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Review Article

Internet-based mental health programs: A powerful tool in the rural medical kit

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Abstract

***Objective*:** *To discuss, using two case examples, the potential utility of Internet-based depression information and automated therapy programs in rural regions.*
***Design*:** *Systematic review of evaluations of two Australian web-based mental health programs: MoodGYM and BluePages Depression Information.*
***Setting*:** *Community, school, university.*
***Participants*:** *A total of 12 papers and reports derived from nine separate studies of MoodGYM and BluePages involving sample sizes ranging from 78 to 19 607 people.*
***Outcome measures*:** *Depressive symptoms, anxiety symptoms, dysfunctional thoughts, depression literacy, stigma, help seeking and cost-effectiveness.*
***Results*:** *Internet-based applications were effective in reducing depressive symptoms and stigmatising attitudes to depression and in improving depression literacy. School-based programs also showed promise in decreasing depressive symptoms.*
***Conclusions*:** *Depression self-help and information programs can be delivered effectively by means of the Internet. As accessibility of face-to-face mental health services in rural areas is poor and as there is a strong culture of self-reliance and preference for self-managing health problems among rural residents, the Internet might offer an important platform for the delivery of help for depression in rural regions. Consideration should be given to developing programs tailored to rural settings and future research should evaluate the efficacy and effectiveness of such programs in rural settings.*

KEY WORDS: *community health program and strategy*, *depression*, *health program evaluation*, *rural mental health*, *telehealth/telemedicine*.

Introduction

There is evidence that the prevalence of mental health problems in rural areas is at least as high as among metropolitan residents[1,2] and that rates of suicide are higher than in city or urban areas.[1,3,4] However, fewer people in rural areas seek help for mental disorders.[1,5–7]

There are a number of potential barriers to seeking help for mental health problems in rural areas. First, accessibility of mental health services and professionals in rural areas is very low by comparison with major cities.[8,9] According to rural GPs the greatest need for mental health services relates to the provision of cognitive behavioural therapy (CBT) groups and patient education about depression.[10] Indeed two-thirds of practitioners report a high or extreme need for CBT support and half report such a need for 'patient education'.[10] Second, knowledge of agencies providing mental health services is poor among rural residents with only 40% of respondents in one study of a rural population being aware of where they could receive help for a mental health problem.[11] Moreover, there is little trust in the quality of such services with more than half of respondents in the latter study believing that the available services were 'marginal' or 'poor'.[11] Although there is little evidence that stigmatising attitudes are more prevalent in rural than metropolitan regions, it has been suggested that stigma might be a greater barrier to help seeking for depression in rural communities because of the emeshed nature of rural social networks.[12] It has also been argued that rural residents are more 'stoic and self-reliant'[13] and prefer to manage their own health problems.[14–16] Such qualities have been shown to be associated with lower

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Competing interests: The authors developed the MoodGYM and BluePages websites. They are also authors of the studies reviewed in this paper.

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***What is already known on this subject*:**
- *Access to mental health services is poor in rural areas.*
- *General practitioners report a high level of unmet need for cognitive behavioural therapy and patient education about depression.*
- *Such programs are available on the Internet.*

levels of help seeking from mental health professionals among rural residents after controlling for need and demographic factors.[15] Moreover, there is some qualitative evidence that expressing negative feelings or thoughts is considered inappropriate within farming communities and that a person should seek to solve, rather than talk about, their problems.[4] Recent Australian research has also shown an almost universal preference among rural respondents for self-, rather than formal, help for mental health problems.[16]

Although such attitudes can impede help seeking from health professionals, they might also provide a key to developing improved models for mental health service delivery in rural areas.[13,14] In particular, a culture of self-reliance might be conducive to the use of self-help methods for addressing mental health problems. For example, Weinert and Long argue that for rural residents, 'frequent and direct contacts by human services professionals may be both unnecessary and undesirable in many instances' (p. 453).[14] They consider that health education to improve self-help skills and informal health delivery might be more acceptable.

One possible means of delivering education and self-help skills, including CBT, to rural residents is via the Internet. There is evidence that Internet-based therapy programs are an effective means of mental health service delivery.[17]

This paper describes and reviews the findings from evaluation studies of two popular web-based applications by our group: BluePages, which provides evidence-based information about depression for consumers, and MoodGYM, which delivers automated CBT. These applications were selected because: (i) they address the support needs (psychoeducation and CBT) identified as most important by rural GPs; (ii) MoodGYM has been extensively evaluated and BluePages is the only information website for which there is randomised controlled evidence of efficacy; (iii) they are available without cost or restriction to users; and (iv) MoodGYM is accompanied by practitioner manuals[18] and is thus suitable for use as an adjunct in general practice.

***What this study adds*:**
- *This paper is the first comprehensive review of the outcomes of all completed evaluation studies involving two popular community-based Internet programs, MoodGYM, a cognitive behavioural therapy program for depression, and BluePages Depression Information, an evidence-based information site about depression for consumers.*
- *Both programs improved depression and anxiety symptoms. They also improved knowledge about and attitudes to depression.*
- *MoodGYM and BluePages might be a cost-effective self-help tool and/or adjunct to general practitioner treatment for rural residents with depression. However, there is a need to develop and evaluate the utility and efficacy of mental health Internet applications specifically tailored to rural residents.*

Method

Websites

BluePages Depression Information (http://bluepages.anu.edu.au)

This website provides information about depression for consumers. Written at approximately Year 8 level, and using a consumer-friendly smiley face rating system it sets out the evidence for the effectiveness of approximately 50 medical, psychological and alternative interventions for depression. It also contains interactive online anxiety and depression screening tests, other information about depression and its diagnosis, a list of sources of help and resources, a downloadable relaxation tape and a focused search facility to enable search both within BluePages and across other Australian and international depression websites.

MoodGYM (http://moodgym.anu.edu.au)

This website provides automated online CBT. It can be completed without health professional involvement, as an adjunct to treatment by a GP or mental health practitioner or, in the case of school students in the classroom under the broad supervision of a teacher. MoodGYM contains five modules and a workbook comprising a series of exercises. Modules teach the concepts of cognitive restructuring, behaviour therapy, assertiveness and self-esteem training and problem

solving. Users complete normed depression and anxiety tests as they progress through the application and can print out a summary of their progress for their own records or to discuss with their health professional. MoodGYM Mark I was released on 1 April 2001 and replaced by MoodGYM Mark II in September 2003.

Study review protocol

Findings are reported for all controlled and uncontrolled studies of the effectiveness of MoodGYM and BluePages. The review is based on published articles, reports, dissertations, conference presentations and articles submitted or in preparation.

Results

A total of 12 papers and reports derived from nine separate studies of MoodGYM and BluePages were identified (Table 1). Outcome measures included level of depressive and anxiety symptoms, dysfunctional thoughts, depression literacy, stigma, help seeking and cost-effectiveness. Of the nine studies identified, five were concerned with adult members of the community, one involved university students and three involved programs delivered as part of the school curriculum to secondary school students.

Depressive and anxiety symptoms

The first evaluation of the effectiveness of MoodGYM was an uncontrolled study of users who visited the site in the initial six months after its release.[19] The study found a systematic decrease in users' online anxiety and depression scores as they progressed through the five modules of the application. Although lacking a control group, this was the first demonstration that a website might be capable of delivering effective therapy for depression.

This initial study was followed by a randomised controlled trial (the BlueMood trial) in which members of the community with elevated levels of depressive symptoms were randomised either to receive MoodGYM, BluePages or an attention control intervention involving lifestyle and other interviews about risk factors for depression. Participants were initially recruited by means of a screening questionnaire sent to randomly selected registrants on the local electoral roll. An intent-to-treat analysis demonstrated that both the MoodGYM and the BluePages interventions were associated with a reduction in depressive and anxiety symptoms relative to the control condition immediately after completion of the program.[20] A follow-up study suggested that the efficacy of MoodGYM and BluePages was maintained over a 12-month period (A. MacKinnon *et al.*, under revision, 2007). Thus, the study confirmed the utility of MoodGYM and provided the first (and to date only) demonstration that a simple web-based educational program might also be associated with improved depression outcomes. A recent Norwegian study has provided further evidence of the efficacy of BluePages and MoodGYM. In this study, students from the University of Tromso with high levels of depressive symptoms were randomised either to Norwegian versions of MoodGYM and BluePages presented together or to a no-treatment control condition. The students who completed the post-intervention questionnaires showed a significantly lower level of depression and anxiety than the control group.[26]

We have also recently investigated the efficacy of MoodGYM administered as part of the curriculum in schools. Two pilot studies, one in a boys school and the other in a girls school, have produced encouraging results (R. O'Kearney *et al.*, submitted, 2007). Preliminary analyses of data from a subsequent clustered randomised controlled trial involving 29 schools from around Australia, more than one-third from rural areas, also suggest that MoodGYM is effective in preventing depression and anxiety in school students.[28]

These students and the adult BlueMood participants received weekly reminders from teachers or interviewers to visit MoodGYM or BluePages. Spontaneous visitors to MoodGYM receive no such prompts. Could the absence of prompts affect the utility of MoodGYM? To investigate this question, the online depression and anxiety scores for spontaneous visitors to MoodGYM were compared with those for participants in the BlueMood study. There was no difference in the pattern of findings across modules for spontaneous and BlueMood users.[24] Both showed a systematic decrease in anxiety and depression scores across modules consistent with the suggestion that MoodGYM is effective even in the absence of tracking by an interviewer.

MoodGYM users often do not complete the entire program. This raises the question of which components of the program are most effective and whether a shortened version of MoodGYM could be substituted for the current program. A trial of spontaneous visitors to the site who agreed to be randomised to one of a number of combinations of MoodGYM modules demonstrated that a single module of online CBT was not effective but extended CBT with or without behaviour strategies reduced depression.[25]

Depression literacy, stigma and dysfunctional thoughts and help seeking

MoodGYM but not BluePages reduced dysfunctional thoughts.[20] As might be expected, BluePages improved depression literacy in adults[20,21] as did MoodGYM.[20] Both programs led to reduced personal stigma among

TABLE 1: *Summary of evaluation studies of MoodGYM and BluePages*

Article no.	Authors	Study/program	Sample size and type of user	Type of intervention/type of analysis	Follow up	Outcome measure	Findings	
							MoodGYM	BluePages
1	Christensen *et al.*[19]	MoodGYM Mk I	2909 international, spontaneous visitors to the MoodGYM site	Multi-time, no control group Completers of >1 depression/anxiety test	NA	Depressive symptoms Anxiety symptoms	+ +	
2	Christensen *et al.*[20]	*BlueMood Trial* ISRCTN77824516 MoodGYM Mk I BluePages	525 Australian community sample (18–50 years old) elevated depressive symptoms	RCT Intent-to-treat	Immediate	Depressive symptoms Anxiety symptoms Dysfunctional thoughts Depression literacy (Rx)	+ + + Psychological	+ + 0 +
3	Griffiths *et al.*[21]	*BlueMood Trial*		Intent-to-treat	Immediate	Personal stigma Perceived stigma Depression literacy (D-Lit)	+ – +	+ 0 ++
4	(A. MacKinnon *et al.*, under revision, 2007)[23]	*BlueMood Trial*		Intent-to-treat	6 months, 12 months	Depressive symptoms Depressive symptoms	+ $P = 0.06$	+ +
5	Christensen *et al.*[23]	*BlueMood Trial*		Completers	Immediate, 6 months	Help seeking	+ CBT, exercise massage	+ non-evidence-based Rx
6	Christensen *et al.*[24]	MoodGYM Mk I	19 607 international, spontaneous visitors to MoodGYM site (2001–2003) and 182 BlueMood trial participants assigned to MoodGYM group (see above)	Multi-time, historical comparison group Completers of >1 depression/anxiety test	NA	Depressive symptoms Anxiety symptoms	+ +	
7	Christensen *et al.*[25]	*MoodGYM Variations trial* ISRCTN03012627 MoodGYM Mk II – six different combinations of the MoodGYM modules	2794 international spontaneous visitors randomised to brief or extended versions of MoodGYM	RCT Modified intent-to-treat	NA	Depressive symptoms Anxiety symptoms	+ 0	

+, intervention associated with a positive effect on the variable (e.g., decreased depression symptoms, decreased stigma, decreased non-evidence-based help seeking) or the same pattern of findings as for intervention previously demonstrated to be effective[24] or extended CBT more effective than brief CBT[24].

CBT, cognitive behavioural therapy; ITT, intention to treat; Mk, mark; NA, not applicable; RCT, randomised controlled trial; Rx, treatment.

TABLE 1 (continued): *Summary of evaluation studies of MoodGYM and BluePages*

Article no.	Authors	Study/program	Sample size and type of user	Type of intervention/type of analysis	Follow up	Outcome measure	Findings	
							MoodGYM	BluePages
8	Lintvedt *et al.* [26]	*BlueMood Norway* MoodGYM Norwegian + BluePages Norwegian	215 Norwegian tertiary students with elevated depressive symptoms	RCT Completers		Depressive symptoms Dysfunctional thoughts Depression literacy (D-Lit)	+ + +	
9	O'Kearney *et al.*[27]	MoodGYM Mk II	78 Australian adolescent boys (single sex school-students); universal sample	Controlled trial ITT/completers	Immediate, 16 weeks	Depressive symptoms Depressive symptoms	0 but + trends 0	
10	(R. O'Kearney *et al.*, submitted, 2007)	MoodGYM Mk II	157 Australian adolescent girls (single sex school-students); universal sample	Controlled trial	Immediate, 20 weeks	Depressive symptoms Risk reduction depression Depression literacy (Rx) Personal stigma Depressive Risk reduction depression Depression literacy Personal stigma	0 0 0 0 + (subgroup clinically significant symptoms) + 0 0	
11	Neil *et al.*[28]	*YouthMood trial* ISRCTN67189839 MoodGYM Mk II	1356 universal, 29 schools (11 rural and 18 metropolitan schools), Year 9 and 10 students (boys and girls) 17% of students from farms	Clustered randomised controlled trial (randomised by school) Completers (intent-to-treat analyses pending)	Immediate	Depressive symptoms Anxiety symptoms	+ +	
12	(J. Butler *et al.*, submitted, 2007)[22]	MoodGYM Mk I				Cost-effectiveness	+	

+, intervention associated with a positive effect on the variable (e.g., decreased depression symptoms, decreased stigma, decreased non-evidence-based help seeking) or the same pattern of findings as for intervention previously demonstrated to be effective[24] or extended CBT more effective than brief CBT[24].

CBT, cognitive behavioural therapy; ITT, intention to treat; Mk, mark; NA, not applicable; RCT, randomised controlled trial; Rx, treatment.

adults[21] but were not helpful in reducing perceived stigma in adults[21] or in decreasing personal stigma among school students.[27] There was some evidence that MoodGYM increased the use of selected evidence-based treatments and that BluePages reduced help seeking from non-professional sources such as family and friends.[23]

Cost-effectiveness

A comparison of the direct costs of MoodGYM with face-to-face CBT and GP-administered antidepressant medication concluded that costs per client are lower for MoodGYM, once 753 are treated with medication or 359 people are provided with a course of CBT (J. Butler *et al.*, submitted, 2007).[22] Given the very large numbers of people who have been and can be treated monthly by the program, it is clear that MoodGYM is highly cost-effective.

Discussion

This review of MoodGYM and BluePages evaluations suggests that these programs are associated with improvements in mental health and knowledge and attitudes to depression. None of the studies specifically evaluated the efficacy of the programs among rural users. However, a substantial percentage of the YouthMood study of MoodGYM in schools involved rural schools and according to data collected at registration, 20.5% of spontaneous MoodGYM users worldwide are from rural or remote areas. This high level of use suggests that the program might be applicable to rural residents. Moreover, Australian Bureau of Statistics figures indicate that 51% of people outside metropolitan areas have access to the Internet from home, a figure that although lower than access rates for metropolitan areas (59%), nevertheless suggests a substantial degree of engagement of rural residents with Internet technology.[29]

MoodGYM is not suitable for all users, particularly those with lower literacy levels. It is possible that some rural residents in particular will find the learning style involved in CBT inconsistent with their preferred mode of learning. Moreover, the examples are not specifically tailored for a rural user. Consideration should be given to developing programs tailored to rural users, and future research should evaluate both the usability, suitability and the efficacy and effectiveness of these programs within rural settings. Further analysis of the subset of MoodGYM data provided by rural participants might be also instructive.

We are currently working on a new generation multimedia tailored Internet mental health application and plan to incorporate within it a content stream that is tailored to rural residents. Meanwhile, MoodGYM and BluePages might prove useful for psychologically inclined rural consumers with elevated depressive symptoms. These Internet services are anonymous, can be undertaken around rural work schedules, do not require lengthy travel to consultations and provide a means for rural residents to manage their own health. They are accessible, of high fidelity, and users can register at no cost. Such programs can be used without input from a clinician, or as an adjunct to treatment by the busy rural GP. Indeed, 18.6% of all MoodGYM users report that they are referred by a health practitioner. Consideration should also be given to the ways in which these tools can be incorporated into existing rural mental health services, so that they complement or help reconfigure services and optimise the use of these scarce resources.

The New Freedom Commission on Mental Health, established by US President George W. Bush in 2002, declared that e-technology is 'one of the most promising means of improving access to speciality mental health care in underserved rural areas' (p. 55).[30] The time has come to ensure that this promise is converted into a reality that results in improved health outcomes for a highly under-served population.

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