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Review

Computer-based treatment for anxiety and depression: is it feasible? Is it effective?

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Abstract

The rise of consumerism, escalating levels of technological change and increasing demand for better dissemination of psychological treatments signal a transformation in the treatment of mental health problems. Soon health care consumers will have a choice as to whether they wish to consult a clinician in his/her rooms in order to receive a diagnosis, treatment and support, or instead to receive these services electronically, or a combination of both. Some of the online services currently available include structured therapy programs, psychological treatment by email, real-time online counselling, professionally assisted chat rooms, self-help groups, health information and educational modules. This paper reviews the use of computer programs in mental health care and, in particular, for the treatment of anxiety and depression. Issues of feasibility, ethics, and effectiveness are discussed and the future of computer-based treatment programs in mental health is considered.

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Keywords: Anxiety; Depression; Therapy; Computer-aided; Internet; Self-help

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1. Introduction

At a time when health consumers are becoming more involved in information seeking, decision-making

and treatment and when, concomitantly, healthcare policy in developed countries is focussing on increasing prevention and self-care, information technology is extending the availability and range of mental health services. Some of the online services currently available include structured therapy programs, psychological treatment by email, real-time online counselling, professionally assisted chat rooms,

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self-help groups, health information and educational modules. Computers offer a platform for enhancing access to information and support, for extending treatment options and for providing opportunities for prevention of health problems. According to some writers, the ‘information age health care system’ is gathering momentum [1].

In this article, I review the use of computer therapy programs in mental health care and, in particular, for the treatment of anxiety and depression. I consider ethical issues and concerns associated with their use and provide evidence about their effectiveness. The feasibility of using such computer treatment programs and their likely future is also discussed. As an example, I profile a recently evaluated computer therapy program for the treatment of anxiety and depression. It is beyond the scope of this paper to examine legal issues associated with the use of computers in mental health. These have been covered elsewhere [2,3].

2. Computers and the patient–clinician relationship

Computers have altered the dynamics between clinician and health consumer. The clinician is no longer the main gateway to health information, patient education, treatment and support. The Internet makes available a wealth of information (although not all of it is high quality, evidence-based or accurate), and health consumers are accessing it in increasing numbers. In the US, for example, more than 50% of the estimated 100 million web users have accessed the Internet to obtain health information [4]. Similar proportions are found in other countries [5]. Information about mental health issues is most regularly sought, with depression, bipolar disorder and anxiety problems accounting for 42% of information sought [6]. Web users are also accessing tailored education, treatment and support from the computer: users report they find appealing both the ease with which they can access such services and the greater anonymity that is afforded than by attending a clinician’s rooms. It is interesting to note that for a significant proportion of health consumers, use of the Internet or email has not changed the number of their contacts (visits or phone calls) with health care professionals [7]. However, the nature of their contact has changed. A Harris online poll in the US found that patients who use the Internet to look for health information are more likely to ask more specific and informed questions of their doctors and to comply with prescribed treatment plans [8]. The clinician’s role is thus diversifying to include ‘interpreting Internet-sourced information and advising’ about electronically accessed treatments and services [9]. A small but increasing number of health professionals, in addition, use computer treatment programs as an adjunct to their therapy. Others provide computer-based psycho-education to their patients on waiting lists. As a result of this and other trends in healthcare (such as the increasing role of patients in the self-management of their condition), the locus of power in

the healthcare relationship is shifting to a partnership between patient and doctor.

Not all e-health users consult a clinician, however. A 2000 survey in the UK found that more than one in four people would rather use the Internet for health advice and counselling about depression than visit the family doctor [10]. Two-thirds of those cited their reasons as being the ease and rapidity with which they can access advice and help on the Internet, reduced stigma/embarrassment, and not wanting a mental health record. Forty-three percent preferred to use a computer at home for such information and counselling; others were willing to use a computer in public areas (23% via a computer in a GP’s surgery, 22% in a local community health centre, and 12% in a leisure centre, café or pharmacy). Trends such as these have important implications for the delivery of mental health services, particularly psychological therapies.

People prefer psychotherapy to treatment by drugs [11], and the UK National Service Framework for Mental Health [12] has called for increased availability of psychological treatments for common mental health problems. However, the supply of professionally trained psychotherapists falls well short of demand. For example, there are just 924 therapists accredited with the British Association for Behavioural and Cognitive Therapies [Dr C. Williams, Past Chair BABCP, personal communication]. If only half of the estimated 20% of people suffering at any one time from depression and anxiety were to receive 10 sessions of psychotherapy, there would be a need for a hundred-fold increase in therapists across the UK. Even if the number of clinical psychologists and nurse therapists receiving training were increased, it would take many years to meet this need. Furthermore, psychotherapists are unequally distributed geographically across the UK [13]. The result is a complete lack of access to psychotherapy for some people in need and unacceptably long waiting times for others. These facts, together with emerging consumer preferences for online services, have led to the enhanced use of computers in mental health care.

3. Common concerns about the use of computers in mental health care

Clinicians have used computers for a number of years for assessment, history-taking, record-keeping, diagnosis and patient education [14,15]. The delivery of psychological treatment by computer, however, has been more controversial. Some health professionals cite issues to do with patient acceptance, safety, efficacy and cost as barriers to the use of computer-based treatments. Evidence is accumulating to allay such concerns.

3.1. Patient acceptance

A survey of potential users of self-help psychotherapies in the UK found that 91% of respondents wanted to access

self-help via a computer system [16]. Patients who have used computer therapy programs report high satisfaction across the age range [17,18], with drop-out rates equivalent to face-to-face therapies or other treatments [19,20]. Studies have shown that people feel more comfortable about self-disclosing to a computer [15] and that they are also more likely to disclose suicidal plans to a computer than to a human being [21]. The computer-literate younger generation are especially comfortable with communicating via this medium. Particularly for young males, whose current rates of consultation to mental health professionals are low, computers offer an acceptable and viable form of access to information and help.

3.2. Patient safety

Safeguards can be built into computer treatment programs to ensure that appropriate action is taken in emergencies, through, for example, activating a crisis procedure, triggering a recall/reminder system, or providing a report to the clinician. Computer systems also provide the capacity to store, analyse and display information to be systematically fed back to patients and clinicians: this is a standard feature of computer-delivered therapy programs. Some health care workers express concern that computer therapy programs will be used indiscriminately with all patients, which will harm some patients and take over the role of clinicians with others. However, computers will never be a replacement for health professionals and computer therapy programs do not suit all patients. Some patients prefer face-to-face treatment for their problems. Others prefer bibliotherapy, which is accessible, effective and cheaper than face-to-face and some computer-based treatments. Others still may avoid any form of psychological treatment and choose medication instead. There is another group of patients for whom treatment by computer should only be undertaken with therapist guidance, and others for whom it is not appropriate at all. The latter group includes patients with more complex or challenging conditions who need one-to-one treatment by a health professional.

Computer-based education and self-help programs can facilitate and extend the work of practitioners by being used in a 'stepped care' approach to reduce the number of face-to-face sessions required. This allows clinicians' time to be freed up for more severely disordered patients. Programs are being offered in two ways: with support from a practitioner (to provide clarification, encouragement, suggestions, etc.) or unsupported. To date, there is an absence of data about degree of additional guidance that is optimal, and who is best placed to offer guidance should it be needed (for example, psychologists, nurse therapists, practice nurses, psychological assistants, mental health workers, receptionists or others). Workforce shortage and training issues need to be considered, as well as location of the support workers (in a clinic, a call centre or somewhere else?). Computer-based self-help may also have a place in the management of patients who do not wish to take medication

or for whom the effect of medication is sub-optimal due to side-effects, etc.

Another safety concern expressed by some health professionals is that the use of computer-based interventions will prevent health consumers from seeking treatments that would more effectively address their needs. This is possible. On the other hand, it might be argued that, similar to bibliotherapy, e-therapy may serve as a convenient entry into the mental health system for people who need help but might not otherwise seek it for fear of stigma, anxiety about addressing sensitive issues, and the inconvenience of scheduling therapy sessions [2]. For people living in rural and remote areas, computers may offer the only form of access to information, treatment and support. For those in other areas, computer treatment can cut demand on therapist time (by up to 73% [22]) without impairing patient outcome or satisfaction and it can considerably shorten waiting lists.

3.3. Efficacy and cost

A major concern expressed by some clinicians about the use of computers for psychological treatment is that such interventions are not therapeutically effective. Certainly, the numbers of controlled outcome studies have been few, but they are increasing. Evidence is accumulating that computer-based therapy is clinically efficacious [20,23,24], with effect sizes equivalent to those occurring in face-to-face therapy. Cost-effectiveness studies have been fewer in number, but they show that computer therapy is cost-effective, both in terms of service delivery costs and sickness absence cost offsets [25,26]. I will return to a discussion of the efficacy and effectiveness of computer-therapy programs later in the paper.

4. Ethical issues

The spread of computer-based therapy services has created new ethical issues not encountered in face-to-face therapy. Most professional associations have produced codes of ethical conduct for the online delivery of therapeutic services. In addition, specialist organisations such as the International Society for Mental Health Online (ISMHO) and the Psychiatric Society for Informatics (PSI) have jointly developed detailed operating principles to guide clinicians who provide online clinical mental health and for patients who receive such services. The guidelines have been endorsed across professional disciplines and national boundaries. They involve informed consent about the process, information about the clinician, the potential risks and benefits, safeguards and alternatives; standard operating procedures (such as legal requirements, confidentiality, the structure of the service, records, evaluation) and emergency procedures and back-up [27].

Not only is it incumbent upon clinicians to ensure that this information about them and their service is clearly

visible on the web-site or computer treatment program, it is just as important for consumers to be guided in their choice and use of computer-based psychotherapeutic services. They need to be advised how to check credentials and assess the quality of the service, so as to avoid accessing services from non-accredited and untrained providers. The European Union has established an international initiative, MedCERTAIN, to educate the public and to evaluate sites. It also aims to encourage Website providers to adhere to the WHO international e-health code of ethics.

The use of email to deliver psychological treatments poses additional risks in terms of confidentiality and security of the communication. Encryption technology can improve security and some professional organisations recommend that online therapists make encryption of email and the use of a secure messaging system routinely available to their clients. Similarly, data encryption and security passwords should be standard features of all non-therapist-assisted computer therapy programs. Interactive real-time video communication poses fewer security risks, since video is a form of face-to-face therapy, and to a large extent the ethical issues are the same as those encountered in that medium.

Another concern about the use of computer-based psychotherapies is that non-verbal cues, which can contribute important contextual information to the therapeutic encounter, are lost. Existing computer self-help systems are not able to capture and respond to non-verbal cues, nor are they able to interpret natural language (although this could change in the future as some of the newer treatment applications aim to incorporate video camera technology to 'read' emotions). For this reason, many computer treatment systems are offered along with some face-to-face therapist input. The issue is of less significance for therapists engaging in email counselling. They can (and many do) adjust their method to assist clients to interpret and express non-verbal information in an 'online' way. Some professional organisations, for example Kids Helpline in Australia, provide training for their therapists in this and other counselling skills specific to online interactions. Similarly, developers of stand-alone computer therapy programs, especially the latest generation of programs, are successfully incorporating many other non-specific features of the therapeutic relationship into the programs, along with the specific active techniques of the therapeutic approach on which they are based. However, not all online therapists or stand-alone computer-based therapy programs manage to achieve this. The successful practice of e-therapy requires that clinicians develop a thorough understanding of all these ethical issues.

5. Computer therapy programs

Computer therapy programs have been used successfully in the treatment of a number of mental health problems,

including depression [17,18,28], panic [15,29], posttraumatic stress [30], eating disorders [31,32], phobias [33,34], chronic pain [35], sexual dysfunction [36] and obsessive-compulsive disorder [37]. Some of the programs are stand-alone whole treatment packages, while others are designed to be used with clinician guidance. A variety of computer technologies have been employed, ranging from DOS applications in the early days to, more recently, virtual reality, interactive voice response systems using telephony, the Internet, and interactive television. In addition to the standard PC, palm top computers, telephones, mobile phones (text messaging), and television have been used. The latest generation of computer treatment programs feature state-of-the art interactive, multi-media functionality, incorporating both specific active therapeutic techniques and non-specific features of the therapeutic relationship [38,39]. High tech video, graphics, animations, voiceover are used. The sessions are interactive and personalised. They include multiple-choice responding, self-rating questionnaires, thought recording and challenging, problem-solving, activity scheduling, behavioural experiments and psycho-educational activities. Homework is assigned after each computer session and feedback is given to reinforce learning. The user interface is specifically designed to be engaging and simple to use for people who have had no previous computer experience.

The programs are typically based on cognitive-behavioural therapy (CBT), which is efficacious in the treatment of a number of psychiatric conditions including anxiety and depression [40]. It is as effective as antidepressants or high-potency benzodiazepines in the short-term and demonstrates good maintenance over time [41]. Further, it reduces the risk of relapse. The cost, however, is expensive. Mean cost of 18 sessions of therapist-delivered CBT for panic disorder is approximately £1164. The adjunctive cost of CBT for depression with clinical management and antidepressant medication is £4000–5000 per relapse prevented, which equates to about £12.50 per additional relapse-free day [42].

CBT is especially suited to computer-delivery. It teaches patients to recognise the connections between cognition, emotion, behaviour and physiology, identify distorted beliefs that predispose to problematic interpretations and behaviour, conduct experiments, collect evidence and generate alternate interpretations, substitute more helpful cognitions. CBT, furthermore, is a structured therapy; it has well-delineated procedures and a clear conceptualization to guide selection of procedures. In these ways, it lends itself to computerisation.

Nevertheless, many attempts at translating the replicable ingredients of the therapeutic encounter into computer-delivered psychological treatment programs have been unsuccessful, because they have failed to take into account the non-specific factors implicit in the therapeutic relationship. These include therapist regard for the patient, empathy for patients' distress, communication of hope for improvement, maintaining patients'

motivation and checking patients' understanding of, and satisfaction, with the therapy process. Such non-specific factors accounted for 50% of the effect size in a research study evaluating a group CBT program in the occupational field [43]. They are not easy to incorporate with the core therapeutic strategies into a computer-administered therapy program, and require special expertise on the part of the development team.

6. Clinical efficacy and cost-effectiveness of computer treatment for anxiety and depression

Empirical support for computer therapy programs is growing, as more programs are being developed and more rigorous evaluations are being conducted. Particularly for the prevalent problems of anxiety and depression, studies now span a decade and more, a selection of which is outlined below.

6.1. Clinical effectiveness studies

The impetus for much of the current research was a six-session DOS-based interactive CBT computer program for depression developed in the US in the late 1980s. It was compared with traditional face-to-face CBT and a wait-list control condition in a randomised controlled trial [28]. At the end of treatment and at 2 months follow-up, patients in the computer therapy group did not differ from those who had received therapist administered CBT, and both treatment groups improved significantly more than the control subjects. It is note-worthy that the computer therapy program included minimal therapist contact at the beginning and end of the session and the opportunity for patients to ask questions of the therapist during the session.

More recently, *Beating the Blues*, a nine-session interactive multi-media computer therapy program for anxiety and depression, developed at the Institute of Psychiatry/Maudsley (details of program in Section 7 below) was compared with usual care in a randomised controlled trial with 170 patients in general practice [17]. Pre-treatment scores in both groups were in the moderate to severe range. The computer treatment reduced anxiety and depression significantly and substantially: scores at the end of treatment in the computer therapy group were just above the non-clinical range and gains over usual care were maintained throughout 6 months follow-up. Further, there was no interaction with concurrent drug treatment (the positive effects of the computer program and drug treatment were additive), nor with the duration or severity of baseline depression.

These results were subsequently replicated in an expanded sample [20]. Again, the program's efficacy was unaffected by drug treatment and duration of pre-existing illness. For anxiety but not for depression, treatment

interacted with severity, such that more severely ill patients (at pre-treatment, those scoring more than 18 on the Beck Anxiety Inventory) did better on *Beating the Blues*. The rate of non-completion of the computer program was 29%, of whom only half quit due to dissatisfaction with treatment. This is equivalent to figures reported for face-to-face CBT [44]. Satisfaction with treatment was significantly higher among the computer therapy patients than those who received usual care.

A computer-assisted cognitive therapy program for depression developed in the US (*Good Days Ahead: The Multimedia Program for Cognitive Therapy*) demonstrated clinical efficacy in comparison with standard face-to-face cognitive therapy and wait-list controls. The program consists of 25 min of computer therapy accompanied by 25 min with a clinician (<http://www.gettingyourlifeback.com/dvd.htm>). Equivalent gains were made in the computer-assisted and face-to-face therapy groups and both were superior to wait-list controls [24]. Treatment effects were well maintained at the 3 and 6 months follow-up evaluations.

Currently, an uncontrolled study evaluating the effectiveness of an interactive CD-ROM program (*Overcoming Depression: A Five Areas Approach*—details at www.calipso.co.uk) is being conducted, prior to the commencement of a randomised controlled trial. Patients with depression referred to a clinical psychology department in Glasgow Scotland are offered use of the six-session CD-ROM after screening and whilst on the waiting list for treatment. Preliminary results show a significant reduction in depression symptoms at 6 weeks, the average time with the self-help support nurse is under 1 h and that patients find it helpful [Dr C. Williams, University of Glasgow, personal communication].

Focussing on the prevention of depression, an internet site MoodGYM, offering six interactive cognitive-behavioural therapy modules with weekly telephone input and support from lay interviewers (<http://moodgym.anu.edu.au>) has been recently shown to be as effective as a website offering information about depression, in reducing depression symptoms and increasing depression literacy after 6 weeks [45]. However, only 2% of the community group surveyed actually participated in the study and their entry levels of psychological distress were significantly higher than those who declined to participate. This suggests a treatment rather than preventative focus. Follow-up results at 12 months are awaited before definitive conclusions can be drawn.

The above are examples of the growing evidence base for computer therapy programs for depression. In general, the effect sizes have been large. A recent meta-analysis of five studies of computerised therapy for depression based on the Beck Depression Inventory (BDI) found a pre-post effect size of 1.38 (total $N = 151$) [46]. This effect is larger in size than that often gained from face-to-face CBT.

Turning now to computer treatments for anxiety disorders, studies have shown similarly strong effects. An early and influential leader in the field was a computer-aided self-exposure treatment for agoraphobia, panic, social or specific phobia, which was evaluated in a controlled study ($n = 84$) [19]. Following screening by a psychiatrist, patients were randomised to self-exposure therapy by a computer system, a book, or the psychiatrist. At the end of treatment, all three groups demonstrated similar improvement on phobias, work and social adjustment, had similarly few dropouts and were equally satisfied with the treatment they had received. The gains were maintained to the 6-month follow-up.

More recently, *Fearfighter*, a nine-step therapist-assisted computer treatment program for agoraphobia/panic including clinician screening and brief back-up has been evaluated both in an uncontrolled study as well as in an RCT in the UK. The computer program, using text, graphics, photographs and printouts, helps the user to develop and implement a personalised self-exposure treatment program. In both the uncontrolled study ($n = 85$) and the RCT ($n = 90$), *Fearfighter* was as effective as therapist-delivered CBT, with a 73% saving in therapist time [47].

A six-session Internet-delivered self-help program has been developed in Sweden for people with panic disorder [29]. It offers psycho-education, breathing re-training, cognitive re-training, exposure and relapse prevention via the Internet, as well as minimal therapist support, encouragement and assessment via email (patients answer questions at the end of each module and email them to the therapists who assess readiness to continue to the next module). Mean therapist time per participant is 90 min over the 7–12 week program, including assessment, administration, and responding to emails. RCT results indicate that participants improved significantly relative to the controls on the frequency, duration and intensity of panic attacks, and on associated clinical measures, as well as life satisfaction. Participants rated the program highly: they considered it to be personal and reported that the lack of face-to-face contact facilitated the sharing of sensitive and important issues.

Palm-top computers have also been used in the treatment of anxiety disorders. They offer greater flexibility than desktop computers, as patients can access them whenever they wish (or are prompted to) and wherever they happen to be. Symptoms can be recorded in real time and advice given. A self-help treatment for panic disorder was evaluated in an RCT with 18 patients [48]. The palm-top computer plus four sessions of face-to-face CBT was compared with 11 sessions of face-to-face CBT. Both groups improved significantly and similarly to 6 months follow-up.

Virtual reality techniques have also been used in computer programs that deliver behaviour therapy (BT) interventions for the treatment of phobic avoidance. Two types of techniques have been reported: immersive

techniques whereby users wear a headset which changes the perspective as they move, and non-immersive techniques whereby the virtual world is portrayed on the computer screen and users engage in simulated exposure tasks using the computer mouse or a joystick. Kirkby et al. (2000) applied the latter technique in a three-session computer treatment program for obsessive-compulsive disorder. Users showed significant pre-post treatment reductions in morbidity [49].

Together, these studies provide accumulating evidence of the clinical efficacy and effectiveness of computer therapy programs for anxiety and depression. Evaluations of the cost-effectiveness of such programs have been slower to emerge, consistent with the dearth of cost-evaluation studies of psychological treatments in general. However, a couple has been published recently, with interesting results.

6.2. Cost-effectiveness studies

An economic evaluation of *Beating the Blues*, computer therapy program for anxiety and depression, has recently been completed in general practice settings [25]. Service use cost data were collected for 123 and 138 patients randomised to usual care and computer-delivered CBT, respectively, over two time periods: 6 months pre-randomisation and 8 months post-randomisation (2 months of treatment and 6 months post-treatment). Services measured included contacts with mental health staff, primary care staff, hospital services, home helps and other services such as physiotherapists, dieticians, etc. as well as the dose and course of medications. The cost effectiveness of *Beating the Blues* compared with treatment as usual was determined using the net-benefit approach based on a unit reduction in the Beck Depression Inventory. Data were also collected on doctor-certified days absent from work during the baseline and follow-up period. The results indicated that the mean service cost of *Beating the Blues* group was marginally (though not significantly) higher. However, when considered with the superior clinical outcomes of the computer treatment, no significant differences were found between the two groups, indicating that *Beating the Blues* is a cost-effective intervention. When the costs of lost employment costs were added into the calculations, the usual care group was found to have significantly more doctor-certified days absent from work and to be significantly more expensive than *Beating the Blues*.

A free primary care clinic providing immediate access to one of four computer-aided CBT programs for depression (*Cope*), phobia/panic (*Fearfighter*), obsessive-compulsive disorder (*BTSteps*) and general anxiety/depression (*Balance*) was recently evaluated in an open study [22]. Patients were screened and referred to the program that most suited them. They were able to use the program as much as they wished above a recommended minimum number of

sessions, with brief therapist contact either by telephone or by face-to-face. The results showed that computer-aided CBT significantly reduced therapist time per patient (completers had a mean total of 1 h of therapist support over 12 weeks). Patients also improved clinically on the three more sophisticated systems (*Cope*, *Fearfighter* and *BTSteps*) and the non-completion rate of 29% was equivalent to face-to-face CBT. Overall, the clinic achieved a greater through-put of patients per therapist via computer-aided CBT with no sacrifice of effectiveness.

Whilst a randomised controlled study is needed to confirm the above findings, they are in line with other studies that have demonstrated that computer-aided treatments are less demanding of therapist time, therefore cutting waiting time, and are cheaper. For example, it has been demonstrated by RCT that four times more panic/phobia patients can be treated per hour with the *Fearfighter* system than with face-to-face therapy, with equivalent clinical outcomes and patient satisfaction [33]. In a cost-minimisation analysis (not including savings in therapist time), it was calculated that *Fearfighter* had lower unit costs than standard CBT or drug treatment (37% of the costs to treat a patient over 1 year with face-to-face CBT and 45% of the cost of treating a patient with medication). Similarly, in a controlled study of the palm-held CBT program for panic disorder, savings in overall service delivery costs were shown to be \$540 per panic treatment [48].

These are a selection of the studies that have been recently conducted to evaluate computer-based treatment programs for anxiety and depression. The results provide promising evidence of their clinical efficacy and cost-effectiveness. However, evidence is also needed of their feasibility across a number of settings in naturalistic rather than research conditions. It is to this consideration that I turn next.

7. Feasibility

A feasibility study of *Beating the Blues* implemented in a variety of primary and secondary care settings with minimal research support has been recently carried out [50]. Two hundred and twenty-nine adults with anxiety and/or depression were recruited from 8 general practices (4 rural, 4 urban), 2 community mental health teams and 1 primary care clinical psychology service. Each patient had been identified by a health professional as likely to benefit from computer-delivered CBT. At the first computer session, the clinical helper (generally the receptionist or secretary) spent approximately 5 min explaining the computer programme to the patient and at each subsequent computer session, s/he ensured that the patient was settled at the computer before leaving to get on with his/her normal work. The patient then worked on the programme unattended. Data were collected on patients' clinical outcomes using CORE-OM [51], as well as their work

and social adjustment, in addition to the information routinely collected by the program. In both intention-to-treat and completer analyses, patients' post-treatment scores were statistically and clinically improved on all measures. Gains were maintained at 6-month follow-up. No differences were found in patient outcomes between those offered computerised CBT in primary care or secondary care settings, indicating that *Beating the Blues*, administered under minimal supervision, is effective in routine care and generalisable across different settings.

A feasibility study has also been undertaken of the *Fearfighter* program for phobia/panic sufferers [52]. A self-care clinic was set up on a main road location for self-referrals to the computer-treatment system. The clinic was resourced by two part-time nurses (0.4 fte). Patients were screened by a nurse, who then showed them how to use the program, which they worked on alone. In each of the following sessions, the nurse spent the first and last 10 min with the patient reviewing progress and homework; the remaining 40 min was spent working on the computer program. Of the 131 patients who self-referred to the clinic over 12 months, 49 needed brief advice and 82 were offered computer treatment. Fifty-four started, of whom 32 (59%) completed. Intent to treat analysis, wherein non-completers were regarded as unchanged, showed that significant self-rated and therapist-rated improvements occurred, which were equivalent to gains reported in other studies in which patients received therapy from clinicians. Patients spent 86% less time with a clinician, however. The study demonstrated the feasibility of offering a computer-guided therapy in a self-help clinic requiring minimal clinical resourcing.

Together these studies show that computer treatment programs are feasible in naturalistic settings. Efficacy does not diminish when they are offered under routine rather than research conditions, across different settings and with minimal supervision.

8. Profile of a computer therapy program

Beating the Blues is an interactive multi-media program for the treatment of anxiety, depression and mixed anxiety/depression. It is based upon the principles of CBT as previously translated into a group training program shown to be effective in reducing levels of psychological distress and improving job-finding in long-term unemployed professionals [53]. *Beating the Blues* combines interactive, multi-media functionality with video-documentary material, animation, graphics and voice over. It is designed to be used mainly as a stand-alone treatment package delivered on personal computer located in a primary care practice, psychotherapy clinic or community resource centre, although it can be used adjunctively with face-to-face therapy. The program

‘BEATING THE BLUES’
A COMPUTER COGNITIVE-BEHAVIOUR THERAPY PROGRAMME
FOR ANXIETY AND DEPRESSION

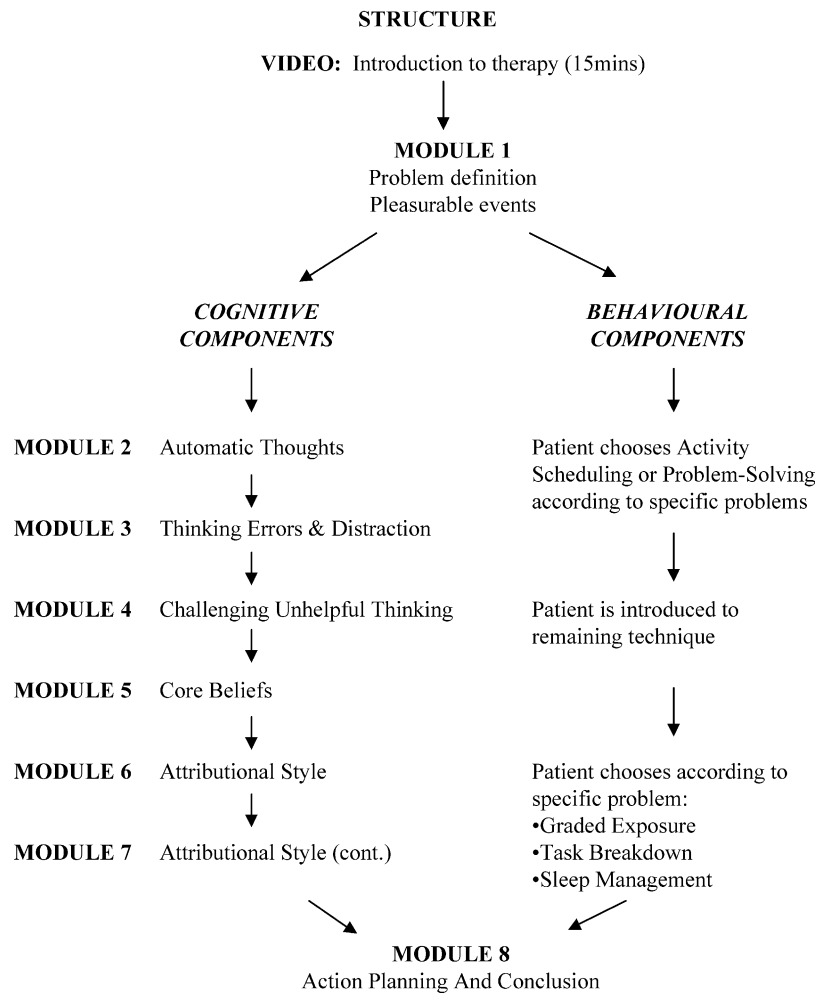


Fig. 1. Structure of *Beating the Blues* program.

consists of nine sessions: an introductory video followed by eight computer CBT sessions, each lasting about 1 h, with homework activities between the computer sessions (see Fig. 1 and, for more details, www.ultrasis.com). Each session with its accompanying homework is personalised to the user's particular problems. A number of techniques are used to enhance patient motivation, including menus, self-monitoring and especially video vignettes of case study patients to act as models for the real patient. By following the vignettes, patients learn both about the nature (aetiology, significance, biological underpinnings, etc.) of their symptoms and how to treat them, using the principles of CBT. Patients then try out these principles and techniques on their own behaviour and cognitions, in part during the session interactively on the computer and in part in the homework projects. A report of the patient's progress, including whether there has been any reported

suicidal intent, is printed out at the end of each session for the patient and the clinician. Users are able to go back within each session and to repeat earlier sessions if they wish. There are also relapse prevention strategies at the end of the program. These factors are incorporated to enhance the clinical utility of the program, whilst at the same time addressing issues of safety.

9. The future

Health care policy worldwide is demanding increased access to treatment and enhanced equity of care. E-mental healthcare can significantly improve access to help for those who, due to waiting lists or remote geographic location, may not otherwise receive it. Advances in

technology and the publication of research demonstrating the efficacy of computer treatments reinforce its value.

However, there are a number of disadvantages associated with e-mental healthcare, which must be taken into account any consideration of its use. These include primarily the variable quality of information and services on the Internet. A recent literature search found 100 studies that attempted to rate the accuracy and health information on the world wide web. Ratings ranged from 15 to 85% (Eysenbach cited in Ref. [54]). There has been an improvement reported in health consumers' ability to differentiate the good from the bad, through for example, using a search engine to find and review a number of different sites that target their specific needs, however, many electronic health providers do not supply up-to-date information. Further, 50% of e-health consumers reported that they never or hardly ever checked the source and date of information on a website [55].

Another limiting factor is the slow pace at which professional organisations are responding to rigorously evaluated evidence-based computerised treatment programs, either as an adjunct to therapy or for use while patients are on waiting lists. In the UK, only 6.9% of accredited therapists with the British Association of Behavioural and Cognitive Psychotherapists recommend computerised self-help materials to their clients [56], yet a much greater percentage recommend bibliotherapy. A contributing factor has been the lack of availability of training programs for mental health professionals in the use of computer-delivered packages. Other factors include the practical issues associated with introducing computer-based therapy into services, such as allocating a staff member to support the program, ensuring IT support is available, identifying rooms for equipment, preventing theft and maintaining data protection.

These factors currently limit the impact of e-mental healthcare on the burden imposed by problems such as anxiety and depression. Further randomised controlled trials are needed to convince health professionals, as well as policy makers, of the efficacy, feasibility and economic value of computer therapy services. Training is also required in their use, so that health professionals can see how such programs can complement and extend the service they provide, rather than feeling in competition with it.

Health consumers are becoming more involved in information-seeking and self-management of their problems, and at the same time, computer-literacy is increasing throughout the population, including the senior population. Computer-delivered services have the potential to meet some of the large unmet need for mental health services that currently exists. However, there is an urgent need for quality issues to be addressed more rigorously. In addition to the current ethical guidelines, professional standards are needed for the provision of information, support and treatment online and via CD-ROM. An area of current

debate in the literature is the amount of therapist guidance or human supervision that is desirable for safe and effective use of computer-delivered treatment programs. Further research is needed in this area, so that evidenced-based guidelines can be written.

The potential benefits of e-mental healthcare are enormous and the demand for it is increasing. There is substantial evidence that computer-based therapy is as effective as traditional treatment in many areas. Because of its widespread availability, it can increase access and reduce cost. The limiting factors to full acceptance continue to be addressed and as effective solutions to these concerns are found and implemented, computer-delivered treatments will make a substantial contribution to effective mental healthcare.

10. Declaration of interest

The author led the development of *Beating the Blues*, computer therapy treatment system for anxiety and depression, and holds the IPR of part of it.

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