Computer-aided psychotherapy for anxiety disorders: a meta-analytic review
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CRD summary
The authors concluded that computer-aided psychotherapy was as effective as face-to-face psychotherapy, but that the results should be treated with caution due to a number of methodological limitations. In light of the poor quality of the included studies and the possibility of reviewer error and bias, the authors' caution is justified.

Authors' objectives
To evaluate the impact of computer-aided psychotherapy on anxiety symptoms and work or social function of people with anxiety disorders.

Searching
MEDLINE, The Cochrane Library, CINAHL, PsycInfo, Social Sciences Citation Index and EMBASE were searched up to March 2008 for studies in English. Experts in computer-aided psychotherapy and members of the International Society for Research on Internet Interventions were contacted for further studies. Programs and abstracts of relevant conferences and relevant journals were handsearched. References of retrieved studies and review articles were searched. This search was part of a wider review of articles on computer-aided psychotherapy and mental health problems (see Other Publications of Related Interest).

Study selection
Randomised controlled trials (RCTs) that compared computer-aided psychotherapy with contrast conditions or face-to-face psychotherapy in adults with anxiety disorders were eligible for inclusion. Studies that compared two active computer-aided psychotherapy conditions and studies with sub-clinical participants were excluded.

Included studies were of internet-based stand-alone computer, palm top or virtual reality computer psychotherapy in adults with panic/agoraphobia, social phobia, spider phobia, flight phobia, mixed phobias, post-traumatic stress disorder (PTSD) or obsessive-compulsive disorder (OCD). The number of sessions ranged from one to 10. Contrast conditions were: face-to-face therapy, including cognitive-behavioural or behavioural therapy; relaxation; waiting list control; book; information; and self-monitoring. In most studies, participants met Diagnostic and Statistical Manual (DSM) or International Classification of Diseases (ICD) criteria. Most participants were recruited from community settings. Outcomes included in the review were anxiety, depression, quality of life and drop-out rates. A range of tools were used to measure outcomes. These were reported in full in another article (see OPRI), but not in the current review. Follow-up ranged from post-intervention to one year. The studies were carried out in Europe, USA and Australia.

The authors stated neither how studies were selected for the review nor how many reviewers performed the study selection.

Assessment of study quality
The methodological quality of the included studies was assessed in accordance with three Cochrane criteria: whether randomisation was carried out by an independent party; blinding of outcome assessors; and completeness of follow up data.

The authors did not state how many reviewers performed the validity assessment.

Data extraction
The mean and standard deviation of post-intervention scores of both groups were extracted and used to calculate an effect size for each study using Cohen's d with 95% confidence intervals (CI). Where more than one scale was used for each outcome, a mean effect size across all scales was calculated. The number of patients who dropped out was extracted and used to calculate the odds ratio (OR) for each study with 95% CI. A ratio was calculated of time spent...
with the therapist in computer-aided versus face-to-face conditions. This was plotted against the effect size for each study.

The authors did not state how many reviewers performed the data extraction.

### Methods of synthesis

Pooled effect sizes and odds ratios were calculated using both random-effects and fixed-effect models. Subgroup analyses were carried out according to type of computer-aided psychotherapy system, age of computer-aided psychotherapy system, type of anxiety disorder and type of contrast group. Sensitivity analyses were conducted excluding outliers. Statistical heterogeneity was assessed using the Q statistic and the $I^2$ statistic. Publication bias was assessed by visual inspection of funnel plots and using Duval and Tweedie's trim and fill method. The fail safe N was calculated.

### Results of the review

Twenty three studies were included for review (n=1,468). Eight studies reported independent randomisation. Seven studies reported blinding of outcome assessors. Drop-out ranged from 2% to 29%. Eleven studies used intention-to-treat analyses.

**Computer-aided psychotherapy compared to contrast conditions:** Computer-aided psychotherapy had a large effect on anxiety compared to contrast conditions at post-intervention ($d = 1.08$, 95% CI 0.84 to 1.32; 21 studies). There was evidence of significant statistical heterogeneity ($I^2 = 65.6\%$). Removal of two outlying studies reduced the effect size ($d = 0.94$, 95% CI 0.80 to 1.08; 19 studies) and lowered the statistical heterogeneity ($I^2 = 36.2\%$). At one to three months follow-up, there was no significant difference in anxiety between the intervention and contrast conditions (two studies). Fail safe N was 71. Computer-aided psychotherapy had a small to moderate effect on quality of life ($d = 0.46$, 95% CI 0.30 to 0.62; 12 studies) and depression ($d = 0.56$, 95% CI 0.41 to 0.71; number of studies unclear) compared to contrast conditions.

**Computer-aided psychotherapy compared to face-to-face psychotherapy:** There was no significant difference between computer-aided and face-to-face psychotherapies at post-intervention (13 studies) or at one to three (three studies) or six months follow-up (six studies). Drop-out rates did not significantly differ between computer-aided psychotherapy and face-to-face psychotherapy (eight studies). The ratio of time spent with a therapist was significantly associated with the effect size (p<0.05). There was evidence of significant statistical heterogeneity for depression ($I^2 = 61.9\%$), but not for quality of life ($I^2 = 0\%$).

Subgroup analyses and sensitivity analyses did not significantly alter the findings for any outcomes. There was no evidence of significant publication bias.

### Authors’ conclusions

Computer-aided psychotherapy was an effective treatment for anxiety compared to contrast conditions and was as effective as face-to-face psychotherapy. The results should be treated with caution due to a number of methodological limitations.

### CRD commentary

The review addressed a clear question with well-defined inclusion criteria for intervention, participants and study design. Several relevant databases were searched. Attempts were made to identify unpublished data, thus minimising risk of publication bias. The review was restricted to English-language articles, which introduced a risk of language bias. It was unclear whether appropriate steps were taken throughout the review process in order to minimise the risk of reviewer error and bias. A validity assessment was carried out and the quality of the included studies was generally low. Most included studies were of panic, simple and complex phobias in participants taken from the community, so the extent to which the findings could be generalised to other anxiety disorders or clinical populations was unclear. Appropriate methods were used to pool the results. Statistical heterogeneity was assessed and explored. In light of the poor quality of the included studies and the possibility of reviewer error and bias, the authors' caution is justified.
Implications of the review for practice and research

**Practice:** The authors stated that certain forms of computer-aided psychotherapy deserved to be integrated into routine clinical practice.

**Research:** The authors stated that further research should be conducted separating the impact of the computer psychotherapy system characteristics from the impact of the frequency, duration and expertise of human support. The use of computer-aided psychotherapy systems as a training and awareness raising tool for students, professionals and caregivers should also be investigated.

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