Psychological Medicine (2009), **39**, 705–712. © Cambridge University Press 2008
doi:10.1017/S0033291708004224 Printed in the United Kingdom

REVIEW ARTICLE

Barriers to the uptake of computerized cognitive behavioural therapy: a systematic review of the quantitative and qualitative evidence

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Background. Studies of cognitive behavioural therapy delivered by computer (cCBT) show clinical efficacy for treating anxiety and depression, but have not focused on barriers to uptake. Potential barriers include adverse consequences, accessibility and acceptability.

Method. An integrated systematic review was conducted of quantitative and qualitative studies and surveys from multiple electronic databases where computers delivered cCBT for anxiety or depression.

Results. Substantial numbers of potential participants are lost prior to trials commencing with little explanation. Among trial participants, drop-outs may be higher in the cCBT groups (odds ratio 2.03, 95% confidence interval 0.81–5.09). Only a median of 56% completed a full course of cCBT and personal circumstance was a more common cause of drop-out than difficulties with the technology or social background. Risk was rarely assessed in the majority of programs. Significant staff time was needed to support clients. Therapists were more negative about cCBT than clients.

Conclusions. While cCBT is likely to be an effective and acceptable intervention for some people, there are barriers to its uptake that will substantially limit its impact if not addressed. These included investigating the outcome and attitudes of those who do not make it as far as cCBT trials and why so few finish a full course of cCBT.

Received 17 July 2007; Revised 26 June 2008; Accepted 1 July 2008; First published online 24 September 2008

Key words: Adverse consequences, cognitive behavioural therapy, computers, cCBT, systematic review.

Introduction

Cognitive behaviour therapy (CBT) is the most commonly practised psychotherapy in the UK National Health Service (NHS) (Department of Health, 2001) and in other healthcare settings. However, demand outstrips the ability of the NHS to deliver this intervention to all who might benefit and the structure of most CBT services, characterized by '9–5' working and hourly appointments, makes this therapy inaccessible to many (Lovell & Richards, 2000).

Computerized CBT (cCBT) is one of several self-help therapies that aim to offer CBT to patients while reducing the number and cost of therapists needed. Four older meta-analyses on self-help have found CBT by bibliotherapy to be as effective as therapist-led CBT but did not look at cCBT specifically (Scogin *et al*. 1990; Gould, 1993; Marrs, 1995; Cuijpers, 1997; reviewed by Bower *et al*. 2001). The National Institute of Clinical Excellence (NICE) has recently published updated guidance (Department of Health, 2006), based on a report from the Health Technology Assessment Programme (Kalenthaler *et al*. 2006), which recommends some cCBT packages for use in mild and moderate depression and anxiety.

Traditional systematic reviews of cCBT, such as those commissioned by NICE, have evaluated the clinical and cost effectiveness of cCBT (Bornas *et al*. 2002; Department of Health, 2002; Kaltenthaler *et al*. 2002; Lewis *et al*. 2003) and have focused on randomized evaluations. However, concerns remain around the acceptability and adverse consequences of cCBT in comparison with therapist-led CBT. These are questions that might be addressed by methods other than randomized controlled trials summarized in traditional systematic effectiveness reviews (Dixon-Woods & Fitzpatrick, 2001).

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This review was presented to a research symposium at the 2005 Annual Conference of the British Association of Behavioural and Cognitive Therapists.

https://doi.org/10.1017/S0033291708004224 Published online by Cambridge University Press

The purpose of this review was to systematically examine the barriers to the uptake of cCBT from a wider range of source types than previous reviews, including the NICE guidelines. We focused specifically on the acceptability, accessibility and adverse consequences associated with cCBT, and utilized both quantitative and qualitative data to enhance the interpretation of numerical findings.

Method

We conducted a systematic review according to best practice guidelines (NHS Centre for Reviews and Dissemination, 2001) and synthesized qualitative and quantitative data together according to an 'integrative method' originally proposed by Thomas *et al*. (2004).

Detailed methods and references are available in the web version of this paper. In brief, we searched electronic databases up to July 2005 for studies of a variety of research designs and from both primary and secondary care settings on cCBT, defined as interventions where the computer took a lead in decision making and was more than a medium. We extracted both qualitative and quantitative data on acceptability, accessibility and adverse consequences. Study quality was assessed in a manner relevant to the style of research. Initial data extraction was by design of study, then extracted into qualitative and quantitative sets around each research question. In particular, we looked at missing data or areas of concern from the harder facts of the quantitative data and then looked to see if the richer but potentially less reliable qualitative data were able to give insight into these (Thomas *et al*. 2004). Meta-analysis was performed on appropriate quantitative data.

Results

Study flow

From 2410 abstracts identified by the computerized search, 46 manuscripts were included in the review, relating to 36 individual research studies. The Quality of Reporting of Meta-analyses (QUOROM) table (Moher *et al*. 1999) is available in the online Appendix (Table A1).

Study funding

It is hard to be clear on this as not all studies gave information on conflict of interest. Some studies were overtly funded, some were conducted by staff employed by the same company who used and developed the software, and some were conducted by staff who had shares in the software (see online Appendix, Table A2).

Study characteristics and data synthesis

Initial data abstraction tables were produced and data were further abstracted into quantitative and qualitative sets. Table A2 (online) shows all the quantitative data: dropping out included being lost to follow-up and not returning post-evaluation data. Table A3 (online) shows the largest area of qualitative data: that relating to acceptability. This table in particular gives many quotes from papers illustrating the type of qualitative data that were used.

Acceptability

Quantitative data

Examining the flow of participants through a trial can be informative in assessing acceptability (see Table A2, online). The presence of a Consolidated Standards of Reporting Trials (CONSORT) diagram (Moher *et al*. 2001) made this task easier. While many were invited to take part in the studies (40 372 people), far fewer started the study (3895 people, median 38%, range 4–84%) and an even smaller number finished (2416 people). Different recruitment strategies may explain some of the variation in progression. Alternatives were not typically offered and studies were not performed within a 'stepped-care' framework. A median of 83% (range 26–100%) of those entering a study (all groups) finished the study, but if studies that did not follow an intention-to-treat methodology are removed, this falls to a median of 79%.

People in the cCBT arm were twice as likely to drop out, though this was not seen in all studies. Statistically, this was not significant [pooled odds ratio (OR) = 2.03, 95% confidence interval 0.81–5.09] but does show a strong trend. As in other meta-analyses of adverse effects data (Ioannidis *et al*. 2002), there was substantial heterogeneity between the studies, hence a random-effects method was used [I^2 (variation in OR attributable to heterogeneity) = 77.5%]. This is shown graphically in Fig. 1. The control arm differed between studies but was typically an active intervention. Dropping out of a research trial is different to dropping out of treatment, but this still raises an area of concern about acceptability.

Data on the number of modules completed showed that just because a person completed the scientific study did not mean they had completed a course of cCBT. Percentage completers ranged from 12–100% with a median of only 56%. There were many reasons for drop-outs, but often no reason was given. Personal circumstances played a major role, including travel

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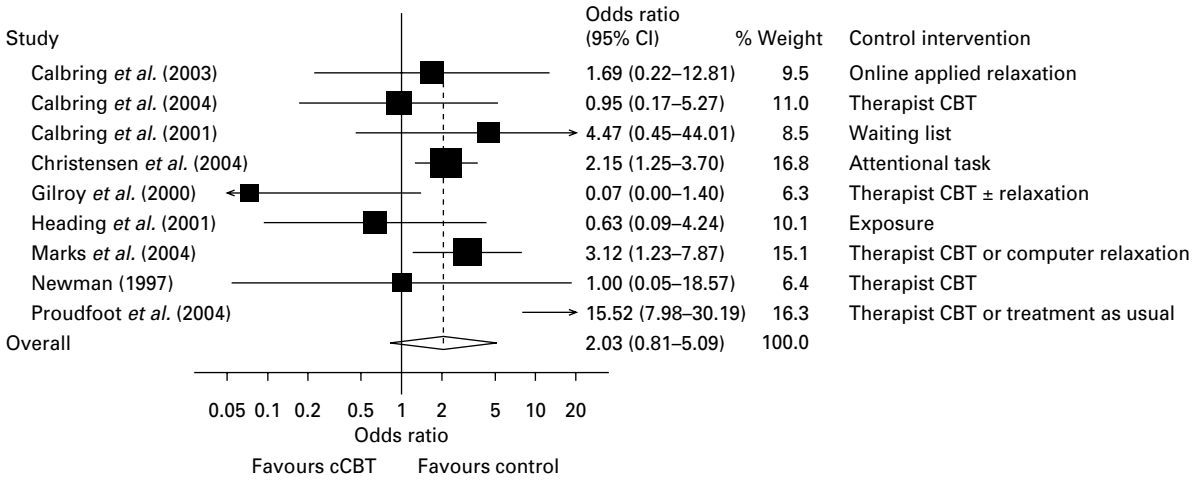

Fig. 1. Meta-analysis of drop-outs from computerized cognitive behavioural therapy (cCBT) and non-cCBT arms of trials (odds ratios). CI, Confidence interval.

(for those studies based around a clinic computer). Internet-based studies did not have this limitation, but lack of time was still an issue. 'Therapy' was given as a reason for dropping out by 100 people, but it was used in an all-inclusive manner and it was not possible to tell from the data whether this was cCBT, the control intervention or both. Information technology (IT) was not given as a common reason for drop-out after randomization.

Qualitative data

For those who participated in trials, satisfaction levels with therapy and content were high (<60% 'good' or 'very good'). Concepts were easy to understand and better than bibliotherapy. People used cCBT who would not have 'bothered' their general practitioner (GP). One study showed a non-significant trend that the therapist was more helpful than the computer, but another study showed that 44% would prefer cCBT and only 12% would prefer a therapist. Only 9% would not consider using a computer. Clients valued a flexible system and would be prepared to pay up to £10 per session (Graham *et al*. 2000). Some felt cCBT was helpful, more durable and better than non-cCBT therapies experienced and would recommend it to a friend. Others found it often too demanding, patronizing or fast-paced and though they felt 'understood' by the computer, there was slight preference for therapist-led therapy and an English accent (for the UK trials). Some felt glad it was available as they would not have otherwise sought help from their GP.

Therapists were less positive. In two surveys (Williams & Garland, 2002; Whitfield & Williams, 2004) they voiced concerns over harm to the client, effectiveness and compliance and were worried about finding space and receiving institutional backing. They saw an advantage over written self-help materials, but did not see the computer replacing therapists – rather as more of a supplement. GPs were more positive: 'I was disappointed when (the research) ended because we'd had (the computer) in place for quite a while and it had become a fairly integral part of the service' (E. Keaverny and K. Blackburn unpublished observations).

People had generally positive views about the technology involved. Older people were felt to have more challenges and some saw the interface as 'cold'. Satisfactory training was given to clients, though therapists felt they needed more training and had concerns over data protection and security (not shared by clients). It should be noted that the clients who had progressed far enough in studies to give this type of feedback would have been a self-selecting group who are able to work with computers. (The majority of the references for this section are shown in Table A3, online Appendix.)

Accessibility

Quantitative data

Education and social class. Four studies (Selmi *et al*. 1990; Gilroy *et al*. 2000, 2003; Heading *et al*. 2001; Marks *et al*. 2003; Gega & Marks, 2004) gave details of employment: two-thirds were currently employed, with roughly equal numbers of unemployed and students. Some studies took place entirely on university campuses (Newman, 1997, 1999; Newman *et al*. 1999) and three (Selmi *et al*. 1990; Marks *et al*. 2003; Proudfoot *et al*. 2003*b*; Gega & Marks, 2004) reported high levels of users having completed basic education (81%, 88%, 100%) and university degrees (28%, 50%).

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This is in contrast to more typical levels of 21% employment in disabled primary care populations and 14% higher education students nationally (Office for National Statistics, 2006).

Computer literacy. Study participants had high levels of computer experience: 62% used at work (White *et al*. 1998); 35% used daily (Gega & Marks, 2004). This is compared with a general population use rate of 38% in one study (Clarke *et al*. 2002).

Staff support. The actual amount of staff support needed varied considerably, zero up to 150 min per client, but was noted in one paper to be 3.7 times less than therapist-led CBT (Marks *et al*. 2004).

Qualitative data

Education and social class. Four descriptive studies noted than their clients came from socially deprived (White *et al*. 2000; Marks *et al*. 2003; Gega & Marks, 2004) or mixed urban/rural (Whitfield *et al*. 2006; G. Whitfield *et al*. unpublished observations) areas with a range of social classes (Carr *et al*. 1988). There was no mention of the reading age of the programs used, but one study used the National Adult Reading Test as part of their assessment (Gilroy *et al*. 2000, 2003) and many studies excluded people who could not read or write (Proudfoot *et al*. 2003*a*, 2004; McCrone *et al*. 2004; Whitfield *et al*. 2006; G. Whitfield *et al*. unpublished observations).

Computer literacy. Several trials and surveys (Carr *et al*. 1988; Osgood-Hynes *et al*. 1998; Fox *et al*. 2004; Grime, 2004; Whitfield *et al*. 2006; G. Whitfield *et al*. unpublished observations) mentioned that training in the cCBT package included computer training and took up to 90 min to do this; one (Osgood-Hynes *et al*. 1998) offered the first use of the program with supervision. Two observational studies used a 'familiarization' module lasting 2 days (Newman, 1997, 1999) or 1 week (Newman *et al*. 1999).

Staff support. This varied considerably between studies. The majority offered some degree of staff contact per visit to the clinic, though some studies said this was more to be seen to be providing contact than an objective identified need. This contact was often said to be little used, though one study (Fox *et al*. 2004) noted 'substantial administrative support was needed' on a range of clinical and non-clinical issues. A range of staff were used (usually either supervised junior staff or qualified therapists or psychiatrists). GPs saw staff support as important: 'someone to answer any queries … on a sort-of day-to-day basis of getting people through the system' (E. Keaverny and K. Blackburn unpublished observations).

Adjuncts to cCBT. A number of studies used additional material to the program such as online discussion rooms, email reminders, bibliotherapy and lengthy handbooks. One trial (Grime, 2001, 2004) noted that a supportive environment was key to uptake of the intervention. One service delivery report (E. Keaverny and K. Blackburn unpublished observations) noted that a lack of paper support could prove difficult: 'I found it hard to come away and do the homework and try to remember how things should be laid out.'

Adverse effects

Quantitative data

There were very few data on clear adverse effects of cCBT. Most studies only began reporting numbers once the trial had started, meaning higher-risk clients had often already been excluded. Table A2 (online) lists 255 subjects excluded from starting seven trials due to risk, often a high score on a measure of suicidality.

Qualitative data

Participants were often recruited by non-clinical means (newspaper advertisements, etc.), but just over half the studies included a risk assessment, or a proxy assessment such as the administration of a scale such as the Beck Depression Inventory (Beck *et al*. 1961), which includes an item on suicidal ideation. A number of the cCBT programs offer scales like this each time the client logs on, but only a few studies specifically mentioned they repeated risk assessments periodically throughout the trial. The majority of studies made some attempt to contact drop-outs, either by phone, post or email, but this was usually to determine the reason for drop-out. Only one study (White *et al*. 2000) specifically mentioned that alternatives were offered to those who could not attend screening. Only two studies (Proudfoot *et al*. 2003*a*, 2004; Gega & Marks, 2004; McCrone *et al*. 2004) made a specific mention of the place of cCBT within a stepped-care structure, and then only in the discussion.

Conclusions

This review looks at a body of research previously mainly assessed for efficacy, and demonstrates the value of combining both quantitative and qualitative data in order to address questions regarding the role and value of new and innovative technologies. The studies included in this review vary in their

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Table 1. *The patient journey with cCBT*

- Recruited patients have only a 38% chance of starting cCBT, with little data on why this is. For Internet-based therapy, there is the additional cost of hardware and Internet access. The type of area they live in does not seem to be a factor, but it is likely that they will be well educated – people with the lowest levels of education will often be excluded
- When they start therapy, personal circumstances still prove a barrier to many. Though travel is eliminated by Internet-based cCBT, time is still a factor. They would probably be offered computer and program training or familiarization at the start, but most would still need substantial support throughout the therapy – though this might be by phone or email only. This support could be from anyone and is typically seen as good, but mental-health trained staff offer extra skills. They may receive additional support such as bibliotherapy. There are additional concerns around accessibility to the technology – it is not known how screen readers (for partially sighted users) or dial-up modems cope with programs
- If they receive cCBT, they will probably already have satisfactory information technology skills and will go on to speak of cCBT favourably. Therapists are less positive, but general practitioners like the system. Some patients might find computerized therapy too demanding, patronizing or fast-paced and might prefer therapist-led therapy. We don't know why, but they only have a 56% chance of completing all the modules and might be twice as likely to drop out compared with other therapies or treatment as usual

cCBT, Computerized cognitive behavioural therapy.

methodological quality, with the sources for qualitative data being generally poor. It was not possible to rank studies according to quality as different measures were used for different study types. However, when interpreting qualitative data some attempt has been made to assign more weight to higher-quality studies (see Table A3, online).

Whilst cCBT is a good intervention for some people, there are barriers to its uptake that may substantially limit its impact. A patient journey for a hypothetical person who might be suitable for cCBT is given in Table 1. Computerized therapy might be considered a form of self-help (Lovell & Richards, 2000), and as such might fit into an organizational system known as 'stepped care'. For a stepped-care intervention to work, the following assumptions must be met: 'the equivalence of cCBT in terms of clinical outcomes, efficiency in terms of resource use and costs and the acceptability .... to patients and therapists' (Bower & Gilbody, 2005).

The efficacy of cCBT is not the topic of this review, but the demonstration of 'equivalence' also requires a consideration of adverse consequences. If only 56% of people complete a course of cCBT, then it is harder to predict the long-term effect of therapy, especially as closing modules may contain important work on relapse prevention. Clients may be twice as likely to drop out from cCBT as from other therapies or 'treatment as usual' (Fig. 1). Other reviews of psychotherapy trials (Churchill *et al*. 2001) show similar drop-out rates in the two arms and, although the main difference here is that a computer is providing the intervention, this cannot be proven as the cause of the discrepancy. Also, some trials had 'usual GP care' as the control arm, meaning that people may have dropped out of the control arm because of attitudes to participating in research. The qualitative data gave some information on the causes for drop-out, but these did not appear to be specific to cCBT and are in conflict to the generally positive comments given, which mostly came from those completing therapy.

Is cCBT efficient?

There is a reduction in therapist time, but it is not to zero. Screening and support still seem to be necessary to some degree. Also, any reduction is irrelevant if costs are transferred to the patient or to other service providers. The only cost-effectiveness paper published so far (McCrone *et al*. 2004) suggests that this is not the case, but more economic data are needed to confirm if this applies to all cCBT programs.

Is cCBT acceptable?

Acceptability is high among those who make it as far as participating in studies, but initial uptake rates suggest that this may not be the whole picture and there are no data on attitudes among the general public. Low uptake rates for research trials do not necessarily reflect low uptake rates for future therapies, but if clients are unwilling to choose offered treatments, then it is unlikely that stepped-care protocols will be accepted. Therapists are less enthusiastic than trial participants about cCBT; however, they often had low rates of knowledge about the programs or benefits. Their feeling that cCBT will enhance rather than replace therapist-led therapy is consistent with their attitudes to self-help in general (Audin *et al*.

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2003). It may be that greater exposure to and training about cCBT will change these views. The provision of cCBT in a stepped-care model inherently emphasizes the ongoing role of individual therapy for more complex cases.

In addition, cCBT may be less acceptable and accessible for people with visual impairment, poor IT provision and with a lower educational level. It is known that typical CBT language has a reading age of 17 years (Williams & Garland, 2002), which will be a barrier to many. cCBT run from a clinic still excludes those with no suitable clinic nearby, though Internet-based programs offer a possible way round this for those with better IT provision.

Summary

With demonstrated efficacy, cCBT is a promising technology, but there are still major barriers to widespread uptake with little known about some areas of concern. It is unlikely that cCBT will be acceptable to all, meaning it will only fulfil a partial place in a stepped-care model. Further research is needed to examine the role of cCBT embedded within a system of stepped care, rather than as a single stand-alone component, particularly for those who drop out of treatment.

Acknowledgements

The funding for the research time of R.W. was provided by the Yorkshire Deanery. The Max Hamilton Fund (University of Leeds) covered project costs. We are indebted to the School of Health and Related Research, University of Sheffield, for access to the search results from the recent NICE review (Department of Health, 2006; Kaltenthaler *et al*. 2006).

Declaration of Interest

None.

Note

Supplementary material accompanies this paper on the Journal's website (http://journals.cambridge.org).

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https://doi.org/10.1017/S0033291708004224 Published online by Cambridge University Press