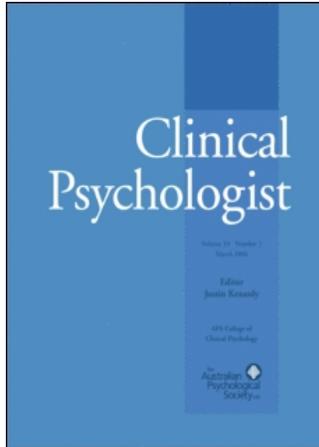


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Integrating information technology into the evidence-based practice of psychology

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Integrating information technology into the evidence-based practice of psychology

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Abstract

Information technology (IT) is increasingly being used to facilitate, complement, and support the implementation of evidence-based practices (EBP) in psychology. This article reviews recent randomised trials that evaluate the integration of IT applications into the process of delivering EBP. More specifically, we review 11 studies that illustrate how IT has been successfully integrated into traditional clinician-delivered psychotherapy to promote the adoption of EBP. Advantages and disadvantages of this approach are discussed. The paper concludes with practical recommendations for clinicians who are interested in integrating IT into their practice.

Keywords: *evidence-based practice, information technology, psychotherapy*

In the context of mental health service delivery, the term “technology” has been used to refer to both behavioural and information technology (IT). Some notable early examples of behavioural technology include B. F. Skinner’s use of self-monitoring to track and promote behaviour change (Skinner, 1976); and the development of systematic desensitisation by J. Wolpe whereby practitioners’ utilise graded exposure to feared stimuli in an effort to gradually reduce fear associated with various objects and situations (Wolpe, 1958).

IT has become increasingly popular in mental health service delivery in the last 20 years (Marks, Shaw, & Parkin, 1998) and this is at least partly due to the desire to enhance the delivery of mental health treatments by making them more cost-effective (Gruber, Moran, Roth, Taylor, 2001). Diverse technology platforms such as personal and handheld computers (Gruber et al., 2001), virtual reality (Maltby, Kirsch, Mayers, & Allen, 2002), and audio and visual media such as CD ROMs (Whitfield, Hinshelwood, Pashely, Campsie, & Williams, 2006) have been used to enhance the delivery of mental health services.

The last decade has witnessed a dramatic increase in the number of literature reviews (e.g., Emmelkamp,

2005; Przeworski & Newman, 2006; Tate & Zabinski, 2004; Taylor & Luce, 2003), empirical studies (e.g., for reviews, see both Marks, Cavanagh, & Gega, 2007; and Marks et al., 1998), special sections in scientific journals (Caspar, 2004; e.g., *Journal of Clinical Psychology*), and new scientific journals (e.g., *Cyberpsychology and Behavior*) devoted to the topic of IT in mental health. The Marks et al. 1998 article and more recent book on the topic are perhaps the most general and comprehensive of these reviews. Marks et al. (1998) describe and review several randomised controlled clinical trials, pilot and case studies that use IT to aid in the treatment of various psychological problems. More recently, Marks et al. (2007) published a book on the topic that presents and reviews approximately 175 studies evaluating the usefulness of IT for treating a wide variety of psychological and medical problems.

The trend toward integrating IT into mental health services delivery coincides with the focus on promoting evidence-based practices (EBP) in psychology (Chambless & Olenick, 2001). The American Psychological Association defines EBP as those that integrate best available evidence defined broadly to include both empirical research and clinical expertise (APA Presidential Task Force,

2006; pp. 273). Many researchers and providers of mental health service delivery have begun to use IT for this purpose, particularly due to such benefits as increasing the cost-effectiveness and reach of treatments for psychological problems (Cucciare, Weingardt, & Villafranca, in press; Emmelkamp, 2005; Marks et al., 1998, 2007; Przeworski & Newman, 2006; Tate & Zabinski, 2004; Taylor & Luce, 2003).

Many randomised controlled studies have evaluated the efficacy of using IT to deliver EBP for a wide variety of psychiatric and behavioural problems such as panic disorder (Carlbring et al., 2005; Carlbring, Ekselius, & Andersson, 2003), specific phobia with or without panic disorder (Marks, Kenwright, McDonough, Whittaker, & Mataix-Cols, 2004), social phobia (Gruber et al., 2001), specific phobias such as fear of flying (Maltby et al., 2002; Rothbaum, Hodges, Anderson, Price, & Smith, 2002; Rothbaum, Hodges, Smith, Lee, & Price, 2000), various anxiety disorders (Spence, Holmes, March, & Lipp, 2006; Wright et al., 2005), multiple mood disorders (Jacobs et al., 2001), unsafe sexual practices (Kalichman, Cherry, & Browne-Sperling, 1999), and problems with body image and eating disorders (Gollings & Paxton, 2006).

The purpose of this article is to review randomised controlled studies conducted between 1999 and 2006 that have used IT to assist clinicians in the delivery of EBP. The electronic database PsychInfo

was searched from 1999 to 2006 with a combination of search terms “psychotherapy”, “computer applications”, and “technology”. Eleven eligible studies met our inclusion criteria of (a) integrating both some form of IT and clinician interaction, and (b) utilising random assignment, a control condition and/or treatment comparison group (Chambless & Ollendick, 2001). We chose criterion A to highlight the various ways in which clinicians might integrate technology into their practice. This article also presents a brief discussion of the potential advantages and disadvantages of incorporating IT into clinician-delivered mental health services, and concludes with some practical recommendations for clinicians who are interested in integrating IT into their practice.

Review of the randomised controlled studies literature: 1998–2006

In the following section we provide an updated review of studies that integrate various forms of IT (e.g., computers, email, and phone) into the process of delivering EBP. The integration of IT into mental health treatment can be viewed along a continuum illustrating the degree to which clinicians are involved in the treatment delivery process (Figure 1). On one end of the spectrum lie self-help applications, whereby patients interact exclusively with a computer-based application (Griffiths & Christensen, 2006,

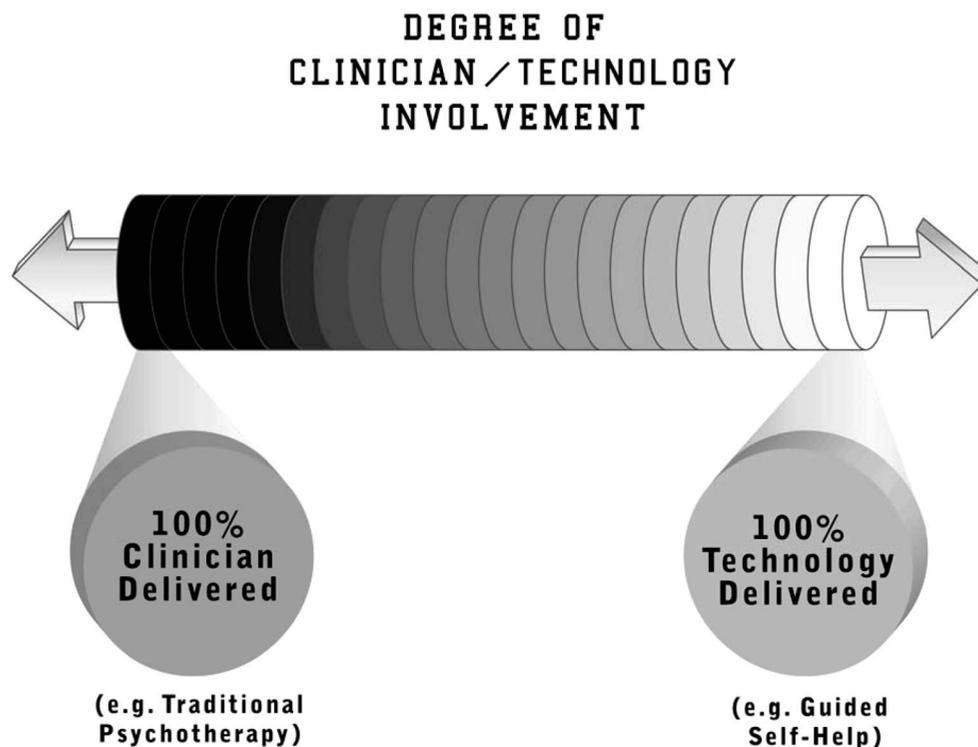


Figure 1. Spectrum depicting degree of involvement of clinician and/or technology in the delivery of evidence-based practices.

2007). On the opposite end of the spectrum lie treatments that are delivered completely via live, face-to-face encounters with a clinician. The present review focuses on the middle of this continuum with the intention of highlighting the various ways in which clinicians can integrate technology into their practice.

Anxiety disorders

Several studies have evaluated the integration of IT with clinician-delivered EBP in the treatment of anxiety disorders. A recent study conducted by Spence et al. (2006) tested the efficacy of combining face-to-face and web-based treatment components of cognitive-behavioural therapy (CBT) for reducing anxiety in children diagnosed with various anxiety disorders (i.e., separation anxiety disorders, generalised anxiety disorder) by randomly assigning anxious children to a face-to-face, clinician-delivered CBT condition, combined face-to-face and internet condition, or a wait-list control. Child participants in the face-to-face-only condition received 10 60-min sessions, while their parents received six 60-min sessions, plus follow-up sessions at 1 and 3 months after treatment. Child participants in the technology plus clinician-delivered group received half of their treatment via computer and half via clinician.

Components of CBT that were delivered via computer included identifying physiological signs of anxiety, relaxation skills, problem solving, self-reinforcement, and instructions on how to apply anxiety coping techniques when needed. Components of CBT delivered face to face included cognitive restructuring, graded exposure, and relapse prevention. Both treatment groups reduced the percentage of children meeting DSM criteria for their primary anxiety disorder (65% reduction in face-to-face delivery and 56% in the mixed technology and clinician-delivered condition) and were more effective than the wait-list control (13% reduction).

IT has also been used as an adjunct method for delivering aspects of clinician-delivered group CBT therapy for social phobia. Gruber et al. (2001) asked patients participating in group CBT treatment for social phobia to use a handheld computer as a method for recording thoughts in real-world feared social situations. Participants were assigned to a 12-week group, an abbreviated version of the 12-week group (eight weekly sessions over 12 weeks) that used a handheld computer for cognitive restructuring-based homework, or a wait-list control. Participants in both treatment conditions received the same manualised treatment consisting of simulated exposure, cognitive restructuring, and homework that promoted generalisation/maintenance of

acquired skills. Although participants in both treatment conditions showed improvements in self-reported ratings of anxiety when compared to the wait-list control group, individuals using the hand-held computer had significantly larger increases in positive thoughts when compared to participants in the other two conditions.

Computers have been used to deliver exposure for treating both specific phobias and panic disorder. In their study, Marks et al. (2004) randomly assigned adults diagnosed with panic disorder or a phobia to clinician-delivered exposure, computer-guided self-exposure, or computer-guided self-relaxation. Participants in computer-aided conditions met briefly with a therapist for coaching and session review at the end of each computer session. All participants received six 1-hr treatment sessions over 10 weeks. Participants in both exposure conditions received the same content: nine sessions of exposure that included a rationale for treatment, instruction on how to identify triggers for panic, and help in developing coping tactics in panic-evoking situations. Participants in both exposure conditions had greater reductions in symptoms than those individuals receiving relaxation training at 1 month after treatment. Researchers noted that participants in the computer-based exposure condition had higher dropout rates (43%) when compared to the clinician-delivered treatment condition (23%), although differences were not statistically significant. Furthermore, no differential treatment outcomes were found between the two treatment conditions.

The studies reviewed thus far position the integration of technology and clinician-delivered EBP toward the middle or far right end of the spectrum (Figure 1). Studies have also been conducted that place a heavier emphasis on the use of technology and lesser emphasis on using the clinician to deliver EBP. One such study conducted by Carlbring et al. (2003) randomly assigned adults with panic disorder to either a computer-based applied relaxation or CBT intervention. Participants receiving the relaxation therapy received online information about relaxation (progressive muscle relaxation) along with a compact disc with instructions for engaging in three relaxation exercises. Providers sent daily cell phone text messages to participants reminding them to practise the assigned relaxation exercises. Participants in the CBT treatment group received six online treatment modules, for example, teaching them how to engage in cognitive restructuring. Participants in both conditions were asked to complete a brief assessment after completing each module and send these via email. Providers used these assessments to determine whether participants were ready to proceed to the next module. Both treatment groups resulted in reduced panic symptoms, with the

relaxation group showing greater (but not statistically significant) reductions at post-treatment assessment.

The use of virtual reality (VR) as a method for delivering exposure-based behavioural treatment for anxiety has grown in popularity over recent years. Recently researchers have investigated the use of VR for treating aviophobia (or fear of flying) (Maltby et al., 2002; Rothbaum et al., 2000, 2002). Rothbaum et al. studied the relative efficacy of VR exposure and standard clinician-delivered exposure to a wait-list control group consisting of adults diagnosed with aviophobia. Participants in both treatment groups received eight treatment sessions over a 6-week period (briefer versions have also demonstrated efficacy, see Maltby et al.). The first four sessions were provided by a clinician and consisted of breathing retraining, cognitive restructuring, thought stopping, and hyperventilation exposure. The latter four sessions were focused on the exposure treatment, in which case the VR condition included analogue scenarios of sitting in the passenger compartment of a commercial plane, takeoff and landing, and flying in calm and stormy weather. Participants in the clinician-delivered treatment condition received exposure at an airport where they engaged in flight-related activities (e.g., ticketing, viewing planes) and spending time on a commercial aircraft imagining takeoff and landing. Both treatment groups were more effective at reducing fear reactions to flying than the wait-list control group, and no differential treatment effects were detected between the two treatment conditions. Furthermore, these gains were observed at 6- and 12-month follow-up.

Major depression

As shown in the above studies, components of CBT are commonly modified for delivery via personal computer to patients with various psychological problems. Recently, researchers have compared the efficacy of CBT delivered via computer (with minimal provider contact) to the same intervention delivered via clinician for adults diagnosed with major depression (Wright et al., 2005). Participants in the computer-delivered intervention were asked to meet with their therapist before each session to discuss how to integrate their computer work into therapy. The results of the comparison showed that both treatment delivery methods resulted in reduced depressive symptoms when compared to a wait-list control, with no differential treatment effects noted between the two treatment conditions. However, participants in the computer-delivered condition showed greater reductions in cognitive distortions and improvement in knowledge about cognitive therapy. Also, on average, clinicians spent 25 and

50 min per session per patient in the computer-delivered and clinician-delivered conditions, respectively, demonstrating the potential cost-effectiveness of a computer-based CBT treatment for major depression.

Psychological problems with a behaviour change goal

Jacobs et al. (2001) compared the efficacy of a short-term individualised psychotherapy grounded in CBT and psychodynamic concepts and strategies (i.e., Therapeutic Learning Program) delivered via clinician or computer. The intervention was designed to be generic in nature so that it could be used to address any psychological problem with a behaviour change goal. The majority of participants in that study were diagnosed with an affective, anxiety, or adjustment disorder. Participants received 10 weeks of treatment, with the computer-delivered condition receiving minimal therapist contact each week focused on basic technical support and mechanics of using the program, review of the summary printout sheets (provided after each session) to ensure that participants stayed focused on their specific problem, and to check for a clinical crisis. Participants in both conditions had a reduction in symptoms of depression, anxiety, stress and clinically significant change on at least one complaint (76% in the computer-delivered vs. 91% in the clinician-delivered condition) at post-treatment follow-up. Demonstrating the cost-effectiveness of the computer-based intervention, participants in the computer-based CBT condition received less time with the clinician (approximately 30 min vs. 50 min per session for individual) and produced approximately equivalent outcomes.

Body dissatisfaction and disordered eating

A CBT-based intervention for women with body dissatisfaction and disordered eating has been successfully adapted to computer-internet delivery. Gollings and Paxton (2006) randomly assigned women with body dissatisfaction and disordered eating (e.g., crash dieting, fasting, vomiting, laxative use) to one of the two treatment conditions: internet-based group and a face-to-face treatment. Participants in the internet-based intervention received eight 90-min weekly group sessions moderated online by a therapist. The first week of therapy was delivered face to face; but subsequent weeks' content was delivered over the internet. Participants in the internet condition received the intervention in an internet chat room, where individuals could post messages on a discussion board. Participants were asked to email their responses to a brief questionnaire assessing their mood prior to each session.

The same program was delivered face to face in a group psychotherapy format. Results of the comparison showed no differential treatment effects between the two groups. Both groups were effective in improving body image and eating behaviours in women. Improvements in depression, anxiety, and self-esteem for both conditions were also noted.

HIV risk reduction

The principles of motivational interviewing have been integrated into a psychoeducational video to reduce risky sexual behaviour in HIV-positive African American men. Kalichman et al. (1999) assigned participants to a motivation skills building (MSB) or psychoeducational group. The MSB group received their intervention in video form, which included education about HIV risk reduction, motivational components to enhance behaviour change, and teaching problem solving and skill building centred on safe sexual intercourse. The standard care condition received a video on HIV prevention, information on HIV antibody testing, and the importance of condoms. Both interventions consisted of two 3-hr video sessions occurring in the same week and in group format. Two therapists facilitated discussion after each video viewing. Results showed that the MSB group demonstrated statistically significant reductions in (a) unprotected intercourse at 3-month follow-up and (b) a reduction in alcohol/drug use before intercourse at 3- and 6-month follow-up when compared to the standard care (SC) condition.

These studies highlight the many ways in which IT can be integrated into the delivery of EBP. As evident in this review, IT can result in reduced costs associated with delivering EBP such as CBT while maintaining the efficacy of such treatments. The following section provides a more in-depth discussion of common advantages and disadvantages associated with using IT in mental health treatment delivery.

Potential advantages and disadvantages of integrating IT into mental health treatment delivery

A sizeable literature has emerged regarding the potential disadvantages and advantages of integrating IT into the delivery mental health treatments (Cucciare et al., in press; Emmelkamp, 2005; Marks et al., 1998; Przeworski & Newman, 2006; Tate & Zabinski, 2004; Taylor & Luce, 2003). The following section briefly summarises this literature and commonly discussed advantages and disadvantages of using IT to deliver mental health treatments.

Potential advantages

Cost-effectiveness. Technology-based delivery of mental health treatments has been shown to reduce both the cost of treatment and the amount of time spent conducting treatment, without compromising treatment efficacy (Gruber et al., 2001; Marks et al., 2004; Wright et al., 2005). These advantages may translate to an increase in the demand for technology-based mental health services for clinics, practitioners, and patients in which financial issues are the primary barrier to adoption, implementation, and access to treatment (Przeworski & Newman, 2006). Developing adjuncts to clinician-delivered mental health treatments is especially important because the supply of therapists trained to deliver EBP is not currently adequate to meet the demand for such services (Emmelkamp, 2005).

Extended reach. Many individuals with psychological problems are unable to access care for a variety of reasons including lack of time, money, and transportation. Persons with physical disabilities and/or living in geographically remote areas can also benefit from technology-assisted delivery of mental health treatments because technology can often deliver mental health services at a lower cost and reduce the amount of time needed for face-to-face contact with a provider (Marks et al., 1998).

Facilitation of disclosure. The personal computer can make it easier for some patients to disclose important details about their emotional problems. Research shows that in some instances primary care patients feel more comfortable disclosing details about emotional problems to a computer than when speaking face to face with a clinician (Marks et al., 1998). Erdman, Klein, and Greist (1985) found that patients feel more open to disclosing issues concerning their substance use with a computer than with a clinician. The use of a computer has also been found to facilitate an increased openness to discussing important issues concerning alcohol misuse (Supple, Aquilino, & Wright, 1999) and sexual experiences (Chinman, Young, Schell, Hassell, Mintz, 2004; Lapham, Henley, & Skipper, 1997). Computer-assisted psychotherapies may provide a way for patients, who might otherwise feel uncomfortable disclosing details about substance use or other emotional problems, to talk more comfortably about these issues.

Potential disadvantages

Higher dropout rates. A main concern among some sceptics regarding the use of technology to deliver mental health treatments is this will result in decreased therapist contact, which will lead to

disproportionate numbers of patients dropping out of treatment (Przeworski & Newman, 2006). One recent study comparing the efficacy of a computer-based and clinician-delivered exposure treatment did find higher dropout rates in the former group (43% vs. 23%) (Marks et al., 2004). It has also been reported that internet-based interventions tend to have higher dropout rates when compared to interventions delivered in person (Emmelkamp, 2005). We hypothesise that the type and degree of clinician involvement may affect dropout rates. For example, one might predict that the more tightly integrated the IT component is to the face-to-face therapy, the higher the likelihood that the patient will actually complete assigned computer-based tasks. The available research tends to support the finding that computer-assisted mental health interventions do not result in significantly higher dropout rates than traditional face-to-face treatment, nor does it result in significantly lower levels of treatment satisfaction (Carlbring et al., 2003).

Reduced need for face-to-face psychotherapy. Some critics may argue that integrating IT into the delivery of mental health services will result in a reduced need for face-to-face clinician-delivered psychotherapy and a corresponding reduction in the need for practitioners (Marks et al., 1998). This does not appear to be the case, and in fact there appears to be some evidence to suggest that technology adoption actually increases demand for face-to-face treatment. A patient satisfaction survey on this issue showed that of a convenience sample of 619 individuals, 452 (73%) stated that they had consulted with a psychotherapist on the internet and 307 (68%) of those individuals had never sought face-to-face psychotherapy. Most importantly, of the 307 individuals not in psychotherapy at the time of consultation, 196 (64%) sought out face-to-face psychotherapy after their consultation, with an additional 43 (14%) reporting plans to seek out face-to-face psychotherapy in the future (Ainsworth, 2001). It is important to note that this survey was posted on a website devoted to internet therapy, which may account for large number of people reporting to have consulted with an online psychotherapist. Although that survey was not methodologically rigorous, the results suggest that technology does not necessarily reduce the need for face-to-face psychotherapy but may increase the need for clinician-delivered services.

Elimination of common factors of therapeutic success. Some critics argue that technology-based mental health services will necessarily exclude common factors that constitute the interpersonal “active ingredients” of effective treatment, namely, the

therapeutic alliance, empathy, as well as important nonverbal behaviour such as facial cues and body language. Interestingly, it appears that interpersonal factors important to treatment outcome can be simulated, to some extent, in computer-based treatments. For example, participants exposed to computer-based therapies have reported computer responses to have an empathic quality (Ghosh, Marks, & Carr, 1988), and have reported higher relationship ratings with their online therapist when compared to individuals meeting with a therapist face to face (Cook & Doyle, 2002). Moreover, these findings may help elucidate why some participants tend to disclose more to a computer than during face-to-face interactions with a provider. The point here is not to suggest that the use of technology in the delivery of EBP can completely replicate the experience of live, face-to-face contact between a patient and provider, but to illustrate that interpersonal aspects that are valuable to the therapeutic process are not necessarily lost when technology is used to deliver mental health services.

Specific recommendations for integrating IT into the delivery of EBP

A major focus of this article is to highlight the ways in which technology can be used to support clinicians in the delivery of EBP. The studies reviewed above illustrate how clinicians can use technology to deliver various aspects of EBP such as psychoeducation, homework and specific treatment components. It is worth noting that the distinctions between these aspects of EBP are blurry because psychoeducation and homework are often referred to as intervention components and vice versa (Robinson, 2003). However, for practical and illustrative purposes, we have divided the following sections into these three categories corresponding to the ways in which an individual clinician might use technology to support the delivery of EBP in his or her practice.

Psychoeducation

The term “psychoeducation” is widely used in the mental health treatment literature and generally refers to information pertaining to the signs, symptoms, and treatment of mental health problems. It has also been used synonymously with the term “intervention” in the literature (e.g., Finkel et al., 2007; Kalichman et al., 1999). For our purposes, we use the term “psychoeducation” to refer to the provision of information or education to individuals about psychological problems (not the treatment of these problems). Providers have a wide variety of IT-based resources available to them to provide individuals with information about various

psychological and physical health problems. For example, clinicians can refer patients to informational websites based in various countries such as those of the Australian Psychological Society (<http://www.psychology.org.au/>), UK National Association for Mental Health, (www.mind.org.uk), and United States National Institutes of Mental Health, (<http://www.nimh.nih.gov/>) for information pertaining to the signs and symptoms, causes, risk factors, and treatments for a wide variety of psychological problems. This is by no means an exhaustive or hierarchical list but is meant instead to illustrate the type of sites that providers might incorporate into their clinical repertoire for informational purposes.

Research has also shown that personal computers are a cost-effective mechanism for delivering treatment rationales, teaching patients how to recognise signs and symptoms of various psychological problems, and applying psychological interventions such as problem solving, relaxation techniques, and exposure (Marks et al., 2004; Spence et al., 2006). Personal computers can also provide clinicians with a viable alternative method for delivering what can become routine or highly repetitious aspects of treatment such as treatment rationales and descriptions of homework. For example, providers conducting a group-based CBT intervention for depression may request that patients participating in the group should access information pertaining to depression (e.g., common symptoms and potential causes) and CBT (e.g., treatment rationale and basic treatment components) online at home several days prior to entering treatment. This would allow the group leader to spend less time on educating patients on these commonly discussed issues and focus more time on such activities as building patients' skills for coping with and managing depressive symptoms.

Homework

Written exercises completed outside the designated therapy session, often referred to as "homework", have long been an integral part of EBP such as CBT (Hollon & Beck, 1994), marital and family therapy (Carr, 1997), solution-focused therapy (Beyebach, Morejon, Palenzuela, & Rodriguez-Arias, 1996), and various addiction treatments (Annis, Schober, & Kelly, 1996). Homework provides patients with opportunities to practise new skills and to promote the generalisation of gains made during therapy to the outside world (Edelman & Chambliss, 1995). Clinicians using CBT might assign homework to enable patients to practise using such skills as self-monitoring, identifying unhelpful thoughts, and cognitive restructuring. Recent research has shown that handheld computers can be used *in vivo* to help patients practise cognitive restructuring in situations

that evoke anxiety (Gruber et al., 2001). Patients can use handheld computers to record, in real time, thoughts that are occurring as they are confronted with feared stimuli (e.g., standing in a crowded mall) and relay that information back to the clinician or other group members for further discussion. Handheld computers or other portable electronic devices, such as mobile phones, can also be used to remind patients to engage in skills outside of therapy. Findings from a study conducted by Carlbring et al. (2003) showed that a relaxation-based treatment package consisting of daily telephone reminders to practise progressive muscle relaxation exercises resulted in a significant reduction in panic symptoms after treatment.

Critics of using computers for homework might argue that one immediate disadvantage to the clinician is the initial cost because handheld computers are typically priced between \$300 and \$500 each (Dell.com). However, Gruber et al. note that a 12-week CBT group for social phobia can be reduced to an approximately equally efficacious 8-week treatment when using a handheld cognitive restructuring computer program. Furthermore, their results showed an initial cost saving of \$133 per patient, which is certainly modest but, considered over the course of several groups, may lead to larger savings in terms of both cost of treatment and clinician time spent delivering treatment.

Delivering treatment components of EBP

Over the last 9 years research in the area of technology and delivery of EBP has focused on using computer-based tools to deliver various components of CBT, exposure and response prevention, motivational interviewing, and problem-solving psychotherapies. These EBP appear to be particularly well-suited for computer adaptation due to the relative ease in which these treatments can be broken into smaller, linear components. For example, CBT can be broken down into components that teach patients how to identify signs and triggers of uncomfortable emotions, how and when to engage in coping strategies (e.g., relaxation, problem solving, and self-reinforcement) and cognitive restructuring (Carlbring et al., 2003; Spence et al., 2006). Similarly, components of exposure and response prevention such as systematic desensitisation, coupled with ongoing coaching and session review by a clinician, have been used to efficaciously treat anxiety disorders (Marks et al., 2004). More recently, exposure therapy has been packaged in VR-based technology to treat a wide variety of anxiety disorders such as fear of flying and post-traumatic stress disorder (Rothbaum et al., 2002). VR involves exposing a patient to a virtual

environment rather than presenting them with the actual real-life feared stimulus.

As in systematic desensitisation, patients can be exposed to various grades of the stimulus, which are controlled by the therapist throughout the treatment process. It is most likely impractical for a private practice clinician to develop their own VR treatment package, but there are companies that specialise in using VR to treat patients with anxiety disorders (e.g., www.virtuallybetter.com). As illustrated by Rothbaum et al. (2002), providers delivering exposure-based treatments to patients with specific phobias might integrate the use of VR or computer-based exposure as a component of the treatment delivery. Specifically, a patient presenting with a phobia and/or panic disorder might receive part of the treatment via computer, from which they can access modules that provide (a) tools for identifying triggers (or specific stimuli) of panic and other symptoms of anxiety and (b) instruction on how to use coping strategies such as progressive muscle relaxation (<http://www.guidetopsychology.com/pmr.htm>). Patients might also use these online modules at home in between face-to-face sessions of graded exposure with a provider (e.g., Marks et al., 2004).

Summary and further recommendations

This article reviews recent randomised controlled trials that evaluate the efficacy of integrating IT into clinician-delivered EBP. Using IT in mental health services delivery can result in extending the reach of such services to persons with geographical and other factors that limit access to care, reducing stigma associated with certain psychological problems, and providing a cost-effective method for delivering EBP.

The degree of integration lies along a continuum, with one side representing traditional clinician-delivered mental health treatment and the other representing the use of IT as the sole method by which services are delivered, as in the case of computer-based self-help. This article reviewed studies that generally reside somewhere in the middle of the continuum; that is, studies that attempted to integrate IT and the clinician into one combined method of delivery. Interventions that are located in the middle of the spectrum are worth further examination because they build upon the strengths of IT and clinician-delivered mental health services. Some of these strengths include reducing the cost of treatment and the amount of time spent conducting treatment, without compromising treatment efficacy, extending the reach of EBP to persons who might otherwise find accessing such services as difficult or impossible due to a wide variety of potentially limiting factors (e.g., geographical

and/or financial), reducing stigma by making it easier for some patients to disclose important details about their emotional problems, and perhaps increasing awareness and demand of mental health services.

The studies reviewed in the present article show that various modes of IT such as personal and handheld computers, the internet, cell phones, text messages, email, CD-ROM, DVD, and VR can be used to deliver EBP and its various components, homework and psychoeducation. Perhaps the easiest way to begin using IT to support EBP is for clinicians to begin referring patients to an established, credible and well-maintained websites that provide psychoeducation on common psychological problems. Clinicians might also consider requesting that patients complete homework assignments via secure email and request that they resend completed documents back to the therapist or upload them to a secured website where they can be viewed by the provider or patient at a later time. Personal and/or handheld computers can also be used to complete homework assignments (e.g., Gruber et al., 2001). Gruber et al. showed that handheld computers can lead to a more cost-effective method for delivering cognitive restructuring in group CBT and we suspect that these cost savings may be experienced in practices in which CBT is delivered individually. However, clearly more studies examining the cost-effectiveness of various modes of IT to deliver EBP are needed. Next, studies showed that technology can be used to deliver various components of EBP such as CBT and exposure. We are not suggesting that clinicians develop their own websites to deliver aspects of these treatments (but this can be done effectively as demonstrated in the studies above). What we are suggesting is that providers identify IT-based resources (e.g., websites, CDs, DVDs) that are relevant for the types of patient problems treated in the clinic(s) or setting(s) in which they work, and use their clinical expertise along with their understanding of individual patient preferences to integrate these resources into daily clinical practice.

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