of the 5 studies assessing medium-term effects found a significant difference in combined fruit and vegetable intake only in favour of the intervention. The effect sizes were small. The 2 studies that assessed long-term effects both showed a significant effect in favour of the intervention.

Other dietary behaviours

Four studies assessed short-term effects on fibre intake; of these, three found a significant beneficial effect with the intervention. Three studies assessed medium-term effects and all reported a significant beneficial effect with the intervention. One study assessed changes in calcium intake and reported no intervention effect at either the medium- or long-term follow up. One study reported no short-term change in use of weight loss behaviour suggestions. Another reported a significant long-term effect on weight loss with the intervention, with a small effect size.
The evidence was insufficient to draw firm conclusions as to whether interventions aimed at more than one behaviour change were more or less beneficial than those aimed at only one change.

**Authors’ conclusions**
The use of computer-tailored interventions to promote healthy diets appeared to have potential, but further research is required.

**CRD commentary**
The aims and inclusion criteria of this review were stated clearly. A number of relevant databases were searched, but the search was limited to studies published in English; it is possible that relevant studies were missed, which could affect the results of the review. The methods of the review (study selection and data extraction) were appropriate for minimising the introduction of reviewer bias or errors. There was no mention of any quality assessment of the included studies and this made it difficult to adequately assess the reliability of these studies.

The authors chose to discuss the results in a narrative form. They appropriately grouped the results according to type of behaviour change. However, a simple scoring system was used to add the numbers of studies showing benefit, or not, from the intervention. Summarising the results in this way takes no account of the characteristics of the individual studies (such as sample size or study quality) and might not have been appropriate.

There were limitations to this review but, overall, the authors' cautious conclusions appear appropriate and the stated need for further research appears justified.

**Implications of the review for practice and research**
**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that more research was needed to assess the effects of computer-tailored interventions in comparison with other intervention techniques. Future studies should be reported according to established standards, should evaluate outcomes using validated self-reports and more objective markers of change, and should evaluate the cost-effectiveness of interventions. In addition, there was a need for research to identify the underlying mechanisms that could result in success with computer-tailored interventions.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.