

Delivering interventions for depression by using the internet: randomised controlled trial

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Abstract

Objective To evaluate the efficacy of two internet interventions for community-dwelling individuals with symptoms of depression—a psychoeducation website offering information about depression and an interactive website offering cognitive behaviour therapy.

Design Randomised controlled trial.

Setting Internet users in the community, in Canberra, Australia.

Participants 525 individuals with increased depressive symptoms recruited by survey and randomly allocated to a website offering information about depression (n = 166) or a cognitive behaviour therapy website (n = 182), or a control intervention using an attention placebo (n = 178).

Main outcome measures Change in depression, dysfunctional thoughts; knowledge of medical, psychological, and lifestyle treatments; and knowledge of cognitive behaviour therapy.

Results Intention to treat analyses indicated that information about depression and interventions that used cognitive behaviour therapy and were delivered via the internet were more effective than a credible control intervention in reducing symptoms of depression in a community sample. For the intervention that delivered cognitive behaviour therapy the reduction in score on the depression scale of the Center for Epidemiologic Studies was 3.2 (95% confidence interval 0.9 to 5.4). For the “depression literacy” site (BluePages), the reduction was 3.0 (95% confidence interval 0.6 to 5.2). Cognitive behaviour therapy (MoodGYM) reduced dysfunctional thinking and increased knowledge of cognitive behaviour therapy. Depression literacy (BluePages) significantly improved participants’ understanding of effective evidence based treatments for depression ($P < 0.05$).

Conclusions Both cognitive behaviour therapy and psychoeducation delivered via the internet are effective in reducing symptoms of depression.

Introduction

Depression is a major cause of disability, and many individuals with depression do not receive adequate treatment.¹⁻³ The internet has the potential to deliver self help interventions globally to people who do not seek or receive help for depression^{4,5} and harness the

technology of the computer, already shown to provide effective treatment for depression in clinical settings.^{6,7}

Internet based programmes to prevent anxiety and panic in populations of students and patients have been effective.^{8,9} In the only randomised controlled trial targeting depression, patients were randomised to either a website (offering cognitive behaviour therapy) or a control condition (the home page of a health maintenance organisation).⁵ The study did not find differences in depression, but the number of visits to the site was low. Post hoc analyses showed a modest effect in people with lower initial scores. This implies that the internet may be a useful tool, at least for some groups.

We used participants recruited directly from the community to investigate this possibility by comparing the effects of a website for psychoeducation and a website offering cognitive behaviour therapy with a control condition. One site (BluePages, <http://bluepages.anu.edu.au>) provided depression literacy, offering evidence based information on depression and its treatment.¹⁰ The other site (MoodGYM, <http://moodgym.anu.edu.au>) offered cognitive behaviour therapy for the prevention of depression.¹¹ These interventions were compared with a control intervention using an “attention placebo,” which provided weekly contact with a lay interviewer to discuss lifestyle factors such as exercise, education, and health habits.

We expected both sites to be more effective than the control condition in reducing depression symptoms and in improving depression literacy. BluePages was predicted to improve depression literacy, whereas MoodGYM was predicted to improve symptoms of depression and dysfunctional thinking more than BluePages.

Methods

Participants and design

Recruitment was via a questionnaire posted to 27 000 people aged 18-52 years in Canberra. We randomly selected participants from the electoral roll. Altogether 6122 people (22.7%) returned questionnaires. Of these, 752 indicated a willingness to participate, had access to the internet, scored 22 or above on the Kessler psychological distress scale¹² and were not

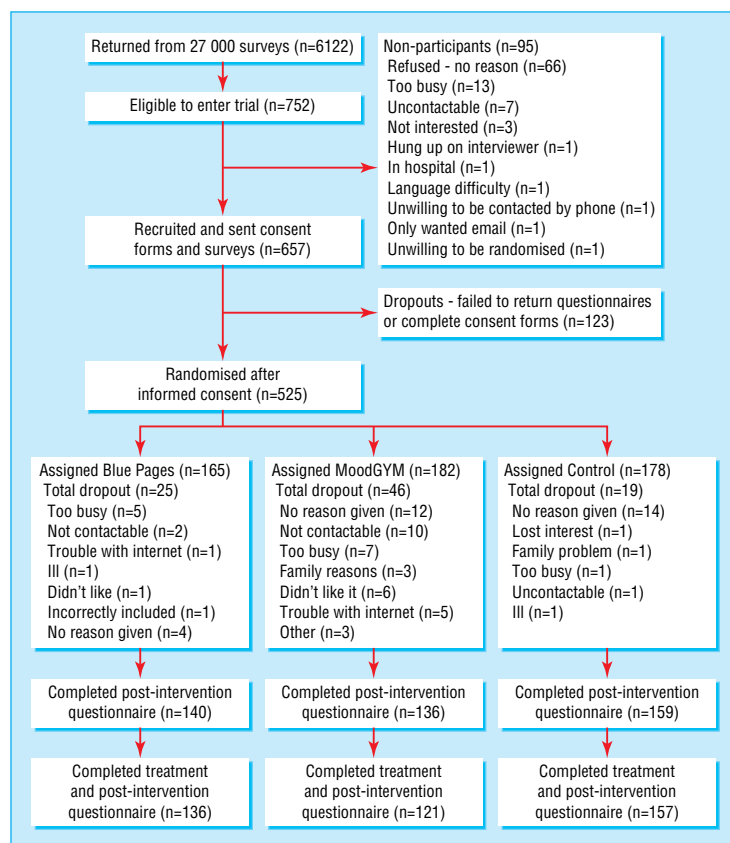
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Flow of participants through the trial

receiving clinical care from either a psychologist or psychiatrist. A total of 525 people were randomised to groups (figure).

Once individuals had returned consent forms a statistician assigned them randomly to one of three treatment groups.

Procedures for BluePages and MoodGYM

Lay interviewers contacted participants weekly by phone to direct the use of the websites. Participants

were sent detailed guides outlining navigation and weekly assignments for MoodGYM or BluePages. Post-intervention questionnaires were posted at six weeks (see also *bmj.com*).

Procedures for the control condition

Participants were phoned weekly by interviewers to discuss lifestyle and environmental factors that may have an influence on depression. Topics covered included physical and artistic activities (week 1); education and hobbies (week 2); social, financial, and family roles (week 3); work habits and stress (week 4); physical health, medications, and pain (week 5); and nutrition and alcohol (week 6).

Outcome measures

The self report 20 item depression scale from the Center for Epidemiologic Studies was the primary outcome measure.¹³ Scores range from 0 to 60, with scores 16 or higher reflecting clinical depression. Dysfunctional thoughts were measured by the automatic thoughts questionnaire.¹⁴ Scores range from 30 to 150, with higher scores indicating greater severity.

We assessed attitudes to treatments by asking the respondent to rate whether each of the interventions listed on the website was likely to be helpful, harmful or neither for someone with depression. Medical literacy was scored 0-2, with higher scores indicating correct responses for the two medical treatments supported by the evidence base (antidepressant medication and electroconvulsive therapy). The maximum score for psychological literacy was 3 (scores for cognitive behaviour therapy, interpersonal psychotherapy, and bibliotherapy) and the maximum score for lifestyle literacy was 3, based on rating exercise, St John's Wort, and light therapy, as supported by the evidence. We used a 16 item "true or false" test that assessed the content and key principles of MoodGYM to assess knowledge of cognitive behaviour therapy principles.

Results

Table 1 shows demographic characteristics at baseline.

Table 1 Baseline characteristics. Values are numbers (percentages) of participants unless otherwise indicated

Variable	Condition		
	BluePages (n=165)	MoodGYM (n=182)	Control (n=178)
Sex:			
Female	115 (69)	136 (75)	124 (70)
Years (SD) spent in education	15.0 (2.4)	14.6 (2.4)	14.4 (2.3)
Marital status*:			
Married/cohabiting	100 (61)	98 (54)	100 (56)
Divorced/separated	24 (15)	26 (14)	24 (14)
Never married	53 (30)	57 (31)	53 (36)
Mean (SD) age in years	37.25 (9.4)	35.85 (9.5)	36.29 (9.3)
Intervention preference†:			
BluePages	27 (17)	21 (12)	20 (11)
MoodGYM	68 (42)	68 (38)	67 (38)
Control	65 (40)	85 (48)	88 (50)
Mean (SD) score on Kessler psychological distress scale	17.5 (4.9)	17.9 (5.0)	18.0 (5.7)
Mean (SD) score on Center for Epidemiologic Studies depression scale	21.1 (10.4)	21.8 (10.5)	21.6 (11.1)
Caseness (score on Center for Epidemiologic Studies depression scale >16)	115 (70)	131 (79)	123 (69)

Not all participants completed all questions.

*Marital status was based on 523, with one in each of MoodGYM and BluePages widowed; education was based on 510.

†Missing data in intervention preference are due to individuals ticking more than one category. All differences of site or condition were non-significant, with the exception of years of education, $F(2,509)=3.33, P=0.04$.

Table 2 Improvement in symptoms and literacy after six weeks (intention to treat analysis, n=525)

Outcome measure	Mean (SD) score improvement			Difference (95% confidence interval)		
	BluePages	MoodGYM	Control	BluePages v MoodGYM	MoodGYM v control	BluePages v control
Center for Epidemiologic Studies depression scale	3.9 (9.1)	4.2 (9.1)	1.0 (8.4)	-0.3 (-2.6 to 2.0)	3.2* (0.9 to 5.4)	2.9* (0.6 to 5.2)
Automatic thoughts questionnaire	6.4 (18.1)	9.3 (16.9)	3.1 (15.8)	-2.8 (-7.2 to 1.5)	6.1* (1.9 to 10.4)	3.3 (-1.1 to 7.7)
Medical literacy	-0.6 (0.7)	-0.1 (0.5)	-0.1 (0.5)	-0.5* (-0.7 to -0.4)	0.0 (-0.1 to 0.2)	-0.5* (-0.6 to -0.3)
Psychological literacy	-0.7 (1.1)	-0.5 (1.0)	-0.0 (0.9)	-0.3* (-0.5 to -0.0)	-0.4* (-0.7 to -0.2)	-0.7* (-1.0 to -0.4)
Lifestyle literacy	-0.6 (0.9)	-0.0 (0.5)	0.1 (0.8)	-0.5* (-0.7 to -0.4)	-0.1 (-0.3 to 0.0)	-0.7* (-0.9 to -0.5)
Cognitive behaviour therapy literacy	-1.1 (2.0)	-2.0 (2.4)	0.1 (1.6)	0.9* (0.4 to 1.4)	-2.1* (-2.6 to -1.6)	-1.2* (-1.7 to -0.7)

*The mean difference is significant at the 0.05 level.

All results remained significant with adjustment using Bonferroni correction.

In the intention to treat condition, the percentage of clinical cases (Center for Epidemiologic Studies depression score <16) was 50% (BluePages), 54% (MoodGYM), and 61% (control) at post-intervention, representing a drop of 20%, 25%, and 8%, respectively, from caseness levels before intervention.

Symptoms of depression and mental health literacy

In the intention to treat analysis, both BluePages and MoodGYM were effective in reducing symptoms of depression (table 2). MoodGYM, but not BluePages, significantly improved dysfunctional thinking compared with the control. Knowledge of medical, psychological, and lifestyle treatments for depression significantly improved for BluePages compared with both MoodGYM and control. Knowledge of effective psychological treatments was improved in MoodGYM relative to control. Literacy in cognitive behaviour therapy improved most with exposure to MoodGYM. These effects were present for completers and for individuals with Center for Epidemiologic Studies depression scores of 16 and over.

Website activity

Web logs from BluePages showed that the site was visited an average of 4.49 (SD = 1.35, n = 113) occasions, with an average of 67.2 (23.9) hits. MoodGYM participants completed half of 29 exercises (14.8; 9.7).

Discussion

Findings and their implications

The internet is a feasible and powerful tool in delivering community based health interventions. The study's hypotheses were confirmed, with the exception that depression literacy was found to be as effective as cognitive behaviour therapy in reducing symptoms of depression. The mechanisms for this effect are unclear, although research from general practice¹⁵ indicates higher recovery rates in patients who receive educational material.

Both the MoodGYM site and (especially) the psychoeducational site were acceptable to patients, with dropout rates of 25% and 15%. Although trial participants were highly selected, these rates are remarkably low in comparison with other interventions. For example, 37% refused or discontinued a problem solving intervention, and 54% refused or discontinued the "coping with depression" course in a community setting.¹⁶ The design and interactivity of our websites may explain in some part their greater acceptability. Other reasons might be the enthusiasm of the lay interviewers or sample characteristics of the sample.

Our participants were highly educated and not recruited through general practice. However, more

What is already known on this topic

Internet interventions may offer help for many individuals without access to effective treatments

Internet based cognitive behaviour therapy may be effective but has not been tested at the community level

No randomised controlled trials have examined the effect of internet psychoeducation on symptoms of depression

What this study adds

Psychoeducation delivered on the web reduces symptoms and increases knowledge of depression and its effective treatments

Cognitive behaviour therapy delivered via the internet with weekly contact reduces dysfunctional thinking and depressive symptoms

Internet sites offer feasible and powerful public health interventions

than 90% (489) reported having been markedly depressed previously, with 64% (329) reporting that they sought help from a doctor or counsellor at the time. This implies that our findings may be relevant to a subset of patients from general practice.

Limitations

Follow up of the results at 12 months will provide information about the sustainability of internet interventions. The higher dropout rate occurred for the MoodGYM intervention, possibly because of lower acceptability. Nevertheless, the pattern of findings was identical for those who completed the study and for the intention to treat analysis. This shows that the higher attrition rate did not substantially alter the effectiveness of the treatment but leaves open the possibility that participants who completed the MoodGYM intervention were differentially biased towards lower scores relative to the other interventions.

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Apple crumble or a selection from the sweet trolley?

In the first month of my GP registrar year, I remember sitting in on a soporific meeting with the accountants who looked after the practice's books. It was over lunch, and, just as I had begun to drift into the first of many microsleeps of the afternoon, one of the two money men thought he'd try to make polite conversation with me: "So, you're learning the ropes of general practice are you? How are you finding it?"

I gave him a stock answer, hoping he would leave me alone. "Yeah, it's great actually . . . really enjoying it, thanks," I replied unoriginally. I was too jaded to ask him anything in return, like who or what "Super-Ann" was or why they kept referring to "drawings" when there wasn't an architect in sight.

Not comfortable with the silence, he changed thread. "So, are you hoping to settle in this area then?"

I wanted to bail out of this conversation quickly. It was time to blame it all on the wife and achieve closure. "Well, probably not. My wife works in London, and she eventually wants us to move to the south coast. In any case, I'm not sure I would want to work permanently in one particular area."

However, this last statement was seemingly too hot to handle. Here was an old school professional, used to the idea of general practitioners being long term community figures, being told by a newbie that he wasn't willing to settle down in one area. A lambasting followed. "Now hang on a minute, that's ridiculous . . . I mean surely you knew when you signed up for general practice that you'd be in one area for 40 odd years—that's what GPs do. It's an intrinsic part of the job isn't it?" he said, chortling with displeasure.

My blood started to simmer. I wanted to explain to this dinosaur that general practice was changing fast and that not everyone had to be a profit sharing partner or work and live in one place forever any more. I wanted to educate him about increasing feminisation within primary care, flexible training, the

myriad of salaried options available to us, the fact that many young GPs locum for a while, the concept of non-principals, walk-in centres, private clinics, work-life balance, job sharing, portfolio careers, etc. All of this, and a fleeting thought that perhaps I could run update courses for out of touch medical accountants, passed through my somnolent head in about three seconds, but I simply couldn't be bothered. "Mmm . . . I suppose you're right." I faked a defeat just to get him off my case. I could have just said that there were lots of other options for GPs these days, but that would have simply protracted the conversation.

Recently I experienced a bout of "esprit de l'escalier" regarding that day—that is, I recalled that particular conversation, how irritated I had felt, and thought about what I would say if I could ever replay it. It went something like this: "If you came round for dinner, and I told you that we were having apple crumble for dessert you'd probably go with the flow and have some, wouldn't you? But if I told you that you had a choice out of the crumble, home made chocolate brownies, a tiramisu dripping with brandy, and a rich crème brûlée, you might find that you didn't want the crumble after all. And that, sir, is my point."

Ayan Panja *senior general practitioner registrar, Aston Clinton Surgery*

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