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Computerized, interactive, multimedia cognitive-behavioural program for anxiety and depression in general practice

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ABSTRACT

Background. Cognitive-behavioural therapy (CBT) brings about significant clinical improvement in anxiety and depression, but therapists are in short supply. We report the first phase of a randomized controlled trial of an interactive multimedia program of cognitive-behavioural techniques, *Beating the Blues*™ (BtB), in the treatment of patients in general practice with anxiety, depression or mixed anxiety/depression.

Method. One hundred and sixty-seven adults suffering from anxiety and/or depression and not receiving any form of psychological treatment or counselling were randomly allocated to receive, with or without medication, BtB or treatment as usual (TAU). Measures were taken on five occasions: prior to treatment, 2 months later, and at 1, 3 and 6 months follow-up using the Beck Depression Inventory, Beck Anxiety Inventory and Work and Social Adjustment Scale.

Results. Patients who received BtB showed significantly greater improvement in depression and anxiety compared to TAU by the end of treatment (2 months) and to 6 months follow-up. Symptom reduction was paralleled by improvement in work and social adjustment. There were no interactions of BtB with concomitant pharmacotherapy or duration of illness, but evidence, on the Beck Anxiety Inventory only, of interaction with primary care practice. Importantly, there was no interaction between the effects of BtB and baseline severity of depression, from which we conclude that the effects of the computer program are independent of starting level of depression.

Conclusions. These results demonstrate that computerized interactive multimedia cognitive-behavioural techniques under minimal clinical supervision can bring about improvements in depression and anxiety, as well as in work and social adjustment, with and without pharmacotherapy and in patients with pre-treatment illness of durations greater or less than 6 months. Thus, our results indicate that wider dissemination of cognitive-behavioural techniques is possible for patients suffering from anxiety and/or depression.

INTRODUCTION

By the year 2020, it is estimated that depression will be the second leading contributor to the global burden of non-communicable disease (Murray & Lopez, 1997). It is already the largest determinant of disability in the world, and co-morbidity with other conditions, such as anxiety, is high. Pharmacotherapy is an effective treatment for depression and anxiety, but a substantial proportion of patients respond incompletely or not at all (Simon *et al.* 1996). Furthermore, many patients do not wish to take drugs or, having accepted, show poor compliance. The chief alternative is psychotherapy and, in particular, cognitive behavioural therapy (CBT). Evidence shows that CBT is as effective

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as pharmacotherapy in the short to medium term, and equal or superior over the longer term (DeRubeis *et al*. 1999), since besides dealing with current symptoms CBT teaches patients self-help strategies for future use. Demand is high but, in its usual form of face-to-face delivery, it is expensive and dependent on a scarce resource: fully-trained CBT therapists.

A number of alternative modes of delivery of CBT have been explored, including group CBT (Proudfoot *et al*. 1997), bibliotherapy (Greenberger & Padesky, 1995) and self-help delivered by phone (Osgood-Hynes *et al*. 1998) or by computer (Selmi *et al*. 1990). The principles of CBT lend themselves readily to computerization. Previous studies show that patients find computer-based treatment acceptable and they manifest degrees of clinical recovery similar to those after face-to-face therapy (Selmi *et al*. 1990). However, these studies were carried out with relatively small samples and the majority of programs consisted largely of text, multiple choice questions and cartoons, without the advantage provided by the full multimedia interactive capability of contemporary computers to address important non-specific aspects of therapy.

In developing the program studied here (*Beating the Blues*™, BtB), we used a number of interactive, multimedia techniques to enhance patient engagement and motivation, including menus, advice, feedback, and especially video vignettes of case-study 'patients' to act as models for the real patient. By following the vignettes throughout the program, patients learn about the nature of their symptoms and how to treat them with cognitive-behavioural techniques. Using the interactive capability of the program, they then try out these principles and techniques for themselves during the session and afterwards as weekly 'homework' projects.

We report here the first phase of a randomized controlled trial comparing BtB with GP treatment as usual (TAU) for patients with anxiety, depression, or mixed anxiety and depression in primary care; in the second phase (in progress) an additional set of GP surgeries has been recruited for replication. Our main research question was: does BtB improve anxiety and/or depression when compared to treatment as usual in general practice? A second question was whether the effects of BtB differed in patients who did or did not receive concomitant pharmacotherapy. Research examining this issue with face-to-face CBT has found a modest advantage from the combination with antidepressant medication (DeRubeis *et al*. 1999), but some evidence of a reduced effect of behavioural treatment when high-dose benzodiazepines are prescribed (Marks *et al*. 1993). Our third question was whether the effects of BtB differed with duration of and severity of baseline depression. Contrary to widespread belief, previous evidence does not consistently indicate that face-to-face CBT is less effective in more severely ill patients (Thase *et al*. 1991).

METHOD

Given evidence that computerized packages of cognitive-behavioural techniques are as effective as face-to-face CBT (Selmi *et al*. 1990) and that face-to-face CBT is effective in the treatment of both anxiety (Power *et al*. 1990) and depression (Gloaguen *et al*. 1998), we predicted that patients receiving BtB would show greater improvement than those given TAU. We also investigated whether the effects of BtB interact with pharmacotherapy, duration and severity of pre-existing illness or with the particular GP practice in which it is administered.

Sample

The study population consisted of adult anxious and/or depressed patients in primary care. Inclusion criteria were: patients aged 18 to 75; suffering from depression, mixed anxiety/depression, or anxiety disorder (including phobias or panic); not currently receiving any form of psychological treatment or counselling; and who scored $\geqslant 4$ on the General Health Questionnaire-12 (GHQ-12) (Goldberg, 1972) and $\geqslant 12$ on the computerized version of the Clinical Interview Schedule-Revised: PROQSY (Lewis, 1994). The latter also produced an ICD diagnosis for each patient. Patients were excluded if they had active suicidal ideas, psychotic disorder, organic mental disorder or alcohol and/or drug dependence, had been taking medication for anxiety and/or depression continuously for $\geqslant 6$ months immediately prior to entry, were unable to read or write, or were unable to attend eight sessions at the surgery. Patients were recruited from seven general practices in London and south-east England. Recruitment took place by screening

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in the GP waiting rooms using the GHQ-12 and by GP referral (these patients were also screened using the GHQ-12). Those who scored above the cut-off of 4 were seen by the GP who administered the inclusion/exclusion criteria, decided whether medication was to be prescribed, and indicated the treatment the patient was to receive if randomly allocated to TAU. Three hundred and ten patients (Fig. 2) were assessed by their GPs as fitting the inclusion criteria and were invited to complete the computerized Clinical Interview Schedule-Revised (CIS-R), with a view to participating in the study. One hundred refused; of the remaining 210, 167 scored above the CIS-R threshold of 12 and consented to participate in the study. These patients were referred to the practice nurse for random allocation. The random allocation schedule was generated at the Institute of Psychiatry, before the study commenced and away from the GP practices in which the study took place. An individual unit of randomization was used. Randomly sorted cards naming one of the two treatments (computer therapy/treatment as usual) were placed by the first author in individual envelopes, which were sealed and numbered. Within each of the seven surgeries, patients who fitted the inclusion criteria and consented to participate were stratified according to whether they were prescribed medication or not (yes, no), and the duration of current episode of episode ($\leqslant$6 months, $>$6 months). They were then randomly allocated, within each of the two strata, to receive BtB or TAU. The sealed envelopes were opened in the surgeries in strict numerical sequence by the practice nurses who ran the study. The integrity of the randomization procedure was checked by the first author on her regular visits to the practices. The study was approved by the Ethics Committee of the Institute of Psychiatry and the South Thames Multi-Centre and Local Research Ethics Committees.

Treatments

The computer therapy intervention, *Beating the Blues*, consists of nine sessions, commencing with a 15-min introductory video, followed by eight therapy sessions (Gray *et al*. 2000; and, for more detail, see *www.ultrasis.com*), each lasting about 50 minutes and normally taken once weekly. Sessions are customized to the patient's specific needs, with each session building on the one before. 'Homework' projects are generated for each patient, to be accomplished before the next session; the computer checks at the start of each session how the projects have been carried out. A report of the patient's progress, including whether the patient has expressed any suicidal intent, is printed out for the GP at the end of each session.

In this study, a nurse explained how to use the program, where she was to be found if something went wrong (e.g. the patient had difficulties with the program, or the printer ran out of paper) and then left the room. At the end of the session, she checked that the patient had the necessary printouts (session summary, homework tasks and progress report) and booked the next session. Nurses were instructed to spend no more than 5 min with each BtB patient at the start or end of each session.

Patients randomized to BtB also received pharmacotherapy, if prescribed by their GP, and/or general GP support and practical/social help, offered as part of treatment as usual, with the exception of any face-to-face counselling or psychological intervention. Patients allocated to TAU received whatever treatment their GP prescribed. In order to replicate natural conditions in primary care, we did not randomize drug treatments, or constrain the interventions received by patients allocated to TAU. The latter included, besides any medication, discussion of problems with the GP, provision of practical/social help, referral to a counsellor, referral to a practice nurse, referral to mental health professionals (psychologist, psychiatrist, community psychiatric nurse, counsellor), or further physical investigation.

Instruments

Demographic information was collected from all participants prior to randomization. Five outcome measures were administered on each of five occasions: pre-treatment, 2 months later (when BtB patients had completed their 9-week programme), with follow-up at 1, 3 and 6 months. Results on the following three self-report scales are reported in this paper.

Beck Depression Inventory II (BDI)

The BDI (Beck *et al*. 1996) is an established 21-item measure of depression severity. The internal

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consistency, measured in our data set by Cronbach's alpha, was 0·89.

Beck Anxiety Inventory (*BAI*)

The BAI (Beck & Steer, 1990) is a 21-item symptom checklist rated on a four-point scale (0–3). The internal consistency of the scale in this study was 0·87.

Work and Social Adjustment Scale (*WSA*)

The WSA (Marks, 1986), measures the degree to which the patient's problems interfere with ability to work, home management, social life, private leisure and relationships. Each of the five indices is measured by a single item 0–8 Likert scale, with 8 indicating severe impairment. The overall scale had an alpha of 0·86 in this study.

Power calculations

Power calculations were performed to determine the minimum sample size needed to detect an effect if present. The calculations were based on independent samples *t* tests of the change scores (pre- to post-treatment) between groups in two previous studies (Selmi *et al.* 1990; Mynors-Wallis *et al.* 1995). To detect a standard deviation difference of 1 in change scores at 80% power and with 0·05 alpha, we determined that a total sample size of 200 was needed.

Statistical analysis

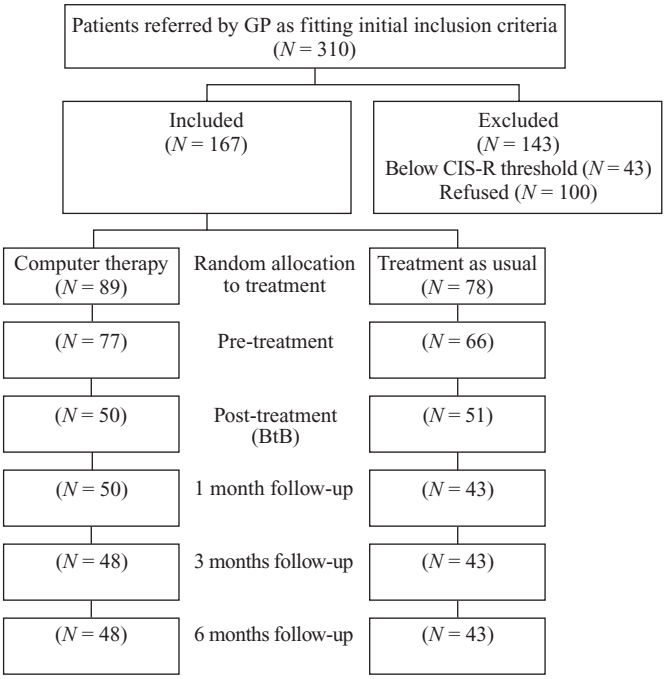
For each of the three outcome measures, BDI, BAI and WSA, a series of mixed effects models were considered. Such models are described in detail in Everitt & Pickles (1999) and Pinheiro & Bates (2000). Fixed effects were used for the covariates, pre-randomization value of outcome, measurement point or visit (i.e. post-BtB and 1, 3 or 6 months follow-up), treatment (0 = TAU, 1 = BtB), drugs (0 = NO, 1 = YES), and duration of illness ($0 \leqslant 6$ month, $1 > 6$ month). Subjects and surgeries were included as random effects. Such models assume that missing values are missing at random (MAR) rather than the stronger assumption of missing completely at random (MCAR) made by simpler methods of analysis such as the response feature approach described in Matthews *et al.* (1989); see Everitt & Pickles (1999) for details. All the models described later were fitted using the lme (linear mixed effects) function in S-PLUS 2000. All analyses were intention to treat (ITT), by which we mean that patients were analysed as randomized rather than by treatment actually received (see below). Within each ITT group, patients will not be included in the model-fitting process described in the Results section if they had missing values on any of the covariates used (pre-treatment value, drugs and length of episode), or all their post-treatment and follow-up values were missing. Any response values a patient with no missing covariates had will be included in the analyses. No attempt was made to replace missing response values with imputed values, for example, last observation carried forward, since the latter is now regarded as a poor and potentially misleading procedure (see Everitt & Pickles, 1999; Everitt, 2002).

RESULTS

One hundred and sixty-seven patients were recruited in the study and randomly allocated to the TAU and BtB conditions (Fig. 1). They were well matched on all relevant variables at the start of the study, including ICD-10 diagnoses (Table 1). At randomization, 28 (36%) TAU patients and 38 (43%) BtB patients were prescribed anti-depressant or anxiolytic medication. Of the 55 patients who completed BtB, 51 (93%) consulted their GPs during the 8 months post-randomization period; six received counselling or psychotherapy, one consulted a clinical psychologist, two saw CPNs for a single session each, one received in-patient care and four who were not originally prescribed anti-depressant medication subsequently received it.

In the TAU condition, 66 of 76 patients received treatment (data are missing for two who moved away). Eleven patients were prescribed 'nothing' at randomization, but nine of these actually received treatment during the following 8 months. Eight patients did not take up the treatment they were prescribed. Seventy-five patients (96%) saw their GPs, 17 (22%) received counselling or psychotherapy, seven (9%) had consultations with a mental health professional (psychiatrist, psychologist or community psychiatric nurse), 28 (36%) saw practice nurses and 4% had further physical investigations. Completion data were difficult to obtain for the TAU group as, for many, their treatment was intermittent.

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Reasons for loss to 6 months follow-up

Beating the Blues	*N* (%)	*Treatment as usual*	*N* (%)
Unhappy with treatment allocated	4 (5)	Unhappy with treatment allocated	2 (3)
Advised against continuing	0 (0)	Advised against continuing	1 (1)
Ill	4 (5)	Ill	2 (3)
Lack of time	1 (1)	Lack of time	0 (0)
Work commitments	1 (1)	Work commitments	1 (1)
Family problems	1 (1)	Family problems	3 (5)
Moved address, uncontactable	5 (7)	Moved address, uncontactable	3 (5)
Did not attend appointments (no reason given)	13 (17)	Did not attend appointments (no reason given)	11 (17)
Total	29 (37)	Total	23 (35)

FIG. 1. Trial profile: the flow of patients through the study. The reduction in sample sizes between randomization and pre-treatment was largely due to loss of data arising from human error. Reasons for loss to 6-month follow-up are also shown for each group.

Figs 2–4 and Table 2 show the treatment × visit mean profiles of the three outcome variables, BDI, BAI and WSA. Unfortunately, pre-treatment data for 24 patients (12 BtB, 12 TAU) were lost due to human error. We therefore report outcomes for the BDI, BAI and WSA on 143 (77 BtB, 66 TAU) of the 167 recruited patients (the differences in sample sizes for each variable at each visit reflect missing data). It can be seen that the pre-treatment scores on each variable were well matched between the BtB and TAU groups.

For each of the three outcome measures, a series of mixed effects regression models were considered. For each dependent variable a series of models were considered by the addition of terms to a basic model including only pre-treatment value and visit. Additional terms were judged for inclusion by the significance level of a likelihood-ratio test (Pinheiro & Bates, 2000). In each case the procedure demonstrated that no interactions of main effects were necessary; in particular treatment × visit, treatment × drugs and treatment × duration interactions

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Table 1. *Demographic information* and ICD-10 diagnosis*

	Beating the Blues N (%)	Treatment as usual N (%)
Age, mean (S.D.)	43·7 (14·7)	45·7 (14·1)
Sex		
Female	66 (74·2)	57 (73·1)
Male	23 (25·8)	21 (26·9)
Marital status†		
Single	25 (29)	20 (27)
Married	32 (37)	34 (45)
Cohabiting	9 (11)	7 (9)
Separated	2 (2)	2 (3)
Divorced	13 (15)	8 (11)
Widowed	5 (6)	4 (5)
Ethnic status†		
Bangladeshi	0 (0)	0 (0)
Black African	1 (1)	0 (0)
Black Caribbean	2 (3)	2 (3)
Black Other	2 (3)	0 (0)
Chinese	0 (0)	0 (0)
Indian	0 (0)	3 (5)
Pakistani	0 (0)	1 (2)
White	68 (88)	57 (88)
Other	4 (5)	2 (3)
Years of education†		
< 5	0 (0)	1 (1)
5–10	8 (10)	10 (14)
11–12	22 (26)	17 (24)
13–15	15 (18)	15 (21)
> 15	39 (46)	28 (39)
Employment status†		
In work	49 (58)	40 (54)
Unemployed or retired	35 (42)	34 (46)
Previous use of computer†		
No	21 (24)	17 (22)
Yes	67 (76)	59 (78)
Psychiatric diagnosis†		
Mixed anxiety & depressive disorder	26 (29)	22 (28)
Mixed anxiety & depressive disorder – mild	17 (19)	15 (19)
Severe depressive episode	15 (17)	8 (10)
Moderate depressive episode	13 (15)	15 (19)
Mild depressive episode	7 (8)	3 (4)
Panic disorder	4 (5)	6 (8)
Social phobia	1 (1)	3 (4)
Agoraphobia	3 (3)	2 (3)
Specific phobia	2 (2)	3 (4)
Total	88 (100)	77 (100)

* Values are N (%), unless stated otherwise.

† Data were unavailable on marital status for 3 BtB and 3 TAU patients; ethnic group for 12 BtB and 13 TAU patients; education for 5 BtB and 7 TAU patients; employment status for 5 BtB and 4 TAU patients; previous use of computers for 1 BtB and 2 TAU patients; and psychiatric diagnosis for 1 BtB and 1 TAU patient.

were totally non-significant, with *P* values of the order 0·3 or larger. (Tests for these interactions are, of course, not particularly powerful.) In addition, no treatment × pre-score interaction was judged to be necessary in the final models chosen for each of the three outcome measures since the corresponding *P* values were again all large.

Turning to the random effects part of the model, BDI required both a random intercept and random slope effect for subject, but no surgery effect, while WSA required only a random intercept for subject and again no surgery effect. In particular no surgery × treatment effect was necessary for either variable. Changes in the random effects included in the models for these two variables made only minimal changes to the estimated confidence intervals for the fixed effects. For the BAI dependent variable, it was found that a random intercept term for subject was again sufficient, but now a surgery × treatment interaction effect was also needed in the model to provide an adequate fit.

The results of the main effects model fitted to each outcome variable are shown in Table 3. Of particular interest among these results are the treatment effects.

BDI

The estimated treatment effect demonstrates a significantly greater reduction, of approximately 5 points in the BDI, after BtB compared to TAU, with a 95% CI of between about 2 and 9 points. Since there is no treatment × visit interaction, this reduction applies to all post-treatment visits. There is also no treatment × drug interaction, so depression is reduced whether patients receive concomitant pharmacotherapy or not.

BAI

The estimated treatment effect demonstrates a significantly greater reduction, of approximately 3 points in the BAI, after BtB compared to TAU, with a 95% CI of between about 0·2 and 6 points. Again there is no treatment × visit or treatment × drug interaction and so this reduction applies to all post-treatment visits and to both drug and no-drug groups. The need for a surgery × treatment interaction for this variable complicates the picture somewhat; we are investigating this issue in a later paper based upon an expanded series of surgeries.

WSA

The estimated treatment effect demonstrates a significantly greater reduction, of approximately

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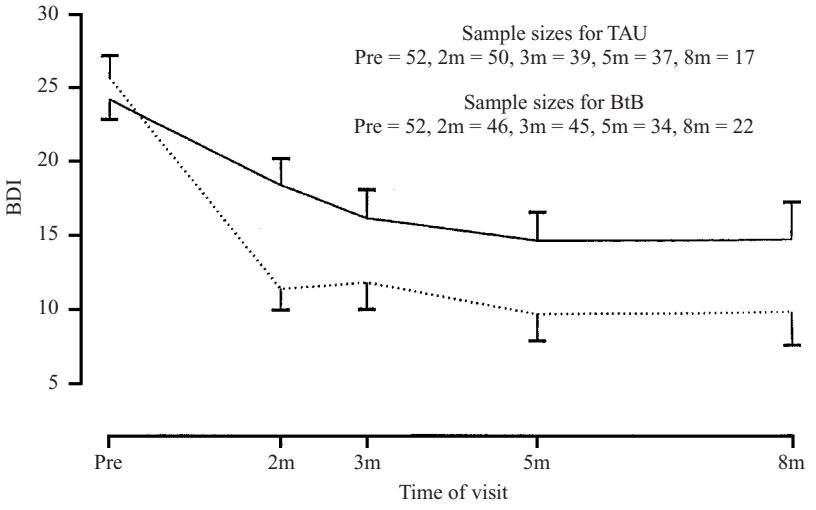


FIG. 2. Treatment mean profiles and standard errors for scores on the Beck Depression Inventory (BDI). (——, TAU, treatment as usual; - - - -, BtB, treatment as usual plus *Beating the Blues*.) Data shown are for pre-treatment; post-treatment, i.e. approximately 2 months (m) later, allowing for completion of the BtB program; and at 1, 3 and 6 m follow-up (FU). This and Figs 3 and 4 are based on the patients who contributed to the estimates given in Table 3, i.e. those with a recorded pre-treatment value on the particular outcome and with at least one post-treatment value. For clarity, the error bars are unidirectional, displaying one standard error of the mean to which they are attached.

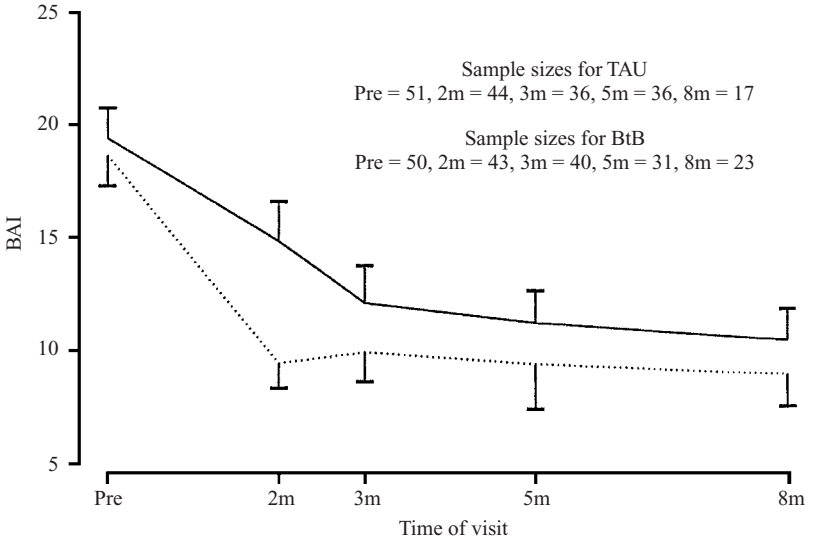


FIG. 3. Treatment mean profiles and standard errors for scores on the Beck Anxiety Inventory (BAI). Conventions as for Fig. 2.

3 points in the WSA, after BtB compared to TAU, with a 95% CI of between 0·5 and 6 points. The effect again applies to each post-treatment visit and to both the drug and no-drug conditions.

These effects remained essentially unchanged when we compared the data from the full sample to those for 'completers' only, i.e., BtB patients who completed the full program and at least the pre-treatment and 6-month follow-up measurement points, and TAU patients who completed at least the same two measurement points. Thus our results are not influenced by the patient's degree of commitment to the trial.

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Table 2. *Means, standard deviations* (S.D.) *and sample sizes* (N) *pre-, post-treatment and at* 1, 3 *and* 6 *month follow-up*

	Treatment		Follow-up		
	Pre-	Post-	1 month	3 month	6 month
BDI					
TAU					
Mean	24·08	18·36	16·10	14·29	16·07
S.D.	9·78	12·65	11·99	11·66	13·06
N	53	50	39	38	42
BtB					
Mean	25·38	12·04	12·50	9·00	9·61
S.D.	11·05	10·45	12·33	9·22	10·06
N	53	47	48	37	44
BAI					
TAU					
Mean	19·39	14·82	12·06	11·11	11·32
S.D.	9·72	11·57	9·98	8·46	9·61
N	51	44	36	37	38
BtB					
Mean	18·33	10·19	10·37	8·82	8·73
S.D.	9·61	8·92	8·64	9·36	7·66
N	51	43	41	33	40
WSA					
TAU					
Mean	18·46	14·82	14·54	12·21	12·10
S.D.	8·25	9·54	10·00	8·94	10·11
N	52	50	39	39	42
BtB					
Mean	19·89	12·21	12·02	10·16	9·11
S.D.	9·29	8·00	9·43	8·59	8·97
N	54	48	48	44	45

BDI, Beck Depression Inventory; BAI, Beck Anxiety Inventory; WSA, Work and Social Adjustment Scale; TAU, treatment as usual; BtB, *Beating the Blues*.

DISCUSSION

Our results demonstrate significant and rapid improvement, relative to treatment as usual, when a computerized program of cognitive-behavioural techniques, *Beating the Blues*, was administered to patients in primary care suffering from anxiety, depression or mixed anxiety and depression. The two groups of patients were well matched at the start of the trail and showed levels of illness typical for general practice (Miranda & Munoz, 1994; Mynors-Wallis *et al.* 1995). There was a small time difference from randomization to the start of treatment (approximately 1 week for BtB and 5 weeks for TAU), but not sufficient to account for the effects of BtB. The observed improvements were of clinical as well as statistical significance: after treatment with BtB, the mean scores for both depression and anxiety fell to the near-normal range. The improvements were also enduring. Importantly, the clinical changes were accompanied by similarly enduring improvements in adjustment to everyday life, as measured by the WSA. In interpreting this commonality between the results for the different outcome measures, however, it should be remembered that these are not independent of one another, and so a large effect on one implies a large effect on the others.

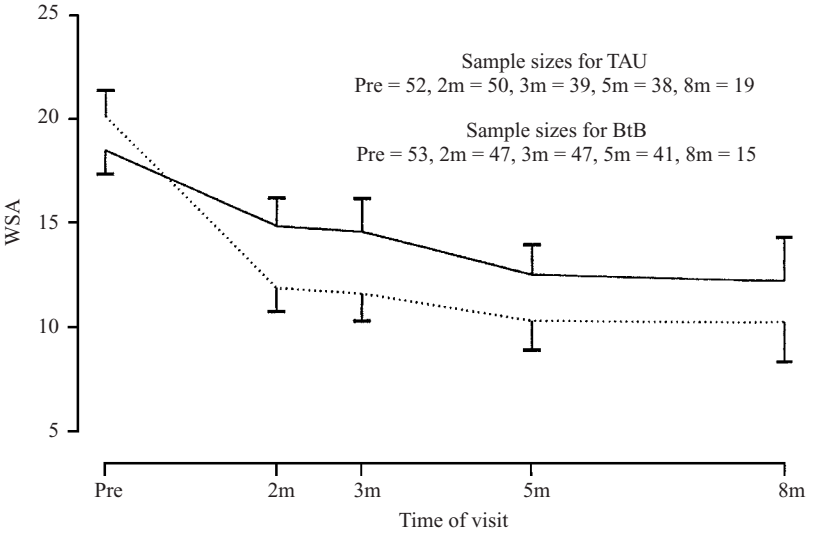


FIG. 4. Treatment mean profiles and standard errors for scores on the Work and Social Adjustment (WSA) scale. Conventions as for Fig. 2.

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Table 3. *Parameter estimates*, standard errors and confidence intervals for main effects model fitted to scores on the BDI, BAI and WSA*

	BDI			BAI			WSA		
Covariate	Estimated regression coefficient	S.E.	95% CI	Estimated regression coefficient	S.E.	95% CI	Estimated regression coefficient	S.E.	95% CI
Pre	0·67	0·09	(0·49, 0·85)	0·59	0·07	(0·45, 0·73)	0·53	0·08	(0·37, 0·69)
Visit	−0·31	0·13	(−0·57, −0·05)	−0·19	0·13	(−0·44, 0·06)NS	−0·43	0·11	(−0·65, −0·21)
Treatment	−5·21	1·73	(−8·60, −1·82)	−2·87	1·37	(−5·55, −0·18)	−3·22	1·39	(−5·94, −0·50)
Drugs	−4·24	1·80	(−7·77, −0·71)	−1·65	1·39	(−4·37, 1·07)NS	−2·00	1·45	(−4·84, 0·84)NS
Duration	3·72	1·73	(0·33, 7·11)	4·10	1·40	(1·36, 6·84)	3·54	1·43	(0·74, 6·34)

* The parameters are simply regression coefficients and are interpreted in the usual way, i.e. they give the change in the outcome measure corresponding to a unit change in the particular covariate, conditional in the remaining covariates remaining constant. For the dummy variables coding treatment, drugs and duration, such a change corresponds to going from one group to the other, for example, treatment, from TAU to BtB.
All effects significant (see confidence intervals) unless marked NS.

Similar to figures reported in trials of face-to-face therapy (Watkins & Williams, 1998); 35% of patients (30) did not complete the full BtB program. Only half (53%) of the non-completers quit because of difficulty using the computer, negative features of the program or poor clinical progress; many of the others quit for extraneous reasons (e.g. moving from the area) or because they already felt better. Among the 30 BtB non-completers, seven (23%) received treatment from mental health professionals; 27 (90%) consulted their GPs and two (1%) subsequently received anti-depressant medication (one as an in-patient). We are aware of only one previous study (Elkin *et al*. 1989) that compared face-to-face CBT to TAU for depression in general practice, with a non-significant trend towards improvement.

Our sample size was too small to conclusively rule out interactions between the effects of BtB and concomitant drug treatment or duration of pre-existing illness, although the relevant *P* values were all relatively large (see above). Nonetheless, it is encouraging for the use of computerized treatment programs that we saw no less of an effect on any of our outcome measures in patients allocated to pharmacotherapy. We cannot with certainty infer from the lower anxiety and depression scores in these patients (Table 2) to causal effects of pharmacotherapy, since the allocation to drug treatment was not random. However, at pre-treatment, patients allocated to drug had higher scores than those not so allocated on the BDI ($t = 1{\cdot}90$, df = 40, $P < 0{\cdot}06$) and WSA ($t = 2{\cdot}02$, df = 137, $P < 0{\cdot}05$), with no difference on the BAI. Thus, in contrast to previous results (Hollon *et al*. 1992) with face-to-face CBT, our findings indicate simple additivity between the effects of CBT and those of pharmacotherapy.

Furthermore, our results indicate that the effects of BtB were independent of baseline level of depression. Thus, BtB was as effective with mild depression as with severe depression. This outcome is contrary to that reported in the Second Sheffield Psychotherapy Project (SPP2) by Shapiro *et al*. (1994), but is in line with follow-up data reported by the same research team (Shapiro *et al*. 1995). Furthermore, it supports an NHS-replication of SPP2, which also found no interaction with severity of baseline depression (Barkham *et al*. 1996). The patients in our sample received a variety of ICD-10 diagnoses (Table 1). Future studies will need to address the effectiveness of computerized CBT in more highly selected groups.

In terms of our third moderating factor, duration of illness, patients whose illness had lasted less or more than 6 months at entry into the trial did not differ on any of the pre-treatment measures. However, duration of illness was a predictor of subsequent resistance to treatment: patients who had been ill for >6 months were significantly more impaired on all measures at all later visits (Table 2). Patients ill for either less or more than 6 months, however, both showed clinical improvement, and this improvement was facilitated to an equal extent by BtB. Since patients allocated to drug were initially more severely ill, and those with longer pre-existing illness were more resistant to treatment overall, we may infer that BtB is as effective in severe as in mild depression and anxiety.

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Our existing sample size is particularly small in respect of the final moderating factor we investigated, GP surgery, in that it was drawn from only seven practices, making it difficult to evaluate what features of the practice environment contributed to the observed interaction with treatment on the BAI. To address this issue we have now recruited additional practices.

Computerized cognitive-behavioural treatment is relatively inexpensive. BtB costs approximately £70/patient, including the introductory video, eight treatment sessions, hardware, software, manuals, clinical and IT support, and training of the clinical helper. Overall, our findings indicate that this mode of therapy may have wide applicability in general practice, offered either as an adjunct to pharmacotherapy or to patients who refuse drugs, and irrespective of duration or severity of illness. Phase 2 of the trial (in progress) seeks to replicate these findings in additional GP practices.

Three of the authors declare a financial interest: J.P. and J.A.G. as minority partners in the commercial exploitation of BtB and D.G. as an occasional consultant to Ultrasis plc.

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