Teaching medical students exposure therapy for phobia/panic – randomized, controlled comparison of face-to-face tutorial in small groups vs. solo computer instruction

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Objective To compare the teaching value of one session of computer-guided solo instruction in exposure therapy for phobias with that of one face-to-face small-group tutorial.

Design Non-blind, randomized, controlled study.

Setting King's College Hospital Medical School, London.

Participants Thirty-seven third-year medical students and 11 behaviour therapists.

Main outcome measures Seventy-five true/false multiple choice questions relating to (b) below answered at pre- and post-teaching by students and just once by behaviour therapists to obtain 'expert' scores; pre- and post-teaching ratings of interest in behaviour therapy and post-teaching ratings of educational and enjoyment value.

Educational interventions (a) All students had a 20-minute group lecture on basic concepts and historical aspects just before randomization to: (b) 90 min of either solo computer or group face-to-face tutorial teaching. Computer instruction used a short version of *'FearFighter'* – a self-help computer system for people suffering from phobias.

Results Solo computer instruction taught exposure therapy principles effectively but improved multiple choice question scores marginally less than did small-group tutorial teaching. Tutorial teaching required 5 times more teacher time but led to knowledge scores that did not differ significantly from those of behaviour therapists. Students clearly rated face-to-face small-group tutorial teaching as more enjoyable.

Conclusion The knowledge gain from a solo computer session resembled that from a small-group face-to-face tutorial, and required far less teacher time, but was less enjoyable. Enjoyment might rise if the computer session was group-oriented and aimed at students rather than patients. In general computer teaching might be best used to complement rather than replace conventional teaching.

Keywords Computer-assisted instruction/*methods; education, medical, undergraduate/*methods; England; phobic disorders/therapy; randomised controlled trials (PT); teaching/*methods.

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Introduction

Phobias are a common and often disabling problem affecting 1 in 9 people.[1] Graded exposure is an effective treatment whose benefits extend to work and social adjustment.[1,2] Only a minority of medical and nursing practitioners are familiar with its principles and fewer still could implement an exposure therapy programme. Instruction in graded exposure is superficial or absent in most undergraduate medical and nursing curricula and is difficult to access for those practising outside of psychiatry. In this context there is considerable potential for an effective and accessible computer teaching package for use either in isolation or combined with computerised self-help aids. Such innovations need to be carefully evaluated and reported[3,4] rather than simply a response to fashion trends in medical education.

In a randomized, controlled trial (RCT) we tested the teaching potential for medical students of a reduced, HTML, version of *'FearFighter'*, a self-help computer system for people suffering from phobias (the content and layout are noted below). Phobia/panic patients who were guided through self-exposure therapy mainly by

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Key learning points

The solo computer-assisted instruction package tested in this study taught the principles of exposure therapy effectively but was marginally inferior to tutorial teaching in small groups.

Students taught by computer required 80% less time in contact with their human instructor.

Students were 'reasonably' satisfied with computerised instruction but rated tutorial teaching more highly.

Computer-assisted instruction may be most acceptable and effective when used to complement rather than replace conventional teaching.

FearFighter improved as much as those guided entirely face-to-face by a clinician, with a two-thirds saving of clinician time, in both a naturalistic pilot study[5] and in a RCT recently submitted for publication. *FearFighter's* PC-based version is in routine clinical use at the NHS Stress Self-Help Clinic attached to Imperial College London and an Internet version is being piloted that could become the main route of access.

Several computer-assisted instruction packages concerning mental health have been developed[6–9] but the system tested in the present study is unusual in offering patients comprehensive instruction in how to undertake graded exposure. All systems used multimedia technology to teach psychopathology and simulate clinical scenarios. Two were compared with conventional didactic lectures and turned out to be as effective overall, and even superior in some respects.[6,9] Where computer teaching was compared with interactive tutorials or workshops the results were less good with conventionally taught students often faring better and rating more satisfaction.[10,11]

In the present study computer-assisted instruction was compared with the 'gold standard' format of interactive face-to-face teaching in small groups. We hypothesized that there would be no post-teaching difference between the 2 conditions on measures of knowledge and acceptability and that knowledge (i.e. multiple choice question) scores would approach those of trained behaviour therapists.

Method

The abridged HTML version of *FearFighter* was used as it is more easily transported, stable and quicker to navigate than the full system which has safeguards to ensure that patients move through the system properly. The system's software was installed onto 20 PCs by local IT staff over 4 hours, and once in place required no maintenance or amendment. Pilot work showed that giving the students a typical case vignette, related questions and guidelines on how to make best use of their time improved efficiency and stopped them spending too long in one corner of the system.

Outcome measures

MMD devised multiple choice questions related to the 'interactive' part of the seminar (see below). They consisted of 15 'stems' each containing 5 statements to be marked true or false (total 75). The multiple choice questions were first checked with 2 other experts (one was IMM) prior to use. Care was taken to test understanding of all relevant aspects of the subject. Emphasis was on testing the student's ability to apply the principles of graded exposure to realistic clinical scenarios and their ability to recognise and avoid common pitfalls in treatment. Only 3 of the 15 stems covered theory and terminology. Two stems are shown in Table 3.

The phrase 'I find behaviour therapy interesting' was rated on a 0–8 scale before and after teaching with 0 = 'not true at all', 2 = 'slightly true', 4 = 'reasonably true', 6 = 'definitely true' and 8 = 'very true'. Two aspects of satisfaction with the interactive part of the seminar were rated at its end – 'I found the interactive teaching educational' and 'I found the interactive teaching enjoyable' – using the same 0–8 scale. These scales were devised for the study and were not previously validated. MMD made clear to the students what 'interactive teaching' referred to. Students were also invited to give written feedback on the interactive teaching and the seminar in general.

Setting and participants

Thirty-seven 3rd year medical students (20 female) from King's College Hospital medical school, 5 weeks into their 6-week clinical attachment in psychiatry, were taught in a 3 h seminar. Three such seminars were attended by 9, 16 and 12 students, respectively, who had previously had a 1 h lecture on anxiety disorders but no instruction in graded exposure. The seminars took place in a modern, well-equipped teaching centre. A computer room containing 20 PCs was set aside for sole use by participants.

No students were excluded. 11 more were expected but did not attend for reasons that are not known.

Design and assignment

A non-blind, randomized, controlled design was used. Using 'odd' and 'even' conditions from a random number series, students were randomized to one session of either solo computer ($n = 19$) or small-group face-to-face tutorial ($n = 18$) teaching.

Learning objectives

These were the same for students in both conditions. The aim was to teach them to identify the behavioural and cognitive aspects of common phobias, devise 'problem and goal' statements and an individualised programme of graded self-exposure, understand the principles involved and anticipate and overcome common 'sticking points' in treatment.

Seminar format (Fig. 1)

MMD briefly outlined the study and emphasized that multiple choice question scores were not part of continuous assessment. The students then rated their interest in behaviour therapy and answered the multiple choice questions. A 20-minute preliminary lecture by MMD followed, concerning basic cognitive behaviour therapy concepts and a historical overview. All 37 students were taught together until this point. After a coffee break they were randomized to have 90 min in the computer or tutorial conditions before being re-tested. In both 90-minute conditions students were given a description of a case of agoraphobia and were asked to 1) give the diagnosis, 2) define the problem in behavioural terms, 3) set treatment goals and 'homework' tasks, and 4) 'troubleshoot' problems.

Students in the *FearFighter* condition worked alone for 90 min exploring the system for instructions on how to answer these 4 questions. IT staff were available for technical problems but no tutor was in the computer room during this time. The system takes the user through standardized questionnaires, the treatment rationale and case examples before helping the devising of a step-by-step personalized exposure programme, complete with homework diaries. It subsequently feeds back progress. A 'troubleshooting' section identifies reasons for lack of progress in treatment and offers a choice of likely solutions.

Students in the 90-minute tutorial group (each $n = 8$ or less) worked with MMD through the same 4 questions in an interactive way.

Re-testing followed using the same multiple choice questions, satisfaction ratings and re-measurement of interest in behaviour therapy.

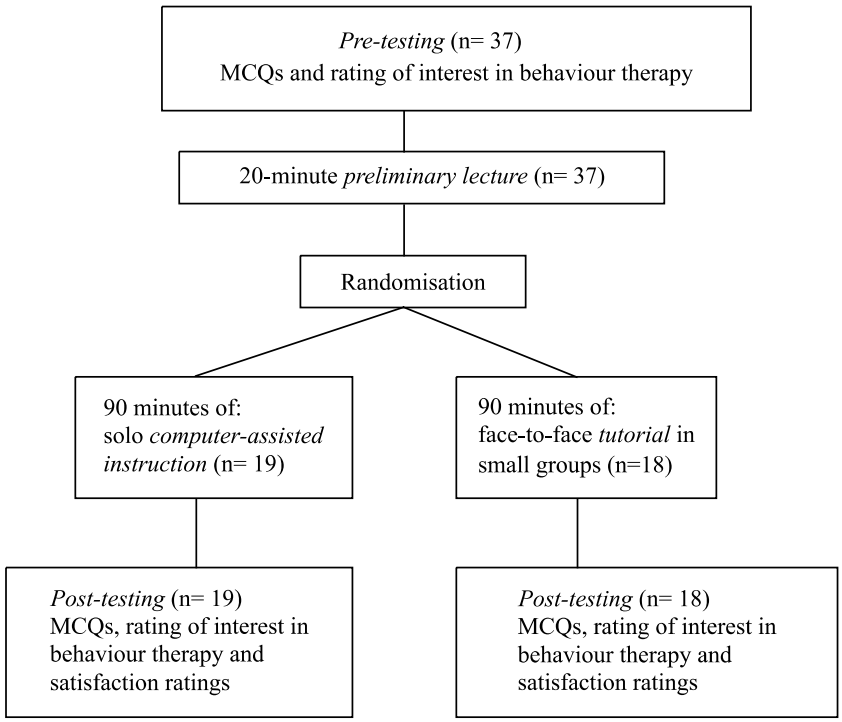

Figure 1 Study flow chart (MCQ = multiple choice question).

Eleven practising cognitive behaviour therapists at the Maudsley Hospital answered the same multiple choice questions just once to yield 'expert' scores for comparison. The 2 expert reviewers of the multiple choice question paper were not included.

Analysis and results

Students in the 2 groups did not differ significantly on any pre-teaching measure, including multiple choice question score (Table 1). Multiple choice question scores and the 'interest in behaviour therapy' ratings taken pre- and post-teaching were analysed by a 2 × 2 (group × teaching) mixed model analysis of variance. As expected, multiple-choice question scores rose highly significantly from pre- to post-teaching in both conditions (for the sample as a whole: mean increase 30%, 95% CI 25–35%, within subjects teaching effect: F 161·2, d.f. 1, 34, p < 0·0001; computer: mean rise 26%, 95% CI 20–31%; tutorial: mean rise 34%, 95% CI 26–43%). The tutorial group's post-teaching scores were slightly superior to those of the computer group and the group–teaching interaction effect approached significance (F 4·1, d.f. 1, 34, p = 0·05). The between-group effect alone was not significant (F 1·3, d.f. 1,34, p = 0·27).

Comparison with 'expert' multiple choice question scores

Compared to experts' scores, the post-teaching scores of the tutorial group tended to be inferior (mean expert score 76·0%, mean difference from tutorial scores 9·4%, 95% CI 1–20%, independent *t*-test: t = 1·9, d.f. 1, 27, p = 0·07) and the post-teaching scores of the computer group were significantly inferior (mean difference from computer scores 18·8%, 95% CI 9–28%, independent *t*-test: t = 3·9, d.f. 1, 27, p = 0·01).

Table 1 Multiple choice question scores

Condition	Pre-teaching mean (s.d.)	Post-teaching mean (s.d.)
Computer *n* = 19	30·6% (11·2)	57·1% (13·5)
Tutorial *n* = 18	31·5% (16·2)	66·5% (14·6)

Satisfaction ratings

Table 2 shows mean student satisfaction ratings. Computer teaching was rated on average as 'reasonably' educational and enjoyable but tutorial teaching was rated significantly more so on both measures (independent *t*-tests: educational value, t 2·3, d.f. 1, 34, p = 0·03; enjoyment, t 4·1, d.f. 1,34, p < 0·001). Students' interest in behaviour therapy, however, rose similarly and significantly with teaching in both conditions – from 'reasonably' to 'definitely' (within subjects teaching effect: F 23·4, d.f. 1, 34, p < 0·0001; between group effect: F < 0·01, d.f. 1,34, p = 1·0; group–teaching interaction effect: F 0·7, d.f. 1,34, p = 0·4). Students had no difficulty accessing or navigating the system and there were no technical failures during the study.

Only 11 students gave 'free text' written feedback. Of the 5 computer-taught respondents, 2 would have preferred to work in groups; 3 found it an effort to explore the system for information and would have preferred a tutorial, and 1 felt that the system was not challenging enough as it was originally designed for patients. The 6 tutorial-taught respondents enjoyed lively discussions with their tutor and fellow students and felt there was ample opportunity to ask questions and clarify points as they arose; one felt that further information might be available on the computer and suggested the 2 formats be combined.

Sub-analysis of multiple choice questions

To explore whether any multiple choice questions were redundant, a sub-analysis of the 15 'stems' (each containing 5 true/false statements) was performed and revealed that on average correct responses rose after

Table 2 Satisfaction ratings*

Statement rated		Computer mean (s.d.)	Tutorial mean (s.d)
'I found the interactive teaching educational'		4·3 (1·9)	5·6 (1·5)
'I found the interactive teaching enjoyable'		3·5 (2·0)	5·8 (1·3)
'I find behaviour therapy interesting'	Pre-teaching	3·7 (2·3)	3·7 (1·4)
	Post-teaching	5·0 (1·7)	5·2 (1·6)

*0–8 scale: 0 = 'not true at all', 8 = 'very true'.

teaching in all except one stem. The pattern of increase was similar in both conditions with an almost identical ranking of stems in order of score increase. The 2 stems where the tutorial condition scored significantly better than the computer condition related to goal setting (Table 3).

Discussion

FearFighter was an effective, efficient tool to teach the principles of graded exposure for phobias. Tutorial teaching of small groups requiring 5 times more teacher time was marginally superior and resulted in knowledge scores approaching the level of practising behaviour therapists.

Students were reasonably satisfied with computer-guided instruction but rated tutorial teaching more highly. Unlike Williams *et al.*'s sample[9] there is indirect evidence that students in the present study were accurate judges of the value of the teaching they received. The tutorial students rated the tutorial higher for educational value and scored better (albeit marginally) on multiple choice questions post-teaching.

Interest in behaviour therapy rose similarly in each condition though students clearly rated tutorial teaching as being more enjoyable. However, students used the computer on their own but had tutorial teaching in a group, so it is unclear how much the greater liking of tutorial teaching reflected interaction (a) among the students and (b) with the tutor. The students' written comments showed that they liked the tutorial's immediate feedback and opportunities to clarify points as they arose. Computer instruction could be devised that is targeted at students rather than patients to make it more enjoyable *per se* and to encourage student users to seek brief help from one another and perhaps a tutor as needed. *FearFighter* and other computerised teaching packages might be best used to prime students prior to face-to-face tutorials which could thus be shortened and perhaps become even more rewarding. This would resemble the way that *FearFighter* is currently used as a treatment tool – patients spend most of their treatment time at the computer and get brief backup advice from a clinician only as needed.

Further limitations of the present study deserve mention. There was no assessment of skill acquisition by students or of subsequent behaviours as detailed in Kirkpatrick's hierarchy.[12] Knowledge retention was not measured by re-testing at follow-up. The multiple choice questions were set by the tutor (MMD) and not validated as a measure of understanding or clinical skill, though, as noted earlier, effort was made to ensure they tested all relevant aspects of the topic. Any bias within the tutorial towards giving answers to the multiple choice questions would have led to a less favourable result for computer teaching. Although recording of the data for analysis was not blind to the teaching condition, the nature of the data (true/false responses and Likert-style numerical data) makes it unlikely that this introduced significant bias.

The short HTML version of *Fearfighter* used in the present study has potential as a training tool but may not suit everyone. At present it can be used by medical, nursing and psychology students. On the Internet it could soon be used to complement and shorten face-to-face teaching and to train local co-therapists such as practice nurses to supervise clients' self-treatment. The same multiple choice questions can be used as part of this process but measures of clinical skill will need to be introduced too.

Table 3 The 2 out of the 15 multiple choice question stems where the tutorial group scored significantly better than the computer group post-teaching

The following are appropriate homework tasks for someone being treated for a phobia of busy streets:
- Visit a busy street for up to five minutes twice a day for a week.
- Take 10 mg of diazepam prior to going out of the house.
- Stay in a busy street once a day only until they feel their anxiety is becoming dangerous.
- Visit Oxford Street for one hour daily for a week.*
- Write an essay on the history of the street they find particularly frightening.
The following are good end-of-treatment goals for John (who suffers from agoraphobia and avoids train/tube travel) to set himself prior to treatment:
- I want to be rid of my phobia of trains.
- Travel to and from work on the tube at rush hour each day.*
- Become a train driver.
- Walk by a tube station without feeling fear.
- Travel from King's Cross to London Bridge (his route to work) and back by Tube at rush hour each working day.*

*Indicates 'true' statement.

In brief, our findings, and previous findings,[10,11] suggest that computer-assisted instruction may be most acceptable to students, and potentially is at its most effective when used to complement rather than replace well-conducted conventional teaching.

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Contributors

MM devised the protocol, multiple choice questions and questionnaires; designed and conducted the teaching sessions; analysed the data and wrote the manuscript. IMM supervised the study. He substantially edited the protocol (including the multiple choice questions and questionnaires) and the manuscript and approved the final draft. He holds intellectual property rights in *FearFighter*.

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